IUCN | Indian National Committee

ANNUAL REPORT **2015-16**

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Secretary
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Foreword

I am pleased to see the second Annual Report of the Indian National Committee of International Union for Conservation of Nature (INC-IUCN) for the year 2015-16.

The challenges of conserving biodiversity amidst developmental pressures and growing human population in India are formidable and can be best addressed by developing synergies and implementing collaborative programmes by all member organizations of INC-IUCN. Using the experiences of each other, we can contribute to successful biodiversity leadership, good governance and responsible management of biodiversity resources and ecosystem services.

I take this opportunity to compliment WII and all the member-organisations of INC-IUCN for their significant contribution to the cause of conservation and especially in working together in achieving the Aichi as well as National Biodiversity Targets.

AJAY NARAYAN JHA

Place : New Delhi
Date : 23rd August 2016

Preface

The Indian National Committee of International Union for Conservation (INC-IUCN) came into existence in 2001 and has since provided a forum to discuss and act on a range of issues relating to nature and wildlife conservation in the country. Over the years, its membership has grown and represents a large number of scientific institutions and civil society organizations dealing with a wide range of expertise from conservation education to urban landscape.

In alignment with the global Aichi Biodiversity Targets, India has also formulated her National Biodiversity Targets and I am pleased to state that INC members are actively contributing in achieving them.

I am happy to present the Annual Report for the year 2015-16 of INC member-organizations. As a Member-Secretary of INC-IUCN, I would like to thank all the members for their valuable contribution to this Annual Report to make it more informative and useful to a range of stakeholders.

Dr. V.B. Mathur
Director
Wildlife Institute of India
&
Member-Secretary,
INC-IUCN

Place : Dehradun
Date : 23rd August 2016

The Indian National Committee of IUCN

The Indian National Committee (INC) is a forum of IUCN members in India. It was granted formal recognition by IUCN Council vide IUCN HQ Letter No. IN/4/NC55 dated 14 November, 2001. The mandate of the Committee is to coordinate activities of IUCN members in India for evolving common approaches on nature conservation. The members of the Committee bring with them expertise and knowledge in various areas of nature conservation. It is thus a forum having collective wisdom on issues related to conservation of nature and natural resources.

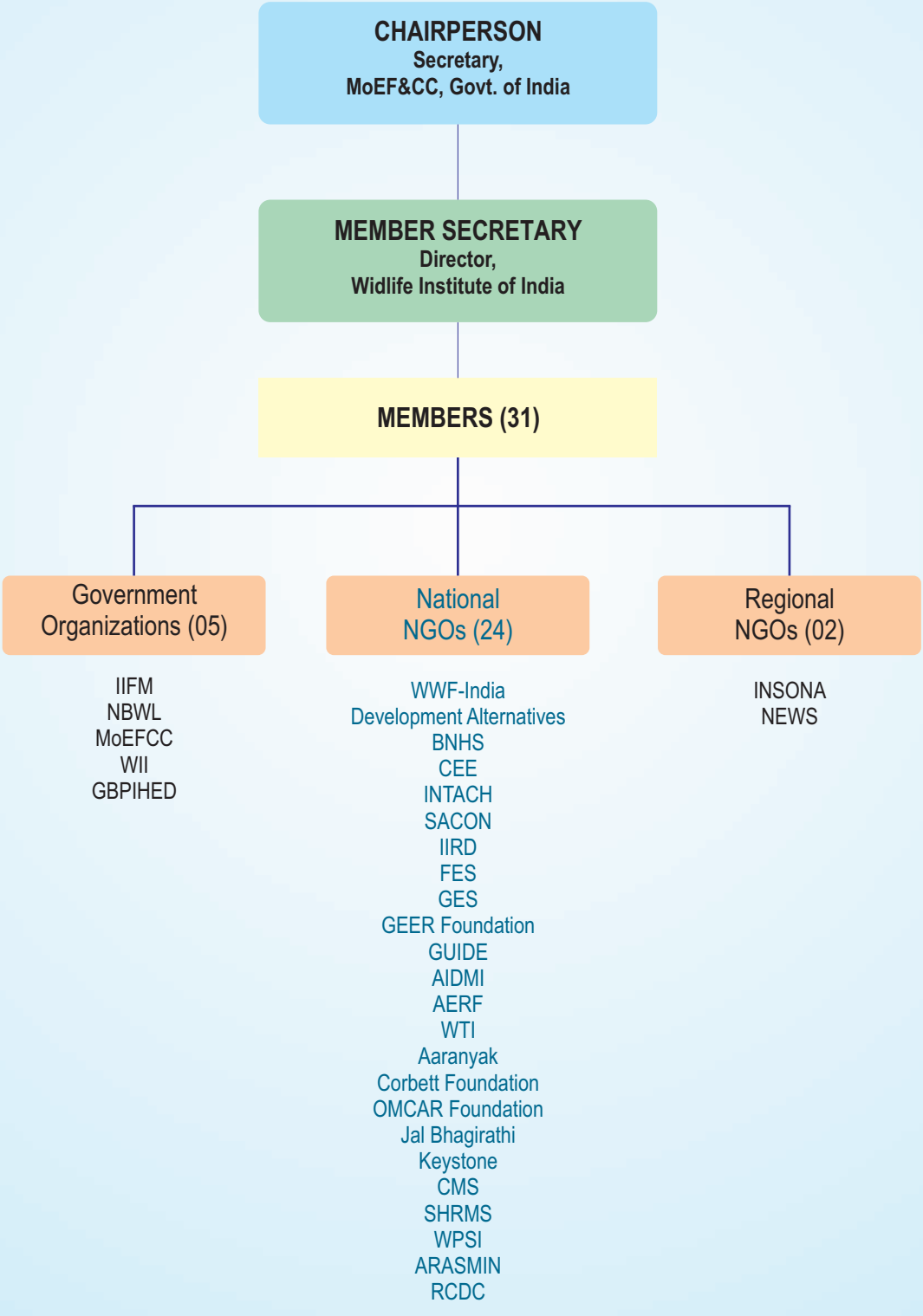
Currently, there are 31 members in the Committee drawn from Government of India, Scientific Institutions and National and International NGOs. The expertise represented in the Committee include policy planning, wildlife enforcement and management, scientific research, capacity building of personnel engaged in management of natural resources, disaster management, urban landscape management and livelihood issues.

IUCN India Office provides support to the member organization of the INC-IUCN in taking forward the global agenda of conservation including IUCN programmes. Together we are able to address all the five strategic goals adopted at CBD COP-10 at Nagoya, Japan.

Objectives

- Provide a common forum with governmental agencies, non-governmental, organisations and others in the country connected with the IUCN
- To develop communication, cooperation and coordination amongst all Indian Members of the IUCN and communication between them and the IUCN
- To evolve a common strategy and approach and identify areas of priority conservation action, which would be taken up in the IUCN and its various commissions;
- To serve as a clearing house for dissemination of information for the IUCN within the country;
- To ensure adequate representation of government and non-government IUCN members at each World Conservation Congress
- To set-up sub-committees and specialist groups, as appropriate
- To encourage the use of scientific and professional skills, practical experience and resources of government and NGOs necessary to support the above; and
- To do all such other things as are conducive or incidental to the attainment of the above objectives.

Organizational Structure



Activities

6th Asia Regional Conservation Forum: Resilience in Action: Creating Solution for people and nature

The 6th Asia Regional Conservation Forum (RCF) was held in Bangkok from 10 to 12 August 2015.A total of500 representatives of NGOs, governments and the business sector from across Asia gathered together to discuss how they can work together to deal with Asia's environmental issues and to share their experiences.

An exhibition depicting the publications, posters and films of the members of the Indian National Committee of IUCN (INC-IUCN) was set up during the RCF.

INC-IUCN produced an annual report of the activities of its members for the year 2014–2015. The annual report was released on the first day of the RCF by Mr. Zhang Xinsheng, IUCN President, and Professor Youngbae Suh, Former Chair of the IUCN Asia Regional Members Committee, in the presence of Ms Meena Gupta, Vice Chair of the Governance and Constituency Committee, Mr. Vinod Ranjan, ADG (WL), and Dr. Bitapi C. Sinha, Coordinator, INC-IUCN.

On the last day of the RCF, Mr. Zhang Xinsheng, IUCN President met the members of INC-IUCN. The IUCN President appreciated the efforts of the Indian National Committee and discussed issues that required focus during the World Conservation Congress at Hawaii in 2016.

MEMBERS REPORT

Sálim Ali Centre for Ornithology and Natural History (SACON) was established in 1990, in memory of the late Dr. Sálim Ali, doyen of Indian Ornithology, as Centre of Excellence, under the Ministry of Environment, Forest and Climate Change, Government of India, with a mission "To help conserve India's biodiversity and its sustainable use through research, education and people's participation, with birds at the centre stage".

Avian Ecology and Endangered Bird Conservation Programme

SACON has been working towards the conservation of the Edible-nest Swiftlet in the Andaman and Nicobar Islands for more than one and a half decades with the support of the Department of Environment and Forests, Andaman and Nicobar Islands. A population of Edible-nest Swiftlet has almost been established in a house, as seen from the return of some individuals, to demonstrate an approach that will lead to recoveries in the population of the species and benefit the people of these islands.

SACON's work on the Narcondam Hornbill, on Narcondam Island, the longest in terms of field work on the island, shows that other than 13 *Ficus* species, the hornbill feeds on 21 species of fruit available on the island. However, only four species constitute around 85% of the food. At times the Narcondam Hornbills were seen picking up grasshoppers, mantids, spiders and skinks to feed the females and chicks in the nests.

A study of the Andaman Serpent-Eagle, an endemic (to the Andaman Islands) raptor and a Near-Threatened species as per the IUCN Red List has started recently. Data regarding the population, distribution and ecology of this bird are scarce and scattered. Exploring the abundance and distribution of the species, identifying its preferred forest types and identifying the potential threats to it in the Andaman Islands are planned.

SACON has taken up a study on the owl assemblage and occupancy in the Andaman Archipelago, which comprises three large islands and around 325 smaller ones and supports about 270 bird species, including five species of owl (four endemics and one that is also found on the Indian mainland). The study indicates that the species composition of the owls is not structured by inter-specific competition; however, this needs to be confirmed. Other rules such as guild proportionality, nestedness, favoured states and size structure will also be tested once a sufficient number of islands are covered.

SACON has been exploring ecological species sorting in relation to habitat structure in the small-cat guild of Eaglenest Wildlife Sanctuary, Arunachal Pradesh. The project was taken up to examine the role of morphology in spatial distribution patterns and habitat associations in small and medium-sized cats, examine the relationship between body size and diet among them and compare conventional techniques used for surveying small carnivores for cost effectiveness and information obtained. The study has generated valuable information relating to questions on small cats. SACON used geographical information system, GPS receivers, satellite images, heat-sensory camera traps and scat analysis in this work.

SACON has been investigating the taxonomic and conservation status of the Forest Owlet, a Critically Endangered, endemic species distributed in fewer than 10 locations in central India. This species, rediscovered in 1997, after a gap of 113 years, had posed certain questions such as its patchy distribution and probable hybridization with the Spotted Owlet (*Athenebrama*). In this context, the study essentially aims to explore the phylogeography of the Forest Owlet by examining genetic connectivity

among various populations and examining the molecular taxonomy and phylogeny of the species in contrast with other owls. The study is based on molecular analysis of feather samples collected non-invasively. The study is in progress and is generating very encouraging and insightful results.

Habitat Fragmentation and Biodiversity

The High Range Mountain Landscape (Munnar Landscape) is an important biodiversity region in the Western Ghats, in peninsular India. SACON was entrusted with four studies as part of the UNDP Munnar Landscape Project, in this area: (1) Ecosystem Requirements of Hornbills; (2) Site-Specific Eco-restoration Protocol-Based on Existing Community Requirements; (3) Land Use and Management Plans for Production Landscapes; and (4) Plant–Animal Community Studies in Various Landscape Elements (Birds and Butterflies). A preliminary study has been conducted.

Conservation

SACON's study on the avifauna of the coastal talukas of Sindhudurg District (Maharashtra) has generated extensive data relating to abiotic and biotic variables and the abundance of birds, spatial and temporal patterns of avian diversity and density and the major threats to the shorebirds along the coast.

The southernmost area studied during the year is Agasthiamalai Hills (Western Ghats, Kerala). SACON's study has brought to light interesting spatial patterns in the distribution of selected faunal groups (birds and reptiles) and provided a deeper understanding of the factors governing the distribution along the altitudinal gradient from 50 m to 1868 m above mean sea level.

SACON has been working on the woody vegetation and nest-tree use by birds in the riverine forests of Athikadavu Valley (Western Ghats) for a couple of years now. Trees are important for several bird species, and more than 100 species of tree-cavity nesting bird have been identified in India. However, very little information is available about their breeding habits. SACON's study recorded 70 woody species, of which 54 are utilized by cavity-nesting birds in the study area. Our studies also highlight the need for measures to be taken by the Forest Department to control the expansion of agricultural activities alongside the river banks.

Work on threatened plant taxa in Tamil Nadu was taken up according to the requirements of the Tamil Nadu Biodiversity Conservation and Greening Project (TBGP). SACON covered four Divisional Management Units (Sathyamangalam Wildlife Sanctuary, Point Calimere Wildlife Sanctuary, Mukurthi National Park and Gudalur Forest Division), and detailed quantitative data were generated (using the intensive quadrat method) for the use of the Tamil Nadu Forest Department.

Macaca fascicularis umbrosa is a unique endemic primate subspecies restricted to the islands of Great Nicobar, Little Nicobar and Katchal. SACON has been exploring the social organization, behaviour and phylogeography of the species in these islands. The populations of this species, having been isolated for long, potentially faces problems related to inbreeding and genetic isolation. Apart from generating much information about the social organization and behaviour of the species, SACON found that the Nicobar Macaque is a separate and unique group, with its nearest sister group in terms of genetic distance being the Javan group, living more than a thousand kilometres away.

Another interesting study that was done during the

year was an ecological and ethno-cultural examination of the rice diversity in southern India with special reference to the Western Ghats. The investigation extensively documented ecological features of traditional rice paddies. SACON could also locate some very rare cultivars that had unique ecological and agricultural features.

Ecosystem Structure and Function

Earthen burrows are important refugia for many species. However, the ecology of burrows is a little-explored aspect of the country. SACON has been studying spatio-temporal burrow-use patterns among vertebrates in Keoladeo National Park (Rajasthan) in the last couple of years. The study found that 13 species of vertebrate(nine mammal species, three species of reptile and one bird species) depend on the burrows. Several vertebrate species (both predators and prey) were found occurring together in underground burrows. The present study aims to generate data on factors governing the coexistence of predators and prey in these burrows.

Environmental Contamination and Biodiversity

SACON continues to monitor environmental contaminants in birds in India as part of its ecotoxicology work. During 2014–2015, dead birds of 15 species were received from various states. The White-backed Vulture, Black Kite, Spotted Owlet and Sarus Crane were the notable species among these. Analysis revealed various contaminants such as pesticides, heavy metals and pharmaceuticals (diclofenac for example).

Environmental Impact Assessments

During the current year, SACON was involved in a number of environmental assessments: (1) the potential environmental impacts of wind farm development (in the Agali, Attapadi, Kottathara and Nallasingam areas of Palakkad District, Kerala), (2) the impacts of Jangi Wind Power Farm with special reference to birds and bats, (3) a cumulative impact assessment study (faunal aspects) of hydro power projects on the River Yamunaand the River Tons and its tributaries, in Uttarakhand, (4) the impact of the Hara Wind Power Project of CLP Wind Farms Limitedon wildlife, including migratory birds and raptors (Harapanahalli, Davangere, Karnataka) and (5) preparation of a management plan for Fudam Bird Sanctuary (Diu).

Wetland Conservation Programme

Wetlands have been an important theme of SACON's work since its inception. In recognition of SACON's contribution to wetland studies, the MoEFCC entrusted SACON with running the ENVIS Centre on Wetlands. The SACON ENVIS Centre has been awarded the “A-grade” for the financial year 2014–2015. This ENVIS centre perhaps has the largest collection of wetland literature and other information in the country. It is widely used by various researchers, the hit rate crossing more than 10,000.

SACON has been exploring the morphological diversity and ecological patterns ofNear-Threatened colonial waterbirds across the Indian sub-continent using a novel approach. The study has produced encouraging results in standardizingthe use of cameras and methods for non-invasive morphological studies of large sized heronry species.

Nature Education

SACON's Nature Education programmes are received well in and around Coimbatore. Twenty-seven nature awareness programmes for students were conducted in the campus. The annual inter-school Salim Ali Trophy Nature Competition was conducted in February 2015. Another significant activity during the year was “Exploring Nature through Birds”, a science education programme conducted in collaboration with many partners across the country.

Research Publications

During the year, SACON published 34 research articles, of which 24 were in scientific peer-reviewed journals.

The Indian Institute of Forest Management (IIFM), Bhopal,is an autonomous sectoral management institute, under the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, which constantly endeavours to evolve knowledge useful for managers involved in management of forests, the environment and natural resources and allied sectors. IIFM disseminates such knowledge in ways that promote its use by individuals and organizations. The mandate of IIFM is appropriately reflected in its mission statement: "To provide leadership in professional forestry management aimed at environmental conservation and sustainable development of ecosystems."

Economic Valuation of Tiger Reserves in India: A Value+ Approach

This valuation study was conducted by IIFM at the behest of the MoEFCC's National Tiger Conservation Authority (NTCA). It provides quantitative and qualitative estimates of benefits accruing from tiger reserves, which include economic, social and cultural services.

The findings indicate that the monetary value of the benefits emanating from selected tiger reserves range from Rs.830 crore to Rs.1760 crore annually. In terms of unit area, this translates into Rs.50,000 to Rs.190,000 per hectare per year. The report shows that Periyar Tiger Reserve has the highest annual benefits (Rs.1760 crore), followed by Kanha Tiger Reserve (Rs.1650 crore) and Corbett (Rs.1470 crore).

The study is expected to assist policy makers in appreciating the economics of tiger conservation and may be considered by them while taking a call on any project in the future. The study is the first of its kind not only in the country but across the world. It is an attempt to provide an assessment of the economic benefits derived from tiger reserves across a range of tiger landscapes in India.

Review and Revision of the National Forest Policy, 1988

A draft National Forest Policy for the country was developed during 2015- 2016on the basis of intensive village-level focus group discussions, regional and national-level consultations, web-based feedback and review and analysis of primary and secondary datasets. MoEFCC had entrusted this task to IIFM, with financial support from the UNDP. This draft policy integrates the vision of sustainable forest management based on the principles of the ecosystem approach and landscape level planning and experiential learning from participatory forest management while building on the rich cultural heritage of the country. Aspects of biodiversity conservation and sustainable use have been built into the draft policy.

FSC Certification of Tripura Forest Development & Plantation Corporation Limited

IIFM provided technical support by conducting a study to assist Tripura Forest Development and Plantation Corporation Limited(TFDPCL) in getting international forest management certification from the Bonn, Germany-based Forest Steward Council (FSC). FSC certification is a gold standard in forest management certification and is recognized and accepted as a global forest certification label. This certification has opened market opportunities for

TFDPCL products in environmentally conscious markets in developed countries as well as the premium segment of India.

Indigenous Knowledge in Practice: Confirmation of Climate Change and Its Effects through Practitioners' Knowledge Related to Agriculture

Crop cultivation in India is primarily based on traditional knowledge, which is passed on from generation to generation. Traditional knowledge systems are based on wisdom and experience, often tested over a long period by use, and adapted to the local culture and environment. It is imperative to document the indigenous knowledge of crop cultivation and establish a correlation with the effect of climate change and shifting/deviation of agricultural activities. A research project was executed at IIFM in five districts of Madhya Pradesh with a DST grant through the State Knowledge Management Centre on Climate Change (SKMCCC), Environmental Planning & Coordination Organization (EPCO), Bhopal. The study attempted to document the peoples' practical knowledge, developed a language for communication to make them understand that climate change is influencing agricultural activities and suggested a long-term

strategy based on traditional knowledge for attaining stability in agriculture. Simple but robust observations were documented that can be further investigated at agricultural universities, research stations and Krishi Vigyan Kendras (KVKs) so that a firm scientific base could be built based on traditional practices in addition to adapting modern technologies of crop cultivation. The outcome of the study, once disseminated, will help the farmers to understand better climate change and the strategies required at their level for adaptation.

Workshops Conducted

Youth Ready for Climate Change Transformation

A two-day workshop sponsored by EPCO titled "Youth Ready for Climate Change Transformation" was held at IIFM on 28 and 29 July 2015.This was attended by students from various universities of India from all regions including the North-east. The workshop was attended by 20 universities. Apart from academic discussions, the students participated in a run in the city to create awareness about climate change. The main idea behind the workshop was to assess the awareness among Indian youth about the likely impacts of climate change in India and what counter-measures can be taken to mitigate these impacts.

Developing a National Manual for Evaluating Plantations

Plantations are a cost-effective tool for stocking forests, restoring ecosystems and ecological processes, strengthening the watershed and hydrology, enriching wildlife habitats, sequestering carbon and supporting livelihoods. Under the National Afforestation Programme, Watershed Development Programmes, MGNREGA, CAMPA and Green India Mission, large-scale plantation is being taken up in all the states of the country. These plantations projects are subject to several risks such as persistent droughts, ground fires, grazing by cattle, damage by wildlife, competition from aggressive weeds, poor soil quality and patchy implementation efforts. Over the years, several states have developed their own mechanisms for monitoring and evaluating plantation projects. Also, the spread of GPS technology, the availability of higher-resolution satellite images and the digital revolution have opened up exciting possibilities. In this context, IIFM prepared a manual to evaluate CAMPA afforestation projects with the purpose of standardizing and harmonizing the evaluation processes practiced by all the states without hampering their flexibility. This manual covers multi-disciplinary aspects related to statistical sampling, geoinformatics and PRA tools. This manual can guide the states in evaluating plantations.

Climate Change, Greenhouse Gas Inventory, Vulnerability, Adaptation and Mitigation

IIFM, in association with Forest Plus (USAID), organized a 2-day training programme titled "Climate Change, Greenhouse Gas Inventory, Vulnerability, Adaptation and Mitigation" on 29and 30 September 2015.

The programme was aimed at making Forest Department officials look at climate change beyond books and reports. This was the first in a series of capacity building programmes that are to be implemented under an MoU signed by IIFM with Forest Plus. It is important to build the capacity of forest officials to realize the potential of mitigation of climate change through forestry. This programme is a part of a larger project for implementation of REDD+ in India with support from USAID.

CAMPA Evaluation

A workshop on CAMPA evaluation was conducted on 30 September 2015 with the objectives of learning from the initiatives taken by various state forest departments in developing monitoring and evaluation protocols for CAMPA work. Based on the experiences, a national evaluation code is to be developed for CAMPA work, which will be based on a common set of scientific principles while allowing state-specific flexibility. State governments are implementing CAMPA works for more than 5 years now. A need is felt now to evaluate these ongoing efforts technically and from to plan the way forward from the learning. Also, the state CAMPA guidelines stipulate that a concurrent monitoring and evaluation of the works implemented has to be evolved and implemented to ensure effective and proper utilization of funds for the purposes for which they are earmarked. Various state forest departments are keen to get their CAMPA schemes evaluated by IIFM.

Training Programmes

During the period under report, IIFM conducted 11 management development programmes. A total of 228 persons were trained. A total of 10 workshops/seminars were conducted, in which 435 delegates participated. The training programmes were in application of statistics to natural resource accounting, management of NTFPs, forest certification, biodiversity and wildlife conservation.

Awards Received

IIFM was awarded the DNA & Stars of the Industry Group B-School Leadership Award 2015 in recognition of the leadership, development, innovation and industry interface of the institutes.

IIFM achieved the eighth rank overall under the National Institutional Ranking Framework, India Rankings 2016, with 609 management institutes of the country participating.

Industry Relations

International Paper, IIFM join hands to set up Centre of Excellence

International Paper, India, and IIFM have signed a memorandum of understanding to engage in research and work on mutual interests in the field of forest sustainability by setting up a Centre of Excellence. This wide-ranging partnership will entail action research, capacity building and academic exchange involving experts and researchers from both the US-based $24-billion International Paper and IIFM. The MoU was signed by Giridhar Kinhal (IFS), Director, IIFM, and Rampraveen Swaminathan, President, International Paper—India, and Chairman & Managing Director—IP-APPM. As the first step in this direction, the centre is funding a 3-year research study to assess the traditional agro-forestry systems in the Western Himalaya and their linkages to livelihoods and climate change. This novel collaboration between an industry player and an academic institute augurs well for the future of the country as it will create an ecosystem for innovation and spur similar partnerships to be forged between industry and academia in the days to come.

The Corbett Foundation (TCF) is dedicated to the protection of wild species and their habitats and works in prime Bengal Tiger habitats in Uttarakhand, Madhya Pradesh and Kaziranga.TCF been instrumental in the conservation of some of the last remaining Great Indian Bustard habitats in Kutch, Gujarat, and One-horned Rhinoceros habitats in Assam. Besides helping to conserve India's flagship species, TCF works towards the conservation of crucial habitats at the landscape level and creates awareness about their ecological importance.

Through its effective initiatives to reduce human–wildlife conflict and to carry out rescue and rehabilitation efforts and on-ground scientific research and to forge collaborations with local, national and international partners, TCF works towards a future where humans and nature live in harmony.

Conservation and Research

Interim Relief Scheme. The Corbett Tiger Reserve (CTR) with its surrounding forest divisions in Uttarakhand are important tiger conservation landscape within the Terai Arc Landscape, in the buffer zones of which are located about 250 villages and 25 Gujjar settlements. Depredation of livestock by wild carnivores and herbivores is a major source of man-animal conflict. Procedural delays and low compensation rates for losses builds resentment in the community against wildlife and the Forest Department, resulting in revenge-killing of the animals responsible by poisoning of livestock carcasses. This poses a great threat to wildlife conservation. To mitigate this conflict, TCF has been running an 'Interim Relief Scheme' since 1995, to give ex-gratia financial assistance to villagers whose cattle have been killed by a tiger or a leopard in the buffer zone of CTR. WWF-India has been a partner of this scheme since 1997. With nearly 100% reporting of cattle kills, TCF promptly responds to kill-reports, providing immediate effective monetary assistance and medical treatment to the injured. This scheme has reduced the antagonism of locals and the revenge killing of wild carnivores and herbivores. A total of 13, 619 livestock depredation cases have been recorded from 1997-98 to 2015-16 and a total interim compensation of INR 1, 64, 60,736 have been paid under the IRS (approximately USD 244,515). During the financial year 2015-16, 771 depredation cases were recorded and an expenditure of Rs. 11, 85, 710 was incurred in disbursing payment to all the affected locals.

GIB and avifaunal conservation - Windmill and Power line Survey. Migratory and resident populations of avifauna in the coastal region of Kutch, a primary hub for bird movement, are threatened by collision with the numerous and increasing number of wind-farm establishments and high transmission power lines in the area. Collisions with windmills and electrocution deaths due to contact with power lines because of low visibility during flight and non-availability of natural perches, threatens the varied avifaunal species in these areas. The risk of bird mortality increases where natural vegetation is

scarce and where birds congregate such as in flight corridors or at waterholes. TCF has therefore begun a study to determine the impact of these structures on avifauna. The study, being conducted in Jakhau, Kutch, covers approximately 60 sq. km where there are 63 windmills and a 6 km long power line, with surveys being conducted twice a week. It is expected that the study will reveal the species and number of birds affected by windmills and power lines in this area.

Vulture Conservation – Status Report, Meloxicam Distribution and Livestock Inspector Interaction. In October 2015, TCF was recognized as a SAVE (Save Asia's Vultures from Extinction) Associate. TCF carries out vulture conservation work in association with SAVE. TCF submitted a technical report titled "Status and Conservation of Vultures in and around Bandhavgarh Tiger Reserve, Madhya Pradesh" in 2015 to the Rufford Foundation, which includes, monitoring data on the populations and status of resident vulture species, nesting and roosting sites, specific threats to their population, details on the conducted awareness programmes for local veterinarians and campaigns in schools and villages. As a capacity building endeavour, workshops and meetings were organized with paravets who are the primary caregivers of cattle here. With a wide outreach here, any diclofenac use could be widespread. TCF sensitizes the paravets to the dangerous effects of diclofenac use to endangered vulture populations and makes them aware of the safer alternative drug meloxicam for cattle treatment. TCF has distributed vials of meloxicam to the participants of such workshops at a 60% subsidized rate as well as free of cost. TCF also organized three workshops in veterinary colleges on healthy veterinary practises in the context of vulture conservation. Between August and November 2015, TCF's Division in Kutch has distributed around 485 vials of meloxicam to Livestock Inspectors from *talukas* in Kutch. As a community-based vulture conservation effort, TCF compensates farmers for incurring any losses in coconut produce due to vulture-nesting on their trees, by presenting them with RO purifiers, bicycles, free medical treatment as a token of appreciation, and publicly honouring them with certificates as 'Vulture Saviours'. The programme has seen positive outcomes.

Rescue and Rehab. TCF has a team of dedicated wildlife experts, veterinarians and volunteers to assist the Forest Department in rescuing and rehabilitating sick and injured wildlife in Kaziranga National Park. They are given timely care and nursed back to health before being released into the wild. The Forest Department is apprised of these cases. Over the years, TCF has rescued a variety of animals from King Cobras and rat snakes to tiny soft-shell tortoises, birds, deer, squirrels and on one occasion, even the elusive Caracal. In 2015-16, TCF rescue list includes a Burmese Pythons, Monocled Cobra, Green Cat Snake, monitor Lizard, Swamp deer, peacock, Oriental Dwarf Kingfisher and Wooly-Necked Stork. Animals that have made a full recovery are released as far away as possible from human habitation.

Crop-Raiding Mitigation. Agricultural fields on the periphery of Kaziranga National Park are often raided by wild herbivores, especially elephants, rhinos and wild buffalos. Standing crops, the source of livelihood for the villagers inhabiting these areas are destroyed, causing farmers much loss. To mitigate this conflict

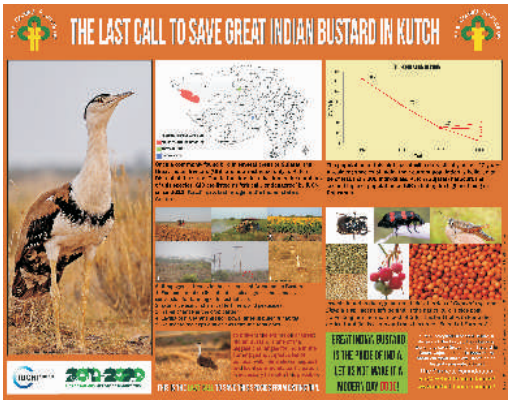
between wildlife and villagers and maintain their support to TCF's conservation efforts, TCF has constructed around twenty watchtower-like structures – locally called *tongis* – at various locations along the periphery of the park and near the fields. The structure comprises tall bamboo stilts, atop which is a platform that can accommodate around four persons, and villagers can keep vigil over their farms and scare away herbivores advancing toward the fields, mitigating potential damage. Provisions to install camera traps on the *tongis* have also been made; the villagers are being trained to guard and use them. These platforms are also being used to monitor tiger movement.

Watershed Management. With support from the Coca-Cola India Foundation, TCF has implemented a Watershed Management Project in five villages fringing Bandhavgarh Tiger Reserve, in the Manpur block of Umaria District in Madhya Pradesh. Agriculture, the main source of sustenance here, is primarily rain-fed due to unavailability of irrigation water and systems and is therefore characterized by poor produce. Under this project, check-dams and farm ponds are being constructed, conserving water through recharge of groundwater reserves and providing water year round for all purposes. To check soil erosion and degradation of the land, field bunds are being constructed. This will result in improved agricultural produce, reduced forest dependence, mobilized communities and agriculture will become a sustainable primary source of livelihood.

Awareness and Advocacy

TCF organizes awareness activities like campaigns, workshops, quizzes and competitions, meetings, celebrations of important environmental days, documentary and film screenings, presentations and nature trails among many other educational, fun-filled activities for teachers, locals and in schools and villages situated in and around Corbett, Kanha, Bandhavgarh and Kaziranga tiger reserves, and the Greater Rann of Kutch. The programmes focus on - Tiger, Asiatic Elephant, Greater One-horned Rhinoceros, Hardground Barasingha and Great Indian Bustard.

Publications. TCF regularly contributes articles and other conservation-related publications to print media, including The Hitvada, Hindustan Times, and Twinkle Star Magazine. These publications are a great way to communicate environmental and conservation knowledge and issues to young audiences. TCF has also created and published informative, educational posters like 'The Plight of Vultures in India', “Save the Great Indian Bustard”, and presents them to authorities including forest officials, District Collectors and to the Principal in rural schools where the message has a larger outreach. These posters have been published in Hindi, Marathi, Assamese and Gujarati as well to effectively communicate their message to specific local communities.



Save the GIB Campaign. The Kutch Ecological Research Centre (KERC), a division of TCF in Kutch, has been running the 'Save Great Indian Bustard' Campaign since 2012. In 2015-16, the outreach of the GIB campaign was more than 4000 students. Through poster making competitions, presentations, and documentary screenings, awareness was created about the importance of the GIB, its habitat and the threats to its existence. The 4-minute GIB

music video and the GIB song **"*Ghorad kare chhe yad*"**, composed by TCF in 2014 is screened at the end of the programme and GIB posters distributed.

Capacity Building Programme for Nature Guides. TCF conducted a Capacity Building and Skills Development programme to train the nature guides of Pench Tiger reserve, Madhya Pradesh from September 23 to 27, 2015 held at a hall at the Turia Gate of Pench Tiger Reserve. Nature guides have the potential to impress the importance of conservation upon tourists. 110 candidates comprising experienced nature guides and fresh recruits attended the training. Teaching faculty comprised TCF staff and external faculty. The trainees participated eagerly in indoor lessons about natural history, conservation issues, wildlife knowledge, laws, communication, etiquette, a quiz as well as in outdoor sessions including nature trails and safaris. TCF is grateful to Mr. Subharanjan Sen (IFS), Field Director and Dr (Mrs) Kiran Bisen (IFS), Deputy Director of Pench Tiger Reserve, Mr. Sanjay Shukla (IFS), Chief Conservator of Forest, Seoni Circle and the guest faculty.

Signboards for speeding vehicles. Wildlife often cross roads and highways in and around wild habitat as part of their daily movement, but many are killed by speeding vehicles. In an effort to curb wildlife deaths from road kill, TCF has created and installed signboards on major roads in and around Kanha Tiger Reserve and along the National Highway 37 passing through Kaziranga Tiger Reserve, appealing to drivers to slow down and drive cautiously in these areas. In 2015, new signboards have been designed and installed on NH-39 near Numaligarh township area in Deopahar, a proposed Reserve Forest in Assam, which is an active elephant corridor. The signboards are designed with vivid images of wildlife and local art as well as and impactful messages to draw the attention of speeding motorists.

Working with Communities

Primary Healthcare for forest-dependent and tribal communities. Remotely located forest-dwelling communities do not have access to modern medical treatment. Suffering from chronic illnesses and malnourishment, villagers often walk for hours to the nearest Public Health facility, only to find that the doctor and medicines are unavailable, thus breeding feelings of neglect and resentment while also making them susceptible to quacks. Only healthy communities can contribute to conservation. TCF thus began its Rural Medical Outreach Programme (RMOP) in Corbett in 1995 to provide these communities with medical facilities in return for their support in conservation efforts. The programme has since expanded to Kanha, Bandhavgarh, Kanha-Pench Corridor and Kutch. TCF treats patients at its outpatient departments as well as through mobile medical camps, using their five dedicated Mobile Medical Units to provide medical attention to remotely located villages. TCF collects a nominal fee of INR 10/- per prescription to prevent misuse of medicines provided. TCF also conducts awareness programmes on medical health and hygiene in local schools and at community gatherings using posters, illustrated handbooks and pamphlets about diseases like malaria, tuberculosis, water-borne illnesses, tobacco and alcohol addiction etc. TCF also chlorinated 200 wells in villages in the buffer zone of Kanha Tiger Reserve. In 2015-16, TCF provided medical care to nearly 35,000 people from such communities. TCF is running the 'Pulmonary Tuberculosis Eradication Project' in collaboration with the World Memorial Fund for Disaster Relief since 2000, for locals living in and around the Corbett Tiger Reserve and has treated 82 TB patients this year.

Community-based natural resource Conservation. TCF has continued its Community-Based Natural Resource Conservation (CBNRC) programme in the village Bakiguda in the buffer zone and close to the core zone of Kanha Tiger Reserve.

This programme, reaching out to 120-households in Bakiguda, aims to reduce the anthropogenic pressure degrading forests as a result of grazing cattle and tree-felling for fuel and timber, and to gain community support in protecting the buffer zone. The community will also assist Kanha Tiger Reserve in better managing its forest. 14 acres of degraded land have been cleared of the invasive lantana weed and 350 saplings of local plants species were planted here over a course of 3 months, protected by tree guards. 200 saplings of bamboo were also distributed to Bakiguda residents to plant on their private lands. Five biogas installations and 60 energy-efficient smokeless stoves *Sakhi* were distributed to the villagers to reduce their dependence on the forest for fuel wood. They are also being encouraged to undertake fodder plant cultivation to reduce free-range cattle grazing, and bamboo cultivation for sustainable harvest. The project aims to motivate the dormant village community into nurturing the plantations and assisting the forest department in monitoring the surrounding forest. Additionally, TCF also extends its sustainable livelihoods, medical and veterinary programmes to Bakiguda village, thus making Bakiguda a replicable model for other villages in the buffer zones of tiger reserves.

Solar-light distribution. 172 solar-light units were distributed to households in villages located in the Kanha-Pench corridor and the buffer zone of Kanha tiger reserve. 24 households living on the boundary of Kaziranga National Park have also benefitted from 24 solar lights distributed by TCF. With illumination after dark, children are able to study better, women, to complete chores more easily and portable lights improve visibility after dusk for safety and to guard fields from crop-raiding animals. Under TCF's project 'Akshay Urja, Swastha Jeevan', supported by the **Coca-Cola India Foundation**, households in remote villages in and around protected areas without electricity supply were given more than 1000 solar lights, giving them access to renewable, clean electricity. In 2015-16, TCF Corbett organized training sessions for beneficiaries, especially women,in solar-light maintenance and repair to give them technical training, enabling them to generate some income and create a sustainable and convenient repair resource. A social audit was also conducted to assess the success of the programme. Further, 101 solar-lights were distributed to residents of village Chhoti Haldwani, established and owned by the famous Jim Corbett. Villagers have responded pocitively, with many finding them useful in routine household and field activities. Villagers contribute to 50% of the cost of the lanterns.

Sustainable Livelihoods. Due to growing populations and increasing poverty, forest-dwelling communities cannot depend as heavily as they did on forest resources for a livelihood. But without any alternative livelihood to survive on, they continue a heavily forest-dependent living, often resorting to illegally felling trees, poaching wildlife and activities that are unsustainable and put them in conflict with the authorities. Giving priority to conservation in light of the existing poor socio-economic status has been much debated. TCF's sustainable livelihoods programme 'PUKAAR', supported by Axis Bank Foundation, across all its divisions aims to divert dependence from forest-based livelihoods to alternative, environmentally and financially sustainable livelihoods. Through vocational and skills training, which will gain the trainees employment and improved financial status, TCF works to empower

these communities, supporting them in entrepreneurial ventures, job placements, starting

Established in 1991, CMS is a not-for-profit, multi-disciplinary development research and facilitative think-tank. It endeavours to work towards responsive governance and equitable development through research, advocacy and capacity building in social development, the environment, communication, the media, transparency and governance issues at the local and national policy levels.

Enhancing Understanding of Nature through Film-Screening, Collaborations and Public Dialogue

- Collaborated for the first Rajpur Nature Film Festival with Rajpur Community Initiative Society, the organizer, at Rajpur, Dehradun, in April 2015, to raise awareness on the biodiversity of Dehradun and the significance and vulnerability of Rajpur,one of the last remaining green belts of the city
- Collaborated with You and I Foundation to organize the second edition of the Dayittwa Film Festival & Forum at Chandan Nagar (West Bengal) in December 2015 with a focus on spreading nature awareness
- Film Panorama, on environmental conservation, organized at the Open Frame Festival of PSBT in September 2015
- Environment & Wildlife Film Panorama at the 10th International Children's Film Festival organized by Children's India in commemoration of the 125th birth anniversary of Pandit Jawaharlal Nehru, in Mangaluru, in November 2015
- Weekly film screenings being organized at Indira Paryavaran Bhavan since April 2015 for the officials and guests of MoEFCC. Special screening with National River Conservation Directorate (NRCD) on 22 March 2015





- Screening of award-winning films twice every month at India Habitat Centre being organized since July 2015. The screenings are open to all.
- Award-winning animation and short-duration films screened at Galli-e-Khaas festival, organized by Dastkar, in June 2015 to celebrate Environment Month
- Yoga sessions conducted in collaboration with New Delhi Nature Society on International Yoga Day
- World Earth Day celebration at the American Center, New Delhi. Organized award-winning films on wildlifeand environmental activism and interaction with a wildlife expert and a filmmaker for children. Attended by 350 school students from Delhi NCR.
- Save Water! (film screenings and discussions) organized at Vignan's Foundation for Science, Technology & Research University, Guntur on 10 March 2016

Strengthening National and International Networks

CMS collaborated with international film festivals such as Jackson Hole Wildlife Film Festival and Voices from Water and organizations such as Conservation International for exchange of films and holding Film Panorama at the festivals. Retrospectives of wildlife and nature films were screened for an Indian audience during the Eighth CMS VATAVARAN 5-day film festival at Delhi.

The Ninth CMS VATAVARAN call for film entries was announced at Mumbai International Film Festival 2016 (MIFF). Thirteen award-winning films screened at Doordarshan Kendra Studio in Mumbai as part of MIFF

The CMS Environment team participated in the following events to strengthen ties and exchange learning and experiences with film festivals and filmmakers:

- 46th International Film Festival of India (IFFI) held in Goa from 25 to 30November 2015

- DocEdge 2016 (forum for filmmakers), Kolkata

- Delhi Literature Festival, 9–10January 2016

- Delhi International Film Festival (DIFF),5 December 2015

- Smile International Film Festival for Children and Youth, Siri Fort, December 2015

- ENVIS brainstorming session on role of ENVIS (Environmental Information System) in decision andpolicy making for MoEFCC, January 2016

Stimulating Production of High-Quality Films

The eighth edition of the competitive CMS VATAVARAN was organized successfully witha theme of "Water for Life" from 9 to 13 October 2015 at the NDMC Convention Centre, New Delhi. A total of 178 films were entered in the festival. In all, 22 awards were presented to filmmakers, journalists (Young Environmental Journalism Awards) and conservationists at this festival.

The Audio Visual Resource Centre (AVRC) at CMS, a state-of-the-art archive of documentaries, films and audio spots on issues related to the environment and development, at present has a collection of 2951 films in various environmental and wildlife categories.

A set of experienced and national award-winning filmmakers organized three workshops—on digital cinematography, the art of storytelling in films, and acquisition and distribution of environment films—in October 2015 for amateur and aspiring filmmakers at the CMS VATAVARAN film festival.

Policy Impact and Conservation Discourse

CMS was involved as a stakeholder in the preparation of the National Wildlife Action Plan (NWAP) 2017–2031. Policy inputs from CMS on communication and information dissemination have been included in the action plan.

In addition, a key component of the CMS VATAVARAN Film Festival and Forum 2015 was the forum titled"Water for Life", comprising workshops and discussions, particularly for informing youth, children, filmmakers, journalists and environmental enthusiasts of the policies and good practices that meet the present-day challenges associated with water in the country. Two media workshops were included in this forum to impart skills and information to journalists, writers and filmmakers, and one children's workshop on water auditing was included.

Engaging with Youth and Children for Environmental Awareness and Action

Water Festivals were organized in the Delhi NCR in collaboration. Some leading institutions such as Presidium School, Lingaya's University, Sharda University and Amity Institute of Environmental Science hosted Water Festivals. Film screenings, interactions with experts, art and essay competitions and cultural performances were organized for students.

The second edition of Disney Friends for Change's"Conserving Green Spaces" programme was implemented by CMS with seven grantee schools in Delhi that undertook park restoration work. Summer Fields School, Kailash Colony was awarded the Best Project Award for using the waste material in a park and involving temple trust members in park development to ensure sustainability. KDB School, Ghaziabad was recognized for their vision of making their park a space for sparrows, and DLF Public School, Ghaziabad was recognized for demonstrating excellent community engagement in their work. They engaged with slum children to make them park rangers, and involved temple priests.

River Festivals in India, 2016

In 2016, the travelling edition of CMS VATAVARAN is organizing International River Festivals dedicated to seven large and small rivers of India.

CITY	RIVER IN FOCUS
Hyderabad	Musi
Mangalore	Netravati
Guwahati	Brahmaputra
Pune	Mula-Mutha
Ahmedabad	Sabarmati
Allahabad	Ganga
Tiruchirappalli	Kaveri

The objective of the river festivals is to celebrate the importance of these rivers through various activities

such as film screenings policy discussions, workshops, competitions, nature walks and cleaning drives. The focus of these river festivals is to delve into the various issues related to conserving and protecting these precious resources, such as river pollution, biodiversity habitats, the concretization of river banks and sustenance of the water flow and associated ecological flows. In each of the seven cities where the Traveling Festivals will be organized, there will be a conscious attempt to highlight the state

of water resources in a rapidly changing environment and the respective behavioural and policy change required to address the same.

CMS-ENVIS Centre

CMS-ENVIS is a premiere centre designated by MoEFCC to facilitate information dissemination and further the cause of improving awareness about the environment and sensitization. Its thematic focus is "Environment and Media".

The CMS-ENVIS website, hosted on the NIC server, was regularly updated with an RSS feed, TV news stories on YouTube channels, fully downloadable publications, online databases and research studies.

The CMS-ENVIS quarterly newsletter, *Green Voice*, came out with four editions in 2015–2016. The daily e-newsletter *Green Media* continued to reach more than 3500 people everyday.

The centre also engaged infocused research studies and analysis of media coverage and trends in environment news in the mainstream news channels and print media (Coverage in Indian News Media, COP 21 Paris—UN Climate Change Conference 2015).

The Wildlife Protection Society of India (WPSI) was established in 1994 with the primary objective of assisting the authorities with curbing poaching and the illegal wildlife trade. WPSI also focuses on human–animal conflict, conservation awareness and community support, including developing alternative livelihoods and promoting sustainable agricultural practices for communities living on the fringes of protected areas.

Support for Wildlife Law Enforcement

WPSI works in close cooperation with enforcement agencies to tackle wildlife crime in India. In 2015, WPSI provided enforcement agencies with information resulting in the registration of 28 wildlife cases across the country and the arrest of 70 alleged wildlife criminals. WPSI also assisted the Central Investigation Bureau (CIB) of the Nepal Police with information, which led to three seizure and arrest cases relating to tigers.

Anti-poaching Training Workshops

WPSI conducted a total of 52 anti-poaching and wildlife crime legal workshops in 2015.These were attended by 3067 forest and police officers. Through these workshops, we were able to provide crucial assistance to law enforcement agents in the fight against wildlife crime and to contribute up-to-date information on wildlife criminals and their ever-changing methods of operation. Illustrated presentations, demonstrations of various poaching methods and simulated crime scenes were used to inform the officials. WPSI's Katni-based lawyer, Ms Manjula Shrivastava, conducted training programmes on how to effectively document wildlife crime cases and other matters covered under the Wild Life (Protection) Act, 1972.

WPSI's Wildlife Crime Database

WPSI's Wildlife Crime Database was launched in 1995, and it has grown to become a robust and valuable source of information, with records that date back over 40 years. It currently contains records of 28,140 wildlife crime cases and mortalities of 453 species protected under the Wild Life (Protection) Act, 1972. In 2015, WPSI added 1548 new cases of wildlife crime and mortality from across India.

Information is shared with enforcement agencies, and this has proved to be particularly effective in monitoring inter-state wildlife criminals. Analysed information is also provided to like-minded NGOs and the media, with the objective of minimising wildlife crime and creating awareness on the subject, and to international bodies such as INTERPOL and CITES to inform strategic decisions and policy on illegal wildlife trafficking.

Secret Information Reward Scheme

Intelligence-led enforcement is vital for curbing wildlife crime, particularly in efforts to apprehend poaching gangs before they actually kill an animal. WPSI actively promotes a secret information reward scheme, using an awareness programme, local-language hoardings, posters, wall paintings and a 24-hour hotline, in villages throughout the tiger landscapes of central India. To reach a broader audience, WPSI has also started using radio and television announcements to advertise the scheme. In 2015, 51 poachers were arrested in 14 operations on the basis of information received through the reward scheme. Many more poachers are known to have stopped killing animals out of fear that they will get reported.

Human–Elephant Conflict and Conservation in Odisha

Odisha has the largest population of wild Elephants in eastern India and is key to the survival of India's remaining Asian Elephants. The Elephant habitat in Odisha is shrinking, and corridors are often disrupted by ill-conceived projects, including mining, new industries and canal networks. Wild Elephants are now forced to search elsewhere for food, and impoverished farmers often face huge crop losses and property damage from these disturbed Elephants. Every year, about 50 Elephants and as many farmers die due to the conflict. WPSI's programme seeks to mitigate threats to Elephants as well as address the ongoing human–Elephant conflict in the state of Odisha.

During 2015, in collaboration with the Wildlife Society of Orissa, WPSI focused on areas that have high levels of incidence of human–Elephant conflict and threats to wild Elephants from poaching and electrocution. A particular focus has been human–Elephant conflict mitigation in Dhenkanal and Athagarh forest divisions. Three field camps are in place, and WPSI has provided fire-fighting kits, hi-powered rechargeable searchlights and alarm systems to forest protection groups and assisted with compensation claims for Elephant crop raids and property destruction. WPSI have also conducted numerous awareness programmes and village meetings and brought to the notice of the state government problems such as sagging power lines, which result in the electrocution of wild Elephants, and dangerous open wells. Patrol equipment was provided to Dhenkanal Forest Divison, experiments were carried out on mitigation measures for crop protection against wild Elephants, protective guards

were designed for installation around open wells and constructed in three forest divisions, and a local-language booklet was produced about wild Elephants, their habits and issues related to the human–Elephant conflict.

Conservation Awareness in Central India

WPSI's Tiger Conservation Awareness Programme uses wildlife film screenings and interactions with village audiences to spread conservation awareness in hundreds of villages on the periphery of tiger reserves in central India. The programme is used to canvas WPSI's Secret Information Reward Scheme and to provide information on compensation schemes, the penalties for wildlife offences and government initiatives that the villages could benefit from.

During 2015, WPSI'sthree awareness vans conducted a total of 376 programmes with film screenings and meetings, reaching out to an audience of 74,915 people. Eight-one programmes were held around Kanha Tiger Reserve and in the Kanha–Pench corridor, with an audience of 10,855 people, and 96 programmes were held around Bandhavgarh Tiger Reserve, with an audience of 22,500 people. A total of199 programmes were held

in the Tadoba–Andhari Tiger Reserve landscape, which were attended by 41,560 people. During the monsoon, when the roads to the villages are impassable, the three vans visited 106 markets and distributed about 30,000 cards advertising the Secret Information Reward Scheme. Since the launch of WPSI's Tiger Conservation Awareness Programme, in 2011, in central India, WPSI's vans have conducted a total of 1310 meetings, with a massive outreach to approximately 2,53,200 villagers.

Community Support in the Sundarbans

WPSI started its Community Support Programme in the fringe villages of Sundarban Tiger Reserve in 2001 to encourage the local people to view their wildlife and forests as an asset to be conserved. The programme is run in collaboration with a small, local NGO called the Bali Nature and Wildlife Conservation Society (BNWCS). We work with the Forest Department to conduct joint patrols in the region to control illegal fishing and felling of mangrove trees and to detect any poaching or wildlife crime in the area. WPSI coordinates the trained, voluntary Tiger Rescue Team, which assists forest officials with rescuing and releasing Tigers that stray into human settlements. This has helped prevent unnecessary deaths of both Tigers and people in the area. WPSI also runs a kindergarten school for 62 children on Bali Island.

In 2015, WPSI held 28 small group meetings and two large meetings at its Tiger Conservation Centre on Bali Island. The topics ranged from Tiger conservation awareness to various livelihood options. WPSI also hosted the annual Mangrove Festival and other events during Wildlife Week, in collaboration with the Forest Department. Twenty-

one wildlife film screenings were held during the year on Tiger conservation issues at far-flung locations in the Sundarbans. The screenings received an overwhelming response, with large gatherings of local people. In November 2015, WPSI launched a 5-month anti-plastic campaign in collaboration with a local co-operative and funding from the Sundarban Tiger Reserve.

Livelihood Development

WPSI and BNWCS have been working with the Indian Council for Agricultural Research (ICAR) to develop alternative livelihoods in order to reduce the dependence of the local people on the mangrove forests. The work is being done in collaboration with the Central Institute of Freshwater Aquaculture (CIFA), Bidhan Chandra Krishi Viswavidyalaya (BCKV), Krishi Vigyan Kendras (KVK) and other subsidiaries of ICAR. Four local persons have been employed to implement the projects.

Small tractors with power tillers and seeding equipment have been provided. The equipment is kept at WPSI's centre and is loaned to local farmers for the cost of the fuel. Good-quality rice, lentils and vegetable seeds are being distributed. A small fish-breeding facility has been constructed at the WPSI Centre, from which hatchlings are distributed free of cost. In 2015, hundreds of chickens were distributed and vermi-compost pits were provided in several villages for production of organic manure. Organic cultivation and production of natural manure were also taught to the villagers to help them improve their crops. Local people received training in nutrition garden maintenance, poultry and agricultural practices and rainwater harvesting techniques

through land-shaping and basic knowledge of veterinary science.

To help women develop skills that will allow them to support their families financially, WPSI presently hosts 51 self-Help groups. Many of these groups also have micro-credit schemes. Workshops were held to teach skills in organic farming, pickle-making, mushroom-farming and poultry care. Farming equipment procured by ICAR—such as paddy threshers, sprayers, coconut climbers and pump sets—were distributed to the self-help groups.

Community Health Care

WPSI hosts weekly medical camps in the community hall at the Tiger Conservation Centre. Doctors from Kolkata, who generously donate their time for this cause, conduct the camps. If there are any major medical emergencies or operations are required,the villagers involved are sent to Kolkata. In 2015, four such operations were organised.

Other Programmes

Apart from the foregoing, WPSI conducted programmes for conservation awareness and human–animal conflict in Kerala and provided vocational training for Van Gujjar women in Uttarakhand. WPSI's legal programme supported the prosecution of important wildlife cases. WPSI participated in the drafting of recommendations and decisions regarding Asian big cats and pangolins at CITES.

Aaranyak

www.aaranyak.org

Aaranyak is a registered society working towards nature conservation in North-east India since 1989. Its strength lies in applied research in the biological and social fields, and the thrust area of the work is North-east India and the eastern Himalaya. Sincerely motivated towards protecting the rich biodiversity of the region, Aaranyak, which is based in Guwahati, Assam, has been steadily growing as a premier research-based organisation focused on biodiversity conservation. Aaranyak is recognised as a scientific and industrial research organisation (SIRO) by the Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India.

Workshops and Meetings

- A workshop for students was organised in Guwahati on 4 and 5 April 2015. The workshop was aimed at inculcating in the mind of students love for wildlife and using colours to draw various wild species and their habitats to enhance conservation awareness.
- Aaranyak made a presentation at "A drive for greening Tinsukia District *vis-à-vis* conservation of wildlife" organised by the District Administration, Tinsukia, and Digboi Forest Division at Digboi on 5 April 2015.
- The Wildlife Genetics Laboratory of Aaranyak at Guwahati organised a hands-on training programme on molecular marker applications and phylogenetics during 6–8 April 2015.
- Aaranyak supported local youths of Saraipung Range, Dehing Patkai Wildlife Sanctuary, with field guides on birds and mammals, for capacity building on 11 April 2015.
- A seminar titled "Challenges in Forest and Wildlife Conservation in Assam" was organised on 11 April 2015 at Guwahati.

- A talk and film shows on wildlife conservation were organised at Saraipung Forest Village, Dehing Patkai Wildlife Sanctuary, on 20 April 2015.
- A Hoolock Gibbon conservation training programme was held on 24th April 2015for the forest guards of Assam (fourth batch). The week-long residential course covered a wide range of topics: Biodiversity Conservation in North-east India, Primate Conservation in North-east India with Special Reference to the Hoolock Gibbon, Gibbon Censuses or Population Estimation, Gibbon Data Collection, Maintenance and Reporting, Techniques of Floristic Studies, Gibbon Habitat Characteristics and Restoration, Population and Habitat Monitoring, Gibbon Rescue and Rehabilitation, Global Positioning System and Use in the Field and Legal Orientation (Wildlife Laws and Their Application).
- A wildlife poster presentation and wildlife photo exhibition was organised on26 and 27 April 2015 at Bonkual High School (near Kaziranga National Park).
- As part of Aaranyak's Elephant conservation initiative at Dehing Patkai Elephant Reserve, in Digboi Forest Division, 40 pairs of raincoats were distributed among the forest staff.
- A workshop on captive breeding of the Magur fish was organised on 16 May 2015at Saraipung forest village.
- International Day for Biological Diversity was observed at Sonakhuli ME School, Srijangram on 22 May 2015.
- On "World Turtle Day", an awareness programme was held for school and college students of Hajo at Bishnuram Medhi Shishu Kalyan Bhawan on 23 May 2015.

- A series of four-day workshops on Elephant conservation titled "Haati Goes to School" were organized at different locations in Assam, from 27 to 30 May at Jorhat, 9 to 12 June at Kaziranga, 17 to 20 June at Golaghat and 6 to 9October at Majuli, which provided training to groups of high school teachers from the Elephant conflict areas.
- Nearly 2000 saplings of various local trees were planted in about 2 hectares of severely degraded forest land in Subankhata Reserve Forest,Batabari Range, in Baksa District on 5 June 2015.
- A workshop on wildlife crime and its legal aspects was organised in Digboi on 12 June 2015. The participants included police and forest personnel, students, local NGOs and the media.
- Aaranyak joined a regional training programme titled "Hands-on Training of Community-Based Flood Early Warning System", conducted by ICIMOD at Kathmandu, Nepal, from 8 to 12 June 2015. The team was accompanied byofficials from the District Disaster Management Authority of North Lakhimpur and Dhemaji districts.
- A programme titled "Training on Cutting and Tailoring" took place from 10 to 16 July 2015 at Subankhata's Uttar Kusi village, in Baksa District, Assam. The participants were tutored in the basic steps of measurements, cutting and tailoring.
- A teachers' training programme was held on 20 and 21 July 2015 at Uttarkuchi, which was aimed at creating environment awareness, with special reference to human–Elephant co-existence.
- In an effort to encourage the exemplary work undertaken by them, Aaranyak, in association with the Jokholabandha police, distributed raincoats, shoes and torches among the VDPs of 14 villages in Jokholabandha.
- The Geo-spatial Technology Application Programme (GTAP) team organised multiple training programmes titled "Remote Sensing, GIS and GPS Application in Various Fields" in 2015.
- A week-long Summer School Programme was organised from 25 July to 31 July 2015 for the under-privileged students of class I to class X of the Subankhata area, near Manas Biosphere Reserve. The emphasis of the training was to impart environmental education to the students with special reference to the Elephant.
- A 3-day intensive capacity-building workshop for grassroots-level environmental NGOs of Assam was held from 7 to 9 August 2015, in Guwahati. The purpose of the workshop was to build various skills of grassroots-level environmental workers.
- An awareness programme was carried out in Nopara, near Dadara, for a group of 65 women. On the occasion of Janmastami, the women participated in *Naam* (religious songs) and offered prayers for the upcoming breeding season of the Greater Adjutant Stork with the message "Hargilla ...You are safe in our village".
- A mass rally was organised on 6 September 2015 at Kahitema, adjacent to Manas National Park, to increase and encourage community participation. Over 400 people participated in the mass rally, in addition to school children from several different schools in the area.
- The "Rhino Goes to School" awareness campaign travelled to schools in the fringe areas of Kaziranga National Park on the northern side, in Biswanath Range. The programme was organised during 12–15 October 2015and reached out to students and teachers of eight schools in the area.
- A campaign for awareness about conservation of the One-horned Rhino was initiated at Laokhowa and Burachapori, from 1 to 3 October 2015, by Aaranyak. Street plays with conservation messages were enacted in several places in the area to generate interest and make the message clear for common people.
- In conjecture with the Wildlife Week celebrations, a Greater Adjutant Stork awareness meet was held at the Sensowa Amar

Borkakoti High School, Nagaon, on 6 October 2015.

- An awareness campaign and field trip was conducted for the students of Dirak HS School (Kakopathar) on 17 October 2015. A presentation on Asian Elephants and butterfly diversity was also made.
- A workshop titled "Climate Change, Remittances and Adaptation in Upper Assam" was organised in Guwahati on29 October 2015.
- On the occasion of Children's Day, on 14 November 2015, a life-size replica of the Greater Adjutant Stork was gifted to Sankardev Sishu Niketan, Dadara.
- An orientation workshop on green reporting was held on 22 November 2015. The purpose of the workshop was to stress the critical need for environmental journalism in the region.
- Aaranyak organised a 5-day training programme between30 November and 4 December 2015 at Gibbon Conservation Centre. The programmewas for students, teachers and NGO workers of North-east India.
- A wall painting initiative was carried out around Dehing Patkai Wildlife Sanctuary, where budding artists of Saraipung painted their school walls with the colours of conservation on 4 December 2015.
- The Wildlife Genetics Laboratory of Aaranyak organised a training programme on genetic population estimation of wildlife species for forest department officials from Bhutan during7–13 December 2015.
- In a bid to assist and encourage the exemplary work of the casual staff members of Pobitora Wildlife Sanctuary, Aaranyak distributed warm jackets amongthem on 17 December 2015.
- The Water, Climate and Hazard (WATCH) Division of Aaranyak participated in the India-ICIMOD Week events at the MoEFCC premises in New Delhi during 11–15 December, 2015.
- To promote eco-tourism in the area, a capacity building training for the local youths and frontline staff of forest department was successfully conducted at Burhachapori Wildlife Sanctuary on 25-27 December, 2015.
- To inculcate mass awareness towards protection of Greater one-horned Rhino in Manas National Park, many educational activities were carried out on 29 December, 2015 in Bhuyanpara Range of the Park. Two rallies, one from the Bhuyanpara Range Office and another from the Lawkhibazar, Kokilabari had been organised to sensitise the local community.
- Aspiring wildlife researchers from all across India attended the Certificate Course in Wildlife Research Technique, from 5 to 7 January 2016.
- A residential nature camp was arranged at Dehing-Patkai Wildlife Sanctuary from 30 January to 1 February 2016.
- A training programme on conducting elephant censuses using the indirect method was held for the staff of Ripu Chirang Elephant Reserve, from 2 to12 February 2016.This reserve stretches from Haltugaon Division to Udalguri Division.
- Aaranyak conducted a study tour on 16 February 2016 for the frontline staff of Dehing-Patkai Wildlife Sanctuary in which they went to Dibru Saikhowa National Park, Assam. During the trip, the participants were oriented to bird watching and aspects of wildlife conservation.
- Forest guards of Assam underwent training in Hoolock Gibbon conservation from 19 to 21 February2016. The training was held at the Gibbon Conservation Centre, Hoolock Gibbon Wildlife Sanctuary, Assam.
- A capacity building training programme was held at Khonoma village, in Nagaland, on 26 and 27 February 2016. Khonoma has created for itself a unique identity in the conservation arena and has received global appreciation for its community-based conservation practices.
- A 2-week long training programme in basic patrolling techniques and data management was conducted for the forest staff of Manas National Park at Bhuyapara Range from 29 February to 12 March 2016. This programme is the first to be held under the Manas Tiger Conservation Programme (MTCP),which will strive to double the number of wild Tigers at Manas in the coming decade.

- Aaranyak and WWF-India successfully conducted training programmes at Kaziranga from 21 to 24 March 2016 to capacitate a group of vibrant youths as naturalists.
- A micro-enterprise development training programme was provided to five woman self-help groups from Golaghat District on 29 and 30 March 2016.
- A training programme in database management was conducted on 8 and 9 April 2016 at Research Division Office, Guwahati.
- Aaranyak initiated an Elephant conservation awareness campaign titled "Asiyo haatir bidyalay yatra" (Asian Elephants' journey to schools). It is being conducted in schools of Golaghat District, in Assam.

Research Activities

- A reconnaissance was conducted to understand the socio-economic status of the villages on the southern fringe of the reserve to plan a detailed socio-economic survey and assessment
- For the first time, the population of Asian Elephant has been assessed using an indirect dung count method in Dehing Patkai Wildlife Sanctuary. The present use of the three Elephant corridors (Bogapani, Golai and Katha) was assessed for the first time.
- Analysis and GIS mapping of areas between Deepa rBeel and Rani Reserved Forest were carried out in different time periods.
- Large-scale maps of Jorhat Municipal Corporation areas were prepared using remote sensing, geographical information systems and gield GPS data.
- The distribution of the Asian Box Turtle *Cuoramouhotii* in North-east India was mapped. The effect of forest management on amphibians, which are indicators of ecosystem health, in Lower Dibang Valley, Arunachal Pradesh, was studied. The distribution and status of the Asian Box Turtle *Cuoramouhotii* in Lower Dibang Valley, Arunachal Pradesh, were successfully determined.
- Theresearch project titled"Status and Trends in Wetlands with Reference to Hydrological Connectivity, Climate Change Impacts and Implications for Biodiversity and Community Livelihood: A Study in Deepor Beel, Kamrup (Rural) District, Assam" was completed.
- The research project titled "Strategic Urban Planning on Climate Change Resilience of Jorhat, Assam'
- The research project titled "Enhancing Community Resilience to Floods by Facilitating Integrated Flood Management and Providing Early Flood Warning in Selected Rivers in Assam' was completed.
- The first-ever genetic study on the Critically Endangered White-bellied Heron in Bhutan was conducted in collaboration with the Royal Society for Protection of Nature, Bhutan.
- Genetic population monitoring of the Tigers in Pakke Tiger Reserve, of Arunachal Pradesh, was carried out jointly with the Forest Department.

Awards Received

- Sansad Adarsha Gram Yojana—Good Practices Award was presented by the Ministry of Rural Development, Government of India, in September 2015 for Good Practices in the Rural Development Sector under Sansad Adarsh Gram Yojana (SAGY).
- Purnima Devi Barman, Project Officer, Greater Adjutant Stork project, was conferred the prestigious India Biodiversity Award 2016, by UNDP, Ministry of Environment, Forest and Climate Change and National Biodiversity Authority of India.

Foundation for Ecological Security (FES) works towards centre-staging an ecological agenda alongside priorities of economic growth, reorienting progress with conservation and social justice perspectives and presenting local visions and voices at local and global levels. Currently, FES works with 11,618 habitation-level institutions for improved management and governance of 3.93 million acres of common lands and reaches out to 6.51 million people.

During the year, FES received an award for restoring grasslands in India, in the organisation category, during the XXIII International Grassland Congress, held in New Delhi in November 2015. The award was presented by Shri Radha Mohan Singh, Hon'ble Minister for Agriculture and Farmers Welfare, Government of India.

Workshops and Meetings Conducted

Continuing its efforts of engaging with communities, civil society organisations and other stakeholders for building capacities in the management of natural resources and sharing of lessons, FES conducted a series of meetings and workshops across its project locations.

- In collaboration with the US Forest Service, Forest Plus and Wildlife Institute of India, FES organised a workshop titled "Forests within Landscapes: Connecting Forests with Farming Systems in the South Asia Region" in February 2016 at Udaipur. Fifty-two participants, including practitioners with backgrounds in science and forest bureaucracy participated in the workshop. Representatives of NGOs from Bhutan, Nepal, Bangladesh and Sri Lanka and officials from the US Forest Service were among those who participated in the workshop. Besides discussions centred around the value of forests in farming systems (in providing water and nutrients and serving critical functions such as pollination and pest control) and the critical links of forests with the broader landscapes within which they are located, there were deliberations covering issues involved in the governance of forests at a landscape level so as to help build a larger farmer constituency for conservation.
- In Odisha, one state-level workshop on community forest rights (CFR) was conducted. This multi-stakeholder workshop saw the attendance of about 100 participants, including government officials, NGO members and community representatives (including members of Forest Protection Committees from 20 districts of the state). FES also hosted a national-level workshop, attended by 25 NGOs, to highlight the need to address post-CFR issues. The deliberations of the consultation, challenges and opportunities in the post-CFR scenario and a possible roadmap for the future are captured in the report titled "Post-CFR Scenarios in Central Indian Landscape: Prioritising Issues and Developing Support Mechanisms" (http://fes.org.in/studies/post-cfr-scenarios-central-indian-landscape.pdf). In addition to this, three district-level workshops were organised, in Boudh, Kalahandi and Sundergadh districts of Odisha, which were attended by NGOs, district-level government officials, forest rights committees and forestry networks, who shared their views and experiences in facilitating the CFR claim process in the state.
- A series of workshops was conducted in Nagaland with 26 Community Conserved Area (CCA) Management Committees, Village Councils and other important village institutions to support them with preparing CCA management plans.
- FES, through the Prakriti Karyashala (Rural Colleges), conducted more than 800 training programmes covering different aspects of natural resource management and biodiversity conservation, for around 32,500 participants, including members of rural communities, village

institutions, panchayats and NGOs and government officials.

Research Activities Undertaken

- FES continues to monitor the long-term ecological health indicators using comprehensive Ecological Health Monitoring (EHM) framework. The assessment of bird diversity in one watershed showed that in comparison to 93 species in 2009, 13 additional species of birds such as Asian Palm Swift, Brown Fish-owl, Eurasian Hoopoe were enlisted in the new survey. Woolly-necked Stork, coming under the IUCN threatened category, was also recorded during the survey.
- A pollination study was undertaken in Kalyanpura watershed, Bhilwara to assess the pollinator diversity and the nature of pollinator habitats. The availability of bee nesting sites and diverse foraging resources were assessed in the watershed.
- To build economic evidence, surveys were conducted in two locations using the International Forest Resources and Institutions (IFRI) framework and Natural Resource Accounting System (NRAS) framework. A village in Rajasthan recorded a gain of INR 15.6 million, including standing biomass against an investment of INR 4.16 million on 125 acres of common land over a period of five years whereas a village in Odisha showed total direct and indirect gain including standing biomass to be INR 51.11 million which is almost 75 times the initial investment over a period of twenty-seven years. Both the cases highlight the value of secure tenure rights and local institutional arrangements for achieving better ecological and economic outcomes.
- FES in collaboration with Arizona State University and the International Food Policy Research Institute undertook Simulation Games for Strengthening Collective Action towards the management of Groundwater as Commons. The games, focusing on both access and over-exploitation issues; on one hand, tried to bring effective governance of groundwater as a common property and on the other hand tried to ensure that small and marginal farmers to have reasonable access to groundwater resources.

- Two phases of river ecology assessment recorded 18 different endemic fish species in Dikhu River, in a stretch of around 55 km along T(D)GZ and Nanga Greener Zone (NGZ). The study revealed negligible pollution though silt deposition was observed due to erosion. Kohima Science College and Dibrugarh University provided technical support for the study.
- 15 CCAs were supported in mapping their boundaries and the respective village councils have ratified their maps. Till now, 22,000 hectares of forest lands has been covered under the initiative.

Events Organised

- In Maharashtra, following the launch of "Jal Yukt Shivar Abhiyaan, which is aimed at making Maharashtra drought-free, FES initiated the River Revival Campaign with the support of the district administration of Yavatmal. This resulted in the initiation of a multi-stakeholder process, including the District Planning Committee in Ghatanji Block of Yavatmal District, for reviving the Waghari River. The campaign has encouraged the communities to look at pasture restoration as a key driver for restoring water flows and has helped the revival of MGNREGA activities, which were almost defunct in the district.
- During the period, FES took an active part in unfolding the Mukhyamantri Jal Swawlamban Abhiyaan (MJSA—Chief Minister's campaign

for Self-sufficiency in Water) in Rajasthan. Nominated in the state- and district-level committees of MJSA in Bhilwara and Udaipur, FES participated in various state- and district-level workshops and provided critical inputs for the restoration of water bodies through the campaign.

- FES leveraged the celebration of World Water Day (WWD) to initiate discussions around various issues related to water such as availability, better irrigation and cropping techniques, crops that consume less water and improved governance for strengthening collective action around water in its project locations. Workshops, *Kalajathas* (local folk dances and storytelling), federating meetings, etc. were used as the medium for bringing people together on one platform.
- A total of 150 rural volunteers, federation members, community leaders and MGNREGA beneficiaries participated in the 100-day Jabab Dehi Yatra (a walk for accountability), organised in Rajasthan, which provided an opportunity for cross-learning for participants about MGNREGA and various social justice schemes, especially related to pension.
- Women's Day celebrations were organised in the Rajasthan project areas. Women marched from village to village, singing slogans pertaining to women's education, health, leadership and capacity and capability to excel in all fields. This was followed by a discussion to generate awareness regarding women's health, education, participation in the preparation of village development plans, MGNREGA, overall development as well as empowerment. *Kalajathas* were also used as a tool for dissemination of information.

Follow-up on National Biodiversity Targets

- The Indian Biodiversity Information System (IBIS)was enriched with the launching of the Flora Portal, which has extensive information on a total of 21,764 species, 515 sub-species, 2514 varieties, four sub-varieties, 58 formas and one sub-forma belonging to 3667 genera, 271 families and 50 orders. IBIS-Flora follows the bird and mammal portals (titled AVIS-IBIS and IBIS-Mammals), while reptiles, amphibians and spiders are next in line.
- “India Observatory”, an FES initiative, is aimed at providing rural communities access to reliable and up-to-date data for better stewardship of natural resources. India Observatory will present, in a demystified form, comprehensive information about India's biodiversity, ecology, rural demographics, etc., to guide decision-making at local, regional and national levels.
- FES participated in Great Backyard Bird Count-2016 with an aim of involving rural communities, rural volunteers and students in identifying and counting the birds in their locality. Of the 137 species recorded, 11 species are listed in the category of IUCN Red List of Threatened Species.
- Checklists of 148 birds in NGZ; 55 birds in Pauna CCA; 59 birds and 34 butterflies in Yaongminchen CCA and 51 birds and 25 butterflies in Sakraba CCA were made during a biodiversity assessment exercise in Nagaland, which was conducted with the active participation of the youth of the CCAs.

Regional Center for Development Cooperation (RCDC) has been making an effort to protect and manageresources of local communities sustainably through people-led development processes and working with local and regional institutions for the community's traditional knowledge, beliefs, institutional unity and collective action.

RCDC campaigned continuously for community conservation of forest, water, land and biodiversity resources in 54 villages in 2015–2016 keeping in view the Forest Right Act, PESA and Biodiversity Act. Besides, an attempt was made to implement the post-FRA plan and include a community-prepared environment and biodiversity conservation and implementation plan in the working plan of the forest department. Discussions were had with different government departments, research institutions, academicians and networks for protecting sensitive eco-zones and using them sustainably. An environment protection calendar and Parivesh Jagna were organised by the community on a regular basis to overcome threats and challenges faced by the environment and biodiversity at different times. The details are provided here:

- Community biodiversity calendar (prepared in eight villages and presented at the Gram Sabhas)
- Community Forest Rights (protection of community forest resources within the customary boundaries by villagers of 140 villages)
- Post-FRA plan (54 villages)
- Protection of ecologically sensitive areas and sustainable use
- Parivesh Jagna (oath-taking among forest protection committees and villagers)
- Biodiversity assessment and protection campaign (exchange of knowledge among students and forest protection committees)
- Let Us Learn and Make Learn campaign (knowledge-exchange among farmers and *baidyas*)
- Disaster assessment by community (impact on forest health, environment, animals and forest adjacent to agricultural land)
- Involvement of youth and women in the protection of the environment and biodiversity (linking up local resource protection and management-related traditional festivals with forests, the environment and animal protection)
- Seed, food and biodiversity festival (knowledge-exchange and demonstration among local farmers, NTFP collectors and *baidyas*)
- Training in CFR and role of Gram Sabha at district and state levels
- Setting up mangrove nurseries and mangrove plantations in coastal areas

Follow-up on National Biodiversity Targets

- National Biodiversity Award (shortlisted)
- Printing and publication (*Ama Jangala Amara* (*Our Forest Is Ours*), *Jhar Darab* (*Forest Produces*))
- Identification and protection of 78 RET species
- Community nursery and seed-sowing for conservation of rapidly declining species
- Food forest (*exsitu* and *insitu* conservation of RET species)

Keystone
A GROUP FOR ECO-DEVELOPMENT INITIATIVES

Keystone Foundation has completed nearly 17years in the Nilgiris, working with indigenous communities on eco-development initiatives. The foundation's work has been concentrated in the areas of apiculture, micro-enterprise development, non-timber forest produce, land and water management, revival of traditional agriculture and other issues concerning indigenous communities.

The goal of Keystone Foundation is to work on issues related to natural resources and rural development, with indigenous people in mountainous and adjoining regions, addressing the challenges of conservation, livelihoods and enterprise development, through appropriate knowledge and action, technologies, socio-economic innovations and institutions.

Forest and Beauty Case Study—FAO

NTFP-EP, with the support of the Food and Agriculture Organization of the UN (FAO), conducted case studies on forest resources that are used for beauty products in the cosmetics, personal care product and perfume industries. Wild Turmeric, or *Curcuma aromatic* Salisb, and Soapberry, *Sapindus emarginatus*, were chosen by Keystone Foundation for the study in India. Twelve other case studies were being conducted across the region. The findings of the study were shared at the Asia Pacific Forest Week (APFW), held in Manila. The Forest Spa was one of the introductory and promotional events for the mini-seminar titled “Forests and Beauty” held at the APFW. The case studies were undertaken by Anita Varghese and Shiny Miriam Rehel. Shiny also took participated in the result-sharing event held at Manila as part of APFW.

Human–Wildlife Interactions in the Western Ghats

With increasing attention being drawn towards negative interactions between humans and wildlife, understanding the nature of these interactions has become crucial. Continuing from last year, the conservation team, in partnership with NNHS, conducted a series of stakeholder workshops at Kotagiri, Coonoor and Kodaikanal between April and October 2015. The workshop at Kodaikanal deserves special mention just because of the turnout of interested/affected people as well as the overall participation in terms of ideas and opinions. This workshop was organized in association with the Palni Hills Conservation Council.

The intent of conducting these workshops was to understand the interactions at the micro (individual/subjective) level as well as the macro (institutional/agency) level. The insights gleaned from these workshops were very valuable and offered many ideas on factors that could increase negative interactions between humans and wildlife and other factors that could help mitigate the same. There were also instances of people wanting to understand how best they could mitigate negative interactions on their own.

A culmination workshop was also organized at Kotagiri in October 2015. Over 20 participants from different conservation groups, including NCF, WWF, FES, WRCS, Shola Trust, Edhkwehlynawd Botanical Refuge, media institutions and the Forest Department (Nilgiris North, Nilgiris South, Gudalur and Mudumalai Tiger Reserve), were present and were involved in a 2-day deliberation of how we understand negative interactions between humans

and wildlife, as well as the best way forward. This workshop provided a very deep and clear insight into the areas that will need to be worked on and strengthened to help reduce and mitigate conflict.

Apollo Tyres—Engaging with Businesses

The Apollo Tyres Foundation (ATF), the corporate social responsibility entity of Apollo Tyres Limited, Gurgaon had engaged Keystone Foundation to design and conduct a biodiversity assessment study of their plant at Chennai and a buffer area of 5km^2 around the plant. After many field trips during the year 2014–2015 to the site and assessment of the biodiversity, the conservation team prepared a biodiversity enhancement plan for the plant and the area around it. After the submission of the final report, the ATF gave Keystone Foundation another smaller assignment to understand the ecological requirements and develop a management strategy for enhancing the growth and quality of the teak plantations in Tiruvannamalai District, Tamil Nadu, as a part of their carbon offsetting programme.

Exploring Cultural Imaginations of Landscapes through Folklore

While conservation activities seek to promote co-existence, incidents of negative interactions between humans and wildlife are on the rise. This project attempts to explore imaginations of the landscape of different indigenous communities within the Nilgiri Biosphere Reserve. The Paniya community from Nilambur and Sholigas from Punanjanur are the communities in which these imaginations are being explored. The project also hopes to create an archive of folklore and indigenous knowledge from these communities as well as form a network of storytellers from within the community and maybe across communities as well. This folklore would help us gain a historical perspective towards understanding how people and wildlife have co-existed as well as the different uses of landscapes they might have.

Youth Environmental Leadership Programme (YELP)

YELP was conceptualized to enable individuals to use different skills and modes of communication to talk about the environment and other issues from their respective areas. The first phase of the programme was a month-long wildlife photography and nature filmmaking workshop conducted in collaboration with Dusty Foot Foundation and Green Hub at Hasanur in February 2016.

Eleven students from Pillur, Sigur, Dhimbam and Punanjanur participated in the workshop. The schedule was an intense one, with the students being kept occupied from early in the morning to late in the evening. Skills required for photography, filming and editing were imparted at the workshop. Along with this technical skill set, participants were also provided information and training on how to understand birds, plants and reptiles better.

All 11 students completed the workshop successfully, and for their final assignments, each group was asked to make a 5-minute film, resulting in three films that were conceptualized, shot and edited by the students themselves. Seven students were picked from this group and were asked to conceptualize another story/issue that they feel deserves attention and to produce a 10-minute film.

Restoration of Urban–Rural Landscapes with Forest Species

The native species nursery is located at the Keystone campus in Kotagiri, Punanjanur and Sigur. About 103 saplings were planted at Karimara and Hubbathalai (Coonoor) as part of the wetlands/spring restoration work this year. Over the year, around 3456 saplings of 25 species were raised in the three nurseries. Saplings have also been given to individuals to be planted in their land. Pollinator-friendly plants have also been raised in the nursery to develop a pollinator garden. Bees, butterflies and other insects forage on the plants, and thus the insect diversity in the area is improved. Training programmes were conducted for forest officials, and nurseries were set up for individuals.

Sacred *Elaeocarpus* in the Nilgiris

Keystone Foundation engaged with the Nilgiri Natural History in a study commissioned by the Indian Natural Trust for Arts and Cultural Heritage (INTACH) to undertake a survey of the status of *Elaeocarpus* trees, which were venerated in the Nilgiris. Surveys and interactions were carried out with the Badaga community of the Nilgiris.

WWF-India is working for promotion of nature conservation and environment protection as a foundation for sustainable and equitable development throughout India. It has identified country's most critical regions and priority species that characterize the country's natural heritage and is working to improve their health and numbers through action on ground, policy interventions and positive campaigns. Through its various projects, WWF-India contributed to 5 of the 12 national biodiversity targets during 2015-16. The actions taken are briefly described as per the indicators described for each of the targets in 'India's Fifth National Report on the Convention on Biological Diversity 2014.

Target -1

Involvement of youth

In its efforts to reach out to the youth with the objective of raising awareness about India's wildlife and environment amongst young students, WWF-India conducted 8th edition of the Wild Wisdom Quiz, in partnership with the Ministry of Earth Sciences. The quiz received participation from 600 schools and had 36,000+ registrations, both online as well as on-ground.

The WWF Volunteers programme's objective is to tether volunteering engagement from the youth, employees of corporates, senior citizens and educational institutions who wish to give back to the community and get involved in conservation opportunities. Since its launch in January 2016 till March, 1700 volunteers from across India have signed up till March for 32 different projects in five states.

Engaging Institutions in creating Environemntal awareness

The pilot project of WWF-India's programme EK PRITHVI – Conservation Leadership through ducation, was launched at the DIET office in Leh, Ladakh. The programme aims at building conservation leadership among students and teachers in Ladakh through experiential learning, exposure to nature and engaging students in action for conservation. A two day training programme was conducted for 142 participants including teachers, DIET master trainers and pupil teachers from the Leh and Kargil district of Ladakh.

WWF - India engaged with over 300 community members from the Ganga basin in assessing the health of the river.

WWF-India organized a mass environment education programme, reaching out to 2000 villagers in 13 villages, in the Ranthambhore-Kuno wildlife corridor, connecting Ranthambhore to the forests of Kuno in Madhya Pradesh.

An awareness programme was organized in Central India i.e. Kanha-Pench walk. The 120 km walk invloved 34 participants from across India. The event helped to gain insight of the rich biodiversity of the region and to learn from the forest dwellers, the way of harmonious co occurrence with forests and wildlife.

A month long campaign on “Zero Poaching” was organized to sensitize students and villagers around

the Corbett landscape. The Campaign reached out to approximately 1275 school students and 5330 villagers.

During the wildlife week 2015, WWF organized 38 awareness programs on wildlife conservation in the entire landscape covering around 10,000 school children, villagers, forest staff and local media.

Target 2

Number and coverage of studies- The Economics of Ecosystems and Biodiversity (TEEB)

WWF-India, in partnership with CMFRI Kerala conducted economic evaluation of the clam fishery certification in the Ashtamudi lake in Kerala. A complete valuation of fisheries in the lake ecosystem took into account not only the direct revenues and costs of the fishery, but also the broader environmental and social costs and benefits that fishing and fish trade provide.

Climate change adaptation and mitigation measures formulated/ implemented

Six districts (Moradabad, Bareilly, Bijnor, Shahjahanpur, Kanpur and Fatehpur) of Uttar Pradesh were selected as pilot for implementation of the climate adaptation programme, after analyzing the weather data for 9 districts. Threat mapping exercises were subsequently carried out in consultation with communities and government officials in the 6 districts through Participatory Rural Appraisals (PRAs) which highlighted the community's perception of threats to the river and possible solutions in 39 villages spread across these districts.

A vulnerability assessment in Sikkim was conducted for the Upper Teesta River Basin focusing on the villages of Lachen and Lachung. The aim was to understand and identify the current physical and social vulnerability of the area and to understand the stakeholder's views, causes and measures for adaptation to reduce the vulnerability.

Studies on economic and noneconomic valuation of selected ecosystem services

In an attempt to address loss of wetland functions, WWF – India undertook a study on the 'Valuation of Ecosystem Services of Kunigal Wetlands in Bangalore' to assign economic values to the important roles played by these wetlands. Under this an index (titled as “Ecosystem Dependency Ratio”) showing the relative dependency of the local community on the ecosystem services has been devised for the first time. The most important contribution of this study is the creation of a replicable framework for assessment of ecosystem services of wetlands in India.

A study was conducted to assess of the values of ecosystem services in the Terai Arc Landscape (TAL). The value of ecosystem services turned out to be INR 27,784.56 million – with 2005 as a base year. This indicates that if the TAL ecosystems are destroyed, the damage cost as per the figures of 2005-06 will be INR 27,784.56 million (USD 0.62 billion considering 2005-06 exchange rates). At 2014-15 prices, this turns out to be INR 47,452 million (USD 0.79 billion with 2014 exchange rates), considering WPI as the adjusting factor (or inflator/deflator). This implies that that a decline in forest cover brings about a more than proportionate decline in the value of ecosystem services –a clear testimony that the rural poor actually lose out more when forest cover is lost.

Reflection of biodiversity and ecosystem services in policy decisions, planning and reporting processes

The findings of the impacts of riverbed mining in the Baur river, Kosi-Dabla and Nihal-Bhakra wildlife corridors in the Terai Arc Landscape in Uttarakhand have been presented to the State Level Monitoring Committee set up by the Uttarakhand Government to improve governance of the extractive sites and reduce disturbance to wildlife.

Engagement with the Chhindwara Forest Division and Western Coalfields Ltd. is underway to promote better mining practices and restore functionality of this corridor by restoring abandoned mines.

Quick action in the form of rapid surveys, impact analysis, development of alternative recommendations and advocacy at multiple levels led to a commitment from the National Highway Authority of India for construction of vehicle overpasses and animal underpasses at appropriate sites along the proposed highway expansion plan for NH 125 passing through the Kilpura-Surai-Khatima corridor in Uttarakhand.

Target 3

Changes in water quality

With the objective to improve the water quality in Ramganga river and to prepare a water risk mitigation plan for Moradabad industries and tanneries of Kanpur, WWF-India entered into strategic partnerships with Indian Institute of Technology and consortium of metal industries (Export Promotion Council of Handicrafts; 900 metalware units) for water risk, footprint assessment and a green finance strategy. It has been successful in initiating 10 pilots in metal ware units in Moradabad with pilot design initiated for 10 leather units in Kanpur. Additionally, the programme has been successful in establishing a UK buyers' platform to support sustainable business linkages in the Ganga basin.

Target 5

Area under organic farming/ integrated pest management/organic farming certification

organic Manure and vermicompost

With objective to reduce pressure of intensive agriculture on natural ecosystems, it engaged with 50 farmers on pilot basis in Pench-Satpura wildlife corridor (Chhindwara district) of Madhya Pradesh to align them with National Programme on Organic Production (NPOP) certification of APEDA. All the farmers have got ICS – 1 from APEDA. To adhere with the NPOP standards, required trainings on nutrient management, pest management, and harvest management were given to the farmers.

Trends in Groundwater Table

WWF-India is working on Ground Water Development through demand management approach with about 25,000 farmers growing water intensive crops of Sugarcane and Cotton in water stress regions. For this, WWF-India has undertaken following steps to enhance the water table:

- Understanding the water balance of intensive water use and water-stress regions through geo-physical analysis and understanding the demand pattern of water in given hydro-geology.
- Establishing scenarios to predict the impact of demand pattern on availability.
- Developing innovative technologies to address the issue of water.

Awareness levels of farmers

More than 61,000 farmers were given training by WWF-India on integrated pest management (IPM) in high footprint region of cotton production in India. Of these, 67% farmers received Better Cotton Initiative (BCI) License for IPM. To provide specialized training, team of known specialist in the area of IPM were hired by the WWF-India in the state of Punjab, Gujarat, Maharashtra and Telengana.

Farmers in 39 villages in 6 districts of Uttar Pradesh were trained in the use of Best Management Practices (BMPs). These BMPs include the use of Micronutrients, in addition to Bio Manure, Bio Pesticides and Package of Practices for wheat, paddy and sugarcane. As a result, 3340 farmers are adopting climate smart agriculture and water management practices. A decrease in input cost by

40%, a saving of 385 liters of water per hectare and a subsequent increase in production of wheat by 30% has been reported.

To provide access of information to the farmers in state of Punjab and Gujarat, WWF-India has developed an interactive android based application. The application has inbuilt solutions on most frequent queries of the farmers and also provide option to farmers to interact directly with the scientist on specific problems.

Certification of fish produce

WWF played instrumental role in getting Clam Fisheries certified by world renowned Marine Stewardship Council (MSC). The short-neck clam fisheries of Ashtamudi Lake in Kerala is the first in India to receive such a sustainability certificate.

Target 6

Other area-based conservation measures

In 2014, A community Forest Resource Use area was recognised over 400 sq. kms in Vazhachal for the particularly vulnerable tribes called Kadars and Malayars. All 9 settlements of the tribes have come together to conserve, use it sustainably and manage the area. This is a crucial wildlife habitat for Tiger and Elephant as well as the four species of horn bills. Another very important conservation step taken by the tribes is that the fishermen agreed to stop fishing during the fish breeding months of June–July 2015. This was made possible after training on sustainable fishing for 50 fishermen from 9 villages in collaboration with the National Bureau of Fish Genetic Resource, Kochi.

Population trends of selected species (16 IDWH and their habitats): WWF-India contributed to conservation of following 7 species under IDWH.

Indian Rhino: In the last two years, 14 calves have been born in Manas National Park to rhinos translocated under the Indian Rhino Vision (IRV) 2020 programme launched a decade ago to revive the rhino population in Assam. The rhino population in Manas reached 33 in 2015 from zero in 1999

To boost use of wildlife forensics in controlling rhino poaching, three relevant personnel, one each from Ministry of Environment and Forest & Climate Change (MoEF&CC), Wildlife Institute of India and WWF-India underwent a WWF-India funded training program on Rhino DNA Indexing System (RhoDIS) at VGL laboratory, Pretoria University and Kruger NP, South Africa in September 2015.

Nilgiri Tahr: WWF-India published and distributed its Nilgiri Tahr study report to major stakeholders. The report has been endorsed by the Kerala and Tamil Nadu forest departments and state governments. A stakeholder meeting to implement the findings of the report is planned towards end of 2016.

Snow leopard: Five individuals were identified from camera trap images proving the presence of snow leopards for the first time in North Sikkim. To manage human snow leopard conflict in Ladakh, 15 predator proof corral pens were constructed with communities that collectively protect more than 1500 livestock, thereby providing livelihood security to the mountain communities as well as reducing risks of retaliatory killing of snow leopards.

River Dolphins: In collaboration with the National Mission for Clean Ganga, WWF-India prepared an operational strategy for the Dolphin Action Plan 2010-2020. A workshop on Dolphin Conservation Action Plan for the state of West Bengal was organised in Kolkota.

Great Indian Bustard (GIB): WWF-India initiated a 3-years project on 'GIB conservation in Desert National Park, Rajasthan' A survey for GIB in Gujarat was undertaken and report has been developed with recommended measures for conservation of the species in Gujarat.

Brow-antlered Deer (Sangai): WWF-India alongwith certain other organizations made a visit to the Keibul Lamjo and other areas currently occupied by Sangai and sent recommendations to the Manipur Forest Department. WWF-India has also offered possible support to strengthen conservation of this species.

Fresh Water Turtles: WWF-India, in partnership with UP Forest Department has released 1151 turtle hatchlings of three species into the Ganga river in Hastinapur in Meerut and in Bareilly. These releases were with involvement of riparian communities to encourage community-led monitoring and conservation of turtle nests in their agricultural fields, and to ensure a sense of ownership and desire for stewardship towards biodiversity conservation.

Marine Turtles: WWF-India continued its efforts to conserve Olive Ridley Turtles along the coast of Odisha. Protection to 1,50,000 nests from predation by terrestrial predators was provided at Rushikulya. In addition, 175 nest were relocated at Devi, 95 nests at Bahuda, 30 nests at Podampeta and 110 nests at Rushikulya to artificial hatcheries to enhance the hatching success.

Conservation status of species, subspecies and varieties and even selected subpopulations at a national scale highlighting taxa threatened with extinction and therefore promoting their conservation

Gangetic Gharial: Under Gharial reintroduction programme, WWF-India reintroduced 35 Gharials in 2015 in the Ganga in Hastinapur sanctuary. With this the total number of Gharials reintroduced during 2009-2015 jointly with UP Forest Department has reached 606. Monitoring conducted by WWF-India showed almost 40% survival rates and biometry revealed good acclimatization.

Tiger: WWF-India undertook following actions for conservation of tiger, an endangered species.

Tiger monitoring: In the third country-wide tiger estimation, WWF-India covered around 30,000 sq.km through surveys and camera traps (650+ in 19 locations) in 10 states involving 18 of its tiger biologists devoting about 300,000 man hours resulting in camera trap captured 471 individual tigers being identified.

Strengthening protection: WWF-India in partnership with Dindori Forest Division organised two-day training on wildlife protection, wildlife crime detection and investigation for 50 officials. Capacity building programmes were organized for 1534 staff of Madhav National Park, Ramgarh Wildlife Sanctuary, Bhesrongarh Wildlife Sanctuary and Mukandara Hills TR, Nawegaon-Nagzira TR, Wayanad WLS, Nilgiri North FD, Nilgiri South FD, Coimbatore FD, Gudalur FD and Sathyamangalam TR, Valmiki TR and Pilibhit TR. Through these training, 220 frontline staff were trained on legal aspects of wildlife, patrolling techniques, Intelligence Gathering, Crime Scene Investigation, Mobile Surveillance, Basics of CDR Analysis, Grounds for Bail, Cancellation, Admissibility of Crime Evidence, the Indian Evidence Act, GPS, patrolling and combat skills and strategies, and operational skills/information gathering for SMART patrolling.

Capacity building and awareness programs on control/prevention of wildlife crime and wildlife trafficking were organized in tiger reserves for Sashastra Seema Bal manning the Indo Nepal border to get their support to control wildlife crime and illegal wildlife trade across the border.

WWF India has been successful in getting endorsement for CA/TS implementation in eight of Uttarakhand Forest Department's forest divisions.

WWF-India in collaboration with the Uttarakhand Forest Department (UKFD), NTCA and GTF organized a workshop on “Protection Audit for Conservation sites” in Uttarakhand. As a result of this, UKFD has decided to undertake Protection/ Security Audit of all of its PAs/ FDs in TAL. Rajaji Tiger Reserve has already undergone protection audit.

For wildlife enforcement activities, WWF-India has provided support for effective care and functioning of the trained sniffer dogs provided by TRAFFIC India to Pobitora WLS and Kaziranga NP in Assam.

Corridor conservation: WWF-India is working to maintain and improve the functionality of 33 tiger corridors in India connecting 21 Protected Areas with an aim of facilitating the distribution of tigers across a wider habitat. Monitoring and research findings have proved their use by endangered species in 8 corridors and strengthened advocacy efforts to mitigate developmental threats in the region. Geo-spatial technology was used to identify the causes of habitat fragmentation and loss in 18 critical corridors in the Terai.

Human Tiger Conflict: WWF-India has been running Interim Relief Scheme (IRS) for providing quick financial support to villagers affected by cattle depredation by predators (tigers/leopards) around Corbett and Kanha Tiger Reserves. There has been no report of retaliatory attacks on predators by villagers over the last year.

Elephant: Low cost electric fencing and early warning systems for managing human elephant conflict in Tamil Nadu and Assam are successfully

reducing crop raiding incidents as well as economic losses for farmers living in and around elephant habitats. In the project sites in Coimbatore forest division of Western Ghats, 405 acres of crop land was protected through 75% reduction in crop raiding incidents benefitting 1625 persons.

Black Necked Crane: WWF-India in collaboration with the Department of Wildlife Protection, Jammu & Kashmir, has been working towards conservation of black-necked crane as a priority species in Ladakh region. At the regional level WWF is working to use this species for high altitude wetland conservation in Tibetan Plateau and as a vehicle for International Cooperation between India, China and Bhutan. A status report for Indo-Bhutan has been developed. Based on this status report, a joint action plan between India and Bhutan will be developed.

Smooth coated Otter: WWF is working to develop an atlas on otter in India. Data based on literature review and field surveys has been collated for the Upper Gangetic Plains. Detailed ecological studies are proposed in Ladakh and in Balaghat.

Sarus Crane: WWF-India has provided technical support for the restoration and management of key wetlands, such as the Surajpur wetland in Greater Noida, Uttar Pradesh. Two wetlands in Kanpur, Uttar Pradesh have been adopted for restoration activities. Local communities are made aware of the hazards of releasing agrochemicals into the wetlands and discouraged to continue practices that would be detrimental to the health of the wetland.

Common Leopard: WWF-India is conducting studies on the status of the leopard within Protected Areas, and its usage of wildlife corridors. It provides supports to strengthen anti-poaching efforts in the protected areas so that leopard poaching is reduced. It also works with the state forest departments and local communities to manage conflict issues as well as raise awareness among villagers about the importance of conserving the leopard.

ALL INDIA DISASTER MITIGATION INSTITUTE
...risk reduction for the poor

The All India Disaster Mitigation Institute (AIDMI) is a registered non-governmental organization based in Ahmedabad, Gujarat, India. It is a community-based action planning, action research and advocacy organization, working towards bridging the gap between policy, practice and research related to disaster mitigation. Established in 1989 after Gujarat droughts, AIDMI has evolved into a learning organization that addresses and advocates rights of poor and marginalized communities across South-Asia. AIDMI's role in addressing HFA priorities (Hyogo Framework for Action 2005-2015) is instrumental. The pro poor approaches of AIDMI to address the risks communities are exposed to, has been recognized by various international, national and sub-national organizations as well as communities. Awarded 'Center of Excellence' by United Nations office for South-South Co-operation (UNOSSC) AIDMI strives to address climate and disaster risks while keeping focus on sustainable development of disaster affected communities.

The Making of Pro–Poor District Disaster Management Plans in Assam

Eco-system Based Disaster Management Planning in 3 Districts of Assam. Activity Involved : Environment Assessment carried out at block and panchayat level.

Non–Structural Safety Assessments from Disasters in Hospitals : A case of 15 Hospitals in Assam

Waste Management and hygiene conditions in hospitals were assessed and recommendation given to each hospital and state government authority

Review of Studies on Urban Floods in Guwahati

Desk review and assessment of studies available on urban floods and development related issues in Guwahati : Impact of environment degradation and illigal reclamation of natural water bodies were found to be a major issue

Integrating Climate Change Adaptation With Disaster Risk Reduction in Assam and Odisha

Climate Change Action plans of every government departments were studies for its impact on environment

Innovating Disaster Micro Insurance for Local Market Recovery

A small business disaster micro-insurance program to enhance recovery of local markets that play a critical role in providing goods and services to climate and disaster affected populations in urban settings.

The Formulation of the District Disaster Management Plans in Jammu & Kashmir and Bihar

Eco-system Based Disaster Management Planning in 3 Districts of Jammu & Kashmir and 5 Districts of Bihar. Activity Involved : Environment Assessment carried out at block and panchayat level.

Methods toolbox for assessing loss and damage at local level

This involves developing a methods toolbox for local-level assessment of loss and damage from climate-related stressors, including sudden-onset events and slow-onset processes.

INTACH

In 1984, Indian National Trust for Art and Cultural Heritage (INTACH) was registered as a society and founded with the vision of creating a membership organisation to stimulate heritage awareness and conservation in India. Today INTACH is recognised as one of the world's largest heritage organisations, with over 180 chapters across the country.

Citizen Science Initiative

A 4-year programme of monitoring the water quality and bird diversity at Okhla Bird Sanctuary, an Important Bird Area, and other water bodies of Delhi NCR was initiated in 2013. This is a collaborative effort with Earth watch India that is funded by the HSBC Water Programme. The programme aims to inspire citizens to value water resources, understand the local and global freshwater issues, help with data collection and enable proactive participation in water conservation. The programme is based on the concept of citizen science and includes various volunteer activities involving HSBC employees, college and school students and other citizens. Under this programme, the volunteers are made aware of the freshwater issues in Delhi NCR and are motivated to take up the challenge of freshwater conservation at personal, institutional and societal levels.

Delhi Biodiversity

Harsh urbanisation is destroying biodiversity and distancing humans from nature. NHD proposed a pioneering approach in enhancing urban biodiversity and habitats with the National Capital Territory (NCT) as the model. This project aimed at biodiversity inventorisation and documentation to assess species and associated landscape information in selected areas. The natural features and habitats are delineated on a base map of NCT Delhi. The urban biodiversity plan has been put in the policy domain to influence Delhi's master plan and provide a replicable model for other cities.

Traditional Agricultural Practices: An Answer to Climate Resilience, Falling Productivity and Water Conservation in the Farming Sector

Declining agricultural productivity caused by deficiency in water inputs and depletion of soil fertility as a result of overuse of chemical fertilisers and exhaustion affects crop output both qualitatively and quantitatively. Increasing uncertainty with regard to the climate greatly increases farmers' risks, their livelihoods and their economic status and food prices for city dwellers and affects the growth of the national economy.

Many innovations in agriculture bring about an initial spike in productivity but contain the seeds of long-term declines. Thus the Green Revolution of the late 1960s and early 1970s was an emergency response to the food crisis of the mid-1960s. The idea of the Green Revolution overwhelmed society's traditional agro-cultural practices, affecting water usage and soil and seed characteristics subsequently. It was not only the hybrid seeds increasing the yield but also the emergence of inorganic fertilisers, herbicides and pesticides. The rampant use of inorganic fertilisers and herbicides for a long period of time suppressed the growth of native weeds and at the same time triggered the growth of a new variety of weeds. Although a few of the native weeds were used as vegetables and others were favoured fodder of livestock according to farmers from the Bundelkhand region,the change in the variety is not important anymore. For example, *Parthenium*, or Carrot Grass, is of no use and leads to skin allergies and irritation.

In the context of traditional agricultural practices, the culture of preserving one's own seed was a common phenomenon but is not the case now, mostly in the plains of India. The penetration of inorganic products and genetically modified crops has adverse effects on the ecological, social, economic and health aspects. The staple seeds that are nurtured in the varied geographical and atmospheric conditions are the "future grains", which now have become the victim of neglect. Thereby, the indigenous seeds of various staple cereals (millets, rice)and oilseeds have become threatened, and a few have even become extinct.

A shift in paradigm has become a necessity wherein "organic farming" is promoted as a solution for the depletion of natural resources. INTACH has been working in Bharatpur and Khajuraho, following the traditional practices of agriculture.

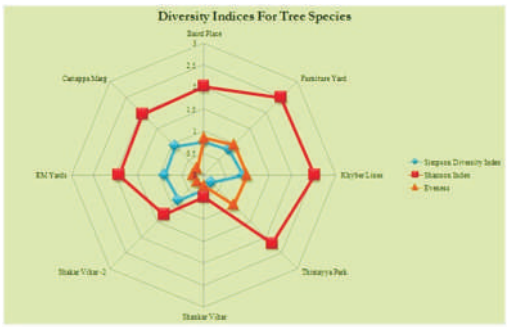
A seed bank has been developed at Khajuraho with a vision of providing indigenous seeds to the locals in exchange for seeds to be deposited later. The traditional agricultural practices of the Bundelkhand region have been documented and have been adapted in the two "Baghs"—Rani Ka Bagh and Pateriyaka Bagh—for conservation of seeds, water and soil. The linkage of the organic produce with the market is being established, and so is the mobilisation of the community.

For the last 3 years, INTACH has been working in Bharatpur with the objective of restoring soil fertility and texture, so as to increase the water-holding capacity and natural nutrients of the soil, to improve the tillage and to reduce the use of water in the fields. This has resulted ina significant increase in the soil moisture and an improved water infiltration rate leading, to a reduction in flooding during the rainy season, which is common in fields that have not been restored and is destructive to the crops. The visual quality of the soil has also improved greatly. The soil is adarker, rich humus of a fine texture compared with other fields, where it becomes light in colour and chunky after 10 ploughings. The soil texture, which was sandy, is now loamy and much more arable, reducing the tillage to two as against 10 for mustard crop. The adaptation has not affected the yield per se, and the biomass yield of jowar is also comparable with conventional fields, with decreased irrigation requirements. The results demonstrate the efficiency and practicality of the efforts and highlight the fact that they are replicable.

Enhancing Climate Resilience, Biodiversity and Habitats in Delhi Cantonment

The NCT of Delhi is urbanising rapidly and losing its natural features. The natural landscapes in the city limits are being engulfed and re-engineered into human-dominated landforms, with profound ecological consequences.

The large campuses that were created in the landscape in yesteryears now offer the potential to increase the habitats and biodiversity in the city. Spread across an area of 42 km^2, Delhi Cantonment has a low density of construction, and aggressive urbanisation is absent, as a result of which it is a green oasis in the urban fabric. The region acts as a refuge for plants and animals in an urban environment that is hostile to biodiversity. The area also has a better air quality and lower temperatures relative to the rest of the city, a relatively low level of noise pollution and a greater diversity in the flora and fauna. However, habitats and biodiversity were never factored into the development, and accordingly, the green patches have poor habitat characteristics, lack biodiversity and are fragmented. With the cooperation of the Cantonment authorities INTACH [NHD] carried out a field study to study the baseline conditions within Delhi Cantonment. The overall canopy cover of the area turns out be 58 percent. The canopy is dominated by the *vilayati kikar* (*Prosopisjuliflora*), an invasive species.



Vilaytikikar spreads rapidly and dominates the recently developed tree community. It was also identified that the less human-altered landscape has the highest species diversity. The open scrub area of Shankar Vihar has a monoculture spread of vegetation, which is unaltered but lacks species diversity. Being a fragmented part of Delhi Ridge, the area holds immense potential to be developed as a biodiversity park.

The biodiversity and habitat plan propose to enhance the ecological services through augmentation of green area networks. It is difficult to change the urban matrix within the Cantonment. But it is still possible to naturalise the mosaic by increasing the number of patches, improving the habitat characteristics of these patches and improving the connectivity between them. The built settlements can be naturalised through rooftop gardening, vertical-scaping, wildlife gardening, etc.

Ecological connectivity will allow the movement of species and gene flow from one isolated patch to another. The suggested changes in the vegetation assemblies through the introduction of native plants will increase the extent of canopy and foliage in open areas, controlling airborne pollutants and facilitating climate regulation (temperature reduction upto 1.5°C). It is estimated that the growth of about 10,000 trees and an equivalent number of shrubs will help in sequestering up to 20,000 tonnes of carbon. Plantation of medicinal as well as fragrance generating shrubs and trees will boost the aesthetic and cultural value of the area.

Enhancement of the extent of diversified habitats will logically result in increased faunal populations and improved eco-system services, thus creating a stable ecological community and providing climatic resilience in the existing area.

At a recent meeting with the Army, a green signal was obtained to implement the plan.

Montane Shola Grasslands: Identifying and Mapping, Building Awareness of Conservation Significance and Preliminary Restoration

The shola–grassland is a montane habitat consisting of evergreen forest patches in the eastward extension of the Western Ghats range. The Palni Hills, which will be focused on in the project, lies in Dindigul District, of Tamil Nadu. These areas have high levels of endemism in various taxa, as supported by various recent studies. But from the 1850s onwards, both the forest and the grasslands have suffered severe destruction, which has affected the habitat and the various taxa in it. Ian Lockwood's preliminary analysis indicates that there has been a disproportionate loss of grasslands, up to 85% in the Nilgiris and possibly a similar extent in the Palni Hills. This indicates that there is a very urgent conservation threat in the landscape.

Although humans have historically occupied this landscape and are an important part of the cultural diversity, their impact seems to be limited to certain parts of the landscape.

There is significant regeneration of native trees in plantations, but there is no record of invasion of plantation species into the sholas. Therefore, the most urgent conservation requirement is to conserve all existing grasslands and push back invading plantation species from the grasslands.

Hence the proposed project involves three critical components:

Part 1: Identifying existing grasslands that are pristine or are mildly invaded by plantation species

The land usage of most grasslands in the high-elevation areas has been modified to one of the following or similar uses:

1. Commercial or industrial plantation of tea and timber species such as wattle, pine and eucalyptus.
2. Land dominated by plantations
3. Cultivation

Most of the grasslands within protected areas have been identified, but the actual extent of the grasslands relative to the shola forests and the extent of exotic invasive species in the grasslands are not known well. Hence this part of the project proposes to use a combination of remote sensing and GIS tools along with field surveys to identify such grasslands. Since the Palni Hills have lost most of its grasslands, this is prioritised for conservation action.

Part 2: Creating a movie/photo series to generate awareness among the public and policy and law makers

Since the visual media are a very effective medium for communication of messages, two videos will be produced.

One video will be in English. This will be for policymakers and will contain technical information. A second video will be in the vernacular languages, that is Tamil and Malayalam, for a wider audience. The videos in the vernacular languages will be aimed at raising awareness among the local people nature clubs and groups.

Part 3: Restoring or reclaiming grasslands where the invasion is light and where restoration is practical

The areas identified as mildly invaded grasslands (in Part 1 of the project) will be prioritised for conservation action. This part of the project will focus on ecological restoration of the last remaining grasslands in this landscape. Different restoration strategies will be involved.

This is a 10-month project (October 2015 to July 2016) and will be completed in collaboration with multiple people and teams with experience and expertise from different research organisations. The execution of the restoration project has been undertaken by the Kodaikanal Chapter of INTACH and will be executed with the involvement of the local villagers and volunteers.

The work has made significant progress on the ground.

Natural Heritage Mapping and Documentation in Sawai Madhopur, Rajasthan

Natural heritage mapping and documentation are in process in Sawai Madhopur District of Rajasthan with the objective of documenting the lesser known and unprotected natural features such as water bodies, *baolis* (stepwells), abandoned mines, old trees and natural storm water channels. Most of these are vulnerable to destruction or encroachment due to the ongoing pace and ecological insensitivity of development. Besides documentation, the current exercise will generate GPS marked features on a final map, which will inform development decisions taken by government authorities. The work has been completed for Sawai Madhopur tehsil and is

progressing in other tehsils of the district with the aim of generating a complete district landscape plan.

Rural Village Environment Mapping with Emphasis on Water Resources and Sustainability at the Village Level in Sawai Madhopur

The goal of the project is to understand the capacity of the village. Information will be elicited from the traditional knowledge and resources that exist in the community. This will be used to develop a policy for preservation and conservation of the natural resources that exist. Insights on what to conserve and how to conserve will be obtained through capacity analysis of the village and through community participation. This approach will help focus on environmental planning from a community point of view. The accompanying figure explains how the process will help reach the goal of village environment planning.

Community

Developed with the help of the community for their use and will be owned by the community. They will help with the process of documentation of the traditional practices and knowledge and understand the changes and the pressure experienced.

Strategies Made

Activities that need to be carried out by exploring the issues and the pressure along with opportunities that the village and the landscape provide with. The action plan developed after the analysis and the things that can be realistically carried out.

Implementation

What to conserve and how to conserve. When and what are the actions that will be implemented. Training, community participation and execution.

Environment

Mapping of the village resources and the usage of the natural resources with the help of the community. Overlaying it with the land-sat image.

Development Alternatives (DA), the world's first social enterprise dedicated to sustainable development, is a research and action organisation striving to deliver socially equitable, environmentally sound and economically scalable development outcomes. DA's green technology innovations for habitat, water, energy and waste management, which deliver basic needs and generate sustainable livelihoods, have reduced poverty and rejuvenated natural ecosystems in the most backward regions of India.

Alignment of DA's work with National Biodiversity Targets

DA strives to deliver socially equitable, environmentally sound and economically scalable development outcomes where biodiversity conservation and natural resource management are one of the key focus areas. The group has pioneered the concept of business-like approaches for eradicating poverty and conserving the natural resource base on which human development depends. DA's work in conservation and natural resource management aligns itself with the National Biodiversity Targets.

Research

The research work performed by DA on the impacts of climate change on the forested regions of Madhya Pradesh highlighted potential for alternative livelihoods and drew various recommendations which were communicated to the state officials and integrated into the Madhya Pradesh Green India Mission Plan.

DA uses technology like remote sensing and GIS for assessment of and estimating the changes in forest cover. DA has estimated spatial changes and analysed temporal variations and trends in mangrove forest cover to inform and design alternative livelihood interventions to help the local economy.

Environmental Reporting

DA has done state-of-the-environment (SoE) reporting at regional, national and state levels with a focus on the forest, wildlife and biodiversity. DA's methods include participatory assessment processes for soliciting inputs from various stakeholders including line ministries, state and central governments, civil society organisations, academic institutions and business groups.

Designated the National Host Institute for the SoE reporting process in India, DA has played a crucial role in performing SoE reporting work for the country, as well as for 11 Indian states with a focus on forests, wildlife and biodiversity.

State of Environment Report India, SoE reporting for Uttar Pradesh, Jharkhand, Sikkim, Meghalaya, Daman and Diu, Karnataka and Tripura have been reported by Development Alternatives in collaboration with various agencies. Presently DA is involved in SoE reporting for Madhya Pradesh, Sikkim and India. Both Madhya Pradesh and Sikkim are known for the amount of land under forested area and the diversity and spread of forests. These reports include recommendations focusing on sustainable management of forest resources and increasing community-conserved areas.

Implementation

Natural resource management: to promote efficient management of natural resources for environment and livelihood security through development action and knowledge exchange at scale. The three major interventions are the following.

- Efficient land and water management at scale
- Promotion of sustainable agriculture
- Climate resilience of vulnerable communities

Efficient land and water management at scale: an extent of 4540 hectares of was covered for soil and water management. The key interventions that helped achieved the results included developing 25,540 running metres of field bunds and construction of 19 check dams, 52 gabion structures and two farm ponds.

These structures have enabled the harvesting of 1.35 million litres of rainfall water and reduction of erosion of top soil by 3785 tonnes, helping improve livelihoods for 500 farmers.

Primarily, the watershed works were carried out in the watershed of three villages of Niwari Block and two villages in Baldevgarh of Tikamgarh, three villages of Shivpuri District, 23 villages of Datia District and three villages of Jhansi. The interventions were undertaken under projects supported by IWMP, La Caixa, ICRISAT, NABARD, TIFAC and 5he Coca-Cola Foundation.

The structures were developed using scientific mapping and planning tools with the participation of the local communities. A total of 36 watershed management committees were formed for the planning, design, maintenance and management of these structures. The watershed committees also promote the development of improved livelihoods through promotion of income generation activities around these structures.

Promotion of livelihood diversification: Regular capacity building sessions and demonstrations were organised with more than 6000 farmers for adoption of improved-quality inputs, income-diversification models and resource-efficient farming technologies.

Around 480 farmers adopted improved practices for vegetable cultivation over 200 hectares of land. Under 542 WADIs (model for agro-forestry)were developed over 218 hectares of land. A total of 1714 farmers adopted improved seeds as inputs in over 938 hectares of land. Line sowing practices were adopted by 720 farmers for 1050 hectares of land. Two hundred and ten farmers adopted the ridge bed technique of cultivation in an area of 102 hectares. Overall, 787 farmers in297 hectares in Pahuj, 180 farmers in 127 hectares of land in Niwari, 1956 farmers in 1517 hectares in Datia and 455 farmers in 573 hectares of land were covered under the initiative.

The initiative also increased the crop productivity by 5–15percent for around 5000 farmers. It is estimated that the solar irrigation and WADI development led to the saving of 21.27 tonnes of CO_2.

DA transferred the vermi-composting package to 102 farmers, for promotion of organic manure, with the support of CSO partners.

Capacity Building

DA also actively does capacity building, knowledge sharing and awareness generation on forestry, biodiversity and traditional knowledge at local, state and national levels. The target groups vary from farmers and rural youth to government officials.

State-level officials in Madhya Pradesh: The objective was to build the capacities of government officials from the state forest department to understand the impacts of climate change on the forest sector in Madhya Pradesh and identify the role of the forest resources of the state in climate change mitigation. The 1-day training programme sensitised the forest department officials dealing with issues of climate change and forest degradation and deforestation. Key issues addressed in the training programme included the following:

- Impact and vulnerability assessment of forest ecosystem and livelihoods
- Adaptation and mitigation strategies
- Climate change mitigation potential of forest resources of Madhya Pradesh and Reducing Emission from Deforestation and Forest Degradation Plus (REDD+)
- Monitoring and evaluation of sectoral strategies for implementation of State Action Plan on Climate Change (SAPCC)

Community-based Environment Management Systems: The major objective of this intervention is to build the capacities of and mobilise different stakeholders at the village level to collaborate and engage with local governance systems for promoting environment action.

Community awareness programmes have been carried out on the basis of detailed environmental reports of 22 villages to sensitise the local communities to undertake action for local resource management. Regular capacity building and sensitisation sessions were carried out for youth groups, farmer clubs and Panchayats on the management of local resources, infrastructure and action for improving climate resilience.

GBPNIHESD

G.B. Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD), previously known as G.B. Pant Institute of Himalayan Environment and Development (GBPIHED), is an autonomous institute of the Ministry of Environment, Forest and Climatic Change (MoEFCC), Government of India. It is mandated to achieve sustainable development and environmental conservation in the Indian Himalayan Region (IHR). The institute functions in a decentralised manner, with its headquarters located at Kosi-Katarmal, Almora (Uttarakhand), and four regional units at Mohal-Kullu (Himachal Pradesh), Srinagar-Garhwal (Uttarakhand), Pangthang (Sikkim) and Itanagar (Arunachal Pradesh). The fifth unit of GBPNIHSED has been established at MoEFCC, New Delhi, as maintain division to look into mountain issues more holistically and bring in the mountain perspective in plans and policies. Biodiversity conservation and management is one of the major thematic thrusts.It focuses on conservation and sustainable use of biological diversity in IHR. During the year 2015–2016, the institute undertook the following major activities towards achieving the Biodiversity Targets 2020.

Workshops and Meetings

- Consultative meetings, workshops and important days celebration such as International Biological Diversity Day (22 May), Environment Day (5 June), Annual Day (10 September), Wildlife Week (1–7 October), Mountain Day (12 December), etc. for awareness generation on various environmental issues including conservation and sustainable use of mountain biodiversity.
- The multi-stakeholders' Himalayan Sustainable Development Forum was made functional with support from IHCAP-SDC. The Institute organised the First Regional Meet of HSDF (4 August 2015) at Dehradun for three northwestern Himalayan states.The meet was inaugurated by Mr. Harish Rawat, the Hon'ble Chief Minister of Uttarakhand. The Second Regional Meet of HSDF was organised on 5 October 2015 at NIED&PR-NERC, Guwahati, Assam, India, to cover the issues and need of NE States of IHR.
- Under Himalayan Young Researcher Forum, Second Meet of Young Researchers was organised at Kosi-Katarmal during 15–17September 2015—a total of 63 participants from 23 different organisations of nine Himalayan states (Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Nagaland, Sikkim, Tripura, Uttarakhand, West Bengal (Darjeeling) participated.
- Himalayan Legislators' Meet was organised on 8 October 2015 at Itanagar, Arunachal Pradesh, in collaboration with GLOBE-India. The need for (a) Himalayan states to come together for the common cause of development in the region, (b) adequately compensating the Himalayan states for the carbon sink value of the forest cover maintained and other services provided by the Himalayan ecosystem, (c) special provisioning in national policies and programmes to have mountain-specific norms for programme implementation, (d) formation of PAN Himalayan Legislator's Forum, (e) facilitatingthe preparation of District Disaster Management Plans for 41 districts of mountain states and (f) forming or identifying a knowledge-sharing platform for Himalayan legislators was emphasised.
- The Institute organised five popular lectures by eminent personalities on the topical issues of Himalayan environment and development:
  (1) Sustaining the Himalayan ecosystem and the emerging issues and challenges (by Padma Bhushan Mr.Chandi Prasad Bhatt, 22 April 2015) at Indian National Science Academy, New Delhi
  (2) Sustainable use of forest resources:the main mantra of economic development of

the north-eastern region (by Prof. P.K. Das, Director, North Eastern Regional Institute of Science and Technology, 10 September 2015) at Itanagar, Arunachal Pradesh

(3) Biodiversity: concept, threats and conservation (by Prof. U.S. Rawat, Vice Chancellor, Sri Deb Suman University, Uttarakhand, 10 September 2015) at Srinagar, Garhwal

(4) Changing agriculture pattern in north-western Himalaya: challenges and issues (by Prof. K.K. Katoch, Vice Chancellor, Ch. Sarvan Kumar HP Agri. Univ., Palampur, 10 September 2015) at Kullu, Himachal Pradesh

(5) The Himalayan environment at the crossroads(by Mr. SonamWangdii,Former Chief Secretary, Government of Sikkim, 10 September 2015) at Gangtok, Sikkim

- The institute organised meets of Himalayan Peoples' Representatives for policy advocacy on sustainable development of the IHR. The meets were organised on10 September 2015 at Kosi-Katarmal, Almora, and on 15 December 2015 at MoEFCC, New Delhi. Meets were chaired by the Hon'ble Minister, Env., Forests and Climate Change, Shri Prakash Javadekar, and attended by the Members of Parliament from different Himalayan States.
- Under the Transboundary Landscape Cooperation Initiative, three projects (Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI), Khangchendzonga Landscape Conservation and Development Initiative (KLCDI) and Landscape Initiative for Far Eastern Himalaya (Hi-LIFE)) are being coordinated by the Institute for Indian Landscape. While KLCDI is being implement; KLCDI and Hi-LIFE are in the preparatory phase.

Research

(a) Towards understanding the biodiversity patterns and processes under changing resource use and climate scenario in Indian Himalayan region, studies were conducted in Kanawar Wildlife Sanctuary, Himachal Pradesh; Chaudans Valley and the Hat-Kalika sub-watershed of East Ramganga catchment in district Pithoragarh, Uttarakhand; Khanchendzonga Biosphere Reserve (Yuksom-Black Kabru transect) in Sikkim and Pine Grove Forest in Ziro valley of Lower Subansiri District in Arunachal Pradesh. Datasets on the status, changing patterns and processes of biodiversity components as well as their conservation and socio-economic values in all the selected sites were generated.

(b) First of its kind long term monitoring site following GLORIA protocol was established in Chaudans valley of Uttarakhand for the vegetation study of alpine and subalpine areas.

The floristic diversity analysis of the GLORIA site revealed presence of a total of 123 species. While comparing the number of species across summits, the lower elevation summit was represented by highest number of species; and the number of species declined with increasing altitudes of summits. It was interesting to note that the North and the West aspects followed the general pattern of species decline with increasing altitude of summit. However, the East and the South aspects did not follow this trend.

(c) Quantitative assessment of vegetation using standard protocol was targeted for Yuksom-Black Kabru transact of Sikkim Himalaya (1780m-4810 m asl). Results revealed a positive correlation ($r=0.874$; $P<0.01$) between altitudes of the sites and density of individual tree per hectare. Negative correlation ($r=-0.797$; $P<0.05$) between altitude and Margalef's Index of plants species richness was recorded.

(d) The Institute has established formal implementation partnership with Uttarakhand State Biodiversity Board (UKBB), Uttarakhand Forest Department (UKFD) and Himalayan Gram Vikas Samiti (HGVS) under the Kailash Sacred Landscape Conservation and Development Initiative project for implementation of project component 3-Access and Benefit Sharing; component 2- Managing Ecosystem for Sustaining Services; and component 4- Long-term Conservation and Environmental monitoring, and community mobilization and preparation of participatory plans for water conservation and management, respectively. Six Biodiversity Management Committees (BMCs) have been developed in collaboration with the Uttarakhand Biodiversity Board, and the process of preparing a People's Biodiversity Register has been initiated.

(e) A three-step methodology was developed to build the capacity of mountain communities for use and management of natural resources:

(1) Technology exploration and documentations
(2) Technology demonstration and dissemination
(3) Human resource development

During the year, a total of 41 simple and cost-effective technologies were introduced, demonstrated, tested/modified and maintained at the RTC (Headquarters), Triyuginarayan (Garhwal Unit) and Pangthang (Sikkim Unit) with a view to replicating and/or disseminating to user groups on a large scale for livelihood enhancement. During the year, a total of 26 training and awareness programmes (22 at Headquarters and four at the Garhwal Unit) were organised for different user groups (farmers, women, unemployed youth, officials from government organisations, NGOs, army personnel, institute programme, teachers, students, etc.).About 38percent of these were people from government organisations, 7 percentwere from NGOs and institute programme, 15percent each were army personnel, teachers and students and disaster-affected persons. A total of 1115 persons (female, 501; male, 614) from 135 villages of eight districts of Uttarakhand benefited.

(f) The development of Nanda Van at Almora for restoration of the ecological balance in the degraded and fragile ecosystem through live demonstrations of hill-specific technology packages was initiated. The initiative is being implemented in partnership with the Nagar Palika, Almora, which has offered about 1.2 hectares of land to the institute for this activity.

(g) Towards promoting conservation and sustainable utilisation of Himalayan plants, the focus was made to develop propagation protocols of threatened and high-value species i.e. *Valeriana jatamansi*, *Zanthoxyllum armatum, Berginia strechii*, etc. Propagation protocols of these species were developed and regenerates were analysed for genetic fidelity using RAPD and ISSR marker. Results reveal hundred percent similarity between in vitro regenerates and mother plants indicates that the protocol can be utilised for mass multiplication of the species for quality plant production. In addition, efforts were made to enhance the production of secondary metabolites in callus suspension culture of different medicinal plants so as to pressure on the wild could be minimised.

(h) A psychrotolerant bacterial strain of *Serratia marcescens*, originally isolated from a glacial

site in IHR, was investigated for laccase production under different culture conditions when investigating the ecological resilience of the extremophiles of the Himalaya.The production of laccase was found to be more consistent at alkaline pH values. The laccase was partially purified using gel filtration chromatography. The molecular mass of the laccase was determined to be ~53 kDa on native PAGE. Among the nitrogen sources, organic sources were found to act as inhibitors ($P<0.01$), and among the inorganic sources only sodium nitrate enhanced the laccase production. Low-molecular-weight organic solvents significantly ($P<0.01$) enhanced the laccase production for up to 24 hours during incubation, with a decline in the later incubation period. The bacterium exhibited cold active and dark red pigment at low temperatures. Production of laccase by the psychrotolerant bacterium in wide ranges of temperature and pH values is likely to have impacts in biotechnological processes.

Events organised

(a) The Institute organised a biodiversity awareness campaign during 20–22 May 2015 for raising awareness about biodiversity in three watersheds (Hat-Kalika, Chandak-AunlaGhat, and Kharangdang-Himkhola) of the Kailash Sacred Landscape (KSL) in India (Pithoragarh District in Uttarakhand State). The campaign was focused on disseminating knowledge about biodiversity, specifically focusing on the prospects of livelihood generation through effective use of the local biodiversity.

(b) A plantation ceremony was organised at the GBPIHED headquarters to mark the festival of greenery (Harela), and rare plants (*Mezotropis pellita*) and some pollinator-friendly plants were planted at Suryakunj on 17July 2015.

(c) The Institute facilitated organisation of India-ICIMOD Week programme "Partnership for Sustainable Mountain Development" held at MoEFCC, New Delhi during 11-15 December 2015 and showcased different research and developmental activities. ICIMOD's engagement in India and opportunities for networking with a range of stakeholders, including the private sector and policy makers, were discussed at this programme. The entire programme took shape to celebrate International Mountain Day 2015 on 11 December and concluded on 15 December in the presence of the Hon'ble Minister of MoEFCC and other senior officials of MoEFCC and related ministries.

(d) A Himalayan students' nature awareness camp was organised at the Nature Interpretation Center of the Institute during 20–22 May 2015 for facilitating the development of a culture of creative nature-based learning. A total of 66 students (45 boys and 21 girls) from 11 schools participated in this camp. Similarly, mentoring workshops were organised at the institute during 8–27June 2015 in three batches under the Department of Science and Technology, Government of India-sponsored project titled "Regional Innovation Science Hub for Innovators (RISHI)". A total of 50 young innovators (18 female, 32 male) from the ninth standard to the 12th standard, representing 30 schools across nine districts of Uttarakhand, participated.

(e) Capacity-building training programmes on enhancing Himalayan farmers' livelihoods for empowering communities through new opportunities and skill building were organised. During the year, 20 training programmes were organised at the headquarters, in which 774 stakeholders (452 male, 322 female) from different organisations (government, NGOs, army personnel, students and the institute) participated.

(f) The Second Regional Consultation of Multi-stakeholders Himalayan Sustainable Development Forum (HSDF) was organised on 5 October 2015 at NIED&PR-NERC, Guwahati, Assam, with the following deliverables: (1) operationalisation of the HSDF,(2) a synthesis report on identified sectors such as climate change and disaster risk reduction, tourism and climate change, and environmental governance for effective climate change adaptation, (3) a knowledge network to support national and state action plans for climate change under NMSHE and (4) an institutional framework for a strategic adaptation plan.

(g) The institute organised a seminar titled "Learning from Nepal Earthquake for Indian Himalayas and Gangetic Plains" (20 August 2015) in association with CHEA, Nainital, at Indian National Science Academy (INSA), New Delhi.

Follow-up of National Biodiversity Targets

The Institute is committed to achieve the National Biodiversity Targets 2020. In this context, the Institute has a dedicated theme, "Biodiversity Conservation and Management", focusing on conservation and management-related issues of Himalayan biodiversity. The Institute is directly or indirectly contributing towards achieving the following National Biodiversity Targets.

National Biodiversity Target 1. Conservation education programme were organised regularly for students and teachers with the aim of making youth aware on the value of biodiversity and the steps they can take to conserve and use it sustainably. During the year, the Institute organised National Nature Camping Programmes. The Rural Technology Centers (RTCs) at Triyuginarayan and Kosi remained very popular and played a catalytic role in building the capacities of the user groups in relation to various rural technologies either introduced or developed by the Institute. The capacity-building programme at Triyuginarayan has made a significant contribution in the field of off-season vegetable cultivation and prospecting for wild bioresources.

National Biodiversity Target 2. Attempts to link ecotourism with conservation provide ample opportunities for empowerment and self-reliance by offering market-oriented solutions. As ecotourism, by definition, demands responsibility and the respect of the stakeholders involved towards the surroundings along with provisions to make it memorable. The possibilities of extending ecotourism through nature-based activities (hiking to alpine meadows, peaks and lakes, bird watching, forest walks, wildlife watching),culture-based events (food festivals, village festivals),pilgrimage-based tours (temples, monasteries),leisure (sightseeing, ropeways), MICE (meetings, incentive tours, conferences and expos)and special events (Buddha Mahotsav, Kullu Dussehra) have been worked out. All these, once executed properly, will help maintain the ecological integrity and enhance the livelihood options for locals.

National Biodiversity Target 3. The Institute is contributing towards minimising the rate of degradation in the IHR through different land restoration programmes. The Institute has already developed different prototypes for participatory rehabilitation of degraded land in the IHR.

National Biodiversity Target 4. Under its transboundary conservation and development initiative in the Kailash Sacred Landscape, GBPNIHESD has initiated extensive mapping of invasive species so as to suggest a comprehensive management plan.

National Biodiversity Target 6. Extensive ecological studies are being taken up in representative biodiversity-rich areas (Biosphere Reserves, Protected Areas, etc.) and sensitive habitats (alpine, timberline, wetland, etc.) to strengthen specific conservation and management strategies. Also, the Institute is involved in monitoring the changes at ecosystem and species levels. In addition, the Institute is effectively using biotechnological approaches especially in the case of species that are difficult to propagate through conventional methods and are rare in the wild.

National Biodiversity Target 7. The Institute is involved in assessing the genetic diversity of rare, endangered, threatened, endemic and high-value plants for minimising genetic erosion and safeguarding the genetic diversity.

National Biodiversity Target 9. The Institute, through its transboundary conservation and development initiative, is facilitating the formulation of Biodiversity Management Committees (BMCs) and preparation of People's Biodiversity Register (PBRs) in remote villages. Also, awareness and capacity-building programmes for diverse stakeholders are being supported.

National Biodiversity Target 11. The institute is one of the major contributing partners of the National Mission for Sustaining Himalayan Ecosystem (NMSHE) task force on traditional knowledge. Also, it has initiated development of the Himalayan Biodiversity and Climate Change Knowledge Network, which will, among others, document traditional knowledge on biodiversity and climate change.

This year, the Bombay Natural History Society (BNHS) completes 133 years of association with India's natural history. Established in 1883, BNHS has grown leaps and bounds to cover the length and breadth of the country, effecting significant changes, especially for threatened species and their habitats. Its work covers research, action and education, the thrust being on sustainable goals in conservation.

With a backbone of 173 staff members, BNHS operates from 18 centres and field stations across India. It plays a prominent role as a facilitator between government bodies and communities. The annual activities reported here are representative.

Research Activities

Vulture

Vulture research is one of the longest running programmes of BNHS. Nature's most efficient scavengers, the vultures are on a rapid decline in India since the 1990s. BNHS, through its four conservation breeding facilities for *Gyps* vultures, at Pinjore, in Haryana, Rajabhatkhawa, in West Bengal, Rani, in Assam, and Bhopal, in Madhya Pradesh, and a Vulture Safe Zone in Bunder, Madhya Pradesh, continues to contribute towards vulture conservation. A programme of release of vultures bred in captivity will begin this year.

Kondana Soft–furred Rat

Since 2012, BNHS is studying this Critically Endangered species in its declining habitat in Pune District, Maharashtra. It has discovered two new populations of the Kondana Soft–furred Rat *Millardia kondana*, at Rajgad and Torna Fort (>1200m ASL), Pune District, and is working closely with the government to conserve the species.

Jerdon's Courser

BNHS continues to pursue assiduously this nocturnal cursorial bird species, found only in the Eastern Ghats of Andhra Pradesh. An effort is on to track the bird, which has been absent from Sri Lankamalleswara Wildlife Sanctuary, where BNHS had last spotted it in 2009, and to look for reasons and solutions.

Bengal Florican

The Bengal Florican *Houbaropsis bengalensis* programme extends over Uttar Pradesh, Uttarakhand, Assam and Arunachal Pradesh. Extensive field surveys and awareness campaigns are part of the study. During 2015–2016, surveys were carried out in areas of Sadiya and Tinsukia that fall outside protected areas as well as in D'Ering Wildlife Sanctuary, in Assam. A total of 21 male Bengal Floricans and one female Bengal Florican were sighted during the survey.

Great Indian Bustard (GIB)

A study on the GIB *Ardeotis nigriceps* is currently on in Solapur District, Maharashtra, and Thar Desert, Rajasthan. BNHS follows a multi-pronged approach to studying and conserving the bird species through a study on pesticide use in GIB habitat, surveys, collaborative studies with the government, biodiversity assessments and training in organic farming for local

farmers. BNHS, in collaboration with the Wildlife Institute of India, is implementing a GIB species recovery programme with support from MoEFCC.

Herpetofauna

Recognising the limited work done on the ecology and conservation of amphibians and reptiles as compared with taxonomy(a reason why many species are put under the Data Deficient category by IUCN), efforts are on to acquire baseline data on bush frogs and *Indirana gundia*, endemic to the Western Ghats. Besides trying to resolve the taxonomic ambiguities in *Calotes*, BNHS is studying the population and distribution of the Spiny-tailed Lizard *Saara hardwickii* in Gujarat and Rajasthan.

The sea turtle Monitoring projects along the Mandvi coast, in Gujarat, and the Andaman & Nicobar Islands, cover the Green Sea Turtle *Cheloniamydas*, Olive Ridley *Lepidochelys olivacea* and Leatherback *Dermochelys coriacea*.

Bird Migration Studies

This is one of the longest running projects of BNHS, starting from the 1950s. Currently, the study areas include Point Calimere, in Tamil Nadu, Chilika, in Odisha, and Pong Dam, in Himachal Pradesh. The Bird Migration Study Centre, set up at Point Calimere

in 2007, is used for monitoring. An Indian bird migration atlas is currently underway.

Molluscan Taxonomy

The studies include surveys, documentation and preparation of maps of the distribution of molluscs along all the coastal states and union territories. Monographic studies on confusing families such as the Nassaridae and Hamnoeidae are in progress. In the Gulf of Kutch, efforts have been on for the past 5 years to study the population ecology of the endemic sea slug *Sakuraeolis gujaratica*.

Giant Clam

For over 12 years, BNHS has been consistently working on the population ecology and conservation of giant clams *Tridacna* sp. in the Lakshadweep and Andaman & Nicobar Islands. The work includes monitoring the coral reefs inhabited by the giant clams. An important contribution has been a giant clam species recovery programme for the Ministry of Environment, Forest and Climate Change.

Freshwater Fishes

A recently concluded study on the status of freshwater fishes in the Sahyadri–Konkan corridor

has facilitated the conservation of globally threatened species such as *Pethialutea*, *Pethiasetnai*, *Hypselobarbus mussulah*, *Parapsilorhynchus discophorus*, *Tor khudree*, *Monopterus indicus* and *Horabagrus brachysoma*. It has not only aided IUCN Red List assessment but also contributed directly to the implementation of CEPF (Critical Ecosystem Partnership Fund) Investment Priority 2.1.

Forest Owlet

Work is in progress at Tansa Wildlife Sanctuary, Maharashtra, with BNHS having sighted the species in 2014. The focus is mainly on conservation-based research through sustainable rural development since the idea is to reduce the pressure on the habitat first.

Satpuda Landscape Tiger Programme (STLP)

BNHS has embarked on a Tiger corridor study that looks at the connected forest patches in the Satpuda Landscape between Pench–Nagzira, Bor–Pench and Bor–Melghat. The aim is to map the presence and distribution of wildlife, identify the threats they face, recommend a management plan and provide baseline data for future research.

Grassland Habitat Research

At Kaziranga National Park, Assam, BNHS is

mapping the biodiversity of the tall grassland habitat located in the flood-prone region along the basin of the Brahmaputra River. The aim is to establish baseline data of the region's flora and fauna and chalk out a management plan based on their habitat preferences.

In the grasslands of the Deccan Plateau, BNHS is studying the flora and fauna in selected patches and the impact of windmills and other development activities on birds and bats. The goal is to devise guidelines for habitat restoration and management of the region.

Coastal Plateaus and Biodiversity

Research targets include an in-depth study of the plant and animal species of the coastal plateaus of the Konkan region, such as Vangurla Plateau and Ambalgod, which display a great habitat diversity.

Climate Change Study

BNHS recently started a study of climate change and its impact on threatened species in the Himalaya. The focus is also on studying the shifting home ranges of pheasants and common bird species, shrinking habitats of finches, high-altitude ungulates and Snow Leopards, changes in the population dynamics of migratory bird species and mortality of wildlife in extreme weather events. The idea is to improve the baseline knowledge on the spatio-temporal distribution of threatened, common and habitat specialist species and create niche models for conservation. Plans are afoot to extend the programme to the Western Ghats.

Ecologically and Biologically Significant Marine and Coastal Areas (EBSAs)

BNHS is mapping EBSAs along the Maharashtra coast using the Convention on Biological Diversity (CBD) guidelines. The progress so far includes field surveys and sample collection in Sindhudurg, Raigad and Ratnagiri districts and sampling surveys in Thane and Palghar districts.

Mangroves

BNHS is conducting extensive surveys to assess the status of mangroves in Maharashtra and has

completed surveys in two coastal districts, Sindhudurg and Ratnagiri. Research work in Gujarat and Maharashtra has resulted in the restoration of degraded mangroves.

Diversity of Coral Reef Fauna

BNHS, through its field stations in Lakshadweep, Gujarat and the Andaman & Nicobar Islands, is documenting the coral reef fauna of India.

Status of Neglected Ecosystems

BNHS has taken up the study of neglected ecosystems such as rocky and sandy shores, mudflats and mangroves along the Indian coast, covering both biological and ecological aspects.

Important Bird Areas (IBAs)

Under its IBA programme, BNHS continues to identify and monitor sites of crucial importance to bird species, both local and migratory. Apart from the regular surveys, IBA has initiated the Common Bird Monitoring Programme, a citizen science project, across the country to ensure systematic documentation of bird species.

BNHS conducted surveys of birds in Kaziranga National Park, Assam, during 17–28November 2015 and 15–25 December 2015. Visits were made to the park every day and to some areas of Karbi Anglong, which is also an IBA.

A survey was also conducted at a new IBA, Amboli-Tilari Reserve Forest, in Sindhudurg District, during 26–27 January 2016.

National Biodiversity Targets

Target 1

BNHS runs an awareness programme for the conservation of grassland biodiversity in Great Indian Bustard *Ardeotis nigriceps* areas of Maharashtra. Emphasis is on the conservation of indicator species such as Great Indian Bustard and Blackbuck *Antelope cervicapra*. The project entails educating the youth regarding ecosystem services provided by grasslands such as water, fodder and soil conservation. BNHS has helped to set up District-level Biodiversity Committees in Latur, Osmanabad and Solapur districts of Maharashtra.

The BNHS Conservation Education Centres (CEC) continued their annual activities of conducting camps, trails, film screenings and workshops in nature education to create public awareness about conservation. A large section of the beneficiaries were school students and youth.

Target 2

BNHS, through its presence in over 30 committees formed by the Government of India and different state governments, provides valuable scientific inputs to several government agencies. It also serves as a facilitator between the government and various stakeholders and works towards sustainable development involving the stakeholders.

A few examples at mainstreaming biodiversity include poverty alleviation and alternative livelihood programmes for tribal communities in Forest Owlet habitat and fishing communities along Konkan mangroves, and training fishermen at Mumbai's Airoli in responsible eco-tourism.

Some of the committees represented by BNHS are the National Board for Wildlife, CAMPA (Maharashtra), State Board for Wildlife (Maharashtra, Gujarat, Madhya Pradesh, Rajasthan, Andaman & Nicobar), Expert Committee on Threatened, Endangered & Endemic Species, National Environmental Policy and Monitoring Committee to monitor the implementation of priority projects identified in the national wildlife plan, and Steering Committee of Great Indian Bustard conservation plan.

Targets 3, 7

Study of ecology of *Sakuraeolis gujaratica* in Gulf of Kutch, Gujarat; Opistho branch fauna along Indian coast, Hydrozoan fauna of Gujarat and Maharashtra, diversity and zoogeography of family *Nassariidae* from Gujarat, Maharashtra, Goa, Andhra Pradesh and Kerala, population structure of Brachyuran crab *Dotillamyctiroides* in Ratnagiri and freshwater molluscs align with targets 3 and 7.

Targets 3, 6, 7, 10

BNHS has taken up the task of identifying Ecologically and Biologically Significant Coastal and Marine Areas (EBSAs) using Convention on Biological Diversity (CBD) guidelines.

Field surveys and sample collection from Sindhudurg, Raigad and Ratnagiri is completed. Sampling is underway for Mumbai, Thane and Palghar districts. Benthos sample sorting and analysis for Ratnagiri district is in progress. Socio–economic field surveys for Sindhudurg is completed; others in progress.

Targets 3, 5, 7 and 8

Studies on the rehabilitation of coral communities and setting up of artificial reefs in Sindhudurg coast, Maharashtra meets will help BNHS meet several targets. The study involves construction and deployment of Artificial reef and coral transplantation concrete modules. It also involves active participation and management of local communities in monitoring deployment and management of this habitat along with local government bodies.

Target 4

One of the objectives of the Himalaya and Climate Change project of BNHS is to develop an understanding of the spread of Invasive/Alien Species due to climate change. In recent surveys in West Bengal and Sikkim, occurrence of Lantana camara has been noted at various altitudes. This data will further be used for modelling the impact of climate change on the invasion potential of this species.

Target 5

To reduce the use of chemical fertilisers and pesticides, BNHS is conducting Sustainable Agriculture Training Programme in villages around the Great Indian Bustard habitats in collaboration with Pune Wildlife Division, and agricultural units. In the orientation phase, farmers were introduced to sustainable agricultural and organic farming.

Target 6

Important Bird Areas are a significant means of identifying representative ecosystems. BNHS is working towards conserving and managing IBAs nationwide, and regularly updates database on IBA information. With BNHS support, Kerala is coming up with a Bird Atlas—the first of its kind in India—which will also showcase IBAs.

BNHS, along with Indian Bird Conservation Network, is helping to identify wetlands in Srinagar and make statutory 'brief documents' for the same. BNHS is also working towards a comprehensive nation-wetland wetland conservation programme which will have the special emphasis on migratory species.

Target 7

BNHS is collecting information about traditionally consumed food resources in SLTP. The data has been generated from shepherds, women, and other villagers from Karwa in Tadoba Andhari Tiger Reserve. Gonds, who occur predominantly in the village, depend on wild food. Their traditional food includes 4 tubers species, 7 climbers' species, 2 aquatic species, 10 terrestrial plant species, one species of mushroom and one newly raised bamboo species.

Target 8

At Lakshadweep, and Andaman & Nicobar Islands, BNHS study of Giant Clam and its habitat uniquely combine research involving new records with conservation action. This action, which meets Target 8, includes interacting with fishermen, village heads, school students, women's groups and other locals and involving them directly in the conservation of the fragile habitat.

Bamboo craft and gobar gas initiatives in Satpuda Tiger Landscape Programme (SLTP), crab culture project in Jaigad, Ratnagiri, extensive education and awareness activities throughout the year in Nagaland and Manipur to save Passage Migrant Amur Falcon *Falco amurensis*.

Target 10

BNHS has played a crucial role in recommending a Flamingo Sanctuary for Mumbai. Among other recommendations to the Indian Government is the demand to declare Craggy Island in North Andaman, with a high density of the species, as a conservation area.

BNHS has submitted a report seeking policy guidelines towards reducing the impact of new

renewable energy projects such as windmills and solar power on biodiversity. It recognises the acute need to conduct Environmental Impact Assessment (EIA) as well as Cumulative Impact Assessment (CIA) studies before construction, during construction as well as during the operational phases of the power plants.

Target 12
BNHS works with Maharashtra State Forest Department and the local administration in the Great Indian Bustard areas to raise financial resources under various schemes in a collaborative manner.

Workshops/Meetings

Common Bird Monitoring Workshops
As many as 14 workshops were held in Maharashtra, Odisha, Gujarat, Manipur and Jammu & Kashmir for forest officials, birdwatchers, journalists and students for monitoring bird species scientifically and systematically in their areas.

GIB Conservation
Meetings were conducted with the Chief Conservator of Forests and Divisional Forest Officer at Jodhpur and Jaisalmer. The key issues discussed were related to supporting local livelihoods through conservation and ecotourism. A plan has been developed to build capacities among the local youth with respect to eco-tourism in GIB areas.

A workshop on the Wildlife Protection Act(WPA) was conducted in Jodhpur for forest officers. It covered capacity building for proper interpretation of the major legal frameworks in WPA. All the wings and circles in Thar Desert under Jodhpur Range participated.

Environment Journalism
A workshop was held for journalists and writers at the Conservation Education Centre (CEC), Mumbai in October 2015 to encourage robust coverage by the media of biodiversity issues.

Tamil Nadu Birders Meet, Coimbatore
BNHS made presentations at the second Tamil Nadu Birders Meet, which was organised at Tamil Nadu Agriculture University, Coimbatore, during 24–25October 2015. More than 100 birders participated in this meeting.

Asian Bird Fair
Representatives from BNHS Vulture Breeding Centre, Assam, and IBA, Mumbai, participated in the Sixth Asian Bird Fair, held in Singapore from 31 October to 1 November 2015.

BirdLife Asia Council Meeting
BNHS attended the BirdLife meeting held on 25 and 26 February 2016 at Singapore. Various issues, including networking in Asia, were discussed during the meet.

IBCN Workshop, Sikkim
A workshop was organised at Kewzing, Sikkim, in collaboration with Sikkim Ornithological Society on 2 and 3 February 2016. A total of 38 people, including birdwatchers and forest officials, participated in the workshop.

Other activities

CEC
The Conservation Education Centres at Mumbai, Nagpur and Delhi continued to contribute towards educating school children and the general public about various conservation issues through camps, online courses, urban biodiversity programmes among corporate bodies and tree censuses.

eMammal International
BNHS, in collaboration with North Carolina Museum of Natural Sciences (North Carolina) and the Museo de Paleontología (Mexico), took up an eMammal project for school children of Sindhudurg, Nagpur and Palghar, in Maharashtra. Over 600 students had firsthand experience in laying camera traps. Over 50,000 images uploaded on the eMammal website, and students networked with their peers and scientists from the USA and Mexico. The database will benefit any institution in the world studying biodiversity.

Flamingo Festival

This year too, in March BNHS organised the Flamingo Festival at Sewri, Mumbai, to sensitise people about flamingos and other waders. Thousands of people from all walks of life attended the festival, which had fun and educational programmes, besides a firsthand introduction to bird species.

Legal Awareness

A4-day training programme was conducted for the ground-level staff of Jaisalmer Range, Rajasthan Forest Department. It covered application of laws in preventing poaching and hunting. It also focused on handling of poaching and hunting cases by the ground-level staff. It was attended by all the officers of Jaisalmer Range, along with the forest guards.

Organic Farming

Training programmes in sustainable agriculture were held for local farmers, who were sensitised to the harmful effects of pesticides on the GIB and other dependent animals. BNHS organised the programme in collaboration with Watershed Organisation, Pune.

Eco–guide Training

The ecotourism guide training programme was conducted at Airoli Jetty, Mumbai, from 28 March to 1 April 2016. The main aim of the training programme was building the capacity of local fishermen to identify the flora and fauna of the area and educate them about the ethics of ecotourism.

Training in Conservation

BNHS conducted workshops in several under-represented areas, such as Jharkhand, Mizoram, Manipur, Bihar, Jammu & Kashmirand Sikkim. The purpose of these workshops was to tackle local conservation problems, help conserve species and habitats and build capacity for conservation action. The outcomes of these workshops include youth groups at Loktak Lake, Manipur, increased state wildlife board engagement in Bihar, creating a network for ornithology in Sikkim and creating a wetland policy for Jammu & Kashmir.

Data Collection

The Bird Migration Study Centre continues to impart training consistently to forest department officials, particularly in monitoring migratory birds.

Sálim Ali Bird Count

Sálim Ali Bird Count was revived and organised in collaboration with Bird Count India, a consortium of organisations working for birds. This citizen science initiative was organised in memory of the late Dr. Sálim Ali on 15 November 2015. A total of 280 participants from 22 states submitted 549 checklists. The number of observations submitted was 15,638.

Asian Waterbird Count (AWC) 2016

BNHS helped conduct and promote people's participation in AWC. The count, which is used to estimate the global and regional populations of waterbirds, was jointly conducted in India by Wetlands International and BNHS.

Collections

The unique specimens housed in BNHS, some over a 100 years old, were referred to by 55 scientists, 32 institutions from India and abroad, 30 BNHS members, 700 students and over a hundred other visitors during 2014–2015.

Publications

Dissemination of scientific knowledge is a primary objective of BNHS. To achieve this objective, it publishes a range of material from the popular to academic. First published in 1886, the peer-reviewed journal of the organisation published its 111th volume in 2015. Volume 111 was also the first issue of the JBNHS to be made available online on its website, www.bnhsjournal.org. All operational tasks of the JBNHS, such as manuscript submission, peer review, archiving, indexing and subscription are now available online.

Launched in 1976, *Hornbill* is an effective means of communication between the society and its members and carries interesting illustrated articles and features on natural history and nature conservation.

BNHS has so far published more than 50 major titles (popular and academic) that are marketed worldwide by the society's co-publishers, Oxford University Press (India). During 2014–2015 BNHS published seven new titles and reprinted six of its published titles.

The region of Marathwada in Maharashtra state is evident of social, economic, and environment inequities that are prevalent. Institute for Integrated Rural Development (IIRD) has emerged out of the need to strengthen grassroots development initiatives for promoting sustainable livelihoods. Since 1987, IIRD has been exploring into the area of "self-reliant" development through people's initiatives focusing on organic agriculture, alternative marketing, appropriate housing, micro-enterprise development, community based health, environmental education and women's development. Together with the people, IIRD strives to bring about better livelihoods- improved incomes, appropriate housing, better health and nutrition, inclusion of the marginalized - particularly elderly destitute persons and persons with disabilities, and a more sustainable environment.

Workshops and Meetings

- Executive Director of IIRD participated and presented on the impact of farm based micro-enterprises and direct local marketing on sustainable agriculture, enhanced environment, and livelihoods of small and marginal farmers at the Symposium on Community Supported Agriculture that was held in Beijing, China, from 19-21 November 2015.
- Representatives from civil society organizations of six districts in Maharashtra state convened a meeting on 17th July to discuss on the situation of local landrace varieties and planned steps to promote native crops.
- Staff of IIRD participated in the national level seed savers meeting that was held in Wardha, Maharashtra, from 26-27 September 2015. The meeting was participated by representatives from about 60 organizations in India. The purpose of the meeting was to discuss on the policies, laws, and regulations that hinder or promote the propagation of native seeds and the steps to ensure better conservation of native landrace crop varieties.
- At a regional conference on the local biodiversity and the environment organized by IIRD in Aurangabad district on 13th April 2015, farmers from six districts of Maharashtra displayed local seed varieties of several crop and tree species in the region.

Research activities undertaken

Engaged in a research study, “Maharashtra Gene Bank”, to identify and document the different crop varieties in Marathwada region of Maharashtra.

Events organized

- “Beej Puja” (seed worship) was conducted with the participation of traditional farmers in forty villages of six districts to assert the importance of local seeds and biodiversity conservation.
- Environment day was celebrated on 5th June 2016. The day is commemorated with village level workshops focused on conservation of local biodiversity.
- Drawing and poetry competition for school children on the theme of biodiversity.
- School children of Aurangabad district were organized to collect and document local varieties of mangoes. Seventy six varieties of mangoes were identified in the district alone. The purpose of this exercise was to recognize the local biodiversity and associated knowledge.
- The festival of Holi was celebrated in Aurangabad district with eco-friendly colours prepared from local varieties of plants. Volunteers from villages participated in related workshops and facilitated the children and youth to prepare the colours.
- International seed day was celebrated on 26th April when traditional farmers were involved in strengthening the local village based seed banks.

Organization for Marine Conservation and Research (OMCAR) Foundation is a registered, non-governmental, non-profit organisation with 80G and 12AA tax exemption and FCRA registration. OMCAR is engaged in a multitude of activities for conservation of coastal and adjacent ecosystems of the northern Palk Bay, India. *In-situ* conservation and environmental awareness are among the chief areas of concern of OMCAR Foundation. The marine and coastal ecology research programme strives to promote and enhance the conservation of mangrove and seagrass ecosystems in the region through a participatory approach involving the local community. Through environmental education programmes in coastal schools, the foundation aims to strengthen individual and team responsibility among school students in nature conservation.

Sustainable Fishery Education

The Sustainable Fishery Education event was organised in 78 schools in 2015. A total number of 7900 students attended the marine conservation education programmes.

India Geospatial Excellence Award 2015 for OMCAR Foundation

OMCAR Foundation received this award on 10 February 2015 during the India Geo spatial Forum 2015, held at Hyderabad International Convention Centre. This national-level award was given for OMCAR's project titled funded by the Ministry of Science and Technology, Government of India.

Sustainable Fishery Drawing Competition in Schools—March 2015

A total of 690 students from 12 schools participated in drawing competitions with mangroves, seagrass beds and sustainable fisheries as the themes. The students were instructed to draw their coastal areas and to express their views on how the economy and health of the local community benefitted from the local fishery resources. The children expressed their thoughts through drawings brilliantly. The five best drawings were selected from each school. A total of 60 drawings were selected from the 690 drawings from all the schools. The first, second and third drawings of each school received prizes during the inauguration ceremony of the Fifth Year of OMCAR Palk Bay Centre, while the fourth and fifth places were given consolation prizes.

New Weather Station at OMCAR Palk Bay Centre

A new weather station was installed at OMCAR Palk Bay Centre in March 2015. The weather station records temperature, rainfall, humidity, wind speed and wind direction. This weather station will be used in marine educate programmes about coastal and atmospheric science as well as in ongoing sustainable-fishery, mangrove and seagrass programmes.

Celebration of Fifth Year of OMCAR Palk Bay Centre

The OMCAR Palk Bay Centre has completed 4 years.

Since the establishment of this centre, it has been visited by students, researchers, fishermen, women groups, scientists, professors and teachers for various training and education programmes. The celebration of the beginning of the fifth year of the centre was organised on 25 and 26 March 2015.

Donation of Mangrove Seedlings to Tamil Nadu Forest Department

1200 mangrove seedlings raised at the OMCAR nursery at Velivayal were donated to the Tamil Nadu Forest Department (Muthupet Range) for planting in the reserve forest. With long-term experience with mangrove nurseries, OMCAR Foundation will upgrade its mangrove nursery in the near future to raise about 20,000 seedlings each year in order to plant them along the coast of Tamil Nadu through the Tamil Nadu Forest Department, schools and communities.

Celebration of World Ocean Day

World Ocean Day was celebrated at Palk Bay Centre with school students and Netfish. The purpose of celebrating World Ocean Day was to remind everyone of the major part the ocean has to play in everyday life. They are the lungs of our planet, providing most of the oxygen we breathe. The objectives of the celebration were (1) to inform the public about the impact of human actions on the ocean; (2)to develop a worldwide movement of citizen towards the ocean; (iii) To mobilise and unite the world's population on a project for sustainable management of the World Ocean as it is a major source of food and medicines and a critical part of the biosphere; and (iv)to celebrate together the beauty, the wealth and the promise of the ocean.

Environmental Education Camp at Palk Bay Centre

Fourteen students from Vruksha Montessori School, Chennai visited OMCAR Palk Bay Centre for a 2-day camp to learn about mangroves, seagrass beds and the productivity of the fisheries in Palk Bay. They visited Muthupet Mangrove Reserve Forest, attended OMCAR's presentations and walked along the beach to see seagrass beds and shells and to learn about coastal habitats and their importance for society. As a part of this programme, the students learned mangrove restoration techniques and helped the staff members of the foundation prepare mud bags for mangrove seedlings.

OMCAR–Netfish (MPEDA) Fisher Awareness Meetings

OMCAR Foundation joined with Netfish (MPEDA) to organise awareness events at fisher villages in Thanjavur District on the following topics: hygienic handling of fish, conservation of mangroves and seagrass beds, sustainable fishing methods and releasing undersized fishes and crabs back to the sea. The events were held at the following villages:(1) Pudupattinam,(2) MGR Nagar,(3) Manora,(4) Manora Colony,(5) Sethubhavachattiram,(6) Mallipattinam,(7) Chinnamanai and (8) Somanathanpattinam. Hygienic fishery practices were demonstrated in the boat.

Coastal Clean-up Programme

Netfish MPEDA and OMCAR Foundation jointly organised a coastal cleanup and tree donation event at Velivayal. Forty students from Rajamadam Government Higher Secondary School and 30 students from Mallipattinam Government Higher Secondary School participated in this event. The event was inaugurated by the Panchayat president of Pudupattinam. Mango, guava and amla seedlings were donated to each house of Velivayal village by the students. Later they collected plastic garbage from the beach at Velivayal. Dr. A. Murugan, Coordinator of Netfish MPEDA, the Panchayat president and the marine police participated in this event.

Cotton Bag Production—Training at Palk Bay Centre

Since 2014 OMCAR Foundation has been organising various skill development training programmes for women from fisher villages. One of the recent training programmes was on the production of cotton bags as the alternative to plastic bags in local markets. Eighteen women who already knew tailoring techniques were selected and trained in three consecutive training programmes. The foundation supported them in finding local shops at Thanjavur and Pattukkottai to marketing the product in the initial stage. However, the trained women did not come to manufacture the product as expected. The reason is that they earn a low income through this product compared with the usual income they have from making blouses and other clothes. This programme needs to be modified or improved with new ideas, or it will be difficult to continue this work. OMCAR Foundation expects to solve the difficulties faced by this project in 2016, failing which this unit will be closed permanently.

Medical Camp at Palk Bay Centre

A medical camp was organised at Palk Bay Centre by OMCAR Foundation along with Meenakshi Mission Hospital, Thanjavur. Basic health checkups such as ECG, sugar and blood pressure were conducted during this 1-day programme. Eighty-four people, mostly old persons from Velivayal, Kollukkadu, Chinna Auvdaiyarkovil, Aandivayal and Pudupattinam, benefitted. OMCAR organised a shuttle van for travel between the villages and the centre.

Dead Blue Whale Necropsy

A dead Blue Whale was washed ashore on the coast of Thanjavur District. OMCAR Foundation was called by the Marine Police station of Sethubhavachattiram to visit the specimen along with the veterinary and forest departments. Dr. Balaji swam into the sea to collect the specimen for the veterinary doctors so that they could analyse tissue samples.

SACON-OMCAR Joint Venture

IUCN member organisation SACON (Salim Ali Centre for Ornithology and Natural History) director and scientists visited OMCAR Palk Bay Centre from 4th to 6th November 2015. SACON is carrying out a pilot project to study mangroves, seagrass beds and coral reefs in Palk Bay, for which OMCAR field expertise will support. MoU between OMCAR and SACON for conducting joint research in Palk Bay initiated.

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

The Wildlife Institute of India (WII) was established in 1986 as an autonomous institute of the Ministry of Environment, Forest and Climate Change, Government of India. The institute has emerged as a premier training and research institution in the field of wildlife and protected area management in South and South East Asia. Its mandates are to generate quality information and knowledge products in wildlife science through research and mainstream them in capacity building programmes for various target groups and provide advisory support to the central and state governments.

Research Activities

Wildlife research at the institute is broadly multidisciplinary in nature, covering ecological, biological and socio-economic aspects of various ecosystems in the country. The research generates valuable scientific information relevant to the Indian ground conditions and creates a group of trained field biologists, socio-economists and wildlife managers. The scientific information generated is utilised for management of protected areas. WII's research conforms to the national conservation priorities. The institute has developed knowledge products on various aspects of wildlife management to help field-level functionaries effectively manage our wildlife resources. The institute has been instrumental in implementing important conservation programmes at the field level, including estimating Tiger populations in 17 states of the country, translocation and reintroduction of species, including the Tiger, in new areas, and applying state-of-art tools and techniques in India in the field of wildlife conservation. The institute's research activities addressed Aichi Targets 1 and 2 of Strategic Goal A and Aichi Target 14 of Strategic Goal D.

Biodiversity Conservation and Rural Livelihood Improvement Project

This World Bank-assisted project of the Ministry of Environment, Forest & Climate Change, Government of India is being implemented in partnership with the concerned state forest departments. WII is one of the implementing partners in this project for enhancing the capacities of the project implementers and a knowledge management centre on the landscape approach to biodiversity conservation. India has been experimenting with participatory approaches for managing biodiversity conservation and has achieved global recognition through programmes such as Joint Forest Management and Ecodevelopment.

The second phase of ongoing studies titled"Biological Indicator and Ecological Mapping for Implementing Landscape Approach" has been approved and is being undertaken in the Askot Landscape. In June 2015, an expedition in Chipla Kedar, Pithoragarh District, was conducted for collection of primary data on the Caterpillar Fungus that could help conservation strategies including participatory resource management and improving conservation awareness among local communities in Uttarakhand. Ninety-four camera traps and other associated items have been procured for facilitating this study. Various reports related to the first phase of the study arebeing printed.

Many initiatives were undertaken during 2015–2016 to carry forward this project. During the year, six major training programmes and workshops were conducted at various places in the study area, in which more than 200 participants participated actively.

Satellite Tracking of Amur Falcons *Falco amurensis* from Nagaland, India

Two satellite-tagged Amur Falcons, Naga and Pangti, returned to Nagaland on their southbound migration for the third consecutive year, which has set a record of continuous tracking of the species. This year again, no hunting of the falcons by local people was reported during the period. A large number of Amur Falcons were also reported to be roosting in the adjoining areas in Manipur, specifically Tamenglong and Senapati districts. According to the local people,theyhave also started protecting the falcons. The satellite tracking of Amur Falcons, a joint initiative of WII, Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, and the Nagaland State Forest Department in collaboration with the Convention on Migratory Species (Raptors MoU), Birdlife International—Hungary and Hungarian Museum of Natural History, has created a lot of awareness among the local people in the state and elsewhere and helped people actively protect the falcons.

The local people of Yaongyimchen village declared a large area of their community forest where Amur Falcons roost a Community Conservation Reserve. A letter of appreciation from the Convention of Migratory Species (Raptors MoU) acknowledging the efforts by the local people was handed to the community leader by Dr. V.B. Mathur, Director, WII, and Dr. S.K. Khanduri, IG(WL), MoEFCC handed over a map showing the migratory routes of two Amur Falconsthat were satellite-tagged to the community leader Mr. Nuklu Phom of Yaongyimchen village, Longleng District, in Nagaland, in November 2015. This was followed by a visit of Mr.Prakash Javadekar, the Hon'ble Union Minister, MoEFCC, Government of India, to the roosting site. He likened the Pangti area to a “natural university”,a centre of learning where local communities had taken it upon themselves to protect the Amur Falcons. Recognising that the satellite-tagging initiative has helped generate a lot of awareness, he said that four to five Amur Falcons would be satellite-tagged at other roosting sites in Nagaland next year and that the birds would be named after the villages.

Capacity Building

As part of its capacity-building programme, the institute runs two long-term regular training programmes for in-service forest officers. The institute also organizes many short-term courses for different stakeholders. These courses fulfill Aichi Targets 17 to 20 under Strategic Goal E,that is, participatory planning and capacity building.

Regular Training Programmes

Since its inception, the institute has trained more than 1231 field managers through its flagship programmes,the Post-graduate Diploma Course in Wildlife Management and the Certificate Course in Wildlife Management. During the reporting period, the institute completed twoof these programmes, in which 44 officer trainees participated and completed various modules and field exercises as per the course curriculum.

Another batch of 13 officer trainees joined the XXXVII batch Post-graduate Diploma in Advanced Wildlife Management in September 2015 for a period of 10months. The course is meant for IFS officers of state forests departments and equivalent foreign nationals.

Short-Term Training Programmes

Apart from the regular training programmes, the institute also organised many short-term courses for various stakeholders during the reporting period. More than 480 participants from different backgrounds and professions participated with different objectives. Some of the major short-duration courses organized during 2015–2016 are described in the following.

Second Special Certificate Course on Coastal and Marine Biodiversity and Protected Area Management,Havelock, Port Blair, Andaman & Nicobar Islands, 1–18 December 2015. Thiscertificate course, for the field-level staff of forest departments, was inaugurated on 1 December 2015 at Havelock Island, Andaman, with 13 participants, comprising largely Range Forest Officers representing Gujarat, Maharashtra, Kerala, Andhra Pradesh, Odisha and Andaman & Nicobar Islands. The course included open water scuba diving training and monitoring underwater biodiversity. The course was organised jointly by WII and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

*Third School in Herpetology (Phase II), Dehradun, 1–15 October 2015.*An intensive course in herpetology (study of amphibians and reptiles), sponsored by Department of Science and Technologyand Science Engineering Research Board, called the “School in Herpetology”, was conducted at WII. The course targeted master's students, doctoral students and young faculty members from India. The course was designed to assist students with pursuing careers in herpetology. In all, 24 participants from India were selected for the course.

The course had five modules, namely, Taxonomy, Systematics and Biogeography; Ecology and Behaviour; Biostatistics and Science Communication; Reproductive and Developmental Biology; and Conservation Biology. The students were also trained in laboratory techniques, such as preservation, curation, morphometry, behavioural observation of larvae and regeneration experiments. A field trip was organised to Dhanaulti and Benog Wildlife Sanctuary. The participants were exposed to field techniques in herpetology and photo-documentation. A workshop on field photography was also organized. The participants were asked to prepare one poster on their own research work.

Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) Capacity-Building Forum, Dehradun, 19–22 October 2015. Governments, organisations and other stakeholders met in India to discuss opportunities for aligned investments in ecological knowledge for sustainable development. A key international initiative for addressing concerns over threats towards biodiversity and ecosystem services, IPBES was established in 2012 and currently consists of 124 member states.

The first IPBES capacity-building forum was organised in India, Dehradun, at WII. A total of 75 participants attended this training programme. The first meeting of the forum aims to promote dialogue amongst receivers, implementers and funders of capacity-building activities. The meeting explored opportunities for cooperation on aligned investments in capacity-building needs; furthering partnerships for piloting and delivering the IPBES capacity-building programme; and planning further action, including preparation for future meetings of the forum. Dr. Zakri Abdul Hamid, IPBES Founding Chair and Science Advisor to Malaysia's Prime Minister and member of the UN Secretary-General's Scientific Advisory Board, graced the occasion.

Three-day training programme titled"Mainstreaming Biodiversity in Road and Rail Transportation Projects for Promoting Smart Green Infrastructure", Dehradun, 17–19 February 2016. The training programme was jointly organised by WII and National Tiger Conservation Authority (NTCA), New Delhi, at WII**.** This special training course was also endorsed by the International Association for Impact Assessment (IAIA), the largest association of professionals engaged in impact assessment. A total of 43 participants including road and rail planners, transportation engineers, decision makers, wildlife managers and impact assessment professionals attended the course.

This 3-day course was designed to provide an opportunity to become abreast with the recent developments in the field of road ecology and to upgrade technical skills for responsible planning of roads to balance the growth and mobility of people with the security of habitat connectivity and permeability for wildlife species.

International Consultation Workshop titled"Enhancing Capacity for Effective Management of Coastal and Marine World Heritage Sites of the Asia-Pacific Region", Sundarbans World Heritage Site, West Bengal, 26–28 February 2016. The workshop was jointly organised by the newly established UNESCO-WHS Category 2 Centre (C2C), WII, GIZ, New Delhi, and the West Bengal Forest Department at the Sundarbans World Heritage Site. A total of 27 participants from the Asia–Pacific Region including Natural World Heritage Sitemanagers, protected areamanagers, professionals engaged in conservation of coastal and marine biodiversity, decision makers, NGOsand experts on coastal and marine biodiversity and fisheries attended the workshop.

The main objectives of the workshop were to (1) sensitise the participants to the existing policy and legal issues, international guidelines and framework of management planning concerning Coastal and Marine World Heritage Sites (WHS); (2) equip the site managers to deal with disaster events and adopt risk reduction strategies; (3) introduce the concept of "climate proofing", management of climate change and adoption of mitigation measures; (4) share experiences and best practices in Coastal & Marine WHS management in the region; and (5) evolve a road map towards effective management of Coastal & Marine WHS in the region.

"ARASMIN", the Tribal en-birth Civil Society Organization takes birth in a Tribal belt during the year 1992 at the village Gressingia, adorning the villages and hamlets of Tribal Communities and Schedule Caste Communities under G.udayagiri Block of Kandhamal District in the State of ORISSA (INDIA). The initiative was taken by a group of Qualified, Experienced and Service-oriented Social Workers from different parts of the State as a token of their commemoration. The Aims and objects if this Tribal en-birth organization is to render dedicated and persistent services to those down-trodden communities for their community reconstruction and all-round development by means of pacific macro-policies, creating a commendable ideology and congenial atmosphere. Since, then this Tribal en-birth organization is in practice of providing equality to all communities and all citizens irrespective of Caste, Creed, Sex and Religion and have the firm belief to sacrifice for the all round development of the hilly- dwelling poor people.

Forest and Environment

Environmental degradation during these present days has become a Global Issue. Degradation of forest, Extinction of wild animals, diminishing biological diversity, and raise of temperature are an acute problem and the vital cause of environmental degradation. It is a broad concept which includes pollution of various biological and physical components of the planet as a result of which the entire world is going to be destroyed. Though the Clean Development Mechanism (CDM) allows emission-reduction projects in developing countries to earn Certified Emission-Reduction (CER) credits, the emission reduction targets of the Kyoto Protocol Conference is not yet satisfactory.

The fact is that, from the inception, the tribal people have been residing in forest area and they were the real owners of the forests and jungles and they were taking the proper care of the same. But, in the course of time being motivated and misutilized by the businessmen and wood mafias they are in the perseverance of destroying the forests and jungles to surmount their poverty. But, they are the real assets to save the nature.

In this juncture, ARASMIN has thought it wise and gainful to work in conjunction with the poor tribal community and trying for acceleration and restoration of forest landscape, conservation of biodiversity, protection of nature, control of pollution, restoration of environment and climate change. On the other hand, the lives of all wild animals like tigers, elephants, bears, deer, monkeys, wild boars and other animals can be saved. All the village forests are being developed which will generate fresh air, clean water and create a congenial atmosphere for the lives of all. Hence, vigorous awareness campaigns with appropriate actions are being taken in a regular manner on restoration of forest landscape, protection of environment and conservation of biodiversity.

Wildlife Conservation

ARASMIN is an active member of the "INC-IUCN" and as such the organisation is trying its best to protect the wild animals and wild birds and migrated birds so as to avoid different types of natural calamities, en-hazards and different diseases like cancer, asthma and tuberculosis etc. in order to accelerate the human life-cycle. A regular awareness program is being conducted to stop tiger poaching, deer poaching and hunting of different animals and birds. ARASMIN is also getting much more support from the officers and staff of the Forest Department of Odisha.

In view of the above phenomenon, some of the activities undertaken by the organisation in conjunction with the community organizations are mentioned hereunder.

01. ARASMIN has formed Forest and Wildlife protection Committees in 260 villages in the

area of operation and having regular interactions with the stakeholders periodically to protect the nature.

02. Restoration of forest landscape by creation of social forestry, agro-forestry and plantation of different useful plants through the indigenous people so as to promote their livelihood.
03. Awareness campaigns are being conducted on the merits of forest, environment and wild animals and how to protect them from the endangered situation.
04. Protection of forest, environment and wildlife animals and birds.
05. Celebrating the "Van Mahotshav Week" (Great Forest Festival Week) in conjunction with the indigenous forest dwelling stakeholders.
06. ARASMIN has formed an anti-poaching squad in conjunction with the community leaders and engaging them to stop hunting and poaching of different animals and birds in forest area and initiating legal action against the plunderers.
07. Special attention and awareness programmes are being done at the elephant corridor in Kalahandi District and Kandhamal District to save the lives of the elephants.
08. The community members are watching regularly to save a rare species of big animal called "Gayal" (seems like wild buffalo) only seen in Kalahandi District of Odisha State.
09. Awareness campaigns were done in Suhan, Gundalaba, Daluakani, Anakana, Chhenu, Tandaghar, Udayakani, Musapada, Nadiamatha and Chhuriana villages near Ramchandi River mouth and Keluni River mouth to save the Olive Ridley Turtles.
10. Awareness campaigns are done at Brahmagiri and Satapada Area adjacent to Chilika Lake to save the Dolphins and the migratory Birds.
11. Awareness campaigns are done at Kalinga Ghat to save the lives of the monkeys and apes coming to the road for food given by the travellers in conjunction with the local people and the forest personnel.
12. Watching the forest area and trace out the wood mafias and report to the appropriate authority for taking legal action against them.
13. Decisions have been made by the indigenous stakeholders not to destroy the forest and not to fire the Forest during the summer season so as to save the carnivorous animals and medicinal plants of the forest.
14. Decisions have also been taken to identify the plunderers of other states coming for hunting and poaching and handover them at the Police Station.

Livelihood Alternatives

ARASMIN has observed that lack of options in food production is another major reason for degradation of natural resources. Ecology works to promote sustainable agriculture, non-timber forest products and community enterprise. The organisation is working to provide these alternative opportunities that improve the individuals and poor community well-being. Hence, the organisation is encouraging the community members to have the subsistence agricultural production, which saves the lives of the tribal people as well as the planet. The details of the advantages of the subsistence agricultural farming and production are mentioned hereunder:

01. Practices of land use: The land use practice is generally horizontal and sometimes it is vertical for the purpose of subsistence agricultural cultivation.
02. Crop Coverage: Suan Rice, Boro-Rice, Raggi, Maize, Black gram, Beans, Pea, Cowpea, Turmeric, Zinger etc.
03. Duration of the crops: The duration of the crops are very less i.e. before 60 days except the turmeric and zinger.
04. Advantages/Opportunities
    - No need of more water.
    - No need of fertilizer.
    - Nutrition contents are more.
    - Medicinal value is also there.
    - Economic for cultivation.
    - Easy to harvest.
    - Palatable for consumption.
    - Freedom pattern of cropping.
    - The possibility of infection is less.
    - There is more demand for marketing.
    - Fertility of soil will not be destroyed.
    - The best practice for climate change.
    - Overall, the cultivation in eco-friendly, climate-friendly, climate -resilient, climate smart, carbon smart, water smart, and energy smart.

The Applied Environmental Research Foundation (AERF) is a registered Non-Governmental Organization (NGO) based in Pune, India. Since its inception in 1994, AERF has been working towards biodiversity conservation on the ground.

The Foundation applies the principles of 'community based conservation' and develops natural resource management models that actively involve local communities in the cause of forest protection to make conservation beneficial and to create a win-win situation for all the stakeholders. AERF projects are implemented in the North Western Ghats that form a part of a global biodiversity hotspot in India. Team AERF also works across the country for research, training, capacity building and networking for conservation.

AERF's mission is to establish a strong link between research and its effective use in the process of development, for poverty alleviation, sustainable resource use and participatory conservation.

Innovative approaches to engage with local communities for long term conservation action

AERF has been using the incentive based mechanisms as an effective tool for protecting forests on privately owned lands in the Northern Western Ghats since 2007.

Since the first conservation agreements of 5 years matured in 2013 -14, the owners happily renewed them for next 5-10 years. The success of this mechanism has instilled faith in the local people and many of them voluntarily come forward from many villages to be part of this innovative process which

has been tried successfully for the first time in India. Though the process of discussing the concept to actually signing the agreement still takes 3to 6 months, we are proud to report that in the year 2014, AERF was successful in bringing more than 600 acres of forests under agreements till the year 2013. Three new villages Devade, Umare and Terungun have joined the programme in 2014. Within last two years the area under conservation agreements has increased to 3000 acres covering 14 villages and more than 300 beneficiary poor farmers / forest owners. AERF is the first organization in India that has successfully implemented conservation agreements for long term forest conservation. This has been AERF's solid contribution to ensure conservation of otherwise non protected open access forests for the North Western Ghats. AERF is constantly working on studying these forests, developing innovative mechanisms to make these forests economically beneficial and constantly working to partner with local communities for protection of valuable biodiversity in these forests.

Forests for livelihood of stewards - Linking Conservation to forest based enterprise and conservation of sacred groves.

Legally the sacred groves are owned by the revenue department, however in the north Western Ghats they are managed by the village through traditional village management mechanisms or through oral traditions of sanctions and allowances. These systems have been changing and deteriorating for renovation of the temple for developmental activities like roads and dams. The interest of local people has been decreasing as these spaces were not providing any

direct benefits. AERF has been working for revival of the tradition and restoration of degraded sacred forests. These sacred groves host old *Terminalia belirica* trees in plenty and AERF has developed an income generation model based on fruits of these trees from the grove thereby creating a possibility of revenue generation to the village. This has impacted the conservation of sacred groves in two ways. For the first time people could think sacred groves as places of economic importance and are convinced about the conservation for such benefits. Second important aspect is the revenue department also joined hands in the process and allowed local people to accrue the benefits without any objections.

Team of Pukka Herbs a herbal products company from UK has been working with AERF team and local people at Kosumb and Ujgaon to get the Fair Wild certification to *Terminalia belirica* trees (bibitaki as they are called in Ayurveda) and has ensured the purchase of fruits of such certified trees. *Terminalia belirica* old growth trees are important as they provide nesting sites to hornbills (flagship species of forests in NWG) linking them to economic benefits will help conserve the trees in sacred groves and in private forests. This is being supported by Darwin Initiative, in partnership with DICE, University of Kent ,UK . AERF is the first organization in India to receive Fair Wild Certification to two fruits collected from Wild for 2015 & 2016 and demonstrated that better returns could be provided to communities for conservation and sustainable collection from wild , through certification.

The hard work of last four years also emphasized the importance of sacred groves and traditional conservation institutions for benefits sharing.

Awareness campaigns for Sacred Grove protection in North Western Ghats

Since 2012 AERF has been concentrating to take the environmental issues of NWG to people using different formats of awareness building. AERF has organized quite a few awareness campaigns in the form of Yatras. The focus of one such yatra was on local streams , rivers and sacred forests from Sangameshwar block of Ratnagiri district. . These Yatras involved local people, school teachers ,

women , local govt. officials and civil society groups. The interesting feature of the Yatra is to create the awareness about stream's health in and around Devrukh , an upcoming small town, so that local people and residents could realize the their role in maintaining the health of these streams.

In Sangameshwar block the tradition of sacred groves and the local institution maintaining the is same still prevalent in many villages however globalization is impacting it and the form of worship as well as management are changing. These traditional biodiversity rich spaces are extremely important and could be used as climate change adaptation mechanisms. To discuss this new dimension and to recheck the status of sacred groves today an awareness campaign on sacred groves has been initiated since Jan 2013 . It included slide shows, meetings , collective visits to Sacred Groves, cleaning drives and guarding the hornbill nesting sites on old growth trees within the grove. Such campaigns have been organized and continued throughout the year in 20 villages. Similar awareness generation programmes to create awareness about streams, watersheds and sacred forests have been carried out in Chiplun block with the local organizations working for rural development. Ministry of Environment, Forests and Climate Change has supported these campaigns in 2013-2014 and later they are continued with other support.

Civil Society Action for Conservation

Applied Environmental Research Foundation, (AERF) Pune with the Save the Western Ghats group organized a 3 day Practitioners' Conclave from 30th November to 2nd December 2012. The conclave marked 25 years of the Save the Western Ghats March of 1987/88 which was a pioneering environment movement in the Western Ghats.

The 3 day event had numerous sessions and workshops and brought in many eminent scholars and environmentalists to interact with the audience. The Conclave was inaugurated by eminent environmentalist Mr. Anupam Mishra. The conclave dedicated the second day to the numerous Indigenous communities who live in harmony with the vivid biological diversity of the Western Ghats terrain. The day saw a unique Food Festival which showcased the cuisine and the culture of some tribal communities of the Western Ghats. This was an attempt to show the linkage between conservation and agro-biodiversity. The tribals from Maharashtra, Tamilnadu, Karnataka and Kerala interacted with the delegates and spoke about the way they work to preserve their agro-biodiversity and work towards food sovereignty.

The assembled delegates also showcased their work through the Environment Dialogues session. The delegates heard more about the trends of urbanization in the Western Ghats, the significance of green economy and institutional frameworks, the role of the media in highlighting environmental concerns and the way they could draw inspiration from local communities' struggles to save the environment. There was a session focused on the recent UNESCO world heritage site tag being accorded to 39 sites in the Western Ghats.

The conclave was organized at a crucial time when the WGEEP report was being widely discussed and the UNESCO world heritage site tag had drawn the attention of the world towards the Western Ghats. The Conclave helped to publicize and put out in the open many issues which were concerning environmentalists and researchers working in the region. The media attention has ensured that the opinions were put across to a wider audience which shall facilitate in an informed debate. This kind of involvement in critical environmental issues shall hopefully translate into sound public policy decisions. The conclave also has laid the foundation of some sustainable partnerships across various fields of work

which will be followed up in the near future. It was also an attempt at reuniting with some of the old marchers who have been relentless in their pursuit of just environmental decisions and sustainable development since the past 25 years.

Business & Biodiversity

Business and Biodiversity can no longer afford to be paradoxical any longer. AERF is trying to bridge the gap between the two through this programme by engaging businesses and corporate bodies in conservation on the ground and various capacity building activities. The objective is the engage businesses in a meaningful manner to generating awareness and capital both for the cause of biodiversity conservation.

For last six years AERF has been constantly working with corporate companies to engage them meaningfully in process of conservation on the ground and promoting their support for conservation activities beyond philanthropy. AERF has been working with companies like ITC, Credit Suisse, Praj Industries, and Innoventive Industries to name a few. Our work with corporate involves training, campaigns, partnership for conservation on the ground and use of technology for conservation. It is our constant endeavour to influence the corporate sector for creating space for conservation initiatives in their CSR space. AERF is trying to gain long term support for conservation and demonstrating how corporate and conservation organizations together can contribute to sustainable development in true sense.

IUCN ENGAGEMENT IN INDIA

India became a State Member of IUCN in 1969. The IUCN General Assembly, predecessor to the World Conservation Congress, was held that same year in New Delhi. IUCN now has 43 Members from India, and over 570 experts represented in the six IUCN Commissions. This association has been significant in the establishment of the India National Committee (INC), Chaired by the Secretary, Ministry of Environment, Forest and Climate Change (MoEF&CC).

IUCN has been granted the status of an autonomous, international non-profit organization, in accordance with an MoU signed with the Government of India. Accordingly the IUCN India Country Office was established in New Delhi in 2007. Since then, IUCN-India office has been providing necessary support to its members in India and commission members through various programmes as part of our One Programme approach.

Ongoing Initiatives

The *Mangroves for the Future (MFF)* initiative aims to address threats to all coastal and marine ecosystems and communities across Asia. MFF in India focuses on building socio-ecological resilience of local coastal communities. Key outputs include strengthening of livelihoods and income security, science-based policy recommendations, knowledge and awareness products and capacity building of stakeholders for enhanced governance.

Through the ***IUCN Tata Steel Partnership*** a comprehensive biodiversity management policy and site-specific biodiversity management plans are being developed for Tata Steel's mining operations in India, to minimize impacts on biodiversity.

The ***IUCN Tata Power Partnership*** is working towards strengthening the companies overall biodiversity management. Additionally, IUCN will work with Coastal Gujarat Power Ltd (CGPL), a subsidiary company of Tata Power to develop Biodiversity & Ecosystem Services Protocols.

Leaders for Nature (LfN) is a network of multi-national, and national enterprises. In offering knowledge & training, project support and inspiration, LfN in India encourages and facilitates companies to take lead in incorporating natural capital in their core business, sensitizes companies to the value of nature, and assesses biodiversity related risks and opportunities to inform strategic decision-making. LfN has 10 Member companies: Tata Steel, Tata Power, HUL, Apollo Tyres, Wipro, ACC, Cairn India, Rio Tinto, Veolia India and Aditya Birla Group

The ***Monitoring the Killing of Elephants (MIKE)*** initiative is an international collaboration that tracks trends in information related to the illegal killing of elephants from across Africa and Asia, to monitor effectiveness of field conservation efforts. The sub-regional support unit for South Asia is hosted by IUCN in India.

As part of the ***South Asia Vulture initiative***, the Governments of India, Bangladesh, Nepal and Pakistan, have signed a Regional Declaration for the conservation of endangered *Gyps* species. In addition to working at the policy and research levels, IUCN in India has recently completed an economic valuation study of the regulating services provided by vultures.

The ***IUCN ITC Partnership*** is developing Sustainable Agriscapes, incorporating ecological and biodiversity concerns, whilst supporting agriculture, and allied livelihoods, in Munger, Bihar.

ANNUAL FINANCIAL REPORT

IUCN-CELL
Receipt & Payment

For the Financial year 1st April 2015 to 31st March 2016

Receipts	Amount	Payment	Amount
To Opening Balance	596450.89	By Travel Expenditure- Resoruce Personal	158735.00
To Interest	18546.00	By Travel Expenditure- Administration IUCN	35185.00
To Member Ships	87500.00	By Stationery items	2000.00
To Misc. Receipts	52.50	By Report Printing	155767.00
		By Misc. and Meeting and Confrenace	57120.00
		Total Expenditure	**408807.00**
		By IUCN CELL - UBI Saving A/c No# 41	**293742.39**
Grand Total	**702549.39**	**Grand Total**	**702549.39**

Audit Certificate

I have examined the Receipts and Payment Account for the Financial Year 1st April 2015 to 31st March 2016 of the WII-IUCN Cell Dehradun. I Certify, as a result of my audit, that in my opinion these accounts are properly drawn up so as to exhibit a true and fair view of IUCN Cell- Wildlife Institute of India, DehraDun according to the best of information and explanation given to me and as shown by the books of the organization.

Finance Officer

वित्त अधिकारी/Finance Officer
भारतीय वन्य जीव संस्थान, देहरादून
Wildlife Institute of India, Dehradun

National Board for Wildlife

CEE
Centre for Environment Education

Gujarat Institute of Desert Ecology

SHRMS
Society for Hill Resource Management School