



A Two-day workshop on

Conservation of wildlife in Deccan Plateau of Maharashtra - a neglected ecosystem

Dates: 3rd - 4th March 2015

Venue – Nirmalkumar Phadkule Sankul,
Near Siddeshwar Temple, Solapur, Maharashtra, India



© BNHS 2015: All rights reserved. This publication shall not be reproduced either in full or in part in any form, either in print or electronic or any other medium, without the prior written permission of the Bombay Natural History Society.

BNHS-India

Hornbill House, S.B. Singh Road,
Mumbai 400 001, Maharashtra, India.

Tel.: (91-22) 2282 1811

Fax: (91-22) 2283 7615

Email: info@bnhs.org

Text Editors:

Shripad Kulkarni, Ascharya Creative Communications
Sujit Narwade, Project Scientist, BNHS-India

Design and Layout:

Mr. Gopi Naidu, BNHS-India (Front Cover) and
Ascharya Creative Communications (Inside Pages)

A two-day workshop on

Conservation of wildlife in Deccan Plateau of Maharashtra

- a neglected ecosystem

The Programme Schedule

Time for each presentation: 10 minutes for presentation followed by 5 minutes for question answers.

Day one: 3rd March 2015

Sr. No.	Name of speaker	Topic	Time
		Registration	8.00 am to 10.00 am
		Inaugural session	09.30 am to 11.00 am
1.		Workshop commences with a ceremonious event	
2.	PRO, BNHS	Welcome address to the participants	
3.	Sujit Narwade	Background of the workshop	
4.	Shri J. Pattabhiraman, AGM, Environment, NTPC, Solapur	About Wildlife Conservation and Monitoring Plan to be implemented by NTPC, Solapur	
5.	Shri Sarjan Bhagat, PCCF, Maharashtra	Inaugural address as a Chief Guest	
6.	Dr. Asad Rahmani, Director, BNHS (Chair person of the Workshop)	Keynote speaker - Deccan plateau – a neglected grassland ecosystem	
	Tea break		11.00 am to 11.30 pm
	Session I	Biodiversity in Deccan plateau	11.30 am to 1.00 pm
7.	Shri Sunil Limaye, CCF, Wildlife, Pune (Co-chair of the workshop)	Keynote speaker - Challenges in Management of Sanctuaries in human dominated landscape of Deccan Maharashtra	
8.	Dr. S.P. Gaikwad, Walchand College, Solapur	Plant wealth of Solapur district with special reference to Acacias	
9.	Mr. Bharat Cheda, Nature Conservation Circle, Solapur	Issues in wildlife rescue and poaching in Solapur	
10.	Gopal Raut, Shivaji University, Kolhapur	Preliminary studies on diversity of Praying mantids in Solapur area	
11.	Mr. Pratik Talwad, Shivaji College, Barshi, Solapur	Snakes of family Colubridae from Solapur district, Maharashtra, India.	
12.	Mr. Aditya Kshirsagar, Solapur	Butterflies of plantation area at “Siddheshwar Vanvihar, Solapur”	
	Lunch break		1.00 pm to 2.00 pm

	Session II	Biodiversity in Deccan plateau	2.00 pm to 3.15 pm
13.	Release of short film by Sanjay Bhoite of Solapur Forest Department	Spare the space	
14.	Mr. Kamlakar Fartade, Lecturer, Biology, Malshiras, Solapur	Birds of sugarcane field in South-Western Region of Deccan Maharashtra, India	
15.	Dr. Abi Tamim Vanak, ATREE, Bengaluru	Conserving biodiversity outside protected areas in the rapidly changing Deccan Plateau – challenges and opportunities	
16.	Mr. Abhijeet Kulkarni and Dr. Abi Tamim Vanak, ATREE, Bengaluru	Conservation of carnivores in human-dominated landscapes in Maharashtra: the case of the Indian Fox	
17.	Dr. Mahesh Gaikwad, Nisarg Jagar Pratisthan, Faltan, Satara	Diversity and distribution of bats in the Deccan Plateau of Maharashtra	
	Open discussion		3.15 pm to 3.45 pm
	Tea break		3.45 pm to 4.15 pm
	Session III	Communication in conservation	4.15 pm to 4.45 pm
18.	Mr. Atul Sathe, BNHS	Conservation communication	
19.	Mr. Shripad Kulkarni, Director, Ascharya Creative Communications	Communicating science	
	Poster Presentation		4.45 pm to 5.30 pm

Day two: 4th March 2014

Sr. No	Name of speaker	Topic	Time
	Session IV	Grassland conservation	9.00 am to 10.30 am
1.	Shri Subhash Badve, DCF, Solapur	Grassland development	
2.	Mr. Trishant Simlai, University of Kent, UK	Prioritizing Conservation to Protect 'Wastelands': the curious case of India's grasslands	
3.	Dr. R.V. Hippargi, Walchand College, Solapur	Newer Dimensions in Biodiversity conservation of Great Plains of Deccan Peninsula	
4.	Mr. Ameya Gode, ATREE, Bengaluru	Mapping semi arid grasslands of India: an object based approach	
5.	Ms. Nitya Ghotge, Ms. Apoorva Sahasrabudhe, Ms. Sangeeta Khapre and Mr. Mahendra Khatal	Neither Barren nor Forsaken: the Rich diversity of Grassland Landscapes	
	Tea break		10.30 am to 11.00 am
	Session V	Participatory approach for conservation	11.00 am to 12.00 pm

6.	Shri Ashok Patil, Deputy Director, Social Forestry Division, Solapur	Plantation in grassland habitat and medicinal plants	
7.	Mr. Pratik Tambe, BNHS	Environmental Information System project of Government of India	
8.	Mr. Vinod Kamatkar Reporter, Dainik Divya Marathi	Role of media in Wildlife conservation in Deccan plateau	
9.	Mr. Shahaji Pawar, Dainik Bhaskar Group, New Delhi	Reporting wildlife issues through network of media partners in Marathwada region	
	Session VI	Conservation of Great Indian Bustard	12.00 pm to 1.30 pm
10.	Shri Rajendra Nale, ACF, Pune Wildlife Division	Experience of working as a wildlife manager in Deccan Plateau of Maharashtra	
11.	Shri Ramesh N. Kulkarni, RFO, Nannaj	Current Issues of wildlife conservation in context of GIB Sanctuary	
12.	Shri Bhagwat Mhaske, Watchman, GIB Sanctuary, Nannaj	Three decades of experience of GIB conservation in Solapur area	
13.	Shri B.T. Lalsare, Round Officer, Warora and Mr. Vipin Fulzele	A decade of experience of GIB conservation in Vidarbha area of Maharashtra	
14.	Mr. Kedar Gore, The Corbett Foundation	A campaign to protect the habitat for the conservation of GIB in Abdasa in Kutch, Gujarat	
15.	Mr. Anant Vadgaokar, Advocate, Mumbai High court	Legal issues of rationalization of Great Indian Bustard Sanctuary area	
	Lunch Break		1.30 pm to 2.15 pm
	Screening of short film by Mr. Amol Lokhande, Solapur	Migration Magic	2.15 pm to 2.30 pm
	Session VII	Towards sustainable development	2.30 pm to 3.30 pm
16.	Mr. Sujit Narwade, Project Scientist, BNHS	Need of Cumulative Impact Assessment studies for conservation of landscape species	
17.	Dr. Girish Jathar, Watershed Organization (WOTR), Pune	A response of avifauna to watershed development – A case of Darewadi Watershed, Ahmednagar, Maharashtra	
18.	Ms. A Sathya, Ambily PM and Sweety Gajbhiye, NTPC, Solapur	Biodiversity and Business - Role of NTPC in Conservation of Wild Life	
19.	Mr. Saurabh Deshpande, Satara	Conservation laws & landscape species	
	Tea break		3.30 pm to 4.00 pm
	Concluding session		4.00 pm to 4.45 pm
	Selected panellist	Discussion and road ahead after the workshop	

Poster presentations

Note - size of the poster should be 4X5 feet (height X width)

1. Status Of Family Rallidae In Solapur (Ms), India – R. Vanjari and V. Vanjari
2. Great Indian Bustard Sanctuary and Endangered Livelihood Capital - Mr. Sudarshan Kasbe
3. Diversity of Nematode Parasites From Acaudated Amphibians – Dr. Sujeet Jamdar, Dr. Kishor Shinde & Dr. Gajanan Sontakke
4. Monitoring Metal Contamination In Zoo Animals : Solapur Zoo A Case study. Mrs. Asha A. Kirtikar and Mr. Saurabh U. Rokade
5. Livelihood Study of settled and pastoral nomadic tribes in Pune, Aurangabad and Ahmednagar districts of Maharashtra - Laxman Shitole, Maya Somkuwar, Sampath C.M., Shila Bansode, Siddhant Chakravarty
6. A study of wolf distribution and their interactions with shepherds in an agro-pastoral landscape in Western Maharashtra – Iravati Majgaonkar
7. Desolate dens - pastoralists, wolves and local farmers by Santosh Yadav.
8. Impact of pesticides on wildlife in Deccan Plateau of Maharashtra – by Sujit Narwade
9. Diversity of Geckos in Solapur – Pratik Talwad, Barshi, Solapur

Conservation of Wildlife in Deccan Plateau of Maharashtra – a neglected ecosystem

A two-day workshop by BNHS-India, Pune Wildlife Division
and NTPC, Solapur

3rd and 4th March 2015

Nirmalkumar Phadkule Sankul,
Near Siddeshwar Temple, Solapur, Maharashtra, India

Disclaimer: The views expressed in this booklet are not those of the editors' or the organisers' including BNHS-India. The authors of the abstracts shall be solely responsible for the data and any other information shared in this booklet.

Keynote speaker Shri Sunil Limaye, IFS CCF (Wildlife), Pune

Great Indian Bustard *Ardeotis nigriceps*, a large and magnificent bird of open landscapes with minimum visual obstructions and fewer disturbance is facing a threat of extinction from this area of Deccan plateau. Conservation of bustards and their preferred grassland resources was first brought into the focus of governance through a symposium of eminent conservationists in Jaipur, Rajasthan. Following this symposium, the Government of India declared eight Bustard sanctuaries after 1980s. Most of these protected areas were either too small, traditional breeding patches or very large, covering entire agro-pastoral landscape inclusive even of large townships. Within these reserves, the recommendation was to maintain small scattered conservation refuge prominently the traditional breeding spots that could be protected during the breeding season to exclude cattle and human disturbance, and with large buffers. Management of Bustard habitats has been impeded by inadequate appreciation of grassland resources. Hence it was decided to start in-situ and ex-situ conservation efforts. Now these efforts are being taken not only for the GIB conservation but on a larger canvass of conservation of wildlife in Deccan plateau on Maharashtra. With considerable efforts now we are trying to revive this neglected grassland ecosystem and we are sure that with the overall revival of this grassland ecosystem and by creating awareness among local people to avoid and reduce drastic changes in land-use pattern will definitely give a new lease of life to this magnificent bird.

Background of the Wildlife Conservation and Monitoring Plan for Solapur Super Thermal Power Project, by NTPC Limited, Solapur with special reference to the conservation of Great Indian Bustard *Ardeotis nigriceps*

Sujit Narwade, Project Scientist, BNHS-India

On March 3, 2011, on the World Wildlife Day, BNHS-India organised a 'Workshop on Conservation of Great Indian Bustard (GIB)' with the involvement of local people at Solapur in Maharashtra. Over 70 participants, including the staff of BNHS-India and Wildlife Division, Pune, Government of Maharashtra, and the local citizens from Solapur attended the workshop. The participants expressed the need for urgent action to rationalise the boundaries of GIB Sanctuary at Nannaj, in Solapur district. In this workshop, the need was expressed to conduct a workshop discussing much wider range of conservation issues and initiatives.

Ministry of Environment and Forests (MoEF), while granting the environmental clearance to National Thermal Power Corporation Limited (NTPC), suggested to carry out biodiversity survey of the power plant area before the construction commenced. MoEF also asked NTPC to submit a Wildlife Conservation Plan after consultation with Chief Wildlife Warden and reputed wildlife

experts. Based on the available secondary data, BNHS-India submitted a conservation plan to NTPC, Solapur in September 2011. The conservation plan was forwarded to the Principal Chief Conservator of Forests (PCCF), Maharashtra for suggestions and comments. In reply, PCCF, Maharashtra, suggested BNHS-India and Office of Chief Conservator of Forests (Wildlife), Pune to include the primary data of flora and fauna, as well as probable impacts of thermal power plant on the wildlife in the proposed plant area.

A team of BNHS-India scientists and a few local researchers conducted biodiversity studies from September 2011 to October 2012 and submitted a revised plan after consultation with Wildlife Division Pune, Solapur Forest Department, and NTPC Ltd. This will cover not only the 10-km radius area but also the entire Deccan Plateau of Maharashtra and will be implemented in two years. Office of the CCF (Wildlife), Pune will oversee implementation of the plan with the support from appropriate agencies.

Highlights of the Wildlife Conservation Plan

In 2011, only Principal Investigator and Co-Principal Investigator were a part of this conservation plan. In 2012, however, other staff of BNHS, and researchers from local institutes from Solapur joined the effort. From 2014, Wildlife Division, Pune (under the supervision of CCF, WL); Office of the Deputy Conservator of Forests, Solapur; and a wider range of institutes such as Tata Institute of Social Sciences (TISS), Watershed Organisation Trust (WOTR), Ashoka Trust for Ecology and the Environment (ATREE), Wildlife Conservation Society (WCS), ANTHRA, etc. were involved in the initiative. We need more people from local NGOs and institutes for conservation of wildlife in a human-dominated landscape. The conservation plan will be applicable to the flora, and fauna found in the proposed plant area, and some part of this was designed in line with management plan of GIB Sanctuary, Solapur. Some activities planned under the plan include Seasonal Biodiversity surveys, in-house project related to wolf and other wildlife, and shepherding communities and their inter-dependence in Nannaj and nearby grasslands, organisation of a workshop on wildlife conservation in Deccan Plateau of Maharashtra, awareness campaigns, study on impact of pesticides on Great Indian Bustard and its food chain and other grassland birds, socio-economic studies, Sustainable Agriculture training to farmers and concerned officers to have bustard friendly agricultural practices, deploying bustard guards and patrolling squad, promotion of fodder grass development practises, habitat management, mitigative measures for reducing power line collision of GIB and other large birds in and around the core sanctuary areas

Plant wealth of Solapur with special reference to *Acacias*

Dr. S.P. Gaikwad, Life Science Research Laboratory, Walchand College of Arts & Science, Solapur

Solapur district in Maharashtra is rich in plant diversity. A total of 1,441 species – including infraspecific taxa belonging to 694 genera and 143 families – have been recorded from the district. Out of 1,441 taxa, 1,046 species and 45 infraspecific taxa are dicotyledonous

classified into 503 genera and 115 families, while 339 species and 11 infraspecific taxa are monocotyledonous classified into 191 genera and 28 families. *Fabaceae* (*Leguminosae*) with 225 taxa is the largest family, followed by *Poaceae* (157), *Asteraceae* (85), *Euphorbiaceae* (61) and *Cyperaceae* (47). The genera such as *Acacia* (25), *Euphorbia* (23), *Cyperus* (22), *Crotolaria* (19) and *Ipomoea* (19) are dominant among the flora recorded in Solapur.

The study of 1,385 species and 56 infraspecific taxa distributed over 14,844.6 km² area reveal a relatively high species density (0.096), when compared with adjoining Ahmednagar district (0.061), and the Marathwada region (0.050) in Maharashtra. The ratio of indigenous woody (341 taxa) to herbaceous (637 taxa) components is 1:1.87 and that of monocots (244 indigenous taxa) to dicots (734 indigenous taxa) is 1:3. A very low percentage of phanerophytes, and the higher percentage of therophytes indicate the drier climatic conditions and other biological influences present in Solapur.

Acacias are dominant across the district. These are the key components in scrub jungles and grassland ecosystems. They provide food and other resources for a number of mammals, birds and invertebrates. Indirect interactions, mediated by shared herbivores and pollinators, link *Acacias* to other plants in the community. The foliage, fruits, wood and bark of many *Acacias* have been used by humankind for centuries as fodder for livestock, the source of famine-food, as medicines, and as wood-fuel. Many *Acacia* species are important for modern agro-forestry. *Acacias* are known to perform many ecological functions including ground-water recharge, flood control, and retention of nutrients and sediments. We have ignored a majority of *Acacia* trees despite their ecological, commercial and social benefits.

Poaching and trading of wild animals

B.C. Chedda and **P.S. Talwad**, Nature Conservation Circle, Solapur

Poaching is a great threat to wildlife across India and around the world. The threat is more so evident for many bird and mammal species are on the brink of extinction. Solapur has a grassland habitat which supports wildlife, including the critically endangered bird Great Indian Bustard *Ardeotis nigriceps*, and Grey Wolf on the apex of the grassland ecosystem. The southern boundary of the district has the Balaghat mountain range. With its topographical elevations and forest ecosystem the mountain range supports many forest-dwelling bird species, and herbivorous mammals such as Chinkara *Gazella bennettii*.

Many incidences of poaching and illegal trade of wildlife were exposed by the local non-Government organisations (NGOs) and by the Forest Department. Most of the poachers are known to hunt for the food using traditional methods such as setting up a mist net or a bird trap. A few poaching attempts, however, were for recreation – as an adventure and hobby, and used modern ammunition and hunting equipments. Our NGO works for the conservation and protection of nature by means of keeping control on the poachers, and the wildlife rescue operations in the district. Poachers and hunters often target the turtles, birds such a quails, francolins, parakeets and the water birds, the reptiles; primarily the Monitor lizards, and the mammals such as Indian Hare *Lepus nigricollis*, Blackbuck *Antelope cervicapra*,

Chinkara *Gazella bennettii* and wild boars. As high as nine hunters were punished in Boramani Hunting Case in solapur. A number of bird poachers and illegal traders have been punished so far because of the regular follow up by team of dedicated people.

Preliminary study on the diversity of Praying mantids in Solapur

G.A. Raut and **S.M. Gaikwad**, Shivaji University, Kolhapur

Praying mantises are well known for their active predation. These exclusively carnivorous insects are easily identified by their raptorial forelegs. Praying mantises are found in diverse habitats, are well camouflaged, and are known to engage in cannibalism. About 2,384 species under 434 genera belonging to 15 families are known globally (Ehrmann, 2002). According to the '*Updated Checklist of Indian Mantodea*' published by the Zoological Survey of India, 184 species of *mantids* under 73 genera and 11 families are known from India.

The abundance and species-richness of mantises in different habitats in Maharashtra attract the attention of entomologists. Earlier studies are congregated in Western Ghats (Chaturvedi, 2005, Ghate & Ranade, 2002) and Vidarbha (Jadhav *et al.* 2006, Sureshan *et. al.* 2006), however, remaining Maharashtra is unexplored.

During our study in Solapur, the order *Mantodea* is represented by 13 species belonging to 12 genera, 7 subfamilies and 5 families. The collections were undertaken from 2013 to 2014 using the insect nets or by hand picking individual insects. They were collected at late evenings and in the night. The collected specimen were preserved by dry/wet preservation method and were carefully photographed. The specimen were measured in millimetres, and identified following Mukherjee *et al.* (1995).

The study proved that Solapur has very good mantid-diversity, and exploration of 13 species from the district emphasizes the need for more work in this region for mantids.

Checklist of snakes belonging to family Colubridae from Solapur

P.S. Talwad and **M.M. Fartade**, Department of Zoology, Shri Shivaji Mahavidyalaya, Barshi

Snakes belong to *Squamata* order. They are the most diverse reptiles, found in all types of habitats, including residential areas. Snakes have adopted themselves to live in almost all kinds of habitats, and a few species have become human-commensal, leading to human-snake conflict. Snakes maintain ecological equilibrium, proving themselves quite useful for human beings. Between January 2013 and December 2014, random surveys were made in selected area of various habitats in Solapur. The road-killed snakes and the snakes rescued from human inhabitation were also recorded for the study.

With most of the non-venomous and semi-venomous snakes, *Colubridae* is the largest family found in Solapur district; with 16 species divided into 13 genera. *Coelognathus helena* and *Lycodon*

aulicus are the most common species found around human habitations. *Coluber gracilis*, *Lycodon flavomaculatus*, *Lycodon striatus*, *Sibynophis subpunctatus*, *Coronella brachyura*, and *Oligodon taeniolatus* are the rarely occurring species. *Ptyas mucosa* is the longest snake species, and *Boiga trigonata* and *Ahaetulla nasuta* are the two semi-venomous species found in the district.

Butterflies of plantation area at Siddheshwar Van Vihar, Solapur

Aditya Kshirsagar

A 300 hectare plot of the grassland area was developed as plantation area known as 'Siddheshwar Van Vihar' in year 2002. It is located about two kilometre from Solapur city, on the outskirts, in the Vijapur Road area. A good density of host-plants and nectar-plants attract many butterflies to this area. Surveys were carried out to study the butterfly diversity by performing monthly walks from morning 6 O'clock to evening 6 O'clock on the selected transect of 2,000 meters for three years.

We documented 78 species of butterflies. We also recorded the population density of every species by taking half-hourly count. Day-hours were divided into four slots (morning 6 to 9, morning 9 to 12 noon, 12 noon to 3 in the afternoon, and 3 in the afternoon to evening 6) and the number of butterflies counted in the particular slots. A good number of butterflies were observed in the month of September and October during the morning 9 to 12 noon. Butterflies found in the thick forests, such as Blue Mormon, are seen here during monsoons. Species like Large Salmon Arab, Joker, Crimson Tip are endemic to dry regions are recorded here in abundance. The future surveys in other parts of Solapur district will help in identifying many more butterfly species.

Conserving biodiversity outside PAs in the rapidly changing Deccan plateau – challenges and opportunities

Abi Tamim Vanak, National Environment Sciences Fellow, Ashoka Trust for Research in Ecology and the Environment (ATREE)

The semi-arid grasslands of central India have been historically neglected in India's protected area (PA) system. These biomes have been categorised as 'wastelands' for their poor agricultural potential ignoring the massive economic benefits that these grasslands provide in terms of fodder for both nomadic and agro-pastoralist communities. In the recent times, however, the pressure is mounting to convert these 'wastelands' to more 'productive' uses. Ironically, the greatest threats to these areas comes from the 'green' initiatives such as the Green India Mission and Green Energy. It is, therefore, necessary to identify and protect the last of these remaining areas, as well as restore grasslands that have been converted to plantations. We use novel remote-sensing techniques, extensive ground surveys and prioritization algorithms to identify areas that have the greatest potential for future conservation. Further, using a few examples, we highlight how some species (such as the Bengal Fox *Vulpes bengalensis*), have adapted to human-modified landscapes, and how the traditional agricultural practices and land-

sparing have resulted in a matrix of wildlife friendly habitats within human-dominated landscapes. Finally, we highlight the major threats to such systems and call for an urgent need for action to prevent further degradation and destruction of such areas, and to change the policy discourse on conservation of non-forested natural landscapes.

Birds found in the sugarcane fields in the South-western region of Deccan Maharashtra

Kamlakar M. Fartade, Lecturer in Biology, Model Multipurpose High school and Junior College Malinagea, Solapur; **Sujit Narwade**, Project Scientist, BNHS-India and **Madhukar M. Fartade**, Principal, Shri Shivaji Mahavidyalaya, Barshi

South-western region of Deccan Maharashtra includes semi-arid forest, open scrub land and Southern tropical thorn-forest (Champion and Seth 1968). It lies at an average of 600 m above the sea level and comes under the rain-shadow area with about 600 mm annual precipitation. A major part of this threatened and altered landscape was basically the grassland ecosystem, and was once the home of great herds of Blackbuck *Antelope cervicapra* and Chinkara *Gazella bennettii*. It was also the home of the Indian Wolf *Canis lupus*, and the critically endangered bird species including the Great Indian Bustard *Ardeotis nigriceps* and Lesser Florican *Sypheotides indicus*.

This region is a unique mix of habitats including forest, scrub land, wetland, grassland, and agricultural land. These habitats are used by different bird species effectively. Unique among these habitats, the agricultural land supports a large number of birds by providing foods such as grains, seeds, fruits, nectar, rodents, insects, and other arthropods. The visiting and inhabiting birds often perform important ecosystem functions, including pest control, pollination, and seed dispersal (Sekercioglu 2006). There are some positive as well as negative effects of agricultural activities on the breeding success of ground-nesting birds. The changing crop-patterns and seasonal factors, rainfall for example, affect the breeding success of birds.

Agriculture is important for Indian economy, offering employment – direct or indirect – to about two thirds of the working individuals in the country. Agricultural land occupies about 43 per cent of India's geographical area, and contributes about 16.1 per cent to India's GDP (gross domestic product). Sugarcane is one of the most important cash-crops cultivated in India, with about 7 per cent of the total value of agricultural output. It also provides raw material for the second largest, agro-based industry – the sugar industry – after textile. In past six to seven decades the area under sugarcane cultivation has increased with better irrigation facilities.

It is observed over the years that many birds have adapted to use the sugarcane fields more effectively. A total of 56 bird species from 33 families were recorded in the sugarcane fields during our study. Out of the 56, about 46 species were resident bird species, and 7 were the migratory species. Threatened bird species, European Roller *Corrasius garrulous* for example, were observed at many places during the winter. It is observed that species composition changes according to the height of sugarcane in the field. Thus, the same field

may be used by different bird species through the year based on the crop height. The birds such as Cattle Egrets *Bubulcus ibis*, Paddyfield Pipit *Anthus rufulus* and Wagtails were observed in a newly planted and re-growing field, and in the areas with short crop-height. These birds fed on the insects when the field was flooded with water. The birds, for example Grey Partridge *Perdix perdix* and Barred Buttonquail *Turnix suscitator*, were commonly found in all the areas for suitable, natural hiding places. House Crow *Corvus splendens* and Indian Peafowl *Pavo cristatus* were observed killing rodents, minimizing the damage to the crop. Baya Weavers *Ploceus philippinus* preferred the fields with higher crop-plants for roosting, and used sugarcane leaf-blades as the nesting material. A large number of Baya Weavers fed in the surrounding areas and roosted in the sugarcane fields at night.

Our study underline the need of the hour to further monitor the sugarcane fields to better understand the status, distribution and conservation requirements of the avifauna in these agricultural lands.

Diversity and distribution of bats in the Deccan plateau of Maharashtra

Dr. Mahesh Gaikwad, Nisarg Jagar Pratishtan, Satara and **Sujit Narwade**, Project Scientist, BNHS-India

Since 2008, we conducted bat surveys in the rain-shadow areas of Satara, Pune, Nagar and Osmanabad districts on the Deccan plateau of Maharashtra. Distribution pattern, habits, habitats and population variation in the selected roosting sites of bats were studied. The conservation measures have been suggested, especially considering the threats such as habitat destruction and mortality due to a wide range of reasons.

Chiroptera constitutes the second most diverse order of mammals. Studies on bats in the Deccan plateau are primarily focused on the species-checklist and taxonomic identification at various locations in the four districts of Maharashtra mentioned earlier. In the current imperative of conservation of biodiversity, it is important to understand the distribution patterns of bats in the Deccan plateau and the underlying process for the changes in these patterns.

About 16 bat species are recorded in the study area, of which three are frugivorous, one carnivorous and the remaining are insectivorous. The role of bats in the ecosystems of this geography is important for the regeneration of many plant species including *Ficus* sp., Mango, many more. Insectivorous and carnivorous bat species play an important role of maintaining the ecosystems and a wide range of crops. Ecosystem services provided by bats, especially in the agricultural ecosystem, needs to be studied in detail. The frugivorous bat species play a vital role in the pollination process. The insectivorous bat species act the biological pest-control agents.

Nocturnal behaviour and upside down resting habit of the bats gives birth to many myths about these animals. Awareness about their role in the ecosystem and benefits they bring to the humankind need to be communicated for the successful conservation efforts of these neglected mammals; especially near the human-dominated areas.

Conservation of carnivores in the human-dominated landscapes in Maharashtra: the case of the Indian Fox

Abhijeet Kulkarni and **Abi Tamim Vanak**, ATREE

The threats to conservation of carnivores in an increasingly human-dominated world are primarily the habitat loss, poaching and conflict with humans. Many species of carnivores, especially those of the semi-arid savannas of the central India have become adapted to living in the modified landscapes. Traditional dry-land agri-pastoral practices result in a matrix of agricultural fields, fallows, and grazing lands. Such areas are essential for the continued survival of a suite of species such as the Indian Fox *Vulpes bengalensis*, Jungle Cat *Felis chaus*, and Indian Wolf *Canis lupus*. We studied the ecology of Indian Foxes in and around the Great Indian Bustard Sanctuary of Nannaj-Mardi. We found that foxes primarily select the areas that have a higher proportion of grassland habitats, within their home-range at multiple scales. However, Foxes select the human-modified areas for denning, as long as the grassland habitats are within 300 meters of distance. The presence of free-ranging dogs can deter foxes from accessing resource-rich (rodents) fallow areas through the interference competition and intra-guild killing. Thus, although some forms of human modification of the habitat are tolerated, even selected by some individuals, a complete change in the agricultural or the land-use practice are likely to be incompatible for the continued persistence of these species.

Communication for Conservation – How it should be? How should it not be?

Atul Sathe, Manager – Communications, BNHS-India

Importance of Nature Conservation: Nature conservation is necessary to maintain food-cycle, other natural cycles, to conserve gene pools, maintain temperature balance, precipitation, to ensure supply of clean air, water and food, to prevent floods, droughts, erosion, pollution, to get energy, fuel, raw materials, other resources, to obtain medicinal and other useful plants, to ensure human health, prosperity, peace of mind and spiritual bliss

Means of Communication: Print and Electronic Media, Social Media, Lectures/Presentations, Films/Documentaries, Group Media: Games, Puppets, Plays, Books, Research Papers, Nature Trails/Camps

Explain the Basics: India has nearly 1400 species of birds, Earlier, India had wide presence of four big cats, The small Borivli National Park has about 150 butterfly species, A lot of wildlife survives outside the protected areas, India has over one lakh types of Rice!

Explain the Issue Background: Drought in Maharashtra: Depleting groundwater and wrong crops, Over population of crows and dogs: Garbage heaps in urban areas, Real reasons behind the decreasing bird population, Real reasons behind silt accumulation in ports/creeks in Konkan region

Explain Local Issues: We are aware of Global Warming but unaware of what's happening in our backyard, Rivers in Mumbai such as

Mithi, Poisar, Oshiwara, Chena and Dahisar, Issues about forested hill ranges around big cities, speeding traffic and road kills on highways through wildlife corridors, Coastal plateaus and Deccan grasslands wrongly termed as barren

Explain Global Issues: Pollution generated in one part of the world can affect other parts, Impact of pollution and destruction of resources caused by unsustainable activities is felt globally, If the existing excess consumerist lifestyles continue, then over five earths will not suffice, A huge floating garbage dump has generated in the Pacific Ocean due to the waste from various countries

Create Awareness: Highlight significant environmental issues, Information on habitat destruction, threats, Attractive depiction of various manifestations of nature, Link issues to daily life, Dissemination of expert knowledge in accessible language

News and Analysis: News about recent developments, Useful and well-researched information, Analysis for further study and introspection

Different Views and Opinions: Views of nature lovers/activists, Stand of the corporate sector, Government's views, Opinions of the working class, farmers and traders from rural and urban areas, Views across age groups, Sustainable options from experts, Blend of science and daily life

In Context of India: Original Indian tradition sees divinity in all living/non-living beings, is intrinsically eco-friendly and nature-oriented, Similar global examples, Rig Ved, Mahabharat Shanti Parva, Chanakya, Kabir, Shivaji Maharaj, Mahatma Gandhi, Sacred Groves and community conserved habitats, Combination of modern technology with a sustainable model, based on ethical values, Four Purusharthas and sustainable lifestyles

Clear Misconceptions: Wild animals leave their area and "trespass" into human domain, Flamingos come from Siberia, Disposing off plastic bags in dustbins ensures real environment, Earth can satisfy our endless wants as long as we have money, Replacing bulbs with CFL lights provides healthy environment, All buildings with "green building" tag are eco-friendly

Temporary vs. Lasting Solutions: What to promote? Give importance to what?, Conserving existing native trees vs. Planting new exotic trees, Changing "safe radiation levels" vs. Judicious use of mobile phones, Constructing more flyovers/freeways vs. Limited urbanization/limited use of private vehicles, Focusing on thickness of plastic bags vs. Minimum use of plastic articles, Real eco-tourism run by locals vs. Fancy concepts of tourism

Real Issues: Discussion and action on following questions is required, Promotion of sustainable lifestyles, Think Global, Act Local, Information on the surviving eco-friendly traditions, Conservation of habitats, not just in parks and sanctuaries, but also in human landscapes, Blending Field Research, Conservation efforts and Advocacy

No Green-wash Please: Need to discourage following types of "love for nature"?, Publishing tree plantation photos in annual reports after destroying acres of forests, Claiming about job creation after having destroyed self-employment of thousands of people, Naming the

business as "Eco" or "Green" on green coloured signboards, while destroying nature in reality, Undertaking cosmetic conservation/energy saving measures, while leading a wasteful lifestyle for 365 days, Showing glamorous love for environment, while pushing the real issues under the carpet

Shift the focus from negative rhetoric/gossip to positive success stories - There is the need for Positivity! Highlight community conservation examples, Highlight sustainable lifestyle models, Share successful conservation/restoration efforts, Share scientific studies that reveal solutions, Promote activities that bring people closer to nature, Share encouraging experiences

Sustainable thinking as a habit, Sustainability in daily life as a pattern, Native tree species for Afforestation, Waste management at home, judicious consumption, Active participation in conservation initiatives, Choice of sustainable occupations in rural/urban areas, Constructive result-oriented activity.

Communicating science, effectively!

Shripad Kulkarni, Chief – Ascharya Creative Communications

Communication is an integral part of our social life, and science is no exception. Unlike science, which generates information, investigates facts and builds knowledge, the role of communications is limited to transmitting and transferring the content.

It is, however, important to understand that to be able to communicate well, one has to be good at science, and also at the science of communicating. The first step of good communications is good content. Creating good content in science involves keen observation, meticulous documentation of the data, learned cross reference and carefully drawn conclusions. At the stage of collating information and putting it in the form of a scientific report or paper, one can make use of tools often used by communications professionals.

Not just good content, but audience-oriented presentation helps in effectively communicating the content generated by science. Specific terms and concepts used in any scientific content may be a significant deterrent for the transfer of information and knowledge. To make the communicate robust and efficient, one needs to keep it simple. Mind you, simple yet scientific!

Science and scientific communications follow a trickle down effect. A simple, scientific communication brings the new audience to a particular science. From among these, the field recruits its mavericks and they further the scientific field. It is, therefore, important not to ignore the 'popular' part of scientific communications.

It is a 360-degree approach for successful communications of scientific knowledge.

Grassland development

Subhash Badve (IFS), Deputy Conservator of Forests, Solapur

Grasses play a significant role in our economic activities. Grasses grow in marshes, deserts, woodlands, on sands, on rocks, hanging cliffs, and almost all types of soils. The grasses are one of the most successful terrestrial life forms on the earth. Due to their adaptability to changeable environment, ability to co-exist with grazing animals and

man and endless variations on distinct life forms. They may be annual or perennial and ranges from herbs of few centimetres to height of 25 meters or above. Most of the grasses tolerate long period of droughts. Grasses cover ground and make a significant contribution to biomass production. They sequester carbon from the air. They play a crucial role in the maintenance of world's ecosystem and biodiversity. Besides this, our dairy industry is mainly dependent upon grasses. So Grassland development is necessary for dairy development as well as production of meat and restoration of degraded ecosystem. Grasses have a great role in sustainable development of the country.

Grasslands are most ignored of our ecosystem. Once they covered 42 per cent of the earth's surface now over the country, they are only 3.70 per cent of the geographical area.

Because of faulty land management, over the last few generations these grasslands have become degraded and increasingly unproductive. Dominance of low yielding grasses that produces little fodder, and almost or complete absence of legumes. Poor canopy cover is resulting in soil erosion. High intensity of surface water flow and low rainfall infiltration. Very little organic carbon that limit water use efficiency and retention of soil nutrients. Large portion of livestock and wildlife still depends on the grassland ecosystem. Climate is the most controlling factor of grassland. Grassland forms where annual rainfall is insufficient to support luxuriant growth of trees but it is high enough to keep away desert building. In Maharashtra rain shadow area that cover in 14 districts and 96 Tehsils of western Maharashtra and Khandesh are highly affected by monsoon rains. In this field, xerophytic forms of grasslands are found.

Prioritizing conservation to protect 'wastelands': the curious case of India's grasslands

Trishant Simlai, University of Kent, UK

Spatial conservation prioritization assessments are extensively used to identify areas for efficient allocation of conservation investment. However, a vast majority of these evaluations fail effectively to address the underlying socio-economic and socio-political constraints of conservation planning. Grassland biomes are one of the most poorly protected and globally threatened ecosystems in the world. In India, dry grassland landscapes remain largely ignored resulting in rapid transformation of the landscape and a severe lack of its management. This study develops the first conservation prioritization assessment at the district level for dry grassland ecosystems in the western Indian state of Maharashtra, based on spatial distribution models for 11 conservation features, 2 spatial threats and a novel threat index for each district of Maharashtra. Priorities were identified under three different scenarios: (1) Priority areas in districts with high risk of grassland transformation. (2) Priority sectors for protected area expansion under the first scenario and (3) Priority areas in districts, based on spatial threats only. Scenario 1 had the highest representations of grasslands, 5 districts out of the total 34 represented over 50 per cent of grasslands, protected areas are currently representing a minimal proportion of grasslands, and their expansion based on scenario 2 also had the lowest representation. Scenario 3 had the highest representations of threatened and critically

endangered species. This study produces multiple prioritization scenarios that incorporate ecological processes with the socio-economic and socio-political constraints involved in real world conservation decision making across local administrative regions

New dimensions of biodiversity conservation in the plains of Deccan peninsula

1R.V. Hippargi and 2N.V. Shah, Department of Zoology, Walchand College of Arts & Science, Solapur and **3P.M. Bolde**, Department of Electronics and Telecommunications, A.G. Patil Institute of Technology, Solapur

Our study aims to describe the diversity, distribution and species composition of spiders, represented in a range of habitat types (land-use patterns) within a semi-arid grassland-ecosystem and the possible influence of habitat structure (spatially) and season (temporarily) on them. We also present the observations on critically endangered Great Indian Bustard (GIB) *Ardeotis nigriceps* for the conservation of their ecology, evolution and bio-geography.

During the study period spanning between 2009 and 2012, a total of 4,742 spiders, belonging to 250 species (morphospecies) from 42 families were sampled. Except habitat-specialist species, most spider-families were widespread across three sites. The two similar grasslands – STTF (native semi-arid grassland) and SWW (native grassland with heterogeneous plantation) – had a similarity in spider family, genus and species composition. Species and guild composition differed significantly across the three habitats in the study area, and the overall diversity, evenness and richness of spiders differed with land-use types. A positive correlation was evident between structural complexity of the habitat and diversity pattern observed. SWW, a more heterogeneous site of the two, had the highest diversity of spiders compared to MG site, a simpler, less diverse habitat with monoculture plantation of *Gliricidia sepium*.

Quantitative data on the sightings of GIB was collected using visual searching in the Great Indian Bustard Sanctuary at Nannaj, Solapur in Maharashtra. GIB were sighted for a total of 215 times, out of which, 98.13 per cent (n=211) sightings were within the sanctuary area and 1.86 per cent (n=4) sightings were outside the sanctuary area. About 89.3 per cent (n=192) of bustards were sighted in the grassland habitat, another 9.76 per cent (n=21) in scrub land, and 0.93 per cent (n=2) in an agricultural land. A declining trend was evident in the total sightings – 64 sightings in 2009 reduced to 28 in 2013. The mean group size declined from 2.0 in 2009 to 1.12 in 2013.

Our study highlighted the importance of a semi-arid grassland as a unique habitat. This importance is highlighted when the higher diversity of spiders documented in the small study areas compared to the other studies at different habitats surveyed in India. The inventory of spider fauna will help us in the meaningful conservation and implementation of management plans, not just for invertebrates but also for the focal or charismatic vertebrates like the critically

endangered GIB from this habitat. Our generalization that the habitat simplification negatively affects spiders equally applies to all the fauna from this ecosystem.

Mapping semi-arid grasslands of India: the object-based approach

Ameya Gode, Abi Tamim Vanak, Abhijeet Kulkarni, and Chintan Sheth – ATREE

India has more than 500 million livestock, and more than 50 per cent of the fodder for this livestock comes from grasslands. The lack of habitat homogeneity is a problem to take common conservation measures like other ecosystems. In India, the grasslands are present in a matrix of human-dominated landscape, which also makes them spectrally heterogeneous. In this concern, mapping the patchy distribution of grasslands in the hot and semi-arid states of India requires urgent attention, for better systematic planning and management.

Available literature shows that traditional approaches have been used to quantifying grasslands with low to medium resolution remote sensing data and conventional methods of classification such as a Maximum Likelihood Classifier. However, mapping grassland habitat necessitates a multi-faceted approach due the fragmented nature of the landscape.

In this study, we used both object-based classification and maximum likelihood classification for grassland mapping and compared the results to highlight the best method for precise quantification of grasslands on a local scale. Two different study areas located in two different states of India were selected to include the spectral heterogeneity of the Indian grasslands landscape for this comparison study.

Supervised classification method gave an overall accuracy of 72 per cent, compared to the object based which had an accuracy of 85 per cent. The results show that object-based method is more relevant to two aspects; accuracy of classification and the applicability. In a human-dominated heterogeneous landscape, where the grasslands vary from scrub forest to low vegetated grass covered areas, an object-based method helps quantify the extent and connectivity, without a 'salt and pepper effect'. An object-based grassland map will facilitate prioritization of large grassland patches for conservation, and planning the connectivity measures to be taken if smaller patches of grassland are home to endangered species.

Neither barren nor forsaken: the rich diversity of grassland landscapes

Nitya Ghotge, Apoorva Sahasrabudhe, Sangeeta Khapre and Mahendra Khatal – ANTHRA

Wildlife does not only exist within the confines of protected areas. Grasslands, scrub forests, uncultivated fields, semi-arid regions, agro-pastoral lands and open plains that fall outside the protected area network also serve as healthy habitats for a number of herbivores and

carnivores. The Deccan plateau of Maharashtra, that is a vast grassland ecosystem is home to a number of wildlife species such as the Indian Grey Wolf, Golden Jackal, Indian Fox, Striped hyenas, GIB, Blackbuck, Spotted Deer, Chinkara, number of snake species etc. It is also home to the *Dhangars* – a traditional shepherding community who have reared sheep for several hundred years. These communities have always coexisted with biodiversity and also benefited from this biodiversity in a number of ways. But the wildlife has benefited from the shepherds too. Our research tracks the human, livestock, wildlife exchanges in this grassland landscape. This research is an ongoing project to map the migratory routes and grazing lands of pastoral communities in the dry lands areas of Maharashtra. A primary site is in the grasslands of Dhawalpuri in Ahmednagar district. Data has been recorded directly from shepherds as well as through direct observations during field trips. Phone calls are made daily to shepherds to ask them about sightings and the kind of wildlife seen. While in some instances there are examples of faulty identification especially of snake species, the data reveals considerable richness of wildlife species and variety in the landscape. Our data also shows that there are several examples of wildlife species living closely with the shepherding communities. Predators like wolves, hyenas, foxes, jackals depend on the sheep maintained by these pastoral communities.. Birds prey on the insects and other parasites found in the wool and droppings of sheep and goat. Blackbucks, sheep and goat share grazing spaces as some are browsers, and some are grazers and can live within the same grazing landscape without competition. We have also heard from shepherds that young deer are left by their adults near where flocks of sheep are grazing or resting to protect them from wild predators in the vicinity. Thus, it appears that wildlife in non-protected areas benefits from grazing sheep and nomadic pastoralism. However, development plans for grasslands have not recognized this mutual dependence. Grassland landscapes are viewed as barren lands or waste lands that need to be managed and developed for some beneficial "economic" use. This form of development which means bringing these lands under agriculture or mining or industry will not only restrict nomadic pastoralism but will also severely threaten wildlife. There is an urgent need to change this perception and view the grasslands with fresh lenses that would present them for what they truly are, a vibrant, rich and living landscape.

ENVIS-project of the Government of India to get environmental information on fingertips

Pratik Tambe, Scientist-in-charge, ENVIS Centre, BNHS-India

ENVIS (Environmental Information System) is a network of subject-specific centres located in various institutions throughout India. The focal point of the present 68 ENVIS centres in India is at the Ministry of Environment and Forests, New Delhi, which further serves as the Regional Service Centre (RCS) for INFOTERRA, a global information network of the United Nations Environment Programme (UNEP) to cater to environment information needs in the South Asian sub-region. The primary objective of all ENVIS centres is to collect,

collate, store and disseminate environment-related information to various user groups, including researchers, policy planners and decision makers. The ENVIS Centre at the BNHS-India was set up in June 1996 to serve as a source of information for 'Avian Ecology'.

Wildlife and environmental journalism

Vinod Kamatakar, Correspondent, Divya Marathi Daily, Solapur

For the past eight years I have been working in the field of wildlife and environmental journalism. The concept of environmental journalism is gaining grounds in Solapur. The journalists are writing through mainstream media about the rich biodiversity of Deccan plateau. It is a challenging job because biodiversity, wildlife and environment are not common topics discussed and understood by the local readers in this region. No or low levels of awareness among the locals makes our job a lot challenging yet very vital for the purpose of biodiversity conservation. We often face negative responses from our readers, however, we work to ensure that the issues related to nature and environment are brought to the forefront in the world of dominated by humans. For our approach, seldom supported even in the mainstream media, we sometime receive a positive and encouraging response from our readers. This positive response keeps us going forward. Besides covering public protests for civic issues, land-grabs and corruption cases, we try to cover stories and features related to conservation efforts, illegal forest clearance, wildlife poaching and trade, people and organisations fighting for environmental issues, etc. These stories help us in raising the awareness about biodiversity conservation.

Journalism to raise public support for biodiversity conservation

Shahaji Pawar, Dainik Divya Marathi, Latur

It is the need of the hour that biodiversity conservation is supported by the media. Journalists' support for conservation issues, has fetched positive public support and further the cause of biodiversity conservation. Wildlife, water, land, forests are vital ingredients of our existence on the planet. It must be clearly understood that media can play a greater role in raising public awareness, gaining public support for these issues.

For more efficient dissemination of information, scientific yet accessible content has to be made available to the journalists. Biodiversity experts may consider offering better training to the journalists to improve their understanding of the biodiversity and conservation issues so they can write better stories. We have experienced it first hand. With better coordination between the journalists and the experts, we can identify and carry innovative, important yet interesting stories. The story regarding the hailstorm havoc in 2014 was a good example. With the help of BNHS-India we surveyed many areas in Solapur district and gathered vital details related to the losses to the cattle, agriculture and the local wildlife. Together with the premier scientific organisation like BNHS-India, we effectively communicated throughout the district and the state.

After publishing this story, our colleagues from the mainstream media, policy makers, Government authorities and general public began debating about the horrific effects of the hailstorm on the wildlife. These stories generated an overwhelming response from bird-lovers, concerned citizens and general public. They reported about the local situation and effects of hailstorm on wildlife through letters and photographs. In short span of time, we gathered great data from across the hailstorm affected area through public participation, improving the overall understanding of the calamity and its impact.

Many people, organisations and even the Government works towards biodiversity conservation. These efforts must be reported through the media to raise public support for the conservation efforts. With better environmental stories published in the recent years, we have witnessed better public participation in many environmental initiatives including the 'Great Backyard Bird Count' or the bird-census supported by the state Government.

A campaign to protect the habitat for the conservation of GIB in Abdasa in Kutch, Gujarat

Kedar G. Gore, The Corbett Foundation (Mumbai); **Devesh K. Gadhavi**, Kutch Ecological Research Centre (a division of The Corbett Foundation) and **Dr. Harendra Singh Bargali**, The Corbett Foundation (Uttarakhand)

The Great Indian Bustard (GIB) *Ardeotis nigriceps* has been declared as a Critically Endangered species by IUCN in 2011. The species has faced steep decline in the last three decades, and has been wiped out from almost 90 per cent of its former range (Rahmani 2012). In Gujarat, except Kutch, all other districts have lost their GIB population. As per the census conducted in the 2007, not more than 48 GIB are believed to be surviving in the Kutch region. Local birdwatchers and field biologists believe that the population has dwindled to less than 30 birds and majority of these birds are surviving outside the Protected Area (PA). Alteration of such an unprotected bustard habitat is taking place at a rapid rate in Kutch. In addition, the threats like predation by feral dogs, pesticide use and changing crop pattern in agriculture, rapid infrastructure development and anthropogenic disturbances are adversely affecting GIB's survival. If the current situation continues, it may lead GIB towards local extinction in Kutch, thus Gujarat will lose its GIB population. The only solution to the problem is to ensure protection of the existing unprotected GIB habitat that is outside the Kutch Bustard Sanctuary, by urgently initiating in-situ and ex-situ conservation programmes.

Since 2010, Kutch Ecological Research Centre (KERC), a division of The Corbett Foundation, has extensively surveyed the area in Abdasa taluk to find out prime bustard habitats outside PA, by monitoring the GIB population. The primary aim of the study is to identify the important GIB habitats outside PA (Kutch Bustard Sanctuary), separate it on the basis of its legal status and its usage by the bustards, and propose to the Government to protect and restore these newly

identified habitats for the conservation of bustards in the region. A total 1,475.14 hectares of land (under the control of Revenue Department) in five villages are being used by the GIBs. This area faces an immediate threat of habitat loss due to encroachment and other infrastructure development. This area is close to the existing GIB habitat of 3,251.56 hectares, including the Kutch Bustard Sanctuary of 202.86 hectares, which is already under the control of the Forest Department. The GIB habitat under the Revenue Department needs to be urgently transferred to the Forest Department for more effective conservation programme for GIB and to prevent its local extinction from Gujarat.

Wildlife protection: legal aspects with reference to GIB

Anant Vadgaonkar, Advocate, Mumbai High Court

Indian laws, in their nature, were not inclusive of the environmental aspects. Till recently there were no specific legislations in particular to environmental protection. The various international covenants and treaties of the legal concepts have directed the enactment of the Indian laws. The concepts such as 'Environmental Impact Assessment' and 'Sustainable Development' have been adopted in the Indian laws.

The most significant provision in favour of environment protection was 'The Wildlife (Protection) Act, 1972'. Considering the shrinking cover of forests and wildlife in India, this act substantially provided for the 'Sanctuary'. It has the framework to substantiate the requirement of the protection to the wildlife. The Act has the restrictions in place, for the commercial and other activities, which may give rise to the debate that whether the same are practicable and desirous or progress-worthy?

A Significant case of Great Indian Bustard Sanctuary (GIBS), in Maharashtra

History : There was great ambiguity over the area covered under GIB Sanctuary because of which many administrative issues got complicated. Till rationalization of the boundary of Sanctuary a ban on sale deed of land was posed on local farmers. Two different committees, one under Dr. M.K. Ranjit Singh and other under Dr. V.B. Savarkar gave different reports about total area to be remained as Sanctuary. There was intervention by Supreme Court of India.

Present Scenario:

1. No clarity on area presently covered under GIBS, restrictions on land use.
2. Legal Issues: Some of the Cases witnessed writ Jurisdiction, issues raised therein and legal requirements for management of the Sanctuary. The Wildlife Protection Act, 1972' Thirumalapad's Care, Reports filed in Supreme Court about GIBS, Areas covered under the said report from the Solapur District, Recent legal cases (pending in the court)

3. Role ahead for the maintaining balance between legal provisions and wildlife protection in view of human needs.

The need for Cumulative Impact Assessment studies for the conservation of landscape species

Sujit S. Narwade, Project Scientist and **Asad R. Rahmani**, Director BNHS-India

Developmental projects by themselves may have very little effect on the environment, but collectively, a large number of projects in a geography may pose a significant impact. The collective impact may be greater than the sum of all the projects in a landscape. European Union and the UK legislations demand a Cumulative Impact Assessment (CIA) as part of Environmental Impact Assessments (EIA). The EIA process in India is inadequate and unsatisfactory, especially considering the absence of adequate assessments of the cumulative impacts of small and large scale projects. The current lack of guidelines to provide adequate measures to mitigate the project impact on a landscape, including at the spatial and temporal scale. We believe, there is an urgent need for a strategy and legal corrective action to demand CIA as a standard requirement for EIA. During the past few years, we surveyed about 14 grassland patches measuring over 200 hectares in the south-western region of Deccan plateau. After the consultation with the local communities, and considering the current developmental projects, we tried to estimate the status of the selected grasslands for next five years. Our estimates project that except a few patches within PAs, all other grassland-patches are under tremendous pressure of these development activists. It must be noted that the CIA assessors are also advised to consider the incremental impacts of the development activities, combined with the effects of other land-use changes.

The response of avifauna to watershed development – case of Darewadi watershed in Ahmednagar, Maharashtra

Girish Jathar, Manager – Biodiversity Team, Watershed Organisation Trust (WOTR), Pune

Anthropogenic changes in a landscape, such as watershed development, sometimes benefit the wildlife in the area. A comparative analysis of the avifauna of untreated and treated watershed shows a significant difference in the avifaunal assemblage. Activities such as area treatment, drainage treatment, afforestation, and selective grazing provides a win-win situation for both humans as well as birds.

Darewadi is situated in a typical dry grassland habitat, with a little annual rainfall average of 300-400 millimetres. A majority this rainfall is received during the Southwest monsoons between June and September each year. There are very few large plant species found here, some due to the local afforestation programme. The valleys surrounding the village are full of indigenous trees such as

Azadiricta indica, *Acacia catechu*, *Butea monosperma*, *Zizyphus sp.*, etc., and the plains are dominated by a variety of grasses such as *Cynodon sp.*, *Aristida sp.*, *Heteropogon sp.* and *Eragrostis sp.* *Euphorbia* scrubs are primarily restricted to roadsides, however, are found dotting the landscape at some places. The total area of the watershed is 1,535.24 ha, of which 306.53 ha is the forest land, 147.59 ha is under the control of Revenue Department, 17.69 ha is the community land and about 1,063.43 is owned by the locals.

The avifauna of Darewadi and Varvandi was studied over a period of four years from September 2010 to August 2014. We had over 30 visits through all the seasons. These visits ranged from a single-day visit to a 20-day residential tour. Darewadi watershed shows a unique assemblage of nearly 123 bird species – of which the 57 resident species are seen through the year, the 32 are migrant species, 22 are observed to be the local migrant species because they are seen here periodically, and the five vagrant species seen only once during the study period. The untreated watershed shows the assemblage of only 67 species.

In recent years, due to changing landscape of the region and other unknown factors it was observed that the *Euphorbia* scrubs show an association with *Lantana camara*. Invasion of the *Lantana* along the roadsides is clearly visible. In addition, *Prosopis sp.* is taking over the grassland habitat. The farmers in this area have started using various pesticides and insecticides, which affect non-target species, as well as the bird diversity and population in the near future. The region is facing droughts over the past two years; therefore, the wetlands are drying before the arrival of the migratory birds in the area. This has an adverse impact on the population of wetland bird species in the area.

A better management of invasive plant species, sustainable agricultural practices and a judicious use of water may be helpful in conserving avifauna and other wildlife of the region.

Role of NTPC in the conservation of wildlife

A Sathya, Deputy Manager (P&S), **PM Ambily**, Deputy Manager (HR) and **Sweetly Gajbhiye**, Assistant Manager (F&A), NTPC Limited

Wildlife conservation, the practice of protecting wild plant and animal species and their habitat is one of the important aspects that NTPC emphasizes at its Projects. Among the goals of wildlife conservation are to ensure that nature will be around for future generations to enjoy and to recognize the importance of wildlife and wilderness lands to humans. NTPC is passionate about the environment and proactive in its approach in ensuring a greener tomorrow. NTPC has planted more than 20 million trees nationwide, and the mission continues.

Wildlife conservation has become an increasingly important practice due to the adverse effects of human activity on wildlife. An endangered species is defined as a population of a living being that is at the danger of becoming extinct because of several reasons. The reasons can include that the species has a very small population or is

threatened by the varying environmental or prepositional parameters.

NTPC has been carrying out its business activities with responsibility towards protecting the environment. It is possible to achieve a satisfactory combination of environmental quality and techno-economics through determined efforts of NTPC. Continuous vigilance is maintained to minimize pollution at all levels.

The extensive green cover created along with water reservoirs and lakes attract a wide variety of fauna including birds. In the case of three projects (Kahalgaoon, Badarpur, and Unchachar), wildlife sanctuaries were declared near the projects by the Ministry of Environment and Forests after they were accorded environmental clearance.

NTPC has an independent Horticulture Department at its projects headed by experienced horticulture officers / supervisors. Saving existing trees, planting right at the beginning of construction phase, upkeep of the trees and advice from State Forest Departments and agricultural universities are a few general guidelines followed by NTPC.

Further NTPC, in line with the regulations and norms of MoEF also brings out Wildlife Conservation Plans with various partners. With an example of Solapur STPP, the wildlife conservation plan for wildlife in Deccan Plateau of Maharashtra with special reference to GIB is being drafted with BNHS-India and Pune Wildlife Division.

Being a responsible Public Sector business, NTPC steps up in taking an extra step for the Conservation of the Environment with its Flora and Fauna for a sustainable and greener future.

Conservation laws for landscape species

Saurabh Deshpande

As the conference is focused on the conservation of wildlife in Deccan plateau and biodiversity, two important legislations are considered here – 'The Wildlife (Protection) Act, 1972' and the 'Biological Diversity Act, 2002'.

The Wildlife (Protection) Act, 1972 is enacted with a view to protect the wild animals and plants and to ensure the ecological and environmental security of the country. This act completely banned the hunting of wildlife and provided protection to specified plants. There are provisions for the Protected Areas, Central Zoo Authority, National Tiger Conservation Authority, Wildlife Crime Control Bureau, etc. The Section 39 of this act explicitly declared that wildlife is the Government property. With the various relevant provisions, this act has proved to be a boon for wildlife conservation. The Act is not sufficient for conservation of landscape species like GIB and Blackbuck because these animals are found primarily in the human-dominated landscapes. There is the need to make amendments in the Act for species-specific conservation measures.

GIB is a scheduled bird under this act. It is inserted in the part 3 of the schedule 1. This is the only provision regarding the GIB in this act, no more special provision regarding the landscape species or the sanctuary in the grassland.

Biological Diversity Act, 2002 was made with a view to prioritise conservation and the sustainable use of biological diversity, and fair and equitable sharing of the benefits arising out of the use of natural resources. The act defines biological diversity under the section 2(b) as 'the variability among living organisms from all sources and the ecological complexes of which they are part and includes a diversity within species or between species and of ecosystems.'

The Act defined creation of certain authorities, and clearly stated their roles and duties. The act acknowledges that the development without concern for the environment can only be short-term. Sustainable development is the only means to meet the needs of the present without compromising the ability of the future generations to meet their requirements. Many institutions and the Government bodies are working to protect the environment, however, the involvement of the general public is crucial. To increase the participation of the citizens because, according to Article 51A of the 'Constitution of India' it is a fundamental duty of every citizen to protect the environment and be compassionate towards living creatures.

Medicinal plants

Ashok D. Patil, Dy. Director, Department of Social Forestry, Solapur

Health of all the living beings on the face of earth is dependent on the health of the eco-system of which we are all a part. Depleting environmental resources are resulting into greater problems, including reducing food production, pollution, global warming, etc.

When speaking of depletion of natural resources, one cannot ignore depletion of medicinal plants from the wild. It must be noted that even in the modern day and age, 90 per cent of medicinal plants are sourced from the wild. This is more so evident in the developing societies where a large section of the population depends solely on the medicinal plants for remedies to the ailments.

Our herbal export was nearly ₹500 crores in the year 2000. Growing six times it reached to ₹3,000 crores in 2005. Today it stands at about ₹10,000 crores. These exports include products such as Ayurvedic medicines, natural fragrance, edible and medicinal oils, etc. It is therefore in our interest to protect the sources of these products – the medicinal plants. We must invest in in-situ and other conservation efforts for our medicinal plants and other endangered, threatened plant species.

The national policy on forestry clearly directs that we protect and conserve our plant biodiversity to protect the diverse gene pool available to us through our forests, and the plant diversity around us.

Abstracts of poster presentations

Status of family *Rallidae* in Solapur

Rahul S. Vanjari, Sangameshwar College, Solapur and **Raghvendra S. Vanjari**, D.B.F. Dayanand College of Arts and Sciences, Solapur

The *Gruiformes* is an order of the large, flying as well as small, land dwelling birds like Crakes, Ralls, etc. It comprises five avian families in the Indian subcontinents, and except *Heliornithidae* the other four mark their appearance in Solapur. Fundamental family of this order is *Gruidae* and the suborder *Grues*. Together they are termed as 'core-gruiformes'. Several species of the core-gruiformes became extinct in the last century. Ralls and Cranes exist on the earth since the Oligocene period.

We have discussed here the occurrence and the status of the family *Rallidae* Vigors 1825 (Aves: *Gruiformes*), in the study area, which falls under the southern part of Maharashtra state on the Deccan plateau. Solapur district lies in Bhima-Sina basins. Habitat composition of this region supports more than fifty avian families. We selected three different sites – Hipparga Lake, Sambhaji Lake and Degaon – to study the status of *rallidae* birds between April 2013 and April 2014. To observe the preference of birds for comparative analysis we surveyed twelve more analogous spots in and around Solapur.

Our study revealed a total twelve species belonging to family *Rallidae* which represents a 70.58 per cent of the species from *Rallidae* family in the Indian subcontinent. Details about site preference, activity period, and residential status is fairly good. Community assemblage of *Rallidae* among three study sites showed that White-breasted Waterhen *Amaurornis phoenicurus*, Purple Swamphen *Porphyrio porphyrio*, Common Moorhen *Gallinula chloropus*, Common Coot *Fulica atra* occupied all the sites. Spotted Crake *Porzana porzana*, Little Crake *Porzana parva*, Baillon's Crake *Porzana pusilla* and Watercock *Gallinago cinerea* are restricted to only the Degaon site. Ruddy Breasted Crake *Porzana fusca*, Brown Crake *Amaurornis akool*, Water Rail *Rallus aquaticus* and Blue Breasted Rail *Gallirallus striatus* were found at two sites namely Sambhaji Lake and Degaon.

Diversity indices among above all species is reported as Simpson's (=0.7862) while Shannon (H=2.1139). Common Coot has highest index of density, frequency and abundance, while Little Crake and Water Cock has the least. Summarily, the important value index of family *Rallidae* in all the sites in Solapur is reported as (=899.61). Diversity indices across the study sites have variable in occurrence of species as well as the dominance. Comparative β diversity had various values in all six different indices.

Great Indian Bustard Sanctuary and endangered livelihood capital

Sudarshan Kasbe, Tata Institute of Social Sciences, Tuljapur

In 1979, State Government of Maharashtra declared 7,848.47 km² area as Great Indian Bustard Sanctuary under Section 18 of The Wildlife (Protection) Act, 1972. The sanctuary is spread across six

taluks, three each from Solapur and Ahmednagar districts. These are Newasa, Shrigonda, Karjat from Ahmednagar and Mohol, Karmala and Madha from Solapur. North Solapur taluk was included later. This presentation focuses on the problems of people whose lands were included in sanctuary reservation from North Solapur. It tries to understand the changes in the livelihoods of local people in a qualitative and quantities way.

This study is based on readings and material about the sanctuary. It is noted that the opposition to the sanctuary by the locals is neglected, so there was absence of dialogue between the environmental organizations, the Forest Department and the local communities. The environmental organizations did not establish any discussion with the villagers that are affected by the sanctuary. It created tension and negativity about the sanctuary and its biodiversity. It is important to address these opposing voices and understand what villagers face due to the declaration of this Sanctuary.

At present, the villagers and the wildlife are dependent on the same geographical area. Since the area is declared to be a Sanctuary, villagers face multiple restrictions on the acquisition of land besides other regulations including land dealings, grazing, collection of fuel and fodder from and around the protected area. Villagers have reported problem regarding agricultural practices and infrastructure development as well. From this study, I am trying to find a way to resolve these issues and explore alternative ways of biodiversity conservation as well as sustainable development for the local community.

Diversity of *Nematode* parasites From *Acaudated* amphibians

Sujeet Jamdar, Dept. of Zoology, G.M. Vedak College of Science, Raigad, **Kishor Shinde**, Dept. of Zoology, Dr. B.A.M. University, Aurangabad and **Gajanan Sontakke**, Dept. of Zoology, P.D. Vasantao Patil College, Sangli

In the present study, a total of 92 specimen (78 toads and 14 frogs) were collected between June 2011 and May 2012 from different localities across Aurangabad. *Acaudated* amphibians were examined for *nematode* parasites. Although the *nematode* fauna of *acaudated* amphibians has long attracted the interest of many local parasitologists, there are only a few studies dealing with the parasites of amphibians in Maharashtra.

Present study helps to provide the information on nematode parasites of *acaudated* amphibians. For the collection of nematodes skin, lungs, liver, gut, mesentery and urinary bladder of each were observed. As a result of this study, a total of six nematodes belonging to six genera were recovered.

This is the first study about nematode parasites of pond frog (*Hoplobatrachus tigerinus*) from study area and also the first report of nematodes *Oswaldocruzia sp.*, and *Spinicauda sp.* recovered.

Monitoring metal contamination in zoo animals: Solapur Zoo, a case study

Asha A. Kirtikar, Sangameshwar College Solapur and **Saurabh U. Rokade**, Arts, Science and Commerce College, Naladurg

The present investigation was carried out for a period of one year with the intention to assess the effect of the ambient air quality on zoo. Most of the zoos that were once located away from the cities and towns are now surrounded by urban settlements. Rapidly growing urbanization has contaminated the air and water in the vicinity of zoos with the exhaust from automobiles. A survey of animals housed in Mahatma Gandhi National Park at Solapur, using various bio-markers, indicates contaminations from metals. A non-invasive method has been suggested where faecal matter is used as bio-marker. The conservation of biodiversity is one of the greatest challenges to mankind. The present investigation was carried out to understand the adverse effect of environment pollution on captive animals.

Livelihood study of settled and pastoral nomadic tribes in Pune, Aurangabad and Ahmednagar

Laxman Shitole, **Maya Somkuwar**, **C.M. Sampath**, **Shila Bansode**, and **Siddhant Chakravarty** of Tata Institute of Social Sciences, Tuljapur Campus

Nomadic communities play an all too important role in the economy. Unfortunately, their role is ignored by policy makers and economists due to lack of sufficient data as they are part of the informal or hidden economy and have seldom been studied in a detailed manner. Our study sheds some light on their life, livelihood and culture.

The study was conducted with Dhangar and Maldhari communities, in three districts (Pune, Aurangabad, Ahmednagar) of Maharashtra. The objectives of the study were to collect baseline data on available documents, migration patterns, analysis of current livelihood patterns and S.W.O.T. Analysis of their livelihood strategies. Emphasis was on understanding relations with settled communities and the Forest Department in the context of grazing rights. Attitude towards local wildlife, mainly carnivores, was also documented. The data were collected by using the schedule, Transect walks, Village mapping, Resource mapping and audio-visual documentation. Approximately 100 households were contacted for data collection. Dhangars had all necessary documents such as Aadhar, Voting Card and ration card, which will make it possible to access government schemes, in theory. Maldharis lacked basic proof of residence as they migrated into Maharashtra from Gujarat around 40 years ago. This is a disadvantage as it prevents access to education and government schemes. There has been conflicts in the past between local Maratha farmers and the Maldharis and the law has in such cases sided with the majority. Most of the Dhangars migrate seasonally to Konkan and Pune districts during the Maldharis have temporarily settled near Ahmednagar. Both communities are primarily dependent on livestock although a most

Dhangar families around Ahmednagar areas had some land holdings. Maldharis keep the traditional Gir cow or buffalo while the hangars keep sheep and goat and rarely few cows. Dhangars are dependent mainly on fodder and water available from common property lands and agricultural landscapes. The Maldharis, in addition to common areas, have managed to build relations with sugarcane factories and vegetable markets to gain regular fodder for the cattle. Nomadic Dhangars have faced problems of resource scarcity that leads to conflicts with local settled communities and forest department near Protected Areas (Mayureshwar WLS). They also reported problems due to fragmentation of earlier continuous grassland landscapes. Loss of livestock due to wolf depredation is reported but not seen as a serious concern by the Dhangar communities. It appears that livestock rearing will continue as primary occupation of both communities as it has helped them to find a niche in present socio-economic and ecological conditions.

A study of wolf distribution and their interaction with shepherds in an agro-pastoral landscape in western Maharashtra

Iravati Majgaonkar, Ovitala Landga Project

The Indian wolf *Canis lupus pallipes* is a protected species whose wide home-ranges often overlap with human-dominated landscapes. Such contiguous dry-land stretches in western Maharashtra form important grazing lands and dependent on them is an interactive system involving the resident and migratory shepherd communities, large number of livestock and carnivores like wolves. A study done in this landscape has revealed that a significant part of the diet of wolves consists of livestock since domestic animal densities are very high, and wild prey abundance is low here. Also, wolves have been found to be present on agricultural land and plantations along with using man-made features for denning in this area. This overlap of resource use between livestock owners and carnivores like wolves it is often thought to generate negative attitudes towards these carnivores. But this can only be understood by studying large and small scale factors shaping human-wildlife interactions, and this may reveal the reasons for the persistence of wolves in these agro-pastoral landscapes. Such a study holds even more importance in the face of changing land use and tolerance towards wildlife outside protected areas, which is likely to impact both, the pastoral communities as well as wolves because they share the same landscape.

Desolate dens

Santosh Yadav, TATA Institute of Social Sciences (TISS), Tuljapur

Drought in the last few years has adversely affected all life forms, including wildlife, in some regions of Maharashtra. Farmers, pastoralists and wildlife are those subsets of the ecosystem; which usually become victims of the dubious nature of the monsoon. It was observed that the pastoralist community (Dhangar community – that has been taken as sample for study) faced several changes in their

livelihood pattern. Such as change in grazing route, reducing the number of animal kept due to conditions mentioned above. Traditionally Dhangar community is practising pastoralism – both nomadic as well as settled. Our study emphasizes on relations between pastoralists, wolves and local farmers in the aftermath of consistent drought like conditions around Tuljapur hills of Osmanabad district. Human Development Index (HDI) of Maharashtra (0.572) is less than India's national average (0.586), on other hand HDI of selected region in Osmanabad district is 0.649 which is considered amongst the lowest five districts in Maharashtra. Low HDI was the paramount criteria while choosing the study area.

Data used for the study is mostly primary, including personal interviews with pastoralists, site visits (grazing, habitation), etc. Less fodder and water availability, diseases and sometimes killing of animals by predators (wolf) are significant constraints, but still their attitude towards wolves has not found as vindictive. Conflicts between nomadic pastoralists and farmers, forest department personals, nomadic versus settled pastoralists are another segment of the study. With this study author wants to open a topic for discussion that will look at pastoralists and predator relationships and impacts of environment upon it.

Impact of pesticides on wildlife of Deccan plateau of Maharashtra

Sujit Narwade, Project Scientist, BNHS-India and **Dr. Milind Joshi**, Agricultural Entomologist, Subject Matter Specialist (Plant Protection), Krishi Vigyan Kendra, Baramati

During last few years, we are studying wildlife in Deccan Plateau of Maharashtra with particular reference to conservation of the critically endangered Great Indian Bustard (GIB) *Ardeotis nigriceps* and associated fauna in human-dominated agricultural landscape. Over the period, we realised that, not only GIB but also other common organisms like earthworms, honeybees are becoming uncommon from entire rain shadow region of Southern Tropical thorn forests of Maharashtra. We are trying to find out the causes of this decline and would like to address one of the issues of the probable impact of pesticides on wildlife. Out of all crops on the globe, only 15 per cent crops are self-pollinated; while remaining 85 per cent depends on other agents. Now days, pesticide producing companies claim that modern pesticides are less harmful to non-targeted species but they are facing cumulative impact on their survival and reproduction by use of combination of various chemicals in agricultural fields. Pesticides are designed to damage vital biological processes of a target organism like destruction of photosynthesis in herbs or blood clotting in mammals. Non-target organisms also got exposure to these chemicals. For example, in a review done by pesticides and earthworms by Peloci and others in 2014, it has been proved that pesticides impact earthworms at all organisational levels such as disruption in enzymatic activities, increase individual mortality, decrease fecundity and growth, decrease feeding rate, reduced biomass and overall density. Such direct, as well as indirect impact of pesticides on food chain or use of herbicides, may be limiting the

food resources of the wildlife. When pesticide applied to seed dressing, it will enter into soil and ground water, accumulate there and reach plants and crops to their roots.

Diversity of Geckos (Gekkonidae) from Solapur

P.S. Talwad and **M.M. Fartade**, Dept. of Zoology, Shri Shivaji Mahavidyalay Barshi, Barshi

Reptiles are cold-blooded animals found in almost all the parts of the world. All the lizards found in India belong to order Squamata. Lizards are mainly insectivorous animals, that control the population of insects act as bio-insecticides and maintain ecological equilibrium. Lizards are mainly land dwelling and tree climbers. Random surveys are made and visual encounter surveys (VES) method was used. Surveys were made at evening and night around human habitation, grasslands, rocky areas, and shrub areas. Walls, rocks, tree barks are examined for presence of geckos. Five species of geckos recorded belonging to genus *Hemidactylus*.



Knowledge partners:

