XXVII ANNUAL RESEARCH SEMINAR

(30th September & 1st October 2013)

Poster Abstracts

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

Age estimation of olive ridley sea turtle (*Lepidochelys olivacea*) using skeletochronology

- Anupya D. Baburam

A breeding population of olive ridley turtle *Lepidochelys olivacea* forms huge reproductive congregations in the near-shore waters off the coast of Odisha, and nest en-mass (*arribada*) at few selected sites there every winter. This population has been subjected to heavy fisheries related mortality for two decades, and the possible impacts have been little understood. We undertook a study from December 2012 to May 2013 to estimate the age class of this turtle population from humeral bones through skeletochronology. Cross sections of the bones were examined from 85 dead olive ridley turtles (29 males and 56 females) washed ashore the Odisha coast. Sections were taken from the mid-diaphysis, just distal to the deltopectoral crest and beneath the insertion scar on the humerus using first a Dremel 4000 round saw and then thinner sections (25 μm) were made using a freezing stage microtome. Sections were processed according to standardized histological techniques. Lines of Arrested Growth (LAGs) observed in the stained humeral cross sections were then counted to estimate age of the dead turtles. Two age estimation protocols were used: Ranking and Correction Factor Protocol, which yielded age estimates of 24 - 52 and 21.0 . 48.9 years respectively; for a size class (Straight Carapace Length . SCL) ranging from 56.4 - 72.2 cm. This indicates that the olive ridleys arriving in the Odisha waters to breed are primarily above 20 years of age. The median age of the turtles estimated through the two protocols were 35 years and 31 years respectively. A comparison of the SCL and humerus maximal length of the turtles showed a high correlation (r = 0.75), while the correlation between age estimated and SCL was however low (r = 0.33). This is because the turtles examined were adult breeding turtles and in their final growth state, though they may continue to add a growth layer as seen in the humeral bone section. This is evident from the age estimated for turtles to be 27 to 52 years within a size call range of 65.0 - 65.9 cm, which more or less encompassed the age range of all turtles examined.

Evaluating the effect of introduced spotted deer (*Axis axis*) on forest floor herpetofauna of Andaman Islands

- Nitya Prakash Mohanty

Introduced species are a major threat to native biodiversity, especially in isolated systems like islands. An introduced mammalian herbivore, the spotted deer or chital (*Axis Axis*) is a potential threat to native herpetofauna of Andaman Islands, in the Bay of Bengal. Introduced in 1930s, the deer alter the forest structure by browsing. We hypothesised that herbivory is likely to depress folivorous arthropod abundance, which in turn may lead to a decline of insectivorous forest floor herpetofauna. Additionally, reduction in vegetation cover may render the habitat unsuitable for herpetofauna or make them vulnerable to predation. The objectives of this study were to evaluate the effect of chital on the forest floor herpetofaunal abundance and to determine the pathway of interaction between them. A contrasting effect of herbivory by chital on reptiles and on amphibians in the Andaman Islands was observed during the dry season. Forest floor reptiles, which included agamids, geckos and skinks showed reduced densities in the presence of chital in comparison to an island where chital was absent ($P < 0.001$). This effect of chital on reptiles was found to be mediated by vegetation cover ($P < 0.01$). Chital significantly reduced the vegetation cover below their maximum browse height (1.5 m) in the Islands and which in turn led to a reduction in reptile abundance. In contrast, amphibian densities did not differ in islands with and without chital. This study brought to light a pathway of indirect interaction between a mammalian herbivore and insectivorous herpetofauna. In doing so, it has raised conservation concern about the capability of an introduced species to alter an island vegetation structure and acutely impact several endemic fauna.

Project Title	:	Evaluating the effect of Introduced Spotted Deer (*Axis axis)* on forest floor herpetofauna of Andaman Islands
Principal Investigator(s)	:	Dr. Karthikeyan Vasudevan and Dr. K. Sivakumar
Researcher(s)	:	Nitya Prakash Mohanty, M.Sc. Student
Funding Agency	:	WII, Grant-in-aid, M.Sc. Programme
Project Duration	:	December, 2012 . June, 2013

A study of resource selection by the black kites in the urban landscape of National Capital Region, India

- Nishant Kumar

Black kites (*Milvus migrans*) are the scavenger and predator raptors of the old world. Abundance and distribution of these birds suffer due to rapid infrastructural changes in the developing cities which likely limit or change spatial layout of the available habitat and food. Our study focused on a) estimating the abundance of black kites on the Ghazipur dump site and the abundance of nesting pairs in National Capital Region (NCR), b) evaluating factors influencing nesting habitat selection combined with a broad understanding of its foraging habits and c) estimating nest survivorship in the urban landscape. Data from 116 nests and nest sites covariates were used to model nest survivorship under known fate option in Programme MARK. We estimated the current abundance of nesting pairs of black kites at seven study sites. The mean nest density was 15 nests/ km^2 ($\pm$ 7.94) and it ranged from zero to 67 nests/km^2 in Mahipalpur and North campus respectively. Kites choose nest sites, as it was evident from weak significant partial correlation between nest density, food index and green cover (= 0.1, partial r = 0.64, p = 0.06). The sites at the best trade-off between green cover and food availability had the highest nest densities. We counted more than 2,400 kites in the Ghazipur dump. The overall probability that a nest produced a viable fledgling was 0.45 (95% CI: 0.21-0.61). The nest survivorship was stage specific for pre-laying (0.60, $\pm$ 0.014), incubation (0.84, $\pm$ 0.014) and nestling stage (0.90, $\pm$ 0.009). Further studies using individually marked kites will reveal vital details of their behavioural and physiological adaptations.

Resource selection by black buck (*Antilope cervicapra*) in Point Calimere Wildlife Sanctuary, Tamil Nadu

- Frank S.J. Dhanaraj

Competition between livestock and wild herbivores has remained contentious and it has remained as major a conservation issue for native ungulates. This work aimed to investigate the interaction between wild and domestic ungulates with special emphasis on black buck *Antilope cervicapra* in Point Calimere Wildlife Sanctuary in Tamil Nadu. The assumption of the study was that black buck has high degree of food and habitat overlap with other sympatric ungulates in the study area. The food habits and diet overlap of ungulates were estimated using feeding site method and the line transects method was used for estimating the densities of the herbivores and habitat interactions.

The estimated density of black buck was 37.1 ± 5.2 per km^2 with group density of 9.6 ± 3.1, chital was $4.5 \pm 0.9/km^2$ with group density of 2.7 ± 0.5, feral horse was $7.6 \pm 1.2/km^2$ with group density of 3.3 ± 0.3 and cattle was $21.9 \pm 3.3/km^2$ with group density of 2.5 ± 0.4. This study showed that high diet overlap between black buck and cattle (95 %) followed by black buck and feral horse (81%), black buck and chital (38.1%) and cattle and feral horse (91.3%). Forty three forage species were identified to be eaten by all target species out of which black buck utilized 23 food plants, chital 33, cattle 29 and feral horse 35 food plants. There is no significant difference in the nutrient contents of the utilized food plants by black buck. The above information will help in making informed management decisions that will aid in conserving the black bucks and its habitat in the long run.

Project Title	:	Resource Selection by large herbivores with special reference to black buck (*Antilope cervicapra*) in Point Calimere Wildlife Sanctuary, Tamil Nadu.
Principal Investigator(s)	:	Dr. Gopi G.V, Dr. K. Sankar and Dr. S.A. Hussain
Researcher(s)	:	Frank S.J. Dhanaraj, M.Sc. Student
Funding Agency	:	WII, Grant-in-aid, M.Sc. Programme
Project Duration	:	December, 2012 . June, 2013

Assessment of livestock diseases as an indicator of risk to Greater one-horned rhinoceros (*Rhinoceros unicornis*) in Manas National Park, Assam, India

- Debabrata Phukon

The present study focuses on re-introduced population of Greater one-horned rhinoceros (*Rhinoceros unicornis*) and livestock interface issue in Manas National Park, Assam. It was hypothesised that the rhinos interacting with livestock has potential to contract diseases from the livestock population, and therefore the diversity and magnitude of disease prevalence in livestock is likely to pose serious threat to the rhinos. The study quantified disease distribution pattern and commonality between livestock and rhino population and mapped the disease gradient in Manas National Park during the period January-April, 2013. The study design involved: (a) sampling of livestock for disease prevalence in the fringe villages and associated husbandry practice, and (b) mapping of zone of influence (ZOI) of livestock in the park by tracking livestock movement and sampling on systematic plots. A total of 110 dung and serum samples were collected from 11 villages and were subjected to parasitological examination, disease diagnosis and screening for blood parasites using blood smears. Rhino dung samples were collected from nine fresh dung sites inside the park for screening of parasitic load and to understand the commonality between livestock and rhinos. Ninety one percent of livestock sampled showed antibodies against one or the other infectious agents. Forty eight percent showed the prevalence of parasites in their dung. Ten transects were walked from the periphery to interior of the park and 46 plots were laid to quantify dung density distribution as a surrogate for disease risk. ZOI as measured from the fringe villages to forest interior ranged from 0.5 to 3.5 km (Mean= 2 km), and accounted for 19 km^2 area. Interpolation results of dung density indicated significant variation of livestock use within ZOI. This study will provide a basis for developing a standardized approach for risk-based surveillance activities in critical rhino habitats.

Effect of habitat structure on odonate species richness in streams of Kalakad Mundanthurai Tiger Reserve, Tamilnadu

- Anilitty, A.S.

Riparian vegetation and stream structure play an important role in determining odonate assemblages. This study investigated the relationship between odonate species richness and structure of stream habitat in streams within Kalakad Mundanthurai Tiger Reserve (KMTR) in Tamil Nadu. KMTR lies in the southern Western Ghats encompassing areas ranging from 50 to 1,868 m elevation. The vegetation types range from thorn forests to wet evergreen forests. Intensive study areas were three major rivers namely: Tamirabharani, Kil manimuthar and Servalar. Data was collected using 36 belt transects (70 m x 20 m) those were walked thrice and odonate presence/absence data were collected. From each transect, 15 habitat structural parameters along with time and altitude were recorded. A total of 36 species of odonates were recorded that included five endemic species to the Western Ghats (*Euphaea cardinalis*, *Protosticta davenporti*, *Protosticta sanguinostigma, Esme mudiensis, Coconeura sp*). Results from Generalised Linear Models (GML) showed that canopy cover, altitude, stream width and foliage density influence odonate species richness in KMTR.

Density, distribution and factors influencing sea stars in selected islands of Lakshadweep

- Sharmila Jayaram

Coral reefs are one of the most complex and diverse ecosystems in the world. Storms and anthropogenic factors such as tourism, coastal development, overfishing, pollution and climate change are regarded as threat to these ecosystems. Sea stars (Asteroids) population outbreak which is prompted due to anthropogenic factors is also considered as a major threat to coral reef ecosystem across the world. Thus, we estimated density of Asteroid species by snorkeling through belt transect of 25 x 10m by tying transect rope of 25 m on the coral boulders and covering 5m on both sides. The reefs were sampled in four Islands of Lakshadweep; Agatti, Kavaratti, Bangaram and Suheli with efforts of 47, 30, 35 and 32 transects respectively. In order to quantify substrate characteristics a quadrat of 1x1m was laid at every 5 m intervals. The following covariates water temperature, water pH, water salinity, water depth, wave action, aspect, disturbance level and substrate type were recorded. The five Asteroid species detected were *Culcita schmideliana and Culcita novaeguineae* (Oreasteridae)*, Linckia laevigata and Linckia multiflora* (Linckiidae), and *Acanthaster planci* (Acanthasteridae). All five species were found to have varied density across the four islands. Overall density estimates of Asteroids ranged from 0.05 (S.E = 0.02) to 0.80 (S.E = 0.09) per $250m^2$. Canonical correspondence analysis indicated that sample scores on ordination axis 1 were strongly correlated with water pH, depth and dead coral. Of the three strongly correlated environmental variables, pH was found to be the most ecologically important variable affecting Asteroids distribution. Studies on importance of factors influencing Asteroid distribution are inadequate in India. The people of Lakshadweep are dependent on coral reefs for livelihood and survival options. Hence this study provides baseline information on factors influencing Asteroids distribution which possibly will contribute in developing management strategies in future coral reef conservation.

Project Title	:	Density, distribution and factors influencing sea stars in selected islands of Lakshadweep, India
Principal Investigator(s)	:	Dr. S.A. Hussain, Dr. Gopi G.V, and Dr.Deepak Apte (BNHS)
Researcher(s)	:	Sharmila Jayaram, M.Sc. Student
Funding Agency	:	WII, Grant-in-aid, M.Sc. Programme
Project Duration	:	December, 2012 . June, 2013

Recreational value of Periyar Tiger Reserve

- Subish Sebastian

People living in and around PAs pay enormous costs in terms of lost access to their life-support system which lessens the public support for conservation. However, accounting of the services such as recreational value provided by the PA and benefits derived from eco-tourism can help generate support for conservation at all spatial scales. Keeping this in view, the recreational value of the Periyar Tiger Reserve (PTR) was estimated and the distribution of ecotourism benefits among stakeholders was assessed. The recreational value of PTR was calculated using the Zonal Travel Cost Method. This method helps to derive the demand function for the site. Questionnaire survey was carried out to know the socio-economic status, the monetary flow in the household and attitude for people towards PTR.

The recreational value of the reserve was estimated at Rs. 44,176,299.32/year, with the cost per visitor being Rs. 63.56 the consumers' surplus was large, showing the willingness of visitors to pay for wildlife recreation. The study revealed that the 'Tourism Programs' run by EDCs are the best models which underline the principles of ecotourism providing 100% share to local communities, followed by the home stays run by local communities. Even though, resorts managed by bigger businessmen are claimed as ecotourism, only 14.9% of share went to the local community. The results indicated that positive conservation attitudes are not influenced by income class, education, gender and age of the respondents but can be attributed to the benefit sharing approach developed by Forest Department wherein the communities directly benefit from ecotourism. Capacity building, enhancement of local employment opportunities and minimizing monetary leakages would increase benefits to the locals.

Project Title	:	Recreational value of Periyar Tiger Reserve
Principal Investigator(s)	:	Dr. Ruchi Badola, Dr. S.A. Hussain and Shri V. K. Uniyal
Researcher(s)	:	Subish Sebastian, M.Sc. Student
Funding Agency	:	WII, Grant-in-aid, M.Sc. Programme
Project Duration	:	December, 2012 . June, 2013

Quantitative PCR analysis of DNA extracted from scat samples of tiger (*Panthera tigris*) for Major Histocompatibility Complex (MHC) gene

- Ajit Kumar

Quality and quantity assessment of extracted DNA is imperative for many applications in molecular biology, especially in fecal DNA analysis. Quantification of scat DNA concentration is critical due to inhibitor content and secondary metabolites. Impurities in extracted DNA can lead to inaccurate measurement of DNA concentration and could potentially affect genotyping and sequencing. Studying genetic diversity using microsatellites and major histocompatibility complex (MHC) in small and isolated populations may reveal the genetic fitness. Our preliminary study observed the low genetic diversity in Ranthambore Tiger Reserve (RTR) populations with expected and observed heterozygosity 0.7 and 0.4 respectively. In this study, we describe the range of DNA amounts obtained from tiger scats and formulate an efficient approach for accurate amplification and sequencing of MHC gene. Two protocols *i.e.* Qiagen kit and guianidium hydrochloride (GuHCl) methods were assessed to compare their efficacy in yielding PCR usable DNA from blood and scat samples. Quantification of DNA was done by using UV-Visible spectrophotometer (A260/A280 nm) and agarose gel electrophoresis. Sixty two samples extracted using Qiagen Kit and twenty samples extracted using GuHCl yielded an initial concentration of ~120 ng/µl and ~35 ng/µl respectively with OD range 1.20 to 2.00. We observed DNA template (extracted from scats), if used in the range of 30-50ng/µl in OD range 1.75 to 2.00 can significantly increased the PCR success rate from 68% to 92% and it was found to be 100 % with DNA extracted from blood samples. However, mtDNA cytochrome *b* gene (146 bp) amplification success rate was high at 20-100ng/µl. Therefore, we could optimize and refine DNA extraction methods that yielded high amplification of MHC class-*I* exon-2 and 3. The results of MHC gene sequencing suggest further refinement in the technology and expect the removal of ambiguous heterozygous nucleotides can be achieved following single strand conformation polymorphism (SSCP) or cloning of PCR products.

Project Title	:	Evaluation of MHC heterozygosity in isolated tiger population
Principal Investigator(s)	:	Shri S.K. Gupta
Researcher(s)	:	Ajit Kumar, TA
Funding Agency	:	WII, Grant-in-aid
Project Duration	:	February, 2012 . February, 2015

Ecology of tigers (*Panthera tigris tigris*) in Pench Tiger Reserve, Madhya Pradesh

- Anindita Bidisha Chatterjee

Home range, habitat use, food habits, prey availability and population dynamics of tigers in Pench Tiger Reserve, Madhya Pradesh was studied between 2007 and 2013. Three tigers, one adult female (AF), one adult male (AM) and one sub-adult male (SAM), were radio-collared and monitored between March 2008 and December 2011. Carnivore sign surveys were carried out in the intensive study area (ISA) of 410 km^2 (n=44 beats) between June 2006 and April 2011. Bonferroni Confidence Interval and Chi-Square Goodness of fit tests were used to evaluate the habitat usage pattern. The availability of prey species was studied by line transect method in the ISA. Tiger scats (n=622) were analysed to assess the prey choice. The population dynamics was studied using camera trap based spatially explicit mark-recapture technique in the ISA by deploying 87 pairs of camera traps in 4 km^2 grids. The estimated overall home range was 43 km^2, 55.1 km^2 and 52.2 km^2 for the AF, AM and SAM respectively using 100% MCP and 32.1 km^2, 64.1 km^2 and 19.1 km^2 for AF, AM and SAM respectively using 95% FK. In summer, tigers preferred riverine and submergence forests whereas in winter, they preferred teak-mixed forest over the other vegetation types. The most abundant prey species in the study area was common langur followed by chital, sambar, nilgai, wild pig and gaur. Chital contributed maximum to tiger scats both in frequency of occurrence and biomass followed by sambar, wild pig, common langur, nilgai, domestic cattle, rodents, gaur, hare, birds and porcupine. Overall tiger density was 4.7 ±1.2 in 1st trapping year and 4.1±0.7 /100 km^2 in last trapping year. The estimated survival rate of all tiger (n=66) was 0.66 (±0.04). The calculated mean recruitment rate for all tiger population was 9.2±2.2. The sex ratio was found to be female biased.

Project Title	:	Ecology of tiger in Pench Tiger Reserve, Madhya Pradesh
Principal Investigator(s)	:	Dr. K. Sankar, Shri Qamar Qureshi, Dr. Y.V. Jhala and Dr. Rajesh Gopal (NTCA)
Researcher(s)	:	Aniruddha Majumder, SRF, Santanu Basu, SRF and Anindita Bidisha Chatterjee, JRF
Funding Agency	:	WII, Grant-in-aid
Project Duration	:	October, 2007 - March, 2013

Ecology of leopard (*Panthera pardus fusca*) in Sariska Tiger Reserve, Rajasthan

- Pooja Chourasia

Home range, habitat use, prey availability, food habits and population ecology of leopard in Sariska Tiger Reserve were investigated between 2007 and 2013. Two male leopards were radio-collared to estimate home range. Level one resource selection was estimated through kernel utilization distribution based compositional analysis for seven identified leopards by comparing the resource availability in overall geographic area (81.36 km^2) of identified leopards and utilization by each individual. Prey species availability was estimated by line transect method (total effort = 183 km) in the intensive study area of 274 km^2. Based on scat analysis (N = 166) the proportion of different prey species consumed by leopard was estimated. Camera trapping based mark-recapture framework was used to estimate density, recruitment and survival rate, based on capture histories of identified leopard. The estimated home range (100% MCP) of the two radio-collared leopard was 84.3 km^2 and 63.2 km^2 respectively. Leopard largely utilized *Boswellia serrata* dominant forest followed by *Anogeissus pendula* dominant forest. The Indian peafowl was found to be the most abundant prey species in the study area followed by chital, common langur, nilgai and sambar. Sambar contributed maximum to leopard diet followed by chital, nilgai, livestock, common langur, cattle, rodent, peafowl, hare, goat and wild pig. The estimated leopard densities ranged from 3.3 ± 1.2 individuals/ 100 km^2 to 16.8 ± 2.2 individuals/ 100 km^2 during the study period. The overall survival rate of leopard was estimated to be 0.79 ± 0.04.

Project Title	:	Ecology of leopard (*Panthera pardus fusca*) in Sariska Tiger Reserve, Rajasthan
Principal Investigator(s)	:	Dr. K. Sankar, Shri Qamar Qureshi and Dr. Y.V. Jhala
Researcher(s)	:	Pooja Chourasia, SRF and Krishnendu Mondal, SRF
Funding Agency	:	WII, Grant-in-aid
Project Duration	:	September, 2007 - March, 2016

Ecological mapping of Askot landscape, Uttarakhand

- Parisha Bankhwal, Gautam Talukdar and Qamar Qureshi

The component on ecological mapping in the Biodiversity Conservation and Rural Livelihoods Improvement Project attempts to identify the areas of high biodiversity value, resource dependencies and threats in Askot landscape. This will also provide a framework for monitoring biological and social indicators.

The Askot Landscape (29 05qto 30 N, 80 to 81 05qE) is located in Eastern Kumaon, in the State of Uttarakhand. It has geographical area of 4469 km^2 and shares the international border with the Tibetan Autonomous Region of the Peoples Republic of China in the North and with Nepal in the South-East.

The initial work was to prepare various GIS layers namely land-use land cover, forest cover, drainage, settlement, watershed, road, soil and administrative boundaries. Satellite data of IRS LISS III was used to prepare land use land cover and forest cover layer. Based on spectral reflectance, the polygons were digitized at 1:50,000 scale. Interpretation key and ground data were used to prepare the maps. Field data survey was done from 22nd Dec 2012 to 10th Feb, 2013, during which 800 GPS points were collected and about 3,000 photographs were clicked. Four watersheds were identified and detailed maps prepared.

In future, the study will integrate both biological and socioeconomic components, which will help to develop regional plans to understand, protect and manage the natural resources and secure livelihoods of people in Askot landscape.

Project Title	: Biodiversity Conservation and rural Livelihood Improvement Project (BCRLIP)
Principal Investigator(s)	: Dr. Gautam Talukdar and Shri Qamar Qureshi
Researcher(s)	: Parisha Bankhwal, Project Assistant
Funding Agency	: World Bank
Project Duration	: September 2012 . August, 2014

Identifying biological indicators of conservation outcomes in Askot landscape, Uttarakhand

- Abesh K. Sanyal, Ankita Bhattacharyya, Soni Bisht and Vandana Rajput

Conservation outcomes such as improvement of livelihood and biodiversity values of an area are often subjectively evaluated. Alternatively, biological indicators could be used to evaluate well- defined conservation outcomes. However, identifying indicator species is a tedious task, and it is best done by employing experts of taxonomic groups. Askot Landscape encompasses 4469 km^2 in biotic province 2B of the Himalaya Biogeographic zone. In the World Bank supported Biodiversity Conservation and Rural Livelihoods Improvement Project (BCRLIP), various stakeholders were involved to promote biodiversity values in the landscape and also for the improvement of the livelihood of the people. As part of this project, identification and eventual monitoring of biological indicators is being carried out. Sensitivity to human disturbance, abundance in all strata of the landscape, prior information on the species and awareness among locals about the species are the criteria that will be used for identifying indicators. Plants, insects, fishes, birds and mammals are the groups within which, screening for biological indicators will be made. In four months of field surveys: (i) 14 forest tree communities have been identified in Gori valley, (ii) 20 tree species are being utilized by local communities; (iii) 6 species of butterflies were found in undisturbed sites and more than 7 insect species as pests on crops were recorded; (iv) 12 fish species were identified in Gori and Kali drainages, additionally, Mahseer was observed in Gori river; (v) 37 mammals and 280 bird species have been reported from Askot and our survey so far, have revealed 121 birds and 8 mammal species. Based on data obtained through systematic field surveys identification and field testing of indicators will be taken up.

Conservation and development in Kailash Sacred Landscape - a new initiative

- Sweta Singh, Richa Shah, Ajaz Hussain, Sumit Arya and Nayan Gogoi

Newer approaches to conservation are being advocated and validated. 'Landscape Approach' seeks to achieve environmental, social and economic objectives where diverse production sectors or developmental goals compete with biodiversity goals. Priority 'Transboundary Landscapes' straddling across international borders have been recognized in response to the diverse ecological, social, political and economic issues. 'Kailash Sacred Landscape (KSL)' is one such landscape identified for its biological, ecological, cultural and spiritual values. The International Center for Integrated Mountain Development (ICIMOD) has facilitated a process for the development of 'Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI)' by involving three regional member countries (India, Nepal and China). The KSL- India (7120 km^2) extends over Pithoragarh and Bageshwar districts of Uttarakhand state and includes Askot Sanctuary besides extensive managed forests, private and revenue lands. During the preparatory phase, all partners contributed towards the development of: (i) Feasibility Report, (ii) Conservation Strategy, (iii) Comprehensive Environmental Monitoring Plan, and (iv) Implementation Plan. The KSLCDI aims to: enhance cooperation among the regional member countries through establishment of a Regional Cooperation Framework; facilitate coordination among the stakeholders; strengthen local capacity efforts for community-based participation, and enhance cultural-socio-ecological resilience. Presently, a 5-year project is being implemented with five broad based Components. The Wildlife Institute of India, being a partner institution has been entrusted to provide inputs and lead for the Component 2 on 'Ecosystem management for sustaining services' besides some inputs for Component 4 . 'Biodiversity conservation and long term monitoring' and Component 5 on 'Regional cooperation, enabling policies and knowledge management' The expected outputs will be: (i) Participatory Action Research, (ii) Capacities of Line agencies & local institutions, (iii) Participatory Natural Resource Management Planning, (iv) Conservation Strategy Plans for implementation in pilot sites, (v) Implementation of Long-term Environmental Monitoring Systems, and (vi) Capacity building and information management.

Project Title	:	Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI) - Implementation Phase
Principal Investigator(s)	:	Dr. P.K. Mathur, Team Leader; Dr. B.S. Adhikari, Project Coordinator; Dr. S. Sathyakumar, Dr. D. Mohan, Dr. V.P. Uniyal, Dr. K. Sivakumar, Shri Mukul Trivedi, and Dr. G.V. Gopi
Researcher(s)	:	Sweta Singh, Richa Shah, Ajaz Hussain, Sumit Arya and Nayan Gogoi, Project Biologists
Funding Agency	:	International Center for Integrated Mountain Development (ICIMOD), Nepal
Project Duration	:	March, 2013 . December, 2013

Status and distribution of select fauna and their habitats in the impact zone of the Indira Sagar multipurpose hydro-project, Andhra Pradesh

- Paromita Ray and N. Gokulakkannan

The Indira Sagar (Polavaram) multipurpose hydro-project that is under construction across the Godavari River at Polavaram in Andhra Pradesh, has submergence zone of 187.29 hectare inside the Papikonda National Park (PNP). The impact zone of this project also extends upto the Godavari estuary including the Coringa Wildlife Sanctuary. As directed by Ministry of Environment & Forests, Government of India, the Wildlife Institute of India (WII) has initiated an assessment of the impacts on wildlife and their habitats due to the Polavaram project and to provide mitigatory measures. An assessment of the current status of the wildlife habitat and distribution pattern of mammals, birds, reptiles and fishes in submergence zone of PNP and also in the downstream area was conducted from December 2012 to August 2013. Line transects (covering total distance of 64.07 km), pellet count (188 plots), trial walks (total distance of 82.15 km), point count (488 point counts with survey effort of 780), quadrates and time constraint searches (27 plots of 625 sq. m) were conducted to assess the abundances of ungulates, mammalian carnivores, birds and reptiles respectively. Fish species found in submergence zone as well as in the downstream of the river were recorded based on fisherman catch. In addition to that Riparian Vegetation Index (RVI) was estimated for the entire stretch of downstream of the project. So far, there has been no visual encounter of ungulates during transect walk but carnivore sign surveys indicated that small cats and sloth bear signs were encountered at the rate of 0.06/km and 0.06/km respectively. A total of 101 species of birds, two species of lizards and three species of snakes were recorded in the impact zone of the Project from December 2012 to August 2013. In case of aquatic fauna, a total of 83 species of fishes were recorded in the study area, including a new record of *Hypselobarbus kolus* and five exotic species. Observed RVI in the impact zone was classified as Fc class, which means that the modifications in riparian forest have already reached a critical level.

Estimating the abundance of breeding Lesser Florican *Sypheotides indica* in the agriculture fields of Rajasthan and Madhya Pradesh

- Omkar Dhavale

Lesser Florican *Sypheotides indica*, an endemic species to Indian subcontinent is seen during monsoon season in the north-western India, where it breeds. Its population and range is continuously decreasing at an alarming rate due to breeding habitat loss and also certain threats prevailing in the non-breeding habitats which are believed to be in south and south-east India. In this connection, this three year study is proposed to study the ecology and migration pattern of Lesser florican using the satellite tracking techniques to find out their non-breeding habitats, and also to assess the current status and distribution, and ecology of this species in the north-western India.

In 2013, Ajmer was selected as a site for intensive survey of the floricans as they were found in large numbers that too in agriculture fields. It was estimated about 224 males were found in the agricultures fields in and around the Ajmer. This is the single largest population of lesser florican recorded so far in India that too in agriculture fields. It was also found that the florican population was widely dispersed in the form of lekking clusters and spread into the neighbouring districts of Tonk, Bhilwara and Beawar. In Madhya Pradesh, 6 male and 6 female floricans have been found in Sailana in Ratlam district, two male floricans in Petlawad in Jhabua district. Five males and four females were found in Shikarwadi, one female was found in Amba, and one male along with one female was found in Samjarumi during the breeding season of 2013.

Wildlife Forensic Cell: achievements and learnings during 2012-2013

- Ved Prakash Kumar

Large number of species and the varied forms of wildlife parts reported in wildlife offences requires an integration of morphology, genetics, toxicology, pathology and entomology.

From April, 2012 to March, 2013, Wildlife Forensic Cell (WFC) at the Wildlife Institute of India received 342 cases from various enforcement agencies of which 87.7% were from Forest & Police Departments. Seventy three percent cases were of tissue samples and require use of DNA based techniques for species identification. DNA profiling has been a key issue for dealing wildlife offences of species listed under Wildlife (Protection) Act, 1972. Therefore, we aimed to develop DNA profile database of ca. 40 species which are commonly reported in wildlife offences. We discuss utility of DNA profile database across range of species for elephant tail hair sent from Nepal and Tamil Nadu. These elephant tail hair were of African elephant (*Loxodonta africana*) and belongs to Central-western and Eastern-southern African populations. Hence, such database across species range are needed for key species reported in trade like Leopard, Tiger, Elephant, Bear, Musk Deer and one horned Rhinoceros to determine the hot spots of poaching.

Two reports on individual identification of conflict animal were also provided. WFC officials provided expert opinion (N= 24) at different courts all over India.

Fifty seven cases (16.6%) were returned without analysis because samples were not preserved properly. Therefore, imparting training to enforcement agencies for proper and adequate collection and preservation of physical evidences is a must. Sensitization of enforcement agencies continued this year with major impetus on crime scene management and evidence collection techniques.

Examination of wildlife offences (ca. 2500) reveals that there is a need to develop other areas of wildlife forensics such as Forensic toxicology, ballistics, pathology along with ornithology and entomology to cover a vast scenario involving both endemic and exotic wildlife species in international illegal wildlife trade.

Tracking Movement Pattern of Bar headed Goose in Jammu and Kashmir

- Neeraj Mahar

Bar-headed goose (*Anser indicus*), is a long distance migrant Anseriformes. Among highest flying birds, while migrating, they cover almost whole of the Indian subcontinent, making them suspected carrier of H5N1 from North Asia. Supporting this argument with studies conducted elsewhere, we tracked the movement pattern of two Bar-headed geese using Platform Transmitter Terminal (PTT) lasting for a period of six months. The objectives of the study were to examine the movement pattern and habitat use by the species. Two individuals (BHG 111847 & BHG 111848) were randomly selected for deployment of Platform Terminal Transmitters (PTTs; TAV-2630) at Gharana Wetland Conservation Reserve. The PTT were set to record five locations in every 24 hour through ARGOS Satellite Systems. We used ArcGIS 9.3 for spatial analysis in terms of movement pattern, habitat use and ranging pattern. Maps depicting the migrant pathways were plotted on Google earth images.

Contrary to the finding from previous studies, these two birds used the Tawi River flood plains of India and Pakistan in Jammu and Sialkot districts respectively, till August 2012 when the last contact with these birds were got suspended. The BHG 111847 used 384 km long stretch of the Tawi flood plains while BHG 111848 used only 55 km long stretch. The home range of BHG 111847 was 378.27 km^2 (95% Minimum Convex Polygon MCP) and 85.45 km^2 (95% Kernel Density Estimation KD), while BHG 111848 home range was 66 km^2 (95% MCP) and 36.89 km^2 (95% KD). This study showed that the Bar-headed geese used small wetlands of India and Pakistan warranting trans-border conservation efforts for Tawi River flood plains. However, utilization of these areas for breeding is yet to be ascertained. Further investigation on the movement pattern and habitat use is proposed