Prey selection and food habits of tiger and leopard in Mudumalai Tiger Reserve, Tamil Nadu.

- T. Ramesh, TA

ABSTRACT

Prey selection and food habits of tiger (P*anthera tigris*) and leopard (P*anthera pardus*) were studied in Mudumalai Tiger Reserve, Tamil Nadu between January 2008 and August 2008. Prey availability was estimated using vehicle transects (total effort 1138.5 km). The 110 km^2 intensive study area was found to have very high prey species density (104.7 / km^2) with chital *Axis axis* (53.6 ± 9.1/ km^2), common langur *Prebytis entellus* (24.1 ± 3.8 / km^2) and gaur *Bos gaurus* (10.6 ± 2.8 / km^2), elephant *Elephas maximus* (2.5 ± 0.58 / km^2), bonnet macaque *Macaca radiata* (2.7 ± 2.1 / km^2), sambar *Cervus unicolor* (2.1 ± 2.1/ km^2) and other prey species (<8.9 / km^2). A total of 179 tiger scats and 108 leopard scats were collected and analyzed. Percent frequency of occurrence of sambar was high (59.7%) in tiger scats followed by chital (22.7%), common langur (5.2%) and gaur (2.6%), wild pig (4.2%). Chital (37.7%), sambar (28.9%) and common langur (17.5%), gaur (2.6%) wild pig (3.5%) constituted of prey remains 90.3% in leopard scats. In terms of biomass consumed, sambar contributed the most (66.7%) to the diet of tiger, followed by chital (14.2%), gaur (8.2%), wild pig (2.5%), common langur (2.1%) and other animals (6.3%). For leopard, the biomass consumption of prey species were sambar (29.9%), followed by chital (38.7.1%), gaur (2.7%), wild pig (3.6%), common langur (18%) and other animals (7.1%). Sambar, wild pig and cattle were the preferred prey species of tiger and leopard. Leopard utilized common langur more than its availability. The co-existence pattern of these two carnivores in the study area is discussed in term of prey selection and food habits.

Project Title	:	A study on sympatric carnivores (tiger, leopard and wild dog) in Mudumalai Tiger Reserve, Tamil Nadu.
Principal Investigator(s)	:	Dr. K. Sankar and Sh. Q. Qureshi
Researcher(s)	:	T.Ramesh, Technical Assistant
Funding Agency	:	Grant –in-aid
Date of Initiation & Completion	:	29.01.2009 to 28.01.2011

Distribution and relative abundance of carnivores, ungulates and galliformes in the western part of Khangchendzonga Biosphere Reserve, Sikkim: Preliminary observations

- Tapajit Bhattacharya, SRF and Tawqir Bashir, JRF

ABSTRACT

We carried out reconnaissance survey and preliminary investigations on the presence/absence, distribution and relative abundance of carnivores, ungulates and galliformes in the western part of Khangchendzonga National Park [NP] and Biosphere Reserve [BR] from April 2008 to July 2008. Field investigations were carried out in the form of expeditions, and the presence/absence and relative abundance were estimated based on direct sightings and indirect evidences along 26 trails covering a total of 120 km during the study period in Prekk *chu* and Churong *chu* watersheds. The presence of ungulates blue sheep, goral, serow, musk deer, barking deer, and galliformes Blood pheasant, Himalayan monal, Satyr tragopan, Kalij, Snow partridge and Snowcock were confirmed in the study area. Encounter rates for these ungulates and galliformes have been estimated. Scats and other signs of Leopards, Himalayan yellow-throated marten and other unidentified lesser carnivores were also encountered frequently on the trails. Feeding signs and tracks of Asiatic black bear were encountered during summer. Distribution maps for carnivores, ungulates and galliformes have been prepared based on the locations of the direct sightings and indirect evidences. Investigations on the food habits of leopards (N=147), martens (N=48) and lesser carnivores (N= 152) were carried out based on scats analysis. Preliminary observations indicate high frequency of occurrence of Pika (*Ochotona* spp) in the diet of leopards (72%) and martens (61%). We propose camera trapping to obtain information on 'Presence/Absence', relative abundance, and relative habitat use by carnivores in the study area, and the use of molecular genetic studies in the identification of species and for population estimation of carnivores

Project Title	:	Developing spatial database on the mammal distributions and monitoring programme for large carnivores, prey populations and their habitats in Khangchendzonga Biosphere Reserve.
Principal Investigator(s)	:	Dr. S.Sathyakumar
Researcher(s)	:	Tapajit Bhattacharya, SRF, Tawqir Bashir, JRF and Kamal Poudyal, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	29.1 2008 to 28.1.2012

Food plants and habitat requirement of Himalayan brown bear In Kugti Wildlife Sanctuary, Himachal Pradesh

- Rajkishore Mohanta, JRF

ABSTRACT

We studied the food habits and habitat use by Himalayan brown bear (*Ursus arctos*) in Kugti wildlife sanctuary, Himachal Pradesh during 2006 to 2008. One hundred and seventy six scats were analysed and food remains and other hard parts present in the scats were identified through reference materials and hair characteristics. The brown bear diet was comprised of higher portion of plant matter (79%) than animal matter (21%). During summer, monsoon and fall, frequency occurrence of plant matter was 72.2, 77% and 91% respectively, and frequency occurrence of animal matter was 27.8%, 23% and 9% respectively. The animal matter was found to be comprised of insects, ants and unknown items including hairs, bones, jaws, teeth, claws and nails in the bear diet. The plant matter eaten by brown bear comprised of 10 plant species. The habitat use pattern of brown bear has been studied based on direct observations and indirect parameters such as presence of scats in different habitats along 22 linear transects and outside. Nine distinct habitat types have been classified and all these were used by brown bears. Whereas, number of scats per hectare was highest in Agricultural land (53.07 scats/ha), followed by Exposed rocks with slope grasses (50.95 scats/ha), Himalayan moist temperate forest with conifers (38.21 scats/ha), Grassland and forest blanks (26.75 scats/ha), Mixed forest with conifers and broad leaf species (22.39 scats/ha), Near water bodies, river and streams (22.39 scats/ha), Riverine forest (19.1 scats/ha), Moist sub-alpine scrub characterized by *Rhododendron* species (19.1 scats/ha) and Dry alpine scrub characterized by *Juniperus* species (15.92 scats/ha). Their occurrence was also recorded in Alpine exposed rocks and Sub-alpine forests. Bears extensively used *Indigofera heterantha, Rhododentron campanulatum* and *Sorbaria tomentosa* shrubs as shelter. The habitat use by brown bear was found to be largely dependent on the availability of food resources, variety of food plants and shelter in different habitat types.

Project Title	:	Ecology of brown bear (*Ursus Arctos*) with special reference to assessment of man-brown bear conflicts In Kugti Wildlife Sanctuary, Himachal Pradesh.
Principal Investigator(s)	:	Dr. N.P.S. Chauhan
Researcher(s)	:	Rajkishore Mohanta, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	6.3.2006 to 5.3.2009

Status and distribution of Malayan sun bear in north-eastern states

- Lalthanpuia , JRF

ABSTRACT

The occurrence of sun bears in the Indian sub continent became doubtful for a long time, but recently, their presence are reported in selected states of north-east India. We carried out a reconnaissance survey during 2007-2008 to study the occurrence of sun bear in Mizoram, Nagaland and Arunachal Pradesh. We present the preliminary findings of the status and distribution of sun bear in these states.

We conducted questionnaire survey in 60, 15 and 4 fringe villages of different protected areas in Mizoram, Nagaland and Arunachal Pradesh respectively. Out of these in 38 villages, there were 103 respondents who had confirmed direct sighting of sun bears and also seen their indirect evidences in their areas. There is a probability of its occurrence in ten villages. Among 38 villages, the status of sun bear occurrence is low in 13 villages and medium in 25 villages. From this limited data, it was not possible to reveal high status of bears. From the 103 responses, maximum sightings were inside mixed forest (n=70) in all of the three states, followed by bamboo forest (n=12), crop field (n=10), water body (n=4), degraded lands (n=3), forest road (n=2) and other places (n=2). They were mostly sighted alone (n=86), mother with cub(s) (n=11), two individuals (n=6). Sixty six respondents observed sun bear scats, 62 respondents observed claws marks, 71 respondents observed foot prints, 46 respondents observed tree nests, 28 respondents observed log or tree cavities. Direct sightings of the bear were highest in the evening (n=42), followed by noon (n=33), morning (n-25) and night (n=3). Thus, this data confirm presence of sun bear in the three north-eastern states of India. Status report and distribution map of sun bear will be developed after completion of the study.

Project Title	:	Status and distribution of Malayan sun bear (Helarctos malayanus) in North-eastern states, India
Principal Investigator(s)	:	Dr. N.P.S. Chauhan
Researcher(s)	:	Lalthanpuia and Janmejay Sethy, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	10.4.2007 to 9.10.2009

Distribution and relative abundance of Asiatic black bear in Dachigam National Park, Kashmir and black bear- human conflicts in adjacent areas

- Samina Amin Charoo, JRF

ABSTRACT

The distribution and relative abundance of Asiatic black (*Ursus thibetanus*) bear was assessed in the Lower Dachigam area of Dachigam NP, Kashmir from June 2007 to August 2008 using a network of trails (n=13), camera trap and Hair snare stations (n=23). In total, an effort of 291 field days (552 man days, 12,540 hours) 474 km trail/transect walks were made. A total of 337 bear signs including 42 direct sightings, 171 scats, 70 feeding signs and 54 other signs (tracks, rack marks, rub signs) were recorded during the study period. The distribution of black bear signs and sightings was almost uniform in spring (March – May) and autumn (October – November), however, in summer (June – September) it was more clumped in riverine and lower temperate habitats of the Lower Dachigam. Encounter rate (#/km) for black bear based on signs and sightings along trails also showed seasonal variability (p=0.04, One Way ANOVA) and it was highest (1.13±0.17) in the spring season. The encounter rates for different trap sites ranged from 0.95 – 12.3 black bear captures per 100 trap nights. The bear hair snares resulted in 22 hair sample captures which will be used for population estimation through DNA analysis. Black bear – human conflicts were assessed using semi-structured questionnaires in 28 villages (n=207) located on the periphery of Dachigam NP and in the Central and South Divisions during 2007. The results of this survey are presented and discussed. We propose to continue investigations on black bear distribution, population and movement patterns using camera traps, satellite telemetry, and use of non-invasive DNA analysis.

Project Title	:	Ecology of Asiatic black bear (*Ursus thibetanus*) in Dachigam National Park, Kashmir
Principal Investigator(s)	:	Dr. S. Sathyakumar
Researcher(s)	:	Lalit Kumar Sharma, JRF and Samina Amin Charoo, JRF
Funding Agency	:	Grants-in-aid
Date of Initiation & Completion	:	13.3. 2007 to 12.3.2011

Habitat use by Asiatic black bear (*Ursus thibetanus*) in Dachigam National Park, Kashmir

- Lalit Kumar Sharma, JRF

ABSTRACT

We characterized the habitats and their utilisation by Asiatic Black Bear (*Ursus thibetanus*) in the Lower Dachigam region (*ca*. 60 Km^2) of Dachigam National Park, Kashmir from 1 June 2007 to 16 August 2008 based on intensive habitat evaluation studies, field surveys and transect sampling. In total, 291 field days (582 man days) of effort was made during the study period that included, 474 km of transect walks. We had (n=42) black bears sightings during this period. Over 337 black bear evidences were recorded and this includes 171 scats, 70 feeding signs, and 54 other signs (rake marks & rub signs). We quantified the distribution and abundance of food plants and their use by black bear based on direct feeding observations (n=54) and scat analysis (n=171). We identified six black bear habitats *viz*., Riverine (1,600-1,900m), Lower Temperate Mixed (*Celtis australis*, *Morus alba, Rhus succidiana*, *Aesculus indica*, *Juglans regia* and *Parrotiopsis jacquemontiana*, 1,800-2,200m), Lower Temperate Pine Mixed (*Pinus wallichiana* & Others, 1,800-2,200m), Mid Temperate Mixed (*Ulmus wallichana*, *C. australis*, *A. indica* & *P. jacquemontiana*, 2,300-2,600m), Temperate Grassland & Scrubland (1,700-2,600m) and pure Oak (*Quercus robur* – 1,600-1,700m). Of the total black bear sightings and their evidences recorded (n=337), about 31% were in pure Oak patches only during August-September. The Lower Temperate Pine Mixed, Riverine, and Lower Temperate mixed habitats accounted for 24%, 18% and 17% encounters (sightings & signs) respectively. About 38% black bear sightings and signs were encountered in the elevation range of 1850-2050m, and northeastern aspect (37%). The availability of fruits of *M. alba* and herbs during May, fruits of *Prunus cerasifera* and *P. prostrata* during June, nuts of *Juglans regia* and acorns of *Quercus robur* during August and September determined black bear distribution, relative abundance and habitat use patterns. There is a seasonal variation in diet composition of black bear. During spring, herbs and grasses constitute the major proportion (53.63% ± 5.01). While in summer and autumn, fruits are the major component in diet (72.19 ± 4.76 & 75.0 ± 12.5 respectively). Black bear diet included tree species such as *Morus alba*, *Pyrus malus*, *Prunus* spp., herbs species such as *Dipsacus mitis, Selinum tenuifolium, Heracleum spp*., *Salvia moorcroftiana,* insects (cicada) and animal matter (mammal/bird remains). We propose to continue investigations on black bear habitat utilization, food and feeding habits for which six black bears will be fitted with satellite collars and monitored.

Project Title	:	Ecology of Asiatic back bear (*Ursus thibetanus*) in Dachigam National Park, Kashmir
Principal Investigator(s)	:	Dr. S.Sathyakumar
Researcher(s)	:	Lalit Kumar Sharma, JRF and Samina Amin Charoo, JRF
Funding Agency	:	Grants-in-aid
Date of Initiation & Completion	:	13.3.2007 to 12.3.2011

Estimation of population and food habits of leopard in Sariska Tiger Reserve, Rajasthan.

- Krishnendu Mondal, JRF

ABSTRACT

Between December 2007 and May 2008 population and food habits of leopard were studied in Core Zone-I of Sariska Tiger Reserve, Rajasthan. The population of leopard was estimated by camera trap method in an effective trapping area of 223.8 sq. km. (Minimum Convex Polygon and MMDM/2 strip model). The total effort of 2340 trap nights was spread across 59 occasions and in total 17 leopards were recorded (six males and 11 females). The leopard density was estimated to be 7.6±0.7/100 sq. km, which is one of the highest and comparable with the other protected areas in the sub-continent. To estimate the food habits, a total of 171 leopard scats were collected and analyzed for prey remains. Ten prey species were identified from leopard scats. Percent frequency of occurrence of sambar (43.5%) was found to be the highest in leopard scats followed by chital (23.8%), nilgai (12.3%), common langur (11.0%), hare (4.7%), cattle (4.1%), rodent (2.9%) and wild pig (5.2%). In terms of biomass consumed, sambar contributed the most (49.6%) to the diet of leopard, followed by nilgai (18.6%), chital (15.36%), cattle (6.11%), common langur (4.94%), hare (1.78%), wild pig (1.40%) and other animals (2.24%). Sambar was found to be the principal prey species of leopard in terms of number and biomass. The high density of leopard in the study area is attributed to high wild prey availability, with sambar and chital as important prey base. The sambar and chital were indeed an important prey base for tigers in the study area before they were exterminated in 2004. Compared with a pervious study in the same study area, it was found that the leopard shifted their diet selection from rodent and small prey to wild ungulates possibly due to absence of inter-specific competition with tigers.

Project Title	:	Ecology of leopard in Sariska Tiger Reserve, Rajasthan.
Principal Investigator(s)	:	Dr. K. Sankar and Sh. Qamar Qureshi.
Researcher(s)	:	Krishnendu Mondal and Shilpi Gupta, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	6.09.2007 to 5.09.2012

Population status of wild medicinal plants in upper Yamuna and Dehradun forest divisions, Uttarakhand

- Umesh Kumar Tiwari, JRF and Ninad B. Raut, JRF

ABSTRACT

In order to assess the availability and conservation status of commercially important wild medicinal plants, we conducted rapid surveys in three forest divisions of Garhwal *viz*., Dehradun, Upper Yamuna and Tons during February-July 2008. All the forest ranges and blocks within these divisions were covered for survey. Each range was stratified into different ecological zones and populations of medicinal plants were assessed along the 1 km long trails. Along each trail 20 circular plots of 10 m radius for medicinal trees were laid. Within each of these plots 5 m radius area for shrubs and four quadrats of 1 m^2 for herbs were searched and individual species were enumerated. In this presentation we discuss the methodology and preliminary results from selected ranges of Upper Yamuna and Dehradun forest divisions. In these divisions, total number of high value medicinal plant species recorded were 56 and 16 respectively. Distribution and population status of *Origanum vulgare* Linn., *Valeriana wallichii* DC., *Cassia fistula* Linn. and *Woodfordia fruticosa* (L.) Kurz are presented and discussed.

Project Title	:	Survey and mapping of commercially important medicinal plants in the State of Uttarakhand
Principal Investigator(s)	:	Dr. G.S. Rawat and Dr. B.S. Adhikari
Researcher(s)	:	Umesh Kumar Tiwari (JRF) and Ninad Raut (JRF)
Funding Agency	:	Forest Department, Government of Uttarakhand.
Date of Initiation & Completion	:	February 2008 to January 2011.

Distribution, relative abundance and microhabitat use of Royle's pika along sub-alpine – alpine ecotone in Kedarnath Wildlife Sanctuary, Western Himalaya

- Sabuj Bhattacharyya, JRF

ABSTRACT

Distribution, relative abundance and microhabitat use by Royle's pika (*Ochotona roylei* Lagomorpha) was studied along sub-alpine - alpine ecotone in a part of Kedarnath Wildlife Sanctuary. The objectives of the study were (i) to study the abundance of pika across different habitat types and (ii) to document the microhabitat characteristics and utilisation by this species. Presence and number of pika along a 3.5 km trail were monitored on monthly basis for a period of seven months (November 2007 and March to August 2008). Pika sightings were plotted on a topo sheet to record their distribution. Along this trail 10 observation plots of 50×50m were established. Within these plots relative abundance, microhabitat use and food availability were studied. At each plot observations were made on individual pikas during morning, day and evening sessions (four hours each session every month). Individual pikas were identified based on their size, coat colour and moulting signs on the body. Availability of food plants was recorded within 1×1m quadrats on a monthly basis. Microhabitat features such as burrow location, areas available for different activities like feeding; musing and locomotion were recorded and plotted on a map. The relative abundance was found to be highest (7.7±0.3 plot $^{-1}$ session^{-1}) on open broken slopes in sub-alpine forest and least in *Danthonia* grassland (1.7±0.3 plot^{-1}session^{-1}). Out of 58 plant species recorded within observation plots pika fed on 8 species viz., *Ranunculus hirtellus, Carex setosa, Trachydium roylei, Viola biflora, Jurinea dolomiaea, Polygonum macrophyllum, Geum elatum and Potentilla atrosanguinea*. These species were identified based on direct observations and hay piles collected near burrow openings. Percent cover of ground vegetation as an index of food availability in various plots has been compared. Preliminary results are discussed in the light of climate change and possible effects on pika.

Project Title	:	Ecological assessment of timberline ecotone in Western Himalaya with special reference to climate change and anthropogenic pressure
Principal Investigator(s)	:	Dr. B.S. Adhikari & Dr. G.S. Rawat
Researcher(s)	:	Sabuj Bhattacharyya, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	17.5.2007-16.5.2011

Structure, composition and phenology of Timberline vegetation in Kedarnath Wildlife Sanctuary, Western Himalaya

- Ishwari Datt Rai, JRF

ABSTRACT

Structure, composition and phenology of vegetation in any area is directly governed by climate. These parameters of vegetation were studied along an altitudinal gradient of 3000-3650 m in a part of Kedarnath Wildlife Sanctuary, Western Himalaya. The study area was stratified into three zones *viz*., sub-alpine forest (2850-3200 m), timberline ecotone (3200-3300 m) and alpine zone (>3300 m asl). Four sites (one hectare each) in each zone were selected and three permanent plots of 20x20 m at each site were marked to record woody vegetation and phenology for a period of 6 months during March–August 2008. Density, total basal area and Importance Value Index (IVI) of tree species have been compared across different zone. Seedling and sapling density was found to be more along timberline ecotone. Sapling density was maximum in *Betula utilis* dominated timberline ecotone (860 saplings ha^{-1}). Herbaceous layer of timberline ecotone has been compared with sub-alpine forested and alpine zones. Based on the above survey certain indicator taxa (plant) have been identified and marked within the intensive study area for further monitoring. Bud initiation and bursting, leaf initiation and expansion and shoot growth of five major timberline woody species *viz.*, *Abies spectabilis, Betula utilis, Quercus semecarpifolia, Rhododendron campanulatum* and *Rhododendron arboreum* have been studied following standard methods. These parameters varied significantly among species along altitudinal gradient. Total duration between first leaf initiation and leaf fall for *Betula utilis* was 105 days at 3300m while it was only 85 days at 3400m asl. Effects of soil and ambient temperature on the growth pattern of these species have been presented. Preliminary results are discussed.

Project Title	:	Ecological assessment of timberline ecotone in Western Himalaya with special reference to climate change and anthropogenic pressure.
Principal Investigator(s)	:	Dr. B. S. Adhikari & Dr. G. S. Rawat
Researcher(s)	:	Ishwari Datt Rai, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	17.5.2007 to 16.5.2011

Preliminary results of vegetation and bird monitoring in WII Campus

- Sartaj Singh Ghuman, Sahas Sharad Barve,
Rekha Warrier, M.Sc. Students

ABSTRACT

We studied vegetation and bird species within WII campus and the adjoining Sal Patch as an effort to strengthen the ongoing Campus Biodiversity Monitoring Programme. These components were quantified based on hierarchical sampling procedure. Within the selected grids, total count was made of trees, while shrub species were sampled within 2m quadrats. Point counts were done for bird species. The average tree and shrub density in the patch was calculated to be 654 trees/ha (SD 582.483) and 52339.56 shrubs/ha (SD 31746.08) respectively. The weed species *Lantana camara* was found to be widespread throughout the study area. The understorey comprised of about 42 shrub species and the regenerating saplings of 13 tree species. From the 18 sampled points, a total of 85 bird species were detected, and the most frequently sighted bird was red vented bulbul, followed by jungle babbler.

We also found interesting patterns in the age class distributions and correlations of density and age class distributions for trees and the regeneration data has helped provide interesting insights into the growth patterns of the tree species found within the patch. Many of the tree species which showed good regeneration surprisingly had a meagre adult population. A study focussing on the dependency of the villagers in the area on the patch may help throw some light on the reasons for the peculiar adult tree species composition of the patch.

Project Title	:	Campus biodiversity monitoring programme
Principal Investigator(s)	:	Dr. G. S. Rawat
Researcher(s)	:	Sartaj Singh Ghuman, Sahas Sharad Barve, Rekha Warrier and Muralidharan, M.Sc. Students
Funding Agency	:	None
Date of Initiation & Completion	:	-

Status, distribution and habitat use by wild ungulates in Changchenmo Valley, Eastern Ladakh.

- Ashwini Kumar Upadhyay , SRF

ABSTRACT

Five species of endangered mountain ungulates viz., Tibetan antelope (*Pantholops hodgsonii*), Tibetan argali (*Ovis ammon*), Kiang (*Equus kiang*) , wild yak (*Bos grunniens*) and blue sheep (*Pseudois nayaur*) were surveyed and monitored for a period of one year (August 2007 – August 2008) in Changchenmo valley, eastern Ladakh. The study area (about 200 km^2) lies north of Pangong Tso and ranges in altitude between 4700 and 6500 m asl. The observations on animal distribution and habitat use were made during two seasons (summer and winter) using a combination of trail walks (modified line transects; n=42; average length 7 kms) and vantage points (3 observation posts; 6 hrs per post in winter and summer seasons). Kiang sightings were maximum (n=97) followed by Tibetan antelope (n=33), Tibetan argali (n =27), wild yak (n=22), and blue sheep (n=12). Adult male to female ratio (M**:**F) for the sighted individuals was highest in Tibetan argali (1.48 **:** 1) and adult female to lamb / calf / foal ratio was highest for Blue sheep (6.7 **:** 1) and lowest in wild yak (1.7 **:** 1). In case of Tibetan antelope only males were sighted. For each sighting, habitat features such as altitude, GPS location, topography, slope angle, vegetation type, distance to escape terrain and water were recorded. Tibetan argali and blue sheep shared (10%) habitat in the study area. However, they differed in the use of degree of slope and altitude. During winter (December-May) there was higher degree of overlap in the use of slope in these species. On comparing seasonal habitat occupancy, the blue sheep occupied valley bottoms (16.67%) and Kiang occupied ridges and mountain tops (6.25%) during winter. Tibetan antelope occupied flat valley bottoms largely during summer (64.29%) as well as in winter (60%). Most of the wild yaks were sighted in summer (86.66%) and winter (71.43%) on steep, rugged terrain (>5000 m asl). Preliminary results on habitat use and segregation among these ungulates are discussed

Project Title	:	Habitat ecology and conservation status of wild ungulates in Northern Parts of Changthang Wildlife Sancturay, Ladakh.
Principal Investigator(s)	:	Dr. G.S. Rawat & Dr. K. Sankar
Researcher(s)	:	Ashwini Kumar Upadhyay , SRF
Funding Agency	:	Grant–in-aid
Date of Initiation & Completion	:	15.2.2007 to 15.2.2010

Preliminary findings on the ecology of two endemic turtles

- V. Deepak , SRF

ABSTRACT

The study was initiated on February 2006 and in all 30 cane turtles (*Vijayachelys silvatica*) were sighted and marked in Anamalai Tiger Reserve (ATR) and Parambikulam Wildlife Sanctuary (PWLS). Five individuals (3 males & 2 Females) were fitted with radio transmitters. They were tracked on a daily basis for 407 days from 29 July 2007. Food habits of the turtles were examined based on fecal matter and direct observations. Twenty out of the 30 cane turtles were sighted within one square kilometer of the study area where radio tracking is being carried out. There is extensive overlap in the home range within and between males and females. The movements of turtles were mostly associated with rainfall; however, one individual female did have movements on both rainy and non rainy days. Behavioural observations on the cane turtle were made. Four mating occasions were recorded during the month of July of which three of them were by the radio tracked individuals.

Forty trails of 2 km length were marked randomly in four different habitats (evergreen, moist deciduous, teak plantation and bamboo mixed forest) nine repeats were made in all trails from February 9 2006 till 30 November 2006. Site covariates measured were percent canopy cover, habitat types in categories, presence of disturbance, marshland, lantana associated scrub and water bodies. PRESENCE was used to estimate the site occupancy of Travancore tortoise (*Indotestudo travancorica*). In all, 45 Travancore tortoises were encountered during the study period. Habitat types did not influence occupancy. The most parsimonious model was Psi(.), p(Disturbance). Disturbance negatively influenced occupancy and detection probability of the tortoise. Preliminary findings reveal that the diet of the Travancore tortoise included plant and animal materials.

Project Title	:	Ecology of two endemic turtles of Western Ghats
Principal Investigator(s)	:	Dr. Karthikeyan Vasudevan & Dr. Bivash Pandav
Researcher(s)	:	V. Deepak, SRF
Funding Agency	:	Ministry of Environment & Forests, Govt. of India
Date of Initiation & Completion	:	13.1.2006 to 13.1.2010

Has the Gahirmatha Olive Ridley sea turtle rookery become non-conducive for future arribada?

- Satyaranjan Behera, SRF

ABSTRACT

Gahirmatha is the largest known rookery for olive ridley sea turtles in the World (Bustard, 1976). A couple of hundred thousand ridley turtles have been nesting enmass in the Nasi group of islands since its separation from the mainland in 1999. There are a few occasions including the 2007 to 2008 nesting season when Gahirmatha did not witness mass nesting at all. There has been some study conducted to assess the factors leading to non-occurrence of arribada at the Gahirmatha site and have resulted in indicating that the nesting beaches in the Gahirmatha are eroding at a faster rate over the years (Prusty *et al*, 2006). The present study based on monitoring the changes in the nesting beach profile from November 2007 to May 2008, reveals the changes in the beach profile as a very strong reason why arribada may not be taking place at Gahirmatha.

A survey on the extent of offshore congregation of ridleys, though revealed congregations of turtles close to the nesting ground at Nasi islands during the period from February to April 2008, the beach profile work reveals the nesting space available in these islands to be inadequate, compared to the area available during the years when arribada took place in the past. Though the coastal geomorphology is always in a state of flux, it is proposed to study these aspects at greater detail using long term satellite imageries of the Gahirmatha Nesting beaches and analyse the significant changes that have taken place of the nesting beaches over the years to confirm or reject the preliminary finding and the hypothesis.

Project Title	:	Determining the offshore distribution and migration pattern of Olive Ridley Sea Turtles (*Lepidochelys olivacea*) along the east coast of India
Principal Investigator(s)	:	Sh. B.C Choudhury, Sh. Anup K. Nayak, Dr. K. Sivakumar and Dr. C.S Kar
Researcher(s)	:	Satyaranjan Behera, SRF
Funding Agency	:	Director General of Hydrocarbon (DGH)
Date of Initiation & Completion	:	October 2006 to October 2008

Assessment and Inventory of the herpetofaunal diversity of some select Nicobar Islands

- S. Harikrishnan , JRF

ABSTRACT

After the first herpetofaunal documentation of Andaman and Nicobar Islands by Edward Blyth in 1847, post 1947 surveys by Zoological Survey of India revealed several new species from the Nicobars. Further surveys by Indraneil Das in 1996, and S. P. Vijayakumar in 2004, have added information on the distribution pattern of herpetofauna in the Nicobars. After the 2004 tsunami, concerns were raised over the status of lowland herpetofauna in the small islands of the Nicobars. The present survey and post tsunami assessment of the status of herpetofauna in the Nicobars was conducted in selected five islands. Medium-sized (126.9 km^2) and the relatively flat Car Nicobar and the large (1045.1 km^2) and mountainous Great Nicobar were surveyed from 27 February to 31 August 2008. Thirteen species of reptiles and three species of frogs were recorded from Car Nicobar. One species each of a reptile and a frog were not recorded in Car Nicobar in this survey, while they have been reported prior to the tsunami. Twenty species of reptiles and nine species of frogs were recorded in Great Nicobar. Two species of snakes were added to the list of Great Nicobar fauna and one of them is a new record for India. Using published records of occurrence of various species, a presence-absence matrix of all species recorded in 15 islands was made. In order to characterize the distribution pattern, analyses of species co occurrence patterns using two different indices (number of checkerboard pairs and variance ratio) were made. Preliminary results indicated that the herpetofaunal communities were probably competitively structured. The lizard community showed greatest deviation from a null expectation, followed by the snake and the frog communities. If the pre and the post-tsunami distribution patterns need to be compared, more islands in the Nicobars should be surveyed.

Project Title	:	Study for assessment and inventory of herpetofauna of Nicobar Islands, India
Principal Investigator(s)	:	Shri. B. C. Choudhury & Dr. Karthikeyan Vasudevan
Researcher(s)	:	S. Harikrishnan, JRF
Funding Agency	:	Grant-in-Aid
Date of Initiation & Completion	:	May 2005 to December 2008

Barcoding Anurans: An Indian initiative

- Prudhvi Raj Gunturu, JRF

ABSTRACT

Identifying species of organisms by short sequences of DNA is known as DNA barcoding or DNA taxonomy. A C-terminal fragment of the mitochondrial gene for cytochrome oxidase subunit I (COI) has been proposed as universal marker for this purpose among animals. Anurans or frogs from different parts of the country were collected from field sites in Himachal Pradesh, Uttarakhand and Andhra Pradesh, and identified. Tissue samples from these species were collected, catalogued and preserved in 100% alcohol for molecular analyses. Tadpoles encountered during sampling were collected and preserved in 70% ethanol. Field sampling was done using visual encounter and opportunistic surveys. Microhabitat variables were recorded in the sampled areas. Anuran species were photographed and voucher calls will be recorded during the field surveys.

Since majority of the amphibians have a bi-phasic life history, with an aquatic larval stage and a terrestrial adult stage, this study hypothesizes that taxonomic identity of larval stages contributes significantly in improving our amphibian biodiversity assessments in the field.

In an Indian context, anuran tadpoles are poorly studied. We have only sixty species out of roughly two fifty species of anurans known in India. Including tadpoles in systematic sampling method targeted at anuran adults is expected greatly improve efficiency in inventory of anurans in an area.

Project Title	:	Barcoding of anurans
Principal Investigator(s)	:	Dr. Karthikeyan Vasudevan, Dr. Sushil Kumar Dutta and Dr. Ramesh Kumar Aggarwal
Researcher(s)	:	Prudhvi Raj Gunturu, JRF
Funding Agency	:	Department of Science and Technology, Govt. of India
Date of Initiation & Completion	:	31.1.08 to 30.1.1010

Human-sloth bear conflict in Mount Abu and Jessore Wildlife Sanctuaries and mitigation strategies

- Vishal K. Parmar, JRF

ABSTRACT

We studied the human-sloth bear conflict in Mount Abu Sanctuary, Rajasthan and Jessore Sanctuary, Gujarat during June 2007 to July 2008. Information on human casualties by sloth bear was collected from the records of forest departments and hospitals, and also through interaction with affected people. During 1997 to 2008, there were 44 bear attacks on people in and around Mount Abu Sanctuary. Males were attacked more (69%) than females (20%) and children (11%). Thirty incidences (69%) occurred in forests, 5 (11%) in villages and 9 (20%) in crop fields. Most of the attacks were caused by single bear (52%), followed by two bears (27%) and three bears (16%). Maximum casualties occurred in winter 16 (36%) season, followed by monsoon 15 (34%) and summer 13 (30%) cases. Most of the victims were in the age group of 21-30 years (23%), and 31-40 years (20%). Maximum attacks took place in the evening time between 1500 to 2000h when the bears were active for foraging. Whereas in the vicinity of Jessore wildlife sanctuary, there were 31 bear attacks on people during this period. Males were attacked more (65%) than females (29%) and children (6%). Most of the attacks were caused by single bear (75%)**,** followed by two bears (19%). Maximum casualties (39%) occurred in summer season, followed by monsoon (32%) and winter (29%). Sixteen cases (52%) occurred in forests, 13 (42%) in crop fields and 2 (6%) in villages. Most of the victims were in the age group of 21-30 years (28%), 10-20 years and 31-40 years (23% each). Damage to agricultural crops by bears was of varying extent. The study using control and un-control plots revealed 14.3 to 54.5% damage to wheat crop in different villages. Mitigation strategies to reduce the conflict have been suggested.

Project Title	:	Ecology, behaviour and interaction of highly dense populations of sloth bear (*Melursus ursinus*) and human-sloth bear conflict in Jessore wildlife sanctuary, Gujarat and Mount Abu wildlife sanctuary, Rajasthan
Principal Investigator(s)	:	Dr. N.P.S. Chauhan and Dr. V. C. Soni
Researcher(s)	:	Vishal K. Parmar, JRF and Prakash Mardaraj, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	26.4.2007 to 25.10.2008 (Phase I)

Ecological effects associated with National Highway-7 passing through Pench Tiger Reserve, Madhya Pradesh

- A.Pragatheesh, JRF

ABSTRACT

The ecological assessment of road related impacts through wildlife habitats command major importance in view of increasing threats to wildlife species associated with rapid development and up-gradation of road corridors across the length and breadth of the country.

The presentation is based on the studies that have been recently initiated to assess the impacts of the NHAI's proposal of 4 laning of the National Highway -7 between 597 and 652 km. The focus of the present study is the 10 km stretch within Pench Mowgali Sanctuary of the Pench Tiger Reserve. During the study period, habitat features (vegetation type, structure, slope, water availability, anthropogenic disturbance) within 1km on each side of the road were studied. Presence of animal species in the habitat along the road corridor was recorded using line transects and indirect evidences. The existing use of different underpasses was recorded based on tracks. Direct evidence of road kills and information about mortality of animals from secondary records was collected to assess the vulnerability of select species and the barrier effect of road.

Based on the preliminary findings, the biotic pressures along the road extend up to 400 m beyond the road verge. Out of 36 underpasses including box and pipe culverts, only 10 underpasses with height and width more than 3m X 3m are being used by small carnivores and ungulates. During the observations over a 40 day period, 32 road kills were recorded in the 10 km stretch of the road passing through Pench Tiger Reserve. The management implication of the preliminary findings are discussed in the presentation.

Project Title	:	Ecological effects of road through sensitive habitats: Implications for wildlife conservation
Principal Investigator(s)	:	Dr. Asha Rajvanshi and Dr. V.B. Mathur
Researcher(s)	:	A.Pragatheesh, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	1.4.2008 to 31.3.2011

Ecomorphology of the *Phylloscopus/Seicercus* Warblers in east and west Himalayas

- Mousumi Ghosh, JRF

ABSTRACT

The *Phylloscopus/Seicercus* clade shows a turnover of species as we move from east to west Himalayas. While 10 species breed in Himachal Pradesh, the number of species breeding in Sikkim is 15 with only 9 species being common between the two sites. Given that different species constitute the community in the eastern (Kanchendzonga NP and Eaglenest WLS) and western sites (Manali WLS and Kedarnath WLS), this study aimed to (a) test for differences in foraging behaviour of *Phylloscopus*/*Seicercus* species in East and West Himalayas, and (b) to assess the ecomorphological associations for the *Phylloscopus*/*Seicercus* species. Arthropod abundance in the breeding season is known to reach an annual peak for a very short duration based on which most insectivorous birds time their egg laying period. However, while sampling for arthropods we encountered different phases of breeding (from territory establishment to hatching of eggs) at different sites. Hence, no valid comparison could be made between arthropod abundances in east and west. The results indicated that among the 9 species which breed both in the eastern and western sites, the use of "standpick" as a foraging maneuver is significantly higher in the western sites than in the east ($t=-8.74$, $df=8$, $p=0.000$). With respect to ecomorphological associations, significant correlations were observed between (i) body size and proportion of large prey captures, (ii) tarsus length and mean breeding elevation, and (iii) tarsus length and mean foraging height (significant only for eastern species). These correlations give rise to questions regarding the determinants of elevational distribution of species and the role played by habitat structure in influencing species behaviour. Hence, investigating the effects of climatic variables on the species distribution pattern, and habitat structure on species interactions would form the principal objectives for the following sampling seasons.

Project Title	:	Study of bird species numbers and densities in the east and west Himalayas
Principal Investigator(s)	:	Sh. Dhananjai Mohan, Dr. Trevor Price and Sh. Pratap Singh
Researcher(s)	:	Mousumi Ghosh, JRF; Muthamizh Selvan, JRF
Funding Agency	:	WII Grant-in-aid and University of Chicago, USA
Date of Initiation & Completion	:	Jan 2007 to Dec 2011

Bird species numbers and densities of eastern Himalayas : Preliminary findings

- M. Selvan, JRF

ABSTRACT

The project aims to study the bird species distribution, densities and habitat associations in the Western and Eastern Himalayas. This study was conducted in the Eagle Nest Wildlife Sanctuary and the adjoining Pakke Tiger Reserve of the Eastern Himalayas which examines the pattern of species richness, abundance, composition, and altitudinal distribution of birds. Five 5 hectare girds (200 m x 250 m) were established at 250 m, 700 m, 1300 m, 1800 m and 2400 m. The grids represented the tropical lowland evergreen forest, foot hill evergreen forest, sub-tropical broad leaved forest, lower temperate broad leaved forest, and temperate broad leaved forest respectively. Vegetation sampling was done in each grid. Birds were sampled in each grid by counting the singing males by two observers and arriving at numbers through consensus. The species richness and density were highest in 1300 m grid and also the grid had the highest number of species exclusive to it. Foliage height was similar in all the grids. Tree density and ground cover was found to be higher in the 1300 m. Similarity indices show greater similarity of species between fourth and fifth grids.

Project Title	:	Study of bird species numbers and densities in the east and west Himalayas.
Principal Investigator(s)	:	Shri.Dhananjai Mohan and Shri .Pratap Singh WII, Dr.Trevor Price, University of Chicago, USA.
Researcher(s)	:	Muthamizh Selvan K. JRF and Mousumi Ghosh JRF
Funding Agency	:	WII Grant-in-aid and University of Chicago., USA.
Date of Initiation & Completion	:	Jan 2007 to December 2011.

Conservation of Red Junglefowl in India – A molecular genetics approach

- Mukesh, JRF

ABSTRACT

The Red Junglefowl (*Gallus gallus*) [RJF] is believed to be the sole wild ancestor of domestic chicken and therefore has immense economic value. Recently fears have been expressed regarding the endangerment of RJF in terms of genetic purity due to hybridisation with feral/domestic chicken. Keeping this in view, sample collections and the genetic studies on RJF was initiated under this project during Phase-I. As of August 2008, 92 samples (blood/feather/tissue) from wild and captive RJF, and 25 samples from domestic chicken breeds have been collected from different parts of India. Genomic DNA was extracted from whole blood as well as from feathers following DNA zol BD based protocol and Qiagen DNeasy tissue kit, respectively. A panel of 30 highly polymorphic microsatellite markers as recommended by FAO is being used in this study. PCR cycling conditions as reported were tested first and then modified accordingly to get the optimum results. After optimisation of cycling conditions, genotyping was done with eight microsatellite loci. These PCR products were resolved on 2% agarose gel and the average allele sizes for eight loci were presumed as similar to those reported earlier. As the allele differentiation is not prominent in this case, the amplified products will be resolved on automated DNA sequencer. These microsatellite markers will be used to develop the microsatellite allelic profile of RJF populations in India based on which the genetic diversity and variability present within and between the RJF populations in India will be estimated. Further, the comparison of microsatellite allelic profile of RJF with that of chicken will identify the RJF as well as chicken specific alleles and the same will be used in testing the genetic purity of RJF populations in India.

Project Title	:	Conservation Red Junglefowl (*Gallus gallus*) in India (Phase I & II).
Principal Investigator(s)	:	Dr. S. Sathyakumar (WII) - PI, Dr. Rahul Kaul (WTI)-CI, Dr. Rajiv S.Kalsi (MLNC)-CI
Researcher(s)	:	Mukesh, JRF, Merwyn Fernandes, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	September 2006 to February 2008 (Phase-I); March 2008 to February 2011 (Phase-II)

Forensically informative nucleotide sequencing (FINS) as a tool dealing wildlife offences

- Ranjana, RA

ABSTRACT

Illegal trade in animals and their parts is one of the primary causes driving over exploitation of threatened species. According to Wildlife (Protection) Act -1972, 43 are schedule I species of mammals in India. The keys to identify species normally on morphological characteristics are difficult. Therefore, there is a need to develop DNA based techniques to identify different species. Characterization of species-specific molecular marker signature and development of identification assay are highly essential in conservation and management of wildlife. Forensically Informative Nucleotide Sequencing (FINS) of mitochondrial genes have widely been used for species specific identification assays. FINS is a rapid, reliable and reproducible procedure that is based on established techniques. This procedure fills the need for an accurate method of determining the species identity of a specimen when it is not possible by conventional means. Attempt has been made to develop order and family specific based molecular signature present in cytochrome b and 16s rRNA for identification of Indian species. We found order specific repeat sequences. Among these, two repeats of AAATAT (6bp) in 16s rRNA and AATTCTC (7bp) in cytochrome b gene were observed in Cetacean and Artiodactyla respectively. We discuse initiative undertaken for DNA profile for Indian species. Our work indicates that some samples are difficult to extract DNA in spite of using all possible methods and more R/D is needed to handle such samples. Sixty five wildlife offence cases and 49 reference sample were analyzed. Forty sequences were submitted to GENE Bank/ National Center for Biotechnological Information;USA. Such sequences will allow to develop PCR-RFLP (Restriction Fragment Length Polymorphism) based signature which can be used to identify species based on minimum DNA facility.

Project Title	:	Wildlife Forensic Cell
Principal Investigator(s)	:	Dr. S.P. Goyal
Researcher(s)	:	Dr. Ranjana, RA
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	7.3.2008 to 6.3.2009

An assessment of entomofauna for management and conservation of biodiversity in the Gangotri landscape

- Manish Bhardwaj, JRF

ABSTRACT

Insects account for the highest proportion of animal diversity and are important in range of ecological processes, including soil nutrient cycling, pollination, predation and as food for diverse range of vertebrates and invertebrates. At high altitude ecosystems they play major role in pollination and dispersal of plant species. Keeping this in background the study has been initiated in Gangotri National Park (2,390 sq.km.) and Govind Wildlife Sanctuary and National Park (958 sq.km.) of Uttarakhand state from April 2008. In the preliminary survey prominent insect orders *viz.* Odonata (dragonflies), Orthoptera (grasshoppers, locusts and crickets), Hemiptera (bugs), Diptera (flies), Lepidoptera (butterflies and moths), Coleoptera (beetles) and Hymenoptera (ants, wasp and bees) were collected from both the protected areas using well established methods of insect collection: aerial and ground collection, vegetation beating, sweep netting, pitfall and light traps. So far 45 species of butterflies were documented from the landscape and other insects orders are in the process of taxonomic identification.

Project Title	:	An assessment of entomofauna for management and conservation of biodiversity in the Gangotri landscape
Principal Investigator(s)	:	Dr. V.P. Uniyal
Researcher(s)	:	Manish Bhardwaj, JRF and Abesh Kumar Sanyal, JRF
Funding Agency	:	Grant-in-aid
Date of Initiation & Completion	:	23.1.2008 to 22.1.2012

Effect of mixed forest stands on the biodiversity of borers (*Coleoptera: Cerambycidae*)

- Vinay Kumar Bhargav, SRF

ABSTRACT

Beetles represent the largest group of organisms at the order level and they show exceptionally diverse adaptations to wide range of environmental conditions and habitats. Their role in the functioning of the ecosystems is immense. While many of the beetles have harmful effects some are beneficial to mankind. Present study outlines the diverse habits and habitats, biological features of the key forest pest group, commonly called as borers (Coleoptera: Cerambycidae: Longicornia) in the mixed forest habitat types of the biogeographically significant Simbalbara Wildlife Sanctuary, Himachal Pradesh with a mean altitude from 350 m to 1400 m above msl. Most of the borers are strikingly marked or patterned, wood-boring in larval stage, and many species are very destructive to shade, forest, and fruit trees and to freshly cut logs. Sampling for borers was conducted using standard methods in different seasons and habitats. Spatiotemporal variations in the relative abundances as well as richness were found to be significantly different across various habitat types along with the species composition. 52 species of borers were recorded from ten different habitat types surveyed. Apposite statistical analyses were performed to find out the nature of habitat association and preference, resource partitioning, habitat overlap and/or use. Such variations in the species assemblages provided the most predictor of the ability of borers to respond to the vegetation characteristics, predator and/or parasitoids composition of habitats. Though, the monitored habitats of the sanctuary harboured a good biodiversity of borers, and the apparent damage due to borers is under control, due to the presence of their natural predators and parasitoids in natural mixed forest ecosystems. Management goals for forest ecosystems should thus identify mechanisms for controlling fire and anthropogenic disturbance that have a role in altering their assemblages.

Project Title	:	Assessing the potential role of Coleoptera as bioindicators in the Simbalbara Wildlife Sanctuary, Himachal Pradesh
Principal Investigator(s)	:	Dr. V. P. Uniyal
Researcher(s)	:	Vinay Bhargav, CSIR-SRF
Funding Agency	:	Ministry of HRDG, CSIR, Govt. of India
Date of Initiation & Completion	:	2.4.2007 to 31.3.2010