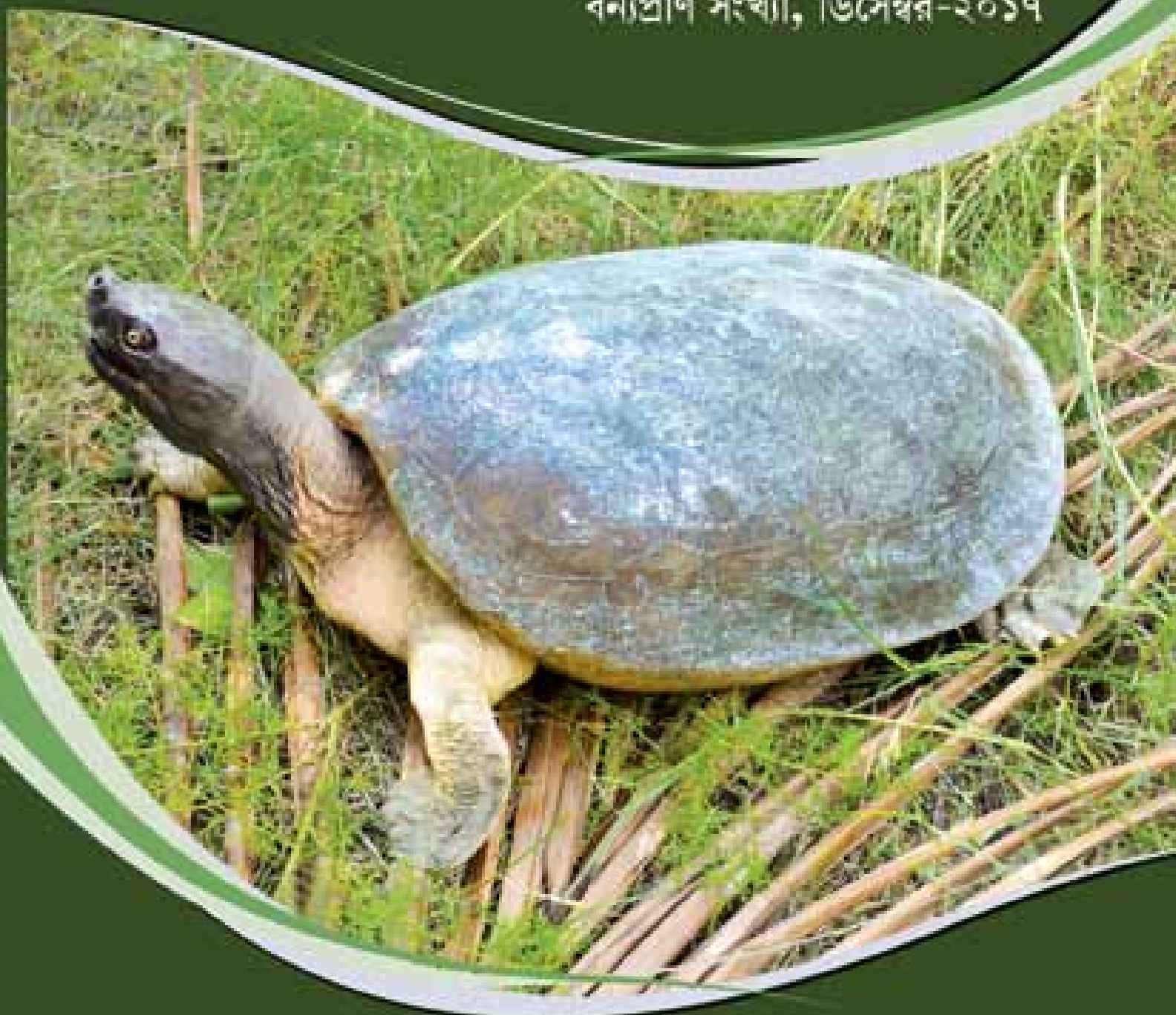
বনবীথি

বন্যপ্রাণ সংখ্যা, ডিসেম্বর-২০১৭



Banabithi

Wildlife Week Issue, December-2017

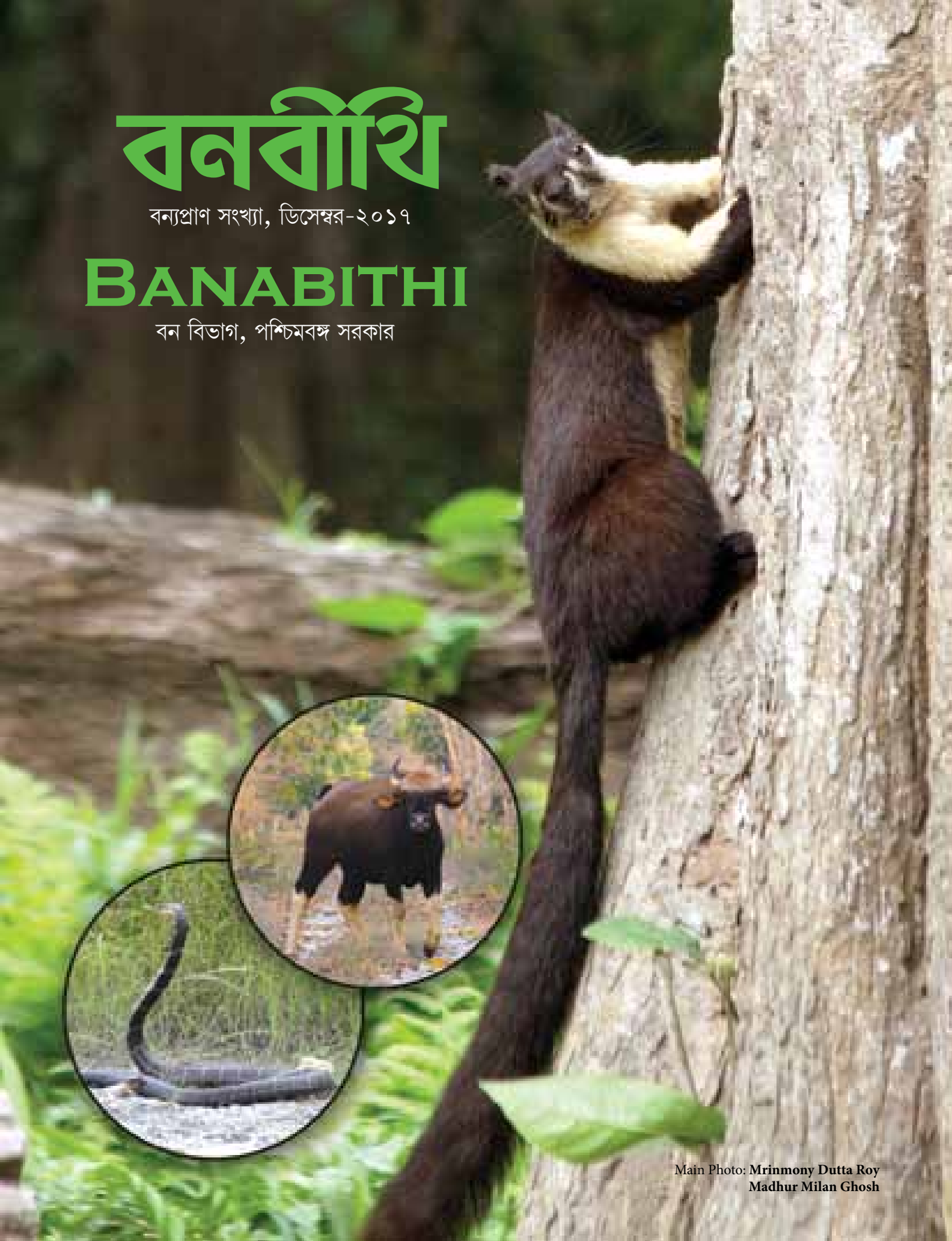
Plum Headed Parakeet
(Psittacula cyanocephala)
Photo: Tapas Das, IFS

বনবীথি

বন্যপ্রাণ সংখ্যা, ডিসেম্বর-২০১৭

BANABITHI

বন বিভাগ, পশ্চিমবঙ্গ সরকার



Main Photo: **Mrinmony Dutta Roy**
Madhur Milan Ghosh

সম্পাদকমন্ডলী

প্রচ্ছদ পরিচিতি

প্রথম প্রচ্ছদ ঃ বাটাগুড় কাছিম
ছবি- প্রশান্ত কুমার পন্ডিত, মুখ্য বনপাল

দ্বিতীয় প্রচ্ছদ ঃ ফুলটুসী
ছবি- তাপস দাশ, মুখ্য বনপাল

তৃতীয় প্রচ্ছদ ঃ বড় কাও ধনেশ
ছবি- উজ্জ্বল ঘোষ, মুখ্য বনপাল

চতুর্থ প্রচ্ছদ ঃ কাঁকড়া খেকো বেজি
ছবি- মৃন্ময় দত্ত রায়

বনভিাগ, পশ্চিমবঙ্গ সরকার কর্তৃক প্রকাশিত
এবং
কল্পনা অফসেট প্রিন্টার লিমিটেড দ্বারা মুদ্রিত।

সূচীপত্র

King Sago Palm Flower
Photo: **Tapas Das,** IFS

সম্পাদকীয়

আমাদের রাজ্য পশ্চিমবঙ্গের বন্যপ্রাণ ও অতুলনীয় জীব-বৈচিত্র্যের সংরক্ষণ ও জনমানসে সচেতনতা সৃষ্টির উদ্দেশ্যে বন্যপ্রাণ দিবস ২০১৭ পালিত হতে চলেছে ১৩ই ডিসেম্বর। এই লক্ষ্যকে সামনে রেখে বনবীথি পত্রিকার বন্যপ্রাণ দিবস ২০১৭ সংখ্যার আত্মপ্রকাশ, বৃহত্তর জনমানসে সচেতনতা সৃষ্টির এই প্রয়াস, সকলের অংশগ্রহনে সার্থক হবে, এই আশারাখি।

সম্পাদক

Clustered Coelogyne Orchid
(Coelogyne corymbosa)
Photo: **Tapas Das,** IFS

মমতা ব্যানার্জী
ममता बैनर्जी
ممتا بنرجی
Mamata Banerjee

মুখ্যমন্ত্রী, পশ্চিমবঙ্গ
मुख्यमंत्री, पश्चिम बंगाल
چیف منسٹر، ویسٹ بنگال
CHIEF MINISTER, WEST BENGAL

৭ ডিসেম্বর, ২০১৭

বন্যপ্রাণ সপ্তাহ উপলক্ষ্যে বার্তা

আগামী ১৩ ডিসেম্বর সারা রাজ্য জুড়ে পালিত হবে **বন্যপ্রাণ সপ্তাহ ২০১৭**। রাজ্যস্তরের অনুষ্ঠানের আয়োজন করা হয়েছে বাঁকুড়া জেলার বাগাডিহাতে।

জীব-বৈচিত্র্যে পরিপূর্ণ আমাদের রাজ্য পশ্চিমবঙ্গ। একাধিক কর্মসূচির মাধ্যমে এই অপূর্ব জীব বৈচিত্র্য রক্ষণে আমাদের সরকার কাজ করে চলেছে।

আসন্ন বন্যপ্রাণ সপ্তাহ উপলক্ষ্যে বনকর্মী সহ সকলকে জানাই আমার আন্তরিক শুভেচ্ছা ও অভিনন্দন এবং এই অনুষ্ঠানের সার্বিক সাফল্য কামনা করি।

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Checkered Vanda
(Vanda tessellata)
Photo: **Tapas Das,** IFS

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বিনয় কৃষ্ণ বর্মন
ভারপ্রাপ্ত মন্ত্রী
বনবিভাগ
পশ্চিমবঙ্গ সরকার
অরণ্য ভবন, দ্বিতীয় তল, ব্লক - এল,এ,-১০এ
সেক্টর-৩, সল্টলেক সিটি,
কলকাতা-৭০০ ০৯৮
টেলি : ২৩৩৫-৪০৪০, ফ্যাক্স : ২৩৩৫-৪০২৯

বন্যপ্রাণ দিবস-২০১৭

শুভেচ্ছা

<u>বনমন্ত্রীর আবেদন</u>

উত্তরে সুউচ্চ হিমালয় থেকে, দক্ষিণে সাগর বেলা, পশ্চিমের রাঢ় বাংলা ও পূর্বের জলাভূমি পর্যন্ত বিস্তৃত আমাদের রাজ্য পশ্চিমবঙ্গ বন্যপ্রাণ ও জীববৈচিত্রে অত্যন্ত সমৃদ্ধ। পার্বত্য বাস্তুতন্ত্র রেডপান্ডা থেকে সমতলের হরিণ, গন্ডার, হাতি, বাইসন, সুন্দরবনের বাঘ এবং অজস্র প্রজাতির পাখি এইসব নিয়ে জীববৈচিত্রের সুন্দর সমাহার।

জনবহুল এই রাজ্যের মানুষ ও বন্যপ্রাণীর শান্তিপূর্ণ সহাবস্থান সারা দেশে দৃষ্টান্ত স্বরূপ। সংরক্ষিত বনাঞ্চল এবং তার বাইরের বাস্তুতন্ত্র এমন কি জলাভূমি-জীববৈচিত্রের সংরক্ষণে পশ্চিমবঙ্গ সরকারের বনবিভাগ সদা সচেষ্ট। বন্যপ্রাণ সংরক্ষণ বিষয়ে জনমনে সচেতনতা সৃষ্টি ও বৃদ্ধির উদ্দেশ্যে আগামী ১৫ই ডিসেম্বর ২০১৭ রাজ্যব্যাপী পালিত হবে বন্যপ্রাণ দিবস ২০১৭।

যৌথ বনপরিচালনায় মানুষকে সঙ্গে নিয়ে বনসৃজনের প্রচেষ্টায় আমাদের রাজ্যে বন্যপ্রাণের সংখ্যা উল্লেখযোগ্য ভাবে বৃদ্ধি পেয়েছে, ক্ষেত্র বিশেষে মানুষ ও বন্যপ্রাণের সংঘাত নিরসনে বনবিভাগ সদা তৎপর। জনসাধারণকে বন্যপ্রাণ সংরক্ষণে যুক্ত করার উদ্দেশ্যে সূচনা হয়েছে "বন্যপ্রাণ সাথী প্রকল্প"।

বন্যপ্রাণ দিবস উপলক্ষে প্রকাশিত হচ্ছে বনবীথি পত্রিকার বন্যপ্রাণ দিবস সংখ্যা-উদ্দেশ্য জনমানুষে বন্যপ্রাণ সংরক্ষণ সচেতনতা সৃষ্টি। বন্যপ্রাণ সংরক্ষণের এই কর্মসূচির সার্বিক সাফল্য কামনা করে, সবার কাছে আবেদন জানাই বন্যপ্রাণ সংরক্ষণে সামিল হওয়ার।

(বিনয় কৃষ্ণ বর্মন)
বনমন্ত্রী
পশ্চিমবঙ্গ সরকার

Batagur baska

- a critically endangered species is The Pride of Sundarbans

Prasanta Kumar Pandit, IFS
Chief Conservator of Forests
West Bengal

Introduction

Batagur baska known by different name as northern river terrapin, batagur, common batagur, four toed terrapin, river terrapin, giant river turtle, giant river terrapin, mangrove terrapin and Asian river terrapin, belongs to the family Geoemydidae, order – Testudines and Class-Reptilia. Once it was distributed in India, Bangladesh, Cambodia, Vietnam, Indonesia, Malaysia, Thailand, Myanmar and Singapore. But presently it found in India and Bangladesh, generally in Mangrove Rivers and creeks only. It is extinct in wild in Thailand, Vietnam, Myanmar and Singapore. Sundarbans of both India and Bangladesh is a good habitat range for this species. It is listed as a critically endangered in the International Union for Conservation of Nature and Natural Resources (IUCN) Red List, 2006 and also the 'top twenty five turtles in Trouble' published by Turtle Conservation Coalition in 2011. This species also listed in the Appendix-I of CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) and Commercial International Trade in specimens of the species is

prohibited. It belongs to Schedule-I of the Wildlife (Protection) Act, 1972 of India. This species is even more endangered than Tiger. In the wild its number even less 100. In India it is found in Sundarbans of West Bengal and Bhitarkanika Wildlife Sanctuary of Odisha.

Description: The *Batagur baska* is one of Asia's largest fresh water and brack water turtles, having carapace length of up to 60 cm and a maximum weight of 18Kg. It is easily distinguished from other terrapins by the presence of only four instead of five claws on the forelimbs. Its carapace is moderately depressed with a vertebral keel in juveniles. The plastron is large, strongly angulated laterally in the young and convex in the adult. The head is rather small with a pointed and upwards lending snout. The legs have band like scales.

The upper surface of the carapace and the soft parts are generally olive brown, while the plastron is yellowish head and neck are brown with reddish bases. Males in breeding coloration have a jet black head and neck with a crimson or orange dorsal surface and red or orange forelegs. The colour of pupils also changes during the period, to brown in females and yellow-white in males. During the breeding season, the colour of the pupils of a female is brown whereas the pupils in the male yellowish white. The jaws have a denticulated edge and the limbs are transversely enlarged with and like scales. Females and juveniles are olive grey in colours with grey or brown eyes. The size of the adult females is larger than adult males.

In profile, the head appears relatively small with an attenuated, upturned snout. The jaws are serrate, with the upper bicuspid (a median notch flanked by pointed tooth like projections) and the lower with a complimentary medial tooth flanked by a shallow notch on each side. The feet are fully webbed with only the tips of the claws extending beyond the webbing. The forelimbs bear a series of transversely elongated band like scales. A flap of skin, reinforced by enlarged scales, borders the forelimbs laterally and merge with the webbing of the toes, giving the limb a paddle like appearance. Scalation on the hind limb is reduced, but a lateral flap of skin and associated scales are present. The posterior and lateral aspect of the hind foot is decked with a series of small transversely elongated scales.

Ecology

Batagur baska is omnivorous. It consumes watersides plants, mollusc, crustaceans and small fishes. Fruits of *Sonneratia apetala* (Keora), *Avicenia officinalis* (Bain) are a highly flavoured fruit food item of this species. This species prefers fresh water habitats and moves to brackish river mouths or estuaries during breeding season which may vary from December to March and then returning after laying their eggs. Females usually lay three clutches of 10-34 eggs each. Individuals have been known to undertake long seasonal migrations of 50-60 miles to the sand banks where they were hatched. When the females has laid her clutch of eggs she covers the nest with sand and then rises and falls on the surface to compact the sand. Exact numbers are in nature are not known but numbers are very limited in fragmented habitat.

In India, in the 19th century, reported that *Batagur baska* was found in the mouth of Hooghly River and great numbers are brought to Calcutta for the foods of Hindus. At the time, river terrapins were a popular substitute for sea turtles in the making of turtle soup. Over the last century and until recently, the commercial trade of turtles in Calcutta has been staggeringly. Immense numbers were shipped in to the fish markets of Calcutta from throughout India. Among the Bengals the river terrapin was considered the most delectable of all turtles.

There is no recent record of river terrapin from the Hooghly and they likely have been extirpated there. If so, water projects affecting the river flows and over exploitation of the turtles for food are likely causes. Also the most recent river survey of West Bengal and Odisha it is found no evidence of the former populations reported from the Subarnarekha and Brahmini rivers.

Vanishing population of *Batagur baska* inhabits the Sundarbans, an extensive mangrove estuary comprising a myriad of creeks, channels and islands, overlapping the India-Bangladesh border. The turtle previously nested in Mechua and Kendo sand islands of Sundarban Tiger Reserve of India but in recent evidence of nesting only at Mechua Island.

In Bangladesh, the *Batagur baska* was discovered only recently.

Conservation measures taken

In India in 1988, the West Bengal Forest Department began a small hatchery and captive breeding programme for *Batagur* at Sajnekhali Batagur rearing centre in the Sundarban Tiger Reserve (STR), after discovering a river terrapin nesting beach at Mechua Island. Out of the initial 88 eggs collected, 38 were hatched. Between 1988 to 1991, Forest Department located 21 more nests and 645 eggs were moved to Sajnekhali to be artificially incubated and the hatchings reared in captivity. Less than 50% eggs that

were hatched. It was reported by Bhupathy (1997) that the project was started with 175 juveniles in several size classes and had 25 adults, presumably for breeding purpose. Between 1990 to 1994 the Forest Department released 490 captive raised juveniles (2-4 years old) in the river Harinbhanga of the STR.

Unfortunately, in the late 1990s due to some administrative reasons subsequent release was not done and some were remained as captives. However, in 2008 the pond at Sajnekhali was censused and 12 *Batagur* (8males, 3 females and an immature) were captured and at least one other turtle possibly female was seen in the pond. The programme has now been reinstated. The Turtle Survival Alliance (TSA) is providing support for husbandry improvements to the pond for basking and nesting.

After that again in 2012 onward ex situ breeding was started at Sajnekhali breeding centre of STR. The scientists of Madras Crocodile Bank Trust came to examine the Batagur and they identified that 3 females were in egg laying stage in the year 2012. Those 3 females were then shifted to a pond with all facilities of laying eggs and protection. One side of the pond was filled with sand in such a way that turtles can move freely from water to sand for laying eggs. Pond was covered with double fencing like agro net inside and nylon net on outside. Top of pond was covered with agro net shed (50:50) to protect the turtles from predators. Nothing was known about their courtship and mating at Sajnekhali. After completion of egg laying mother turtles were shifted to big pond. Hatching pond was then protected by erecting 3 feet high brick compound wall and above it thin corrugated sheet of 4 feet height.

Fresh paste of *Basella rubra* (Pui shak) of about 250 gm for each hatchling as food was given. Then gradually shrimps, small fish, water cabbage, twigs of *Ipomoea asiatica* were added as food. But it was found hatchling favours plant foods. Some wooden planks were floated on the pond for basking of hatchlings. Water of pool was drained out from time to time and filled with fresh river water. No vitamins or mineral additives were given to hatchlings.

No courtship or intromission was witnessed and no hormone was administered to induce egg laying.

After that yearly laying egg by Batagur was regular phenomenon. It was observed that health and general appearance of hatchlings were found to be good mortality is very negligence.

Year wise breeding status is given below:

Year	No. of Individuals	Date of hatching	Male	Female	Unidentified
2012	33	12.06.2012	0	32	1 could not be captured
2013	56	26.05.2013	20	36	-
2014	55	26.05.2014	04	51	1
2015					No hatching was done due to excessive heat
2016	96	19.05.2017			Yet to be identified
2017	78	31.05.2017			Yet to be identified
TOTAL	***318***				

TSA India also works on the recovery of *Batagur baska* in West Bengal, at the vast mangrove wilderness of Sundarban Tiger Reserve at Sajnekhali. Despite poor breeding success in 2016 due to high temperature, 96 hatchings of this critically endangered terrapin emerge from nests in 3rd week of May, bringing the total of 318 since the programme got underway in 2012.

Release of Batagur in the Wilderness: 10 turtles were fitted with acoustic transmitters prior to release that would allow them to be tracked by biologists. The animals were released in to a soft released pen (contained area of natural habitat that allow the animals to acclimate prior to being fully released to the wild) that was constructed on a 300 meter long secondary channel using 800 pieces of bamboo and 50 fishing nets. Turtles a\were held in the soft release pen for about a month where they were observed and tracked using directional hydrophones and man track units provided by sonotronics. The turtles have since been released but have not yet been tracked due to vast and ragged terrain that bring with it many logistical challenges and the risk of tiger attack. However, two members research team has continuously been monitoring the area near release site and plan to increase the study radius, using small motor boats.

Soft release in different ponds: Another 25 nos sub adults were soft released in Chamta pond within Chamta Beat complex under National Park East Range in the Year for diversification of population in different parts of STR.

34 nos were again soft released on Netidhopani Pond within Netidhopani Beat complex under National Park West Range on 5th September, 2017. Field Director, STR told that another few will be soft released on Jhingekhali pond at Jhingekhali Beat under Basirhat Range

By this way to reduce the congestion at Sajnekhali and for better supervision, 3-4 years old sub adults will be soft released gradually to suitable ponds of all Ranges of STR

Threats to Survival:

i. Batagur baska has been heavily exploited both for its flesh and for its large eggs by hunting, capturing in fishing nets, collection of eggs after hatching.

ii. Lost of nesting beaches

iii. Over collection of adults and eggs from nesting sites.

iv. Habitat alteration and destruction

v. Construction of dam in upstream of the river which do not allow flow of sand to downstream.

vi. Increase of salinity due to flow of less fresh water in Indian Sundarban by constructing Farakka Barrage on the Ganges River.

vii. Large scale water pollution from heavy industries. The river Subarnarekha, whose name literally translated means “streak of gold”, today has only streaks of untreated sewage industrial and mineral waste, and even radioactive waste that pollutes the entire ecosystem.

viii. Destructive fishing practices in rivers.

ix. Loss of mangrove habitat and over exploitation.

x. Accidental death by collision with motor boats, watercrafts, etc.

xi. Unseasonal flood.

Conservation Measures Proposed:

Batagur baska a critically endangered species is required drastic and immediate action to stern further declines. Following measurement could be taken:

1. Countries having *Batagur baska* should grant complete protection to the turtles and its eggs and to promote local national and international education programme to publicise it endangerment.
2. Strict enforcement of law.
3. Ex situ breeding of *Batagur baska* and then released in the wild.
4. Cooperative programme between Indian and Bangladesh for its ex situ breeding programme and conservation.
5. Establishment of more captive breeding centres.
6. The entire ecosystem to be protected and enforced allowing habitat and community to remain intact. No hunting, fishing or removal of nature plants should be allowed.
7. A buffer zone should be established around the breeding site where only limited official watercraft is allowed.
8. Several enthusiastic energetic persons to be stationed at breeding site to protect nesting females from predators, poachers and other threats.
9. Nest should be caged if feasible to prevent predators, from destroying eggs.
10. Sensitization of local communities about the importance of Batagur.
11. Involvement of NGOs and other organisations

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Common Silverline
(Cigaritis vulcanus)
Photo: **Tapas Das,** IFS

ABC's of making Butterfly Garden in your backyard

Arunangsu Panda, WBFS
Director, SFTI Hijli

Layout of butterfly garden at state forest training institute, Hijli

Next only to birds, the butterflies are most extensively studied creatures of the world by nature lovers. They are the most beautiful winged visitors in your garden that converts an otherwise quite garden into a vibrant, colourful and happening place. Butterflies are also important components of biodiversity and ecologically important as pollinators. The following are some basic rules to be followed to make your garden enjoyable for both of you and the butterflies.

Rule 1 : Layout of the Garden :

The garden should be located in a sunny area which is also protected from wind. Butterflies are cold blooded and remain inactive at night. They come out in the morning to **bask** in the sunshine. Butterflies also avoids strong winds. The garden can be protected from strong winds by planting shrubs which are also host plants or nectar plants, discussed later. A **mud puddle** (discussed later) can be placed centrally. The nectar plants should surround the host plants as close as possible. A path may be laid through the area for observation but it should not block the movement of the caterpillar.

Rule 2 : Food Source :

2.1 Nectar Plants :- Butterflies will visit any garden, however small, if they can feed from nectar plants. Nectar plants provide primary food for adult butterflies. Butterflies choose such plants that are having small flower from which they can suck the nectar through their proboscis. Butterflies have poor eyesight (from a distance) so the nectar plants should be planted in close cluster.

Some examples of commonly available nectar plants are Lantana (red, yellow, pink, blue etc.), ixora (red, pink, yellow etc.), Cupia, marigold, sunflower, periwinkle (Nayantara), and seasonal flowers like aster, petunia, zinnia, dahlia etc.

The Nectar plants should be chosen such that blooming can be observed throughout the year.








2.2 Host Plants :- Each butterfly species depends on particular plants called host plants to feed and nourish its caterpillars. Plants contain a variety of noxious chemicals that protect them from herbivores and each species of butterflies have adapted to some of these chemicals and are able to detoxify them. Most of the butterflies have their species specific host plants and some are host plant generalist.

The list of host plants can be selected from the checklist of the local butterflies common to the area. For example, the common host plant in South Bengal is Milkweed, Citrus Spp., Curry tree, Zizyphous spp., Bamboo, Nyctanthus spp., Cabbage, beans, grasses including paddy, wheat etc.

2.3 Mud puddle: Butterflies commonly form aggregation on wet soil, dung, rotting fruits like banana , tree sap etc and suck up the fluid containing nutrients such as salts, amino acid etc.

Rule 4: No pesticide: Do not use any pesticides in and around the butterfly garden.

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2. Wikipedia
3. http://bengalbutterflies.com/checklist.html

Some common butterflies seen inside the State Forest Training Institute, Hijli:

Common Emigrant

Common Mormon

Plain Tiger

Yellow Pansy

Paki Bitan, Gajoldoba
Photo: **Tapas Das,** IFS

Fodder Nursery

NEED OF RAISING GRASS FODDER NURSERY

Bimal Debnath, WBFS
Assistant Wildlife Warden
Jaldapara National Park

Introduction

- ✓ Herbivores do not eat all green foliage what we see in the Forest.
- ✓ Herbivores eat on preferred grasses.
- ✓ When the preferred grasses are eaten by the herbivores, the target grasses gradually get depleted and weed suppress the existing root stock.
- ✓ Due to over grazing on preferred grasses the grassland gradually gets transformed into weed land.
- ✓ To enrich the fodder stock and to maintain fodder budget for the herbivores, creation of grass fodder plantation is an essential activity in both the PAs.
- ✓ Creation of plantation without raising nursery always result in degradation of existing grassland.
- ✓ Hence, raising nursery of fodder grasses is most important activity to stop management degradation of grassland and restocking of grass species.
- ✓ To maintain diversity in the grass community in a plantation raising fodder grass nursery is essential.
- ✓ The variety of grasses will provide variety in nutrition of herbivores.
- ✓ Variety of grasses will provide different fodder in different seasons also.

Some Preferred Grasses

❖	Choto Chepti	*Axonopus compressus*
❖	Banshpata Grass	*Setaria palmifolia*
❖	Chukka Grass	*Persicaria chinensis*
❖	Aalu Grass	*Borreria alata*
❖	Kema Grass	*Comellina diffusa*
❖	Durba Grass	*Cynodon dactylon*
❖	Nal Grass	*Arundo donax*
❖	Marua Grass	*Eleufine indica*
❖	Eloa Grass	*Iperata cylindrica*
❖	Jaru Grass	*Setaria genienlata*
❖	Bhutta Grass	*Tripsacum laxum*
❖	Kashia Grass	*Saccharum spontaneum*
❖	Dal Grass	*Eragrostis sp.*
❖	Dhadda	*Saccharum narenga*
❖	Chepti	*Themeda arundinacea.*
❖	Dhansi	*Digitaria ciliaris*
❖	Malsa	*Saccharum longisetosum*
❖	Chouru Grass	*Pannicum crasgalli*

❖	Bansh pata	*Curanligo orchioidis*
❖	Purandi	Alpinia malaccensis
❖	Lemon Grass	Cymbopogon flexuosus
❖	Khagra	Phragmites karka
❖	Hogla	Typha angustifolia
❖	Madhua	Sachharum aurundinecea

Seed Time

❖	Choto Chepti (*Axonopus compressus*)	*November*
❖	Dhadda (*Saccharum narenga*)	*November*
❖	Chepti (Themrda Sp.)	November
❖	Purandi (*Alpinia malaccensis*)	October - November
❖	Khagra (*Phragmites karka*)	November

Seed Collection

Choto Chepti : *Whole Inflorescence is to cut manually and store in a clean dry place. The inflorescence should be collected in the morning time when weather comparatively remains cooler.*

- ❖ Purandi: The fruits (black in colour) are to be collect manually.
- ❖ Dhadda, Madhua, Malsa : The whole inflorescence is to be cut keeping inflorescence directly in a gunny bag and the gunny bag is to filled with dry sand and the whole inflorescence needs to be rubbed, so that all miniscule seeds fall in the sand and the sand with seed is to be stored in gunny bag adding some insecticide like "Gammaxene – 10 %".

Seed Treatment

Chepti

1. Drying and beating the flowering stalk to take out the seeds
2. Drying of clean seeds 3 to 4 days
3. Storage in Gunny Bag with some insecticides like "Gammaxene – 10 %".

Purundi

1. The pericarp is to be taken out to get the seed.
2. Seed is dried for 6 to 7 Days
3. Storage in Gunny Bag with some insecticides like "Gammaxene – 10 %".

Dhadda, Madhua, Malsa.

1. sand is poured in the gunny bag and the hole inflorescence was rubbed, so that all miniscule seeds fall in the sand and the sand with seed is stored in gunny bag adding some insecticide like "Gammaxene – 10 %".

Nursery Site Selection

- The site should be well drained.
- Nursery site soil should be "Sandy alluvial"
- It should be under clear sunlight.

Nursery Site Preparation (December 2nd to 3rd Week)

1. Cleaning of the Nursery Site.
2. Erection of Fencing around the Nursery.
3. Alignment of Nursery bed of size 6 M X 1.2 M at the spacing of 0.75 M

Soil Preparation of Nursery Bed

- For 1 ha. of Nursery bed 2 Truck (12 m^3) cow dung / organic Manure is collected and dried.
- The dried manure is beaten to dust.
- The Nursery site is divided and sub-divided into nursery bed of size 6 M X 1.20 M. at the spacing of 0.75 M.
- The Nursery bed of size 6 M X 1.20 M is spaded and the clods of soil is pulverized into dust.
- The dust of organic manure 0.6 CFT to be mixed in one bed.
- The bed is then made wet by water and then the bed soil again to be pulverized.

Seed Sowing

- The seeds are sown in the bed @ 250 gm / Bed for chepti and about 1 kg including sand in case of Daddha, Malsa and Madhua.
- After sowing seeds, the bed is covered with straw.
- Daily watering of the beds is required by sprinkling.
- After 7 days, the bed has to be checked by taking out straw in small areas to observe the germination status.
- when germination started the straw is removed and daily watering is continued.
- Weeding is done every fortnightly.

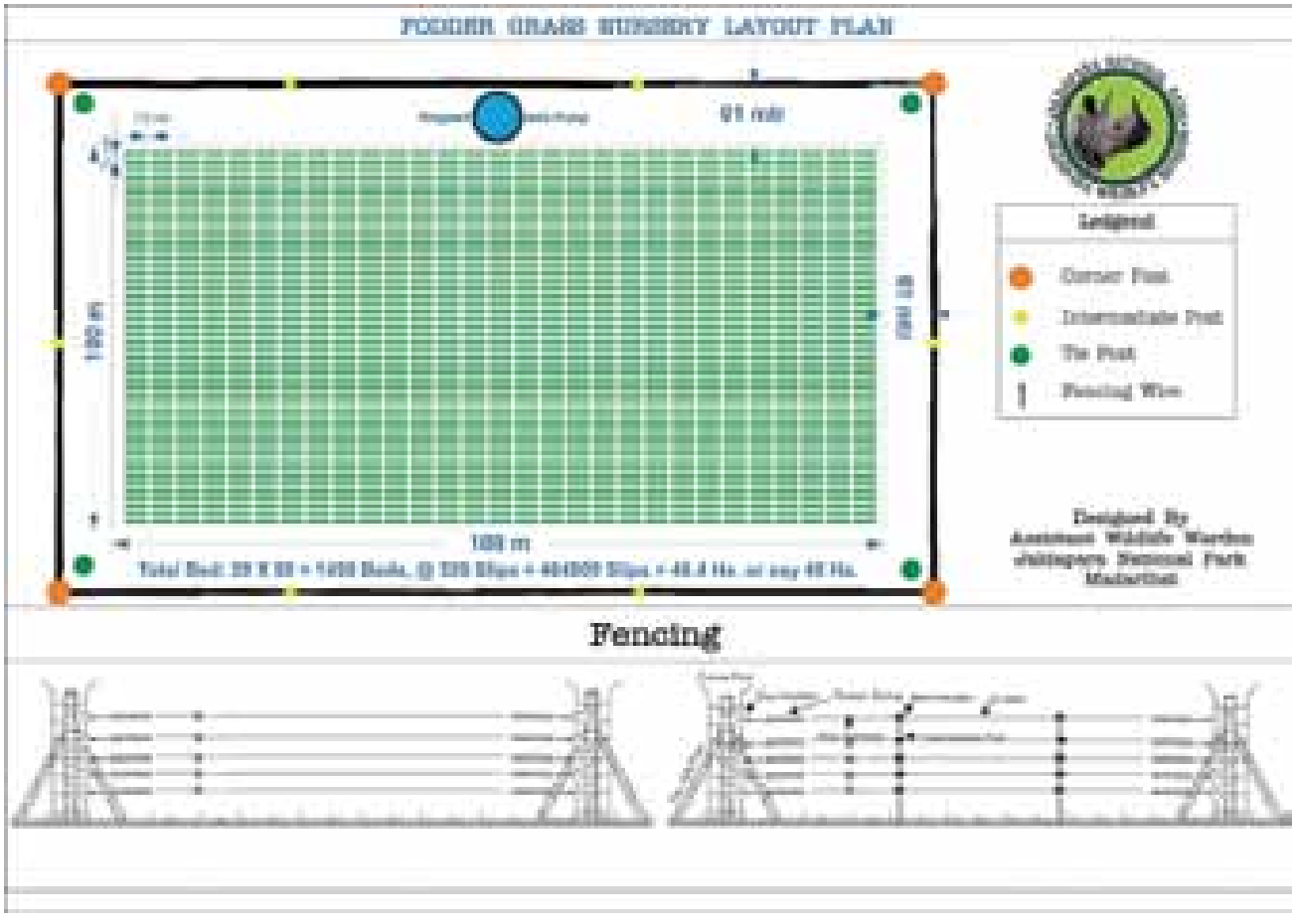
Transplanting

- When the seedlings attain 15 to 20 cm the seedlings are to be transplanted from mother beds to transplanting beds.
- 1 to 3 seedlings are to be planted in the transplanting beds at the spacing of 15 cm X 15 cm.
- The mother bed, where from seedlings are taken for transplanting are also to be maintained and seedlings to be retained at the spacing of 15 cm X 15 cm.
- Watering is to be continued till the monsoon sets in.

Transplanting of slips

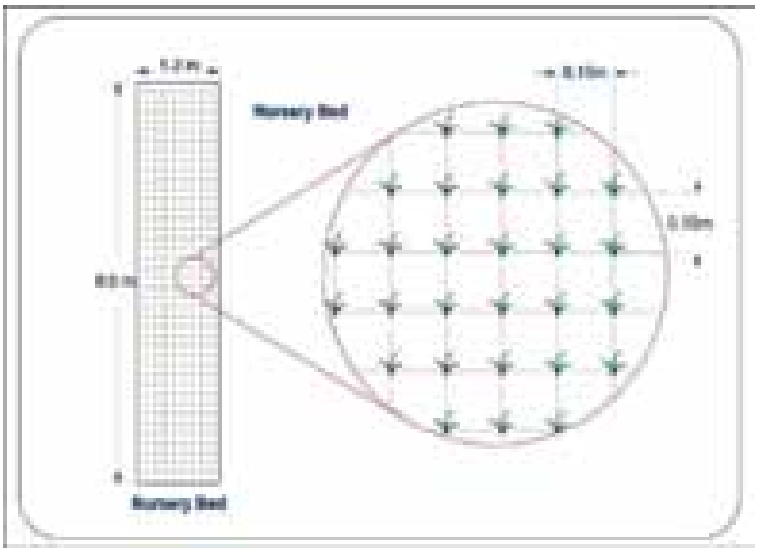
- Seed collection of grasses is very difficult except "Chepti".
- So, to enrich the fodder grass variety transplanting of some depleting grass species may be required.
- Mainly single slips are to be transplanted in the nursery bed and it needs nurturing till Monsoon in the nursery bed by weeding and watering.
- Single slips sprout to new shoots around it giving rise to clumps.
- In one Nursery Bed, only 400 slips is to be transplanted and it would produce almost 2000 slips in Nursery bed.
- In this way the palatable, depleted grasses can be restocked.
- This is why slips transplanting is very important for restocking of palatable depleted grasses.

NURSERY AREA



- If the nursery is is 100 M X 200 M = 02 ha.
- This 2 ha will have 29 X 50 nursery bed 1450 beds.
- There will be 320 slips / seedling in one bed.
- So, total capacity of 2 ha Nursery is 1450 X 320 = 464000 Seedlings / Slips.
- This will produce 464000 X 5 = 2320000 seedlings / Slips.
- If we plant 5 seedlings / slips in one pit the plantation may be created over 46.4 Ha or over 40 Ha including casualty beating (infilling) .
- So, for creation of 40 Ha plantation only 2 Ha Nursery is enough.

SIZE OF ONE NURSERY BED



- Size of one bed is 6 mtr X 1.2 Mtr
- Seedlings / Slips to be planted at the spacing of 15 cm X 15 cm
- So, in one bed there are 320 slips / seedlings.

Species selection as per soil condition

Species are selected as per soil condition like

In sandy soil	Dhadda: *Sachharum narenga*
In clay soil	Chepti :*Themeda aurundinacea*
In clay moist soil with slope	Malsa : Sachharum longisetosum
In shallow moist land	Madhua :*Sachharum aurundinecea*
In water logged area	Nol :*Arundo donex* Hogla :*Typha augustifolia* Khagra :*Phragnaites kharka* Ekra :*Sachhurum hookri*

Creation of Planation

- Survey of the Area- within February-March -April
- Cleaning and Burring- within March -April
- Erection of Fencing- within April
- Alignment of plating line within April
- Hoeing of planting line –within April
- Digging of planting pit on the hoeing line- within April
- Breaking earths clods and pulverizing the soil- within April
- infilling of planting pit- within 1st week of May.
- Planting of slips / Seedlings as per specification (1 m X 1 m)- preferably to be completed by May, latest by 15th June.
- Weeding and cleaning- July, Sept, November, January, March.

Asian Elephant ***(Elephas maximus)***
Photo: **Tapas Das,** IFS

Management of Wild Elephants, Some Emerging Issues of South Bengal

Bikasranjan Chakrabarti
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Introduction

Forests, wildlife and biodiversity play an important role in improving the quality of life of a nation and to maintain the ecological balance. Man, plants and animals are interdependent. India's National Heritage Animal is the Elephant, Species: *Elephas maximus*, known as Asian elephant or the Indian elephant is a huge terrestrial animal and ecologically important as Key stone wildlife species and ecosystem engineers. They are playing a critical role in maintaining the structure of an ecological community and forest ecosystems. They are Schedule-I Animal under the Indian Wildlife (Protection) Act. As per the International Union for the Conservation of Nature (IUCN), Asian elephants are classed as Endangered (EN) and found a place in the IUCN's Red List (RL). There are about 40,000 Asian elephants in the world.

Elephants are long ranging animals and distributed across landscapes covering different geographical regions and different States. According to March-May 2017 Census Report, Elephant Population (EP) estimated for India was about 27,312. Out of which wild elephants in West Bengal estimated around 682 those are spread over into two distinct regions in the forest of North Bengal about 488 and in the forest of South-West Bengal around 194. West Bengal has two Elephant Reserves (ER), named as Eastern Dooars ER (Geographical Region (GR) / Range: North Bengal-Greater Manas) in Jalpaiguri district and Mayurjharna ER (GR / Range: East-Central, Bio-geographic Zone 6B) in Paschim Medinipur, Jhargram, Bankura and Purulia districts in South Bengal. To protecting this iconic species appropriate measures are to be needed to conserve and improve the same for sustainable management of forests and biodiversity including wildlife. As a part of Fundamental Duties, it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures (Art. 51A, The Constitution of India).

Forests of Southwestern West Bengal

Major Forest types is Northern Tropical Dry Deciduous Forests (NTDDF) or,

Dry Penninsular Sal Forest (DPSF),

Forest type: 5B / C1c & distributed over the districts of Jhargram, Paschim Medinipur, Bankura and Purulia. The principal forest tree species in the red lateritic tract of the districts are Sal (*Shorea robusta*), Peasal (*Pterocarpus marsupium*), Kend (*Diospyros melanoxylon*), Mahul (*Madhuca longifolia*)), Kusum (*Schleichera oleosa*), Haldu (*Haldina cordifolia*), Asan (*Terminalia tomentosa*), Bahera (*Terminalia bellirica*), Rahara (*Soyamida febrifuga*), Dhaw (*Anogeissus latifolia*) and Parashi (*Cleistanthus collinus*) etc. The types of forest cover in the districts are protection of Sal coppice and its associates, plantation of Sal with associates, plantation of Akashmoni (*Acacia auriculiformis*), Patash (*Eucalyptus* sp.) etc and having different Canopy Density Classes (CDC) such as very dense forest (VDF, CD >70%), moderately dense forest (MDF, CD 40 to 70%), open forest (OF, CD 10 to 40%) and along with blanks, degraded and poor quality forest lands, where viable rootstock / stumps less than 200 per ha (VRS or STM < 200 / ha) etc. Forests in some areas are mostly patches and intercepted with habitation, roads, agriculture field and non-forest land. The forest is also having different floor species, medicinal flora and forest resources. Forest management is based

on Participatory Forest Management (PFM) and forest protection and development through the Joint Forest Management (JFM).

Threat to Elephants and Man-Elephant conflict

Wilderness and biodiversity is disappearing gradually from the earth planet. In recent years, the most urgent threat to elephants is loss of habitats, degradation / fragmentation, lack of food and shelter, illegal trade, losing their migratory routes, corridors etc. and as a result human-elephant conflict (HEC) has rose to an alarming position. Damage to property, crop raiding, crop damage, hut damage, livestock, human deaths / injuries by wild elephant depredation and retaliatory killing of elephant by villagers are on the rise. The human elephant conflict is the primary issue for elephant conservation. To mitigate the problems proper measures are to be needed.

Man-elephant conflict in South West Bengal has become a major administrative issue. The problem started in 1987 when wild elephants of about 35 to 40 in numbers from Dalma Wildlife Sanctuary (DWS), Jharkhand started migrating to Jhargram Division in the State of West Bengal. Gradually they increased their territory and migratory routes and roam through the large tract and space to search food, water and vegetation cover. They also increased their numbers and their population presently stands around 140-150. Each and every year migratory wild elephants from DWS in the state of Jharkhand are entering in the state of West Bengal and visiting in the districts of Jhargram, Paschim Medinipur, Bankura and Purulia of South Bengal covering very large area and extend to further north and east in recent years. Some times they are prolonged staying in these areas (about 8 to 10 months) and causes severe damages. Some of them become resident in the region. Not only migratory Dalma herd, there are also the Mayurjharna herd and including residential wild elephants (about 50 –55) causes severe depredation and increases human-elephant conflicts.

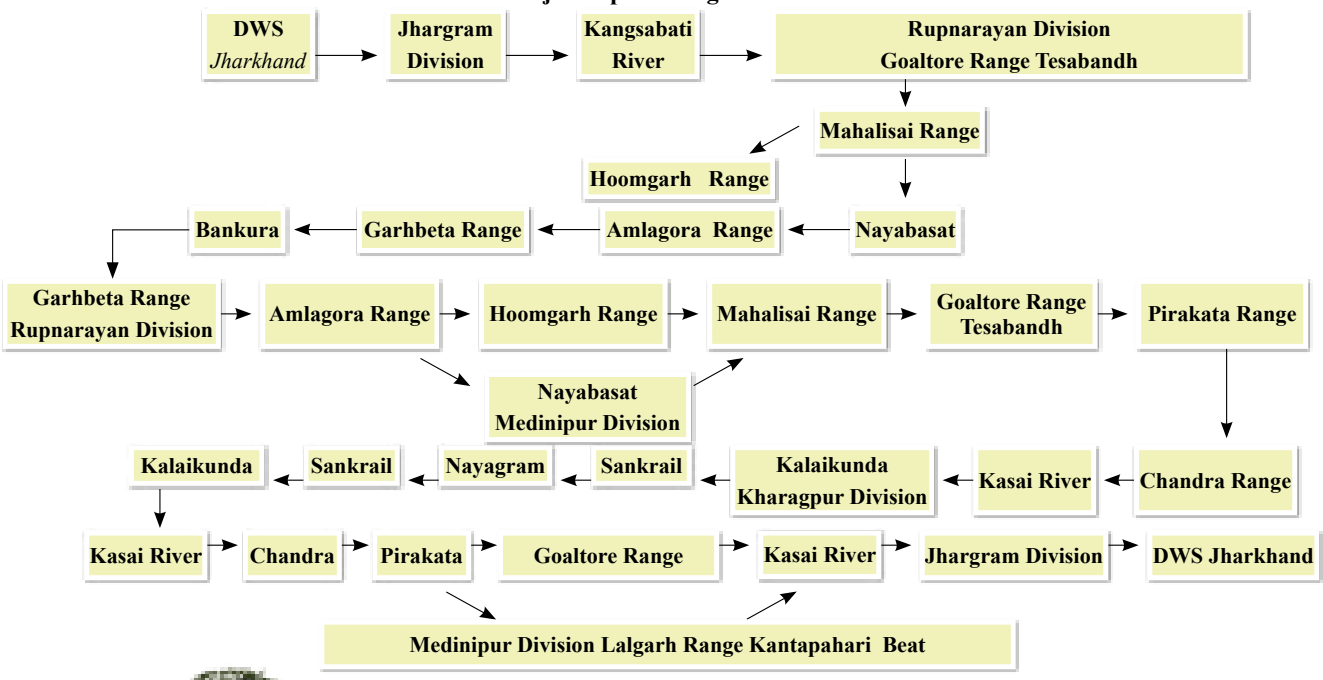
Reasons for prolong staying and causing damages by wild elephants

The main reasons regarding their prolong staying and causing extensive damages by wild elephants in these districts of South Bengal are

Reason behind extensive damages	Reason behind prolong staying
In South Bengal, forests are mostly patches and intercepted with habitation, agriculture field and non-forest land.	Agriculturally the eastern bank of Kangsabati River is very much fertile. The most of the lands used to be under crop throughout the year for that reason elephant get their food throughout the year.
Elephant migration corridors and routes are gradually damages or encroached by construction resulting in invention of new route (s) for the elephant causing extensive damages.	In most of the forest patches water is available throughout the year for elephant.
Compositions of agricultural field crops are such that they are very much palatable for elephant and for that reason elephant frequently raided the crop field.	The compositions of forest in most of the patches have become more suitable for their staying and they easily get refuge shelter in these forests patches.
They found suitable habitat here causing extensive damages throughout the year.	They get sufficient food throughout the year in these districts.
Ground flora in most of the forest patches are not available to be used as food for elephant. Forests in patches of some areas are as mainly mono crops (Eucalyptus /Akashmoni) those are not suitable as elephant food.	The elephant get their most preferred food like sugar cane in Paschim Medinipur district at Sankrail under Kharagpur Division.
Changes of corridors, abnormal sex ratio, country liquor, grazing and over-exposer to human beings are also causes for extensive damages.	In some of the forest patches they get good fodder also.

During their prolongd staying they cause extensive damages to the life and properties. Most of the times they come to the nearest forest fringe villages and causes severe damages which can be reduced by adopting development activities, direct and indirect measures.

Major elephant migration route



Management

Management is done depending upon the situation, systematic process of plan and planning, organizing, executing and managing followed by different short-term and long-term activities and scientific methods. Not only elephant management plan but also as a part of conservation of biodiversity and wildlife management and Mandatory working circles (Overlapping), the Conservation working circle (CWC), and Wildlife management working circle (WLMWC) and Protection working circle (PWC) as per Working Plan are also important for the management of wild elephants.

General objectives of Management

The basic objective is the conservation and protection. The main objectives are

1. To maintain the environmental stability through conservation of natural forests, biodiversity and ecological restoration.
2. To conserve and maintain habitats & enrichment of the natural habitats, food, water and shelter.
3. To conservation and management of sustainable resources.
4. To improve forest ecosystem.
5. To address issues of man-animal conflict.
6. To protect forests, biodiversity and wildlife including wild elephants, their habitat, routes and corridors.
7. To promote conservation awareness and to increase public support for wildlife and elephant conservation.

Prescriptions as per Working Plan

General Prescriptions prescribed as per 3rd Working Plan of Paschim Medinipur district comprising Forest Divisions Medinipur, Rupnarayan, Kharagpur and Jhargram Division (Jhargram Division is presently in the district of Jhargram) are

- No felling is prescribed under Conservation Working Circle (CWC).
- To reduce the biotic pressure on wildlife, plantations / regeneration are prescribed in blank and degraded areas. Fruit bearing species, fodder tree species, indigeneous grasses and bamboos are also be planted in blank areas and degraded forests by aforestation for the benefit of wildlife including wild elephants.
- Regular patrolling both day and night to be taken up by the staff along with RT network, vehicles and arms at the time of wild elephant problems in the district as per needs.
- To avoid incidental forest fires and damage of forest floor species, plantations and biodiversity, Fire lines are to be created and annual cleaning of fire line should be ensured.
- Fire watcher may also be provided during peak times as per needs.
- Necessary training to the staff can be given on chemical immobilization, capturing wild animals and animal health care etc. In this respect help may also be taken from Wildlife Wing.
- Hunting is an illegal activity and is totally prohibited. Precaution should be taken and forest protection committee members to be tagged with the forest staff to prevent illegal activity in zone.
- Periodic census for elephants to be conducted as per direction of Chief Wild Life Warden (CWLW) of the State.
- Construction of watch tower (WT) near forest fringe village can help to detect animals and their movements.
- Both the Range and Divisional level should establish effective intelligence network (EIN) for gathering information on illegal wildlife products and persons involved in such illegal

activities. The system of paying rewards to informers for providing valuable information will prove beneficial.

- Ensure coordination between various enforcement agencies like Police, Civil and Local Administration and other stakeholders is a must to control poaching and illegal trade of wildlife products.

Activities / Measures

A. **Action taken:**

Wild elephants are managed in South Bengal by way of action taken so far

1. Energized Fencing (EF) has been raised at strategic location.
2. Elephant Proof Trench (EPT) has been dug at a strategic location.
3. Organic fencing has been developed at some strategic location.
4. Crop Compensation has been distributed as per availability of fund.
5. Ex-gratia has been given to the deceased family.
6. Medical treatment expenditure has been given to the injured person.
7. Alternate Cropping with Green chilli, Cultivation of Ole or Amorphophallus plants like *Amorphophallus peonifolius* or *A.campunulata*, Plantation with Agave and Cactus Species have been introduced to reduce the crop damages.
8. In some of the patches fodder plants has been raised as food for elephant.
9. Extension and awareness activities undertaken at various locations to educate and sensitize people towards this problem
10. As an immediate measure hullah party used to be engaged by the staff and used to distribute burnt mobile and search light among the affected people.
11. Staff sends advance information to the adjoining ranges to keep the people alerts against the probable attack by elephant.
12. Staff used to maintain coordination and liaison with the local administration and adjoining forest division.
13. Afforestation and construction of water harvesting structures for water & soil conservation measures for improvement of habitats also done.
14. Awareness raising, Dos and Don'ts activities to the local people of the areas.

B. **Other steps:**

Some other steps are also being followed in connection with the management of wild elephants**,** such as

(I) Formulation of 1st Management Plan (2014-15

Photo: **Arnab Ghosh,** FR

to 2023-24) of Mayurjharna Elephant Reserve (MER) of South Bengal.

(II) Formation of Wildlife Division.

(III) Constitution of elephant squad / flying squad and village squads at depredation prone areas by the help of local villagers, FPC / EDC members, forest staff and also by using trained Kunki elephant as per situation.

(IV) Formation of Elephant Movement Monitoring Co-ordination Committee (EMMCC).

(V) Daily Monitoring of elephant movement.

(VI) Construction of permanent Watch Towers at selected places.

(VII) Using Early Warning System (EWS) by which effectively disseminate alerts and warnings to the people or communities to inform about the movement of wild elephants.

(VIII) Bulk Short Message Service (SMS) for alert of villagers and administration.

(IX) Elephant rescue and rehabilitation centre.

(X) Elephant Dossiers / detailed information are prepared.

(XI) Use of modern technology like Drone (unmanned aerial vehicle) in tracking movement of wild animals and help to locate wild elephant movement position in field and in the forest.

(XII) Training of field staff and hold training programmes for Wildlife Managers, JFMCs members, local villagers and handlers.

(XIII) Using Retrofitted wildlife squad vehicle (Airavata) in the field during driving of wild elephants as well as other conflict mitigation measures as per needs and field situation.

C. Further Actions / Suggestios:

Further actions are also suggested that

1. Development of scientific management planning for conservation and an adaptive management with integrated approach.
2. Increasing mixed plantation by planting with suitable fodder species for elephants like Doka (*Odina wodier*), Chalta (*Dillenia indica*), Bel (*Aegle marmelos*), Jamun (*Syzgium cumini*), Chuki jam (*Syzygium paniculatum*) Mahua (*Madhuca longifolia*), Bahera (*Terminalia bellirica*), Arjun (*Terminalia arjuna*), Kotbel (*Limonia acidissima*), Ata (*Annona squamosa*), Dumur (*Ficus glomerata*), Sal & its Associates, Galgali, Bamboos, Jack fruits, Banana and others.
3. Silvicultural Selection Thinning (SST) of older plantations to improve the hygiene of forest, promote natural regeneration of indigenous species and facilitates diverse functions.
4. Control of cattle grazing in forest areas and development of pasture lands and woodlands on available community land outside the animal habitats to meet sustenance need of forest dependent human populations.
5. Creation of barriers and obstruction in the form of EPT and Energized fencing (EF) should be raised at the entry point of elephant, i.e. at the Border of West Bengal, Odissa and Jharkhand.
6. Jharkhand State Forest Department should be requested to undertake massive habitat improvement works at Dalma.
7. All sorts of mining activities should be stopped at Dalma hills.
8. Frequent coordination meeting should be called between affected states.
9. Immediate compensation should be released.
10. Amount of Ex-gratia should be enhanced.
11. Capture and translocation of problem elephants,

translocation and or elimination of established Rogue elephants as per needs after mainting all sorts of formalities as per Rules, Acts and Norms.

12. Managing wild populations.

13. Veterinary care in the wild as well as in captivity.

14. Radio-tracking of a female elephant to gather immediate information about their movement and on habitat use.

15. Construction of watch tower near forest fringe villages and corridors.

16. Living in harmony. Forest adjoining dwelling houses those are having white or brightly painted walls are more prone to damage by elephants than that of natural trees colour like green, orche or green coloured walls.

17. Maintenance of RCC Boundary Pillars and painting surface of pillars by using eco-friendly or environmentally colouring at elephant prone zone. It has been noticed that white painted boundary pillars are susceptible to elephants and causes more damages by wild elephants. Traditional used up white colours on said pillars has been changed or replaced gradually by using with eco-friendly colour (EFC) or choosing environmentally correct colour (ECC) like jungle green, light green, olive (jalpai) green or bi-colour of green and magenda or suitable non-reflective camouflage colour may be used for painting RCC Boundary pillars in different manner in such susceptible areas to avoid the attraction of erected pillars by the wild elephants and minimizing the damages.

1. Crowed management during elephant straying, imposition of Cr.Pc. 144 depending upon the situation, exegency and as per needs.

2. Increasing close touch to the public, more awareness generation and seeking help from all levels in connection with the man animal conflict management issues and save forests, wildlife, biodiversity as well as public property and life.

Launching retrofitted wildlife squad vehicle during October, 2016 & demonstration regarding its use

Maintenance of RCC Boundary Pillars at elephant prone zone

Holding of Public meetings on the Man-Elephant Conflict Management Issue

Man and wild elephant conflicts are a great social and ecological challenge. Any single preventive action or measures are not sufficient to manage and control the situation. To cope up with the problem and protect our national heritage animal, reducing man-animal conflict, save forests, wildlife and property joint efforts are to be needed from all level. It is necessary to review and improve the current practices, research and development (R & D) of alternative measures regarding the management of wild elephants and sustainable management of forests and biodiversity.

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Elephant Herd
Kalabari
Photo: **Ashim Kr. Chaki,** WBFS

Rearing of Striped Hyena (Hyaena hyaena) cubs in captivity in case of infanticide and siblicide

- A case study from
JUNGLE MAHAL ZOOLOGICAL PARK, JHARGRAM

Dharmdeo Rai, IFS,
Divisional Forest Officer
Darjeeling wildlife Division

JUNGLEMAHAL ZOOLOGICAL PARK is situated at the outer skirts of Jhargram Subdivision of West Medinipur District. The zoo contains many species of herbivores and carnivores and represents fauna of the Southern lateritic zone of West Bengal.

There are two striped hyenas in the zoo, one male rescued from Purulia Division in 2014 and a female rescued from Kharagpur Division in 2009. In enclosures they have bred naturally in past but to utter surprise of the staff, mother hyena ate up all the litter in past within 2-3 hrs just after giving the birth. It happened twice, once on 31.10.2014 and then on 18.02.2015. Each time litter size was of 5 cubs but the mother ate all cubs. Though it happened twice but female continue to come in estrus and then mate with the male leading to another pregnancy. However this time female again gave birth to 5 cubs on 06.06.2015 and by the time four cubs could be separated it ate one cub. After that all four cubs were put under the care of Zoo keeper Mr.Shaheb Ram Murmu and Mr. Bimal Murmu, and Animal Attenedent Mr. Mithoo Mahato and Mr. Nagen Murmu and entire medical matter was handed over to Veterinary Officer of Kapghari Centre Mr Sajal Kumar Dutta, who has been of immense help and available twenty four hours. However in spite of the best efforts of the all involved only one cub could be saved and rest died at different ages of 2, 3 and 27 days on 08/06/2015, 09/06/2015 and 03.07.2015 respectively. During this period weight of the cubs were taken on weekly basis and all the feeding material and medication was also documented by the zoo superintendent Sri Janardan Ghosh. These details are given below for further reference, improvements and corrections from experienced wildlifers.

Food- The cubs as were separated from mother just after the birth, couldn't get the first milk (colostrum) of mother and hence were weak in immunity. As they couldn't get regular breast-feeding from mother, it made them further weak. However as per the advice of the Vat they were fed goat milk mixed

with water in 1:3 ratio for 10 days then 1:2 ration for next 7 days then 1:1 ratio and finally only goat milk after 25 days. Another better alternative given by the Vat was to use a lactating bitch but it couldn't be find. From third week some honey was also given but not as a main diet rather as a cough medicine. After one month Beaphar lactol puppy milk was also given but discontinued. After one month chicken soup was given to the cub. It was devoid of bone and in full liquid form. Gradually its solid content was increased and pure raw chicken was given from day 50 onwards. The same diet continued till date twice a day.

Feeding Method- In first 7 days cubs were fed milk by dipping cotton in it and squeezing the same in the mouth after every one hour throughout 24 hours. Later on other food was given in the same way in liquid form. By the time chicken soup was given the cub was able to lick it. Raw chicken cut into smaller pieces and devoid of any bone was served later.

Medication- All the medication was as per the prescription of the Veterinary. The medicines given in the initial phase were to boost the health of the cubs. After 15 days only two cubs were left and one developed symptoms of cough and was treated accordingly though it survived only for 27days on 02.07.2015 morning. All the medicines were given as described in the feeding method technique.

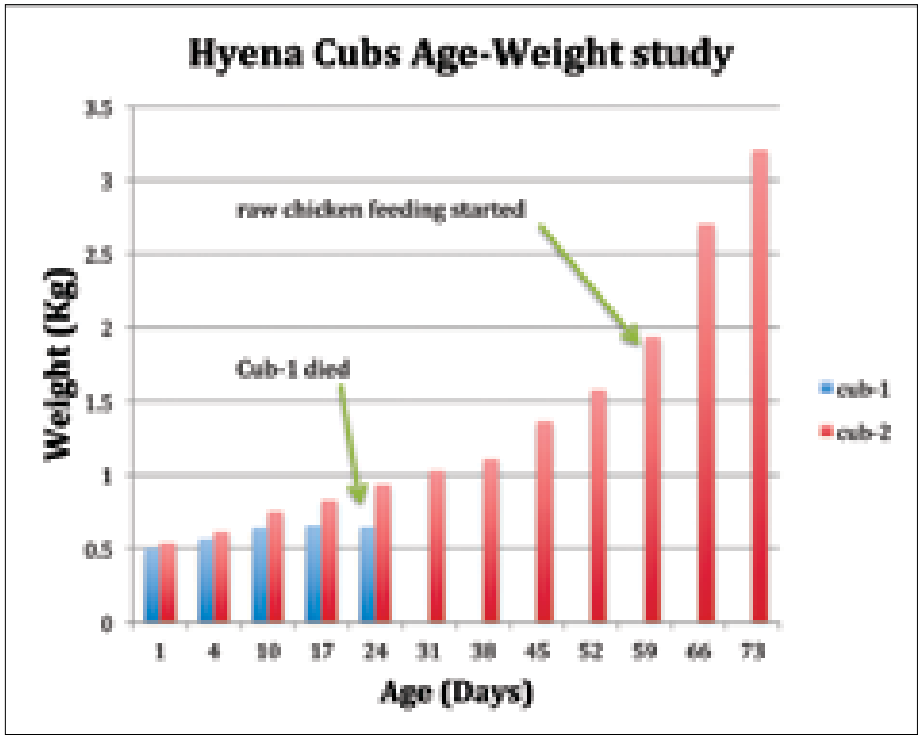
Enclosure- All the cubs were kept in a 4'x6' cage with two fiber walls and two netted walls. On the floor, some cushion was provided by using clothes. The cage was covered during night and most part of the day (except mid day part) to prevent strong light in the cage, but proper ventilation was ensured. Likewise light in the room was also controlled. Similarly care was taken for noise reduction also.

Hygiene- All the utensils used or connected in any way was sterilized in hot boiling water for 30 minutes, after and before every use. Staff used to wash there feet in water of Potassium permanganate before entering into the room. They were provided separate cloth to put on while attending the cubs- for feeding, medication or any thing else.

Age vs weight of Hyena cubs- All the four cubs weighed below 600gm on day one. After that weekly data was collected and is shown below. It is related with the diet directly and a quantum jump is seen when raw chicken is included in diet.

Sl. NO.	Date of measurement	Age (days)	Cub-1	Cub-2	Gain of weight (KG)	Type of food
1	06.06.2015	1	0.5	0.540	0.072	pediiasure and goat milk
2	09.06.2015	4	0.564	0.612	0.138	goat milk
3	15.06.2015	10	0.64	0.750	0.080	goat milk
4	22.06.2015	17	0.658	0.830	0.102	goat milk
5	29.06.2015	24	0.646	0.932	0.096	goat milk
6	06.07.2015	31		1.028	0.076	goat milk, chicken soup
7	13.07.2015	38		1.104	0.258	goat milk, chicken soup
8	20.07.2015	45		1.362	0.218	goat milk, chicken soup
9	27.07.2015	52		1.580	0.355	goat milk, raw chicken
10	03.08.2015	59		1.935	0.765	goat milk, raw chicken
11	10.08.2015	66		2.700	0.500	goat milk, raw chicken
12	17.08.2015	73		3.200		raw chicken

TABLE--Weight-age details of surviving cubs



Inferences Drawn and Management applications-

1. Infanticide may take place in captivity due to many reasons viz. diet, unnatural enclosures, and also first accidental infanticide leading to imprinting of the maternal behavior that is then repeated in all such future events.
2. In such cases a natural looking enclosure may be tried with caves, crevices, hollow logs etc.
3. In case it doesn't work, cubs must be separated after birth
4. Cubs should be kept together at a hygienic place in a cage, with proper ventilation but controlled light.
5. It should be cave like ambience with dim light in peak day and dark in rest of the period.
6. Diluted goat milk or bitch milk (milk:water□1:3) to be given for 10 days, then 1:2 ratio for 14 days, 1:1 ratio 21 days, and finally pure milk.
7. Chicken soup without any bone and solid meat to be given after 40 days with gradual increase in thickness of the soup.
8. Raw boneless meat cut into smaller pieces may be given after 60 days.
9. Feeding rate- every hr till 14days, every 2 hr/14-21 days, then 6 times a day/ 21-40 days, 4 times a day/ 40-60 days, twice a day after 60 days.
10. No dog food or artificial supplements required generally.
11. Regular visit of Veterinary is a must and all medications prescribed must be strictly adhered to.
12. Staff involved must be encouraged in regular visit of senior officer (Zoo Director thrice a week) and some cash reward should be there for successful rearing of the cubs.

Rhino poaching investigation

রাণী

রাণী

বিমল দেবনাথ,
পশ্চিমবঙ্গ বন সেবা

গত ২০১৪ সাল থেকে জলদাপাড়া জাতীয় উদ্যানে পর পর গণ্ডার শিকার হচ্ছিল। আমরা বন প্রশাসনের কার্যকর্তারা এই শিকার বন্ধ করবার জন্য অপ্রাণ চেষ্টা চলাচ্ছিলাম। শিকার রোধে নজর মিনার (ওয়াচ্ টাওয়ার) নির্মান, নজর মিনার -এ ২৪ ঘণ্টা কর্মচাররি অবস্থান, নজর মিনার -এ পোষা হাতির অবস্থান, সকাল ও বিকাল দুই বেলায় হাতির পিছেবসে বন টহল, পায়ে হেটে বন টহল, জি.পি.এস হাতে নিয়ে বন টহল, এলাকা প্রভাবতি করার (এরিয়া ডাইমেনসন) জন্য বন সন্নিহিত গ্রামে পুলিশ ও এস.এস. বি সহযোগে গ্রাম টহল এবং সর্বরোরি যৌথ বন পরিচালন সমিতির সাথে ঘন ঘন সভা করা হতে থাকে। এই অবস্থাতে বন ও বন্যপ্রাণ সংরক্ষণের কৌশলকে আরও সুদৃঢ় করার জন্য আমাদের মুখ্য বনবল তথা প্রধান মুখ্য বনপাল পশ্চিম বঙ্গ সরকারও তৎকালীন মুখ্য বন্য প্রাণ সংরক্ষক শ্রী প্রদীপ শুক্লা, অতিরিক্ত মুখ্য বনপাল উত্তর বঙ্গ ডঃ পি.টি. ভুটিয়া এবং মুখ্যবনপাল, বন্যপ্রাণ উত্তর শ্রী এন.এস. মুরলী এবং পরবর্তীকালে বনপাল, বন্যপ্রাণ উত্তর চক্র শ্রীমতী মুমিতা ঘটক, প্রশিক্ষিত কুকুর, বন ও বন্যপ্রাণ রক্ষার কাজে নিযুক্ত করার পরিকল্পনা গ্রহণ করনে (ট্রাফিক ইন্ডিয়া) এই পরিকল্পনায় আমাদের বিভাগকে সহায্য করতে এগিয়ে আসে।

পরিকল্পা অনুযায়ী জলদাপাড়া জাতীয় প্রশিক্ষণ কেন্দ্রে বি.এস.এফ টাকানপুর, গোয়ালিয়র, মুখ্য প্রদেশে পাঠানো হয়। জাতীয় প্রশিক্ষণের কেন্দ্রে ওদেরকে একটি কুকুর দেওয়া হয় যার নাম এমিনাব্রাণী, লিঙ্গ স্ত্রী জন্ম তারিখ ১৫-০৪-২০১৫, প্রজাতি জ র্মান শ্রেপাড আলসেসিয়ান।

শ্রী ভানু রাভা, চৌকিদার কুকুর রাণীকে নিয়ে ০১-০২-২০১৬ থেকে ০৮-১০-২০১৬ তারিখে জলদাপাড়া তে তাকে নিয়ে আসা হয়। জলদাপাড়াতে আসার পর রাণী কে গণ্ডারের খড়্গ সাক্তকরন, হাতরি দাঁত সনাক্তকরন, বাঘের চামড়া সনাক্তকরন, চিতা বাঘের চামড়া সনাক্ত করন, অজানা মানুষের ব্যবহৃত সামগ্রী গন্ধ নিয়ে অজানা ব্যক্তিকে শনাক্তকরনের বিষয়ে প্রশিক্ষণ দেওয়া হয়। রাণি সাফল্যের সাথে এই সকল প্রশিক্ষণ সহজে আয়ত্তকরে নেয়।

বিপ্লব রায়, বন রক্ষী ও শ্রী ভানু রাভা, চৌকিদার-এর প্রশিক্ষণ

পি.সি.সি.এফ ও হফ্ এবং সি.এফ ডাব্লিউ.এল (এন.) এর রাণীর কাজ পরিদর্শন।

জলদাপাড়াতে আসার পর প্রশিক্ষিত কুকুর রাণী তার পরিচালক সহ বিভিন্ন ধরণের কাজ ক্রম শুরু করে যেমনঃ পায়ে হেটে বন টহলরে সময় বন কর্মীদের সাথে বন টহল করা, গ্রামে এলাকা প্রভাবিত করার টহলে অংশগ্রহণ

করা, সড়কেৰজাতীয় সড়কে গাড়ি পরীক্ষা করা, বনে অজানা বস্তুর গন্ধ শুঁকে অজানা ব্যাক্তিকে শানাক্ত করা, লুকিয়ে রাখা বন্য প্রাণীর দেহাংশ কে খুঁজে বের করা, ইত্যাদি ইতিমধ্যে রাণী যেদুটি প্রধান সাফল্য পেয়েছে সেগুলি হল।

০৫-০১-২০১৭ তারিখে অবৈধে ভাবে একটি জারুল গাছ কেটে ফেলা হয় মেন্দাবারি বিট এর মেন্দাবারি ৩ নং কমপার্টমেন্টে একাজে যুক্ত ব্যক্তিদের ধরার উদ্দেশ্যে বিট অফিসার রাণী কে নিয়ে আসেন এবং তাকে গাছ কাটার জায়গার নিয়ে যান। রাণী বন অপরাধী পালিয়ে যায় কিন্তু এর ফলে বন অপরাধীদের মধ্যে আতঙ্কের সৃষ্টি হয়।

১৭-০১-২০১৭ তারিখে বক্সা ব্যাঘ্র প্রকল্পের অধীনস্থ বক্সা পশ্চিম বিভাগের দমনপুর রেঞ্জের বনচুকামারি গ্রাম -এ একটি চিতা বাঘ মারা যায় যার বিভিন্ন দেহাংশখুঁজে পাওয়া জাচ্ছিল না। রাণী কে সেখানে পাঠানো হয় এবং সেখানে ১৮-০১-২০১৭ থেকে ২০-০১-২০১৭ তারিখ পর্যন্ত বিপ্লব রায়, বন রক্ষী ও শ্রী ভানু রাভা, চৌকিদার। এর তাথে থাকে। রাণী সেখানে সমস্ত সন্দেভাজন জায়গা তল্লাশি করে এবং এর ফলে বন অপরাধীরা আতঙ্কিত হয়ে পরে ও রাতের অন্ধকারে চিতাবাঘটির দেহাংশ গ্রাম পঞ্চায়েত প্রধানের অফিসে ফেলে দিয়ে যায়। এর ফলে অন্যান্য বনঅপরাধীদের মধ্যে এক আতঙ্কের সৃষ্টি হয় যা বন ও বন্যপ্রাণ রক্ষায় সাহায্য করে।

বন ও বন্যপ্রাণ রক্ষায় আমরা সাধারনত তিন ধরনের পদ্ধতি


গ্রামে টহল


বন্যপ্রাণী সনাক্তকরণ


রাস্তার গাড়ি নিরীক্ষণ

অবলম্বন করি। প্রথমত সরাসরি বন টহল ও বন দ্বিতীয়ত পরোক্ষ বন টহল। পরোক্ষ বন টহলের বিষয়টি হল বন কর্তার অনুপস্থিতিতে লোকালয়ে ও বন অপরাধীদের মনে বন কর্তাদের উপস্থিতি ও বন কর্তাদের সমীহ করার মানসিক অবস্থার সৃষ্টি করা। এই মানসিকতার জন্য বন অপরাধীরা, বন অপরাধ করার পূর্বে ভাবতে বাধ্য হয় যে আইন এবং বন কর্তা দ্বারা ধৃত হলে পরিণাম ভয়াবহ হবে। এই ভীতি ও আতঙ্ককে অনেক পরিমাণে বন অপরাধকে নিরশন করে। প্রশিক্ষিত কুকুররের ব্যবহার এই পরোক্ষ বন টহলকে অবশ্যই শক্তিশালী করবে এবং বন রক্ষায় ও ধীরে ধীরে রাণী হয়ে উঠবে।


রাণী, তার ঘর ও তার দুই পরিচালক

‘‘ইতি গজ’’

অর্নব ঘোষ,
বনাঞ্চল আধিকারিক মানিকপাড়া
ঝাড়গ্রাম বন বিভাগ

‘‘সারে জাঁহসে আচ্ছা হিন্দুস্থান হামারা’’..... চমকে উঠলাম, না গানটা শুনে নয়। এটা আমার মোবাইল ফোনের রিংটোন। ঘড়িতে এখন রাত ১২ঃ৩০ মিনিট। সবে ঘুমটা দু’চোখের পাতা জুরে জড়িয়ে ধরেছিল। ফোনটা ধরতেই ওপারের গলায় ভেসে এল ‘‘হ্যালো বাবু, প্রায় ৬০-৭০ টা হাতি নদী পেরিয়ে গ্রামে ঢুকে পড়েছে .... খুব ক্ষয় ক্ষতি করছে... আপনি তাড়াতাড়ি এসে কিছু একটা ব্যবস্থা করুন .... না হলে বড় বিপদ হয়ে যাবে।’’

মার্চ মাস, মাত্র কিছুদিন হয়েছে এই মানিক পাড়া বনাঞ্চলের দায়িত্ব নিয়েছি। তারিখটা না হয় নাই বললাম। গ্রামটা আমাদের তথাকথিত এফ.পি.সি. -এর মধ্যে পড়ে না। পুরো অঞ্চল সম্বন্ধে খুব গভীর ধারনা এখনো হয়ে ওঠেনি। পুরোটাই জঙ্গলমহল এলাকা। বিস্তীর্ন চাষের জমি আর মাঝে মাঝে গ্রাম চিতলবনী, বল্লা, সাতবল্লা, কুমারী ইত্যাদি খোজ নিয়ে জেনেছি। এই সব গ্রামের পাশ দিয়েই হাতি যাতায়াত করে থাকে বলে এলিফেন্ট রুট, আর যে নদী পেরিয়ে এদিকে আসে সেটা হল আমাদের কং সাবতী নদী, এতরাতে কয়েকজনকে। অধিকাংশের ফোন সুইচ্ অফ্। যারা জেগে তাদের এই রাতে বেরোতে খুব অনীহা। যাই হোক অনেক বুঝিয়ে টুকিয়ে রাজি করানো গেল। খবর দিতেই তারাও বলল এব্যাপারে এইমাত্র খবর নিজেও প্রস্তুতি নিতে শুরু করলাম। মিনিটে মিনিটে ফোন আসছে -‘‘এখনো কোন ব্যবস্থা নিলেন না’’ ইত্যাদি ইত্যাদি।

কি করে বোঝাই তাদের এত রাতে হুলাদল একত্রিত করে গাড়ীর ব্যবস্থা করে যাওয়া যে কত কঠিন যেটা বোধকরি যে বা যারা করেছে তারাই জানে। কিছু সময় আসে যখন কিছুই যেন ঠিকমত হয়না। হুলা দল পাওয়া গেলে গাড়ী পাওয়া যায় না, গাড়ী পাওয়া গেলে ড্রইভার পাওয়া যায় না, ড্রাইভার পাওয়া গেলে গাড়ীতে তেল থাকে না.... ইত্যাদি আরও কত কি!

যাই হোক পুরানো সহকর্মীদের মিলিত প্রচেষ্ঠায় সমস্ত প্রস্তুতি সেরে বেরিয়ে পরলাম গন্তব্যস্থলের উদ্দেশ্যে.....

ফোনে খবর নিয়ে জানতে পারলাম গ্রামে দুটো ঘর ইতিমধ্য ভেঙে দিয়েছে। এই সময় মাঠে কোন ফসর নেই। তাই মাঠে হাতির কোন খাদ্য নেই। আম, কাঁঠাল ইত্যাদি আর মজুত করা ধানের গোলা.... এসবই হাতির আকর্ষনের মল কারণ। সাথে বাড়তি পাওনা, ‘হাড়িয়া’, এই প্রকার দেশী পানীয়। কথায় বলে পেটের জ্বালা বড় জ্বালা। মাঝে মাঝে মনে হয় পৃথিবীতে অর্ধেক

অশান্তির কারণ আমাদের এই পেট। আমি শুধু মনুষ্য প্রজাতির কথা বরছি না সমগ্র প্রানীকূলের কথা বলছি। ক্ষমতার লড়াই হয়ত থাকত কিন্তু পেট বড় বিষম বস্তু।

যাইহোক ঘটনাস্থলে যখন পৌঁছালাম, দেখি গ্রামের মানুষজন প্রানের ভয়ে বাইরে বেরিয়ে এসেছে সপরিবারে। কারও হাতে টর্চ, কারো হাতে মশাল, লাঠি ইত্যাদি। ওদের হিসেবে আমাদের পৌঁছতে অনেক দেরী হয়েছে, সেই কারণে কিছু মধুর বচন শুনতে হল। তরে এসব ক্ষেত্রে দুটি কানের উপযুক্ত ব্যবহার করা ছাড়া কোন উপায় নেই। এখন প্রাথমিক কাজ হল হাতির দলটিকে যে ভাবেই হেক গ্রামের বাইরে বের করে নিয়ে যাওয়া যা যথেষ্ট কষ্টসাধ্য ব্যাপার। হাতির দলটি কয়েকটি উপদলে ভাগ হয়ে গ্রামের মধ্যে আছে। আমাদেরও হুলাদলের প্রায় আশিজন আর গ্রমেরই কিছু উৎসাহি মানুষ কয়েকটা দলে ভাগ হয়ে শুরু করলো হাতিকে গ্রামছাড়া করার প্রকৃয়া।

গভীর রাত। উন্মুক্ত তারকাক্ষচিত আকাশের নীচে আমি আর আমার কয়েকজন সহকর্মী দাড়িয়ে প্রয়োজনীয় নির্দেশ দিচ্ছি। জোনাকির ইতি উতি আলো আর ভয়ার্ত মানুষের চাপা গলার আওয়াজ রাতের গভীরতাকে করেছে আরো ঘন। মাঝে মাঝে ঐরাবতের বিদ্যুৎ খেলে যাচ্ছে রক্তে। আমাদের আসেপাশেই ঘটে যেতে পারে বড়সড় কোন অঘটন।

নিরলস প্রচেষ্টার ফল মিললো বেশ কিছুক্ষণ পরে। গ্রাম থেকে মাঠের দিকে বের করা গেল গোটা হাতির দলটিকে। টর্চের আলোয় বোঝা গেল ছোট বড় মিলিয়ে প্রায় পঞ্চান্ন-ষাটটা তো হবেই। হাতি বাহিনীর বোধহয় কিছুটা ক্ষুধা নিবৃত্তি হয়েছিল। তাই ওরাও বেশী অপেক্ষা না করে এগিয়ে চলল নিজেদের পথে নিজেদের মর্জিতে। কিন্তু সাধারণ মানুষের তো আর উৎসাহের শেষ নেই। অতিরিক্ত উৎসাহ অপ্রয়োজনীয় সাহস জোগায়। যা বিপদের একটি বড় কারণ। গ্রাম থেকে বেড়িয়ে গেছে হাতির দল। কিন্তু অগনত মানুষ আশেপাশের গ্রাম থেকে বেড়িয়ে হাতির পিছু নিয়েছে। শুধু পিছু নিয়েই ক্ষান্ত হয়নি তারা। রাগ আর মজার উপাদান মনে করে পিছন থেকে ইট, পাথরের আক্রমণ চলছে। এই অবস্থায় আমাদের ''ম্যান ম্যানেজমেন্ট'' করাটাই আসল পরীক্ষা। আনবরত মাইকে নিষেধ করা স্বত্ত্বেও কিছু মানুষের উৎসাহে কোন ঘাটতি নেই।

এইভাবে কিছুটা এগোনোর পর হঠাৎই পিছনের দুটো দাঁতাল ঘুরে গিয়ে ধেয়ে এল। ব্যাস বর পরের দৃশ্যটা যতটাই মজার ততটাই আতঙ্কের। গজ যুগলের সেই মুর্তি দেখে সেই উৎসাহী মানুষের দল যে দিকে পারলো প্রাণ বাঁচাতে প্রাণজন ছুট লাগালো। গভীর রাতে মশালের আলোয় সে এক অদ্ভুত দৃশ্য। হাতে টর্চ, মশাল নিয়ে যে যেদিকে পারছে দৌড়াচ্ছে। এই দৌড় জীবন বাঁচানোর দৌড়। ''লাইটনিং বোল্ট'' অর্থাৎ উসাইন বোল্ট বা আমাদের উড়ন্ত শিখ, মিলখা সিং এটা দেখলে বোধকরি বেশ তারিক করতেন। যাইহোক হাতিদের এই প্রতিআক্রমণ বেশকিছু উৎসাহী মানুষের উৎসাহে ভাটার সৃষ্টি করলো। সেটা আমাদের পে মঙ্গল হল। হুলা দলটিকে আমাদের কেবলমাত্র একটিই নির্দেশ ছিল, যেন কোনভাবে দলটি কোন লোকালয়ে প্রবেশ করতে না পারে। সময়ের সাথে হাত ধরে হাতির দল কখনো মুক্তো প্রান্তর, কখনো অরণ্য ইত্যাদি বিভিন্ন অঞ্চলের মধ্যদিয়ে এগিয়ে চলেছে। পেছনে আমরা। যেন ওরাই আমাদের পথ দেখিয়ে নিয়ে যাচ্ছে। সে পথ অজানা, অচেনা, বন্ধুর। দীর্ঘ যাত্রাপথের শেষ অবশেষে পুরো দলটি মানিক পাড়া বনাঞ্চল পেরিয়ে পার্শ্ববর্তী একটি বনাঞ্চলে প্রবেশ করলো নতুন ঠিকানার সন্ধানে। উফঃ..... হাঁফ ছেড়ে যেন বাঁচলাম। ঘড়িতে তখন ভোর সারে চারটে। ইশান কোণে হালকা রং ধরেছে। আকাশের তারা আমাদের দিকে তাকিয়ে মিটিমিটি হাসছে আর যেন বলছে, আবার রাতে দেখা হবে।

সারারাত হেঁটে সবাই বড় ক্লান্ত। ছয় নম্বর জাতীয় সড়ক ধরে ফেরার পথে একটা দোকানে ঘুম থেকে মালিককে তুলে চা বানাতে বলা হল। হতভম্ব দোকানমালিক মুখে একরাশ বিরক্তি নিয়ে সবার জন্য চা-বানাতে বসল। যতই হেক খদ্দের হল লক্ষ্মী আর লক্ষ্মীর সংখ্যাটা নেহাত কম নয়। ভোরের আলোয় গরম চায়ের ভাঁড়ে চুমিক দিতেই সারা রাতের ক্লান্ত যেন এক নিমেশে কোথায় পালিয়ে গেল। নতুন উদ্দেশ্যে শুরু হল অরেকটা নতুন দিন। হুলাদলের সদস্যদের বিদায় জানিয়ে রওনা দিলাম নিজের গন্তব্যস্থল, মানিকপাড়া রেঞ্জ অফিস। গাড়ীতে হেলান দিয়ে বসে আছি। গাড়ী ছুটছে রাস্তা দিয়ে। ভোরের মিঠি বাতাস চোখে, মুখে আদর করে দিয়ে যাচ্ছে। একটু অন্যমনস্ক হয়ে গেছিলাম। পাশে বসা চালক আমাকে ডেকে বলল, ''সামনে দেখুন বাবু''। আমি তাকিয়ে দেখি বিশাল এক গডরাজ আমাদের গাড়ী থেকে কিঠুটা তফাতে রাস্তা জুরে দাঁড়িয়ে। আমাদের দেখে শূন্যে শুঁড় তুলে প্রবল হুঙ্কারে ভোরের নিস্তব্ধতাকে খান খান করে দিল। যেন বলল, স্বাগতম্ আমাদের রাজত্বে। আর আমি মনে মনে ভাবলাম, হাতীর রাজত্বে হাতীর থেকে মুক্তি পাওয়ার চিন্তা নিতান্তই মুর্খামী। তাই আমাদের মুক্তির প্রচেষ্ঠা কবির ভাষায় ''শেষ হয়েও হইলনা শেষ।'' বারংবার হুঙ্কার দিয়ে যাবার আগে সে যেন বলে গেল -আমি ছিলাম, আমি আছি, আমি থাকবো। ইতি গজ।

পূজোর গন্ধ

বিজয় চক্রবর্তী
বনাঞ্চল আধিকারিক

বনবিবির কৃপায় টিকে আছি। জীবন-জীবিকা বেঁচে আছে। শুধু মাঝে মাঝে মন খারাপ করে। গহীন অরণ্যে একলা দুকলা গল্প সময় কাটে না।

কানের কাছে খোলা থাকে আর টি সেটা ঠিক সময়ে রিপোর্টিং হয়। বিভিন্ন ক্যম্প থেকে আসে পরিচিত সহকর্মীর গলা। মনে পড়ে মুখটি। নুতন কেউ জয়েন করলে জানতে উচ্ছা করে কোথাকার!

শুধু তোমার দেখা পেলে দিনটি খুশি খুশি হয়ে ওঠে। কালিন্দী রিপোর্টিং বিগবস... ওয়ান টাইগার, মেল, ডাইরেক্ট সাইটিং বাই নিখিল নিয়োগী, সকাল ৭ টা।

আনন্দে গর্বে ভরে ওঠে মন। আর টির সামনে যারা আছে শুনলো আমার নাম।

তবে মন খারাপের গভীরতা বাড়ে বছরের মাঝখানে।

ঝকঝকে শরৎ সন্ধ্যায় পেজা পেজা তুলোর মতো মেঘের মাঝখান থেকে রক্তবর্ণা সূর্যরশ্মি যখন মাতলার জলে ঝিলিমিলি করে, চোখের কোনে জমা এক বিন্দু অশ্রু টলমল করে।

বন্য টিয়ার দল ঘরে ফিরে চলে, মাছরাঙা ঝপ্ করে মাছ ধরে শুকনো পশুর গাছের ডাল টিতে বসে।

মাছরাঙা মাছ খায়, মাছ জীবন দিয়ে বাঁচায় একটি প্রাণ। মাছে আমাতে মিল খুজে পাই, আমার চোখ বেয়ে আসা অশ্রুধারা ঠোঁট স্পর্শ করে।

নোনা স্বাদে সম্বিত ফিরে আসে।

আশ্বিনের ঢাকের বাদ্যি বাজার আওয়াজ এতদুর পৌঁছায় না। বাড়ি যাওয়া হচ্ছে না....

নারান ছুটি পেয়েছ, আমার টা হয় নি।

বোট এসে পড়ে ক্যাম্পে। নারানের সাথে ওঠে পড়ি। নারানকে নামিয়ে দি ঘাটে, ট্রেনে করে ও পৌঁছে যাবে পলাশবনী, ছোট্ট সে গায়ে পথ চেয়ে বসে আছে ওর রাণী।

চোখের আড়াল না হওয়া পর্যন্ত নিস্পলক তাকিয়ে থাকি। ওর বাড়ি যাওয়া আমার অনুভূতিকে গ্রাস করে। চিকচিক করে চোখ।

ফিরে চলি। নোনা জলে.... আমাদের দ্বীপ টির দিকে...

মনে হয় যুদ্ধে পরাজিত সৈনিক আমি, সেন্ট হেলেনায় নির্বাসিত।

দু'দিন পর।

আজ সপ্তমী। এই নদীটি মাতলা। বিস্তৃত জলরাশি। ঘোলা। দুরে গুড় গুড় ঢাক বাজছে। ঢাকের ছন্দে আন্দোলিত হচ্ছে আমার দেহ মন।

সূর্য অস্তমিত। নদীর ওপারে অন্ধকার আকাশে দুরে আলের আভা, ওখানেই হচ্ছে দেবী আরাধনা। সন্ধ্যারতির ঢাকের মৃদু শন্দ যাচ্ছে শোনা।

ঢাকের এই শব্দ শোনার জন্যই দু ঘন্টা বোট চালিয়ে এদিকে আসা। একটু বেশী ওভার ডিউটি করা।

বিশুবাবু বোটটা নিয়ে একটু এগিয়ে চলুন..

ওদিকটায়...।

ঠিক আছে....,

ওরে পটলা নোঙর ফেল।

আজ এখানেই নাইট হল্ট।।।।

ঝড়

বিজয় চক্রবর্তী
বনাঞ্চল আধিকারিক

নরব নিকষ অন্ধকার। চারিদিকে অথৈ জলে। একটু আগের 'চাঁদের নরম রুপালী' আলোয় এক অসম্ভব মায়াবী পরিবেশ নিমেশেই বদলে গিয়ে এখন চরম আতঙ্কের বাতাবরণ।

উত্তরের সামান্য একটুকরো মেঘ এতদ্রুত বিস্তারলাভ করে সারা আকাশ ছেয়ে ফেলতে পারে তা কল্পনার বাইরে।

বর্ষার প্রারম্ভ। হরিখালি ফরেস্ট ক্যাম্পের কাছের মাঝারি খালে আমাদের আস্তানা। সারাদিনের অক্লান্ত খোঁজাখুজির পর যে যার বোটে সাময়িক বিশ্রাম নিয়ে আমরা পুনরায় বেরিয়ে পড়লাম 'অপারেশন ঘোস্ট ক্র্যাব'

রাত ১২.২০ এ. এম.। স্পিডবোটে ড্রাইভার সহ চারজন। দুটি রাইফেল, ওয়াকি-টকি, জলের বোতল সার্চ লাইট। দুপাশে ঘন ম্যানগ্রোভ। বিস্তৃত খাল। সুবিস্তৃত জলরাশি। স্পিডবোটের একটানা জল কেটে চলার শব্দ ছাড়া কিছুই শোনা যায় না। তবুও মন ভরে ওঠে।

রুপোলী চন্দ্রালোকের ছটায়। তরল রূপার পাত্র চিরে তোমাদের বোট এগিয়ে চলে। ইঞ্জিনের পঙ্খ ঘর্ষমে পাত্র উপচে তরল ছিটিয়ে পড়ে। এ এক মোহময়ী পরিবেশ। অজানা পুলকে মন ভরে ওঠে। ধন্যপাদ জানাই সেই মহামহিম কে। যার কৃপাদৃষ্টিতে সুন্দরবনের এই গহীন অরণ্যের নোনা বাতাস আমার শরীর মনকে ধুয়ে দিচ্ছে।

ভাবে তলিয়ে গেছিলাম। সম্বিত ফিরে পেলাম সামনে দুরে কোথাও আলোর ঝলকানিতে। বজ্রনির্ঘোষ। চাঁদের আলো তখনও অমলিন।

স্পিটবোট এগিয়ে চলল। খাল, ভারানি, দুয়ানি পেরিয়ে অনেকটা চলে এসেছি আমরা। চাঁদের আলো এখন অনেকটা ম্লান। উত্তরে মেঘের হাতছানি....!!!

স্পিট বোট এগিয়ে চলেছে। সামনে বাঁক। পেরোতেই, একি!!! বিস্তৃত বিশাল নিকষ কালো মেঘপুঞ্জ। প্রহ্লাদ বলল খাইছে! এ যে ঝড়ের মেঘ!!!

ছোট উত্তুরে মেঘ, বহরে বেড়েছে এখন।

এনেছে ডেকে মৃত্যুর শমন।

এই সময় এই অঞ্চলে আবহাওয়ার দ্রুত পরিবর্তন হয়। তবে এত দ্রুত!!!! আলেয়ার আতঙ্ক এই অঞ্চলের অনেকের মনে বাসা বেঁধে আছে। মেঘের ব্যস্ততা আমাদের মনে সেই আতঙ্ক কে বাড়িয়ে তুলল। লোকালয় বহুদূর। জলরাশি আ-দিগন্ত, অথৈ।

সরাসরি সংঘাতে স্পিডবোট উড়ে যাবে খড়কুটোর মতো। সাঁতরে পাড়ে উঠলেও (যদিও সে সম্ভাবনা কম, কারণ কুমীর, কামটের সঙ্গে আর বন্ধুত্ব এখনো হয়নি) ওৎ পেতে আছেন তিনি। বাঘমামা। তাছাড়া এই অঞ্চলে মানুষ আসে না। যদিও বা আসে কিছু জেলে, তাও ১৫ জুন পর্যন্ত নিষেধাজ্ঞার কারনে আসবে না। ততদিন নিশ্চয়..

এবার মনে বড় ভক্তির উদয় হল। বারবার কপালে হাত ঠেকালাম। জয় বাবা লোকনাথ, তুমি বলেছিলে, জলে জঙ্গলে যেখানে বিপদে পড়িবে রক্ষা করবে। বিপদে মোরে রক্ষা কর বাবা। মা বনবিবি, দখনি রায় সবাই কে স্মরণ কললাম।

আর কাউকে ডাকাডাকি উচিত কিনা মনে এল না। ভয় কমল না। ইতিমধ্যে হাওয়া ও ঢেউ প্রবল বেগে আছড়ে পড়ল এই ক্ষুদ্র জ লযানে। ভেসে যাচ্ছিলাম। চালক সহসা হাওয়ার গতিকে কাজে লাগিয়ে অপর পাড়ে ঝোপের আড়ালে বোট বেঁধে ফেলল।

প্রবল বেগে শ্ শ্ বাতাস বইতে লাগল। উথাল-পাথাল ঢেউ উঠল নদীতে। মোচার খোলার মত ভাসতে লাগল আমাদের জলযান। অপর পাড়ে তখন ঝড়ের প্রবল পরাক্রম। এপাড়ে, মাতৃক্রোড়ে যেনম শিশু আশ্রয় নেয়, তেমন ভাবে গরান, কেওড়া, বাইনের কোলে আত্মসমর্পণ করেছি। গরানের গোড়ায় আমাদের স্পিডবোট বাঁধা। একবার ঐ মূল উৎপাটিত হলে কোথায় ভেসে যাব ঠিক নেই। সামনে বড় নদী, চলেছে সাগর-পানে। এ এক অন্তহীন মুহূর্ত। অসহনীয় ভয়।

ভয় থেকেই আসে ভক্তি। ভক্তি ও অসহয়তার মোড়কে জন্ম নেয় দেব-দেবী। এই সেই অঞ্চল যেখানে সব ধর্মের গোড়ামী প্রকৃতির কাছে আত্মসমর্পণ করে। প্রকৃতির অসীমতার কাছে মানুষ নত হয়। বিপদ-অসহায়তা ছিন্ন করে জাতি-ধর্মের বেড়াজাল। তাই তো এখানে হিন্দু-মুসলিম সবাই মূর্তি পূজা করে। পূজা করে প্রকৃতি স্বরূপা বনবিবির। তাঁর কৃপাতেই বেঁচে ফেরে বারংবার।

বনবিবির কৃপাতে এ যাত্রা মনে হয় বেঁচে গেলাম। ঝড় থেমে গেছে। গরান গাছ থেকে দড়ি খোলা হচ্ছে। এতসময়ে সম্বিত ফিরে পেলাম। অন্যদের কথা মনে এল। আমাদের অন্য টিমগুলি। তাদের অবস্হা।

.....ফাইভ ওয়ান মোবাইল, কলিং ফাইভ থ্রি,.....ফাই ওয়ান মোবাইল, কলিং ফাইভ ফোর.....নো রেসপন্স।

গলা কাপছে,.....ঝড়ের পরের শান্ত শীতল পরিবেশে ও দেহে ঘাম দেখা দিচ্ছে। ঝড়ের বেগে ছুটে চলেছে স্পিডবোট, যেদিকে বড়নদী... ওদিকেই বেরোনোর কথা ছিল অন্য টিমগুলির....

‘‘বন্দেমাতরম’’

পূরবী মাহাতো,
সহ বনাধিকারিক,
মেদিনীপুর বনবিভাগ।

মা,

পত্রে আমার প্রনাম নিও। আজ (০৪০৮২০১৭) সকাল থেকে কিছু খেতে পাইনি মা। এই তো- মাত্র ৫০০ মিটার দূরে তুমি পড়ে আছো। জল আর কাদার মধ্যে। থেকে থেকে শুনতে পাচ্ছি তোমার গোঙানি। আমি যাচ্ছি আর দাদা কান টেনে ধরছে। তোমার কাছে যেতে দিচ্ছে না। এখন সকাল হয়ে গেছে। শয়ে শয়ে লোক তোমাকে ঘিরে ফেলেছে। ছোটো পেলিয়ার সরু মেঠো জঙ্গলগামী পথে কাতারে কাতারে লোক! ঝরঝর বৃষ্টি! কত কৌতুহল!

তোমার মানে আছে! তুমি বলতে এই মেদিনীপুরেই আমার মাতৃভুমি। রূপনারায়ন বিভাগের পাথরিসোল বীট এ জন্মেছি। তার পর হাঁটি হাঁটি পা পা। বাকুঁড়া গেলাম। কখনো হেঁটে, কখনো তোমাদের শুঁড়ে দোল খেতে খেতে। আবার ফিরলাম সেই পাথরিসোলে। ঘুরে ঘুরে রূপনারায়ন পেরিয়ে, ১০ তারিখে লাল গড়ের জঙ্গলে ঢুকে পড়লাম। হি হি কি মজা। কি আনন্দ। নতুন নতুন আর. ডি.এফ. করা জঙ্গল গুলো তে কি সুন্দর তোমার, কাকার, ঠাকুমার বড়ো বড়ো বোডি গুলো লুকিয়ে যাচ্ছে। তুমি কত গল্প বলেছো। লালগড়ের জঙ্গল! কাঠি পড়লে ঢেঁকি, আর পাতা পড়লে কুলো। কত মানুষের সংগ্রাম।

হো হো হো---, হাঁসতে হাঁসতে আমার পেট ছিড়ে যাচ্ছে। মোড়ের মুখে দাড়িয়ে আছে কে গা? লালগড় বিডিও অফিসের তেমাথাতে। একদম আমার কাঁদ বরাবর। হুবুহু আমারি মত দেখতে। আমারি বয়সের হবে। ফোটো দেখবে?? -এই --এই --আমার সাথে খেলবি। উ! আবার দাদা কান মলা দেই।সব সময় আমার কান ছিঁড়া বনধ করতে পারিস না। আরে ওটা মানুষের দেবতা! একদম ছুবি না। এমন হুলার ছেঁকা দেবে বাবার নাম ভুলে যাবি। মানুষের কাছে আমরা ঠাকুর। গ্রামের শেষে, জঙ্গলের গোড়াতে, বোড়ো গাছের

তলাই আমাদের মঙ্গল মূর্তি গড়ে আমাদের পূজো করে। শ্রীলক্ষী প্রাপ্তি যোগের আশীর্বাদ লাভ করে। কিন্তু মনে রাখিস আমরা নয় আমাদের মূর্তি। বাও! মানুষেরা কি ভাল রে দাদা।

আসছি মা। তোমার গোঙানি আমি সইতে পারছি না। ছাড় না দাদা। আমায় যেতে দে। মা যন্ত্রনাতে কাতরাচ্ছে। দেখো মা, দাদা আমায় ঘাস খেতে বলছে। বলছে কচি পাতা খা। ডকা গাছের ছাল খা। আজ থেকে ওদের মতো আমাকেও ডাল, পাতা আর ঘাস খেয়ে থাকতে বলছে। উ! মাগো আমি যে মরে যাব। আমি যে কিছু খেতেই শিখিনি মা। বরঞ্চ না খেয়েই থাকি।

চুপ! চুপ! দাদা সব চুপ করে যা! ডি এফ ও আসছেন! এ ডি এফ ও, রেঞ্জারসাহেব, বীট বাবু, সব ফরেস্টার বাবু। ডাক্তার বাবু। ঘুম পাড়ানি বন্দুক বালা পাশের রেঞ্জের ভঞ্জবাবুও এসেছেন। এবার কিছু একটা হবে মা। হে ভগবান আমার মা চাই। আর কখনো গ্রামে আসবো না ঠাকুর। আমরা অবলা জীব। ঘুরতে ঘুরতে ঢুকে পড়েছি। এত বড়ো শাস্তি দিও না ঠাকুর। আমার মা চাই।কি হলো মা? ওটা প্রাণী বন্ধু ইনজেকশন দিচ্ছে।একটু কষ্ট করো। ইস, ওরা বলছে তোমার শুঁড় পুড়ে গেছে। ভেতর টাও নাকি জ্বলে গেছে। দাদা একটু ছেড়ে দে আমায়। আমি দেখিয়ে দিয়ে আসে কোথায় কিভাবে তার গুলো বাঁধা ছিল।

মাগো দুদিন পেরিয়ে গেলো। কাকী আমাকে ঘাড় ধরে খাস জঙ্গলে -৬৮৮ তে নিয়ে এলো। দাদার চোখে দেখলাম জল। ঝিটকার আকাশে দেখলাম ধুঁয়ো। লালগড় থেকে পালিয়ে রামগড়ে এলাম। ১৫ আগষ্ট। আর মাত্র কয়েক টা দিন বাকি। আমি যে আর হাঁটতেও পারছি না। আমি অনেক রোগা হয়ে গেছি। জানি না তুমি চিনতে পারবে কিনা। আমার গলা শুকে যাই মা। কার যেন গল্প বলেছিলে, মানুষের ছোট্ট শিশু। সহিদ ক্ষুদিরাম। দেশ মায়ের জন্য দিয়ে গেছেন প্রান। আমিও দেবো। আমার মায়ের জন্য। হে ভারত জননী! এ দেশ তোমার আমার। মানুষের উন্নয়নের জন্য স্থাপিত ইলেকট্রিক তার যদি আমাদের ধ্বংশের জন্য ব্যবহৃত হয়, আমি উপড়ে দেবো।দাদা সরে যা আমি তারে টান দেবো- মা--আ---আ---আ---

এসেছি মা। সহিদ হয়ে চলে এলাম। তোমার কোলে একটু মাথা রাখি। কি শান্তি! শুনতে পাচ্ছি রাখালের বাঁশি। --''সবকো সুমতি দে ভগবান''। মা মঙ্গলচন্ডী। হাতি মানুষের লড়াইয়ের বিভীষিকা মুক্ত করো মা। একটা অভয়ারন্য বরাদ্দ করো। ''ব-ন-দে-মা-ত-র-ম------

ইতি ''রুনু''

Aerial View of Sundarban

Larvae of *Hyblaea purea*

A BRIEF NOTE ON MOTH DIVERSITY IN SUNDARBAN BIOSPHERE RESERVE WITH SPECIAL REFERENCE TO THEIR CHANGE IN HOST PREFERENCES FROM NON-MANGROVE TO MANGROVES

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Among the 17 Biosphere reserves in India, Sundarban Biosphere Reserve (SBR) is unique for its most extensive mangrove forest in the world, existing in a vast deltaic regions where fresh water and salt water mix. Sundarban mangrove forests, a continuous landmass expanded over both India and Bangladesh is considered to be one of the most biodiverse but threatened region of the world. More than half of the mangrove forest (around 60%) lies in the Bangladesh and the rest (40%) in the West Bengal (India). The Indian Sundarban Delta spread over about 9,630 sq. km and lies between 21 °40'04" N and 22 °09'21" N latitude, and 88 °01'56" E and 89°06'01" E longitude. Mangroves are one of the dynamic ecosystems that harbour a variety of organisms of which insects play a major role that influences the growth and survival of mangrove. Near total inter-dependence in phyto-entomon relationship, on this extremely versatile but

fragile eco-surface, has brought about co-evolution that ensured emergence of innumerable varieties and variabilities amongst the insects. In comparison to insect faunal diversity of other mangroves in India insect faunal diversity is much more in the Indian part of Sundarban.The knowledge of insect faunal diversity of the Sundarban Biosphere Reserve (SBR) is very recent. Amongst the insects the moths plays a great role in the mangrove eco-system.

Insect diversity in Sundarban Biosphere Reserve:

Probably, the first attention was drawn on the insects and Diptera in particular from Sundarban by Chatterjee in the year 1907. Subsequently, contributors like, Sarangi (1983), Maiti and Nandy (1985), Ray and Choudhury (1985), Choudhury (1986), Ray and Choudhury (1986), Poddar and Choudhury (1986), Nandi and Misra (1987), Mandal and Nandi (1989) Roy and Choudhury (1991), Mukherjee (1993), Ghosh & Ghosh (1994), Bal and Basu (1994), Biswas et al., (1994 a, b, c), Ghosh et al., (1994), Agarwal and Ghose (1995), Bhattacharyya et al., (2002), Mitra et al., (2003), Rajavel et al., (2005) were enriched the insect fauna of this mangrove deltaic islands. Moreover, in recent times Mitra and Mitra (2009), Narendran and Kumar (2009), Sharma (2012), Mitra (2013), Kumar et al. (2014), Ghosh and Mitra (2014), Hassan and Biswas (2014), Mitra (2014), Mitra et al., (2014), Mitra et al., (2015a,b,c) and Biswas et al. (2016 a; 2016b; 2017a and 2017b) have also been contributed several research papers on insect faunal diversity of the SBR of West Bengal.

Latest communication by Mitra et al,2017 reports 753 species, under 506 genera of 129 families belonging to 12 orders of insects from the SBR (Table-1). Of them, highest number of species and genera are reported from the order Lepidoptera (table-1). Whereas, order Diptera is having highest number of families in this Biosphere reserve (table-1). The insect orders, families, genera and species reported from Sundarban Biosphere Reserve have been arranged alphabetically in this communication

TABLE:1 Insect Faunal Diversity in SBR

SL No.	Order	Family	Genus	Species
1	Blattodea	4	6	9
2	Coleoptera	18	73	124
3	Dermaptera	5	8	8
4	Diptera	26	77	162
5	Hemiptera	25	60	70
6	Hymenoptera	11	57	95
7	**Lepidoptera**	**24**	**61**	**210**
8	Neuroptera	3	5	6
9	Odonata	3	23	27
10	Orthoptera	7	32	38
11	Pthiraptera	2	2	2
12	Thysanoptera	1	2	2
	TOTAL	**129**	**506**	**753**

Moth diversity in SBR:

Among the 12 orders of insects reported from this Biosphere Reserve, the highest number of species and genera are reported from the order Lepidoptera. Butterflies and moths under order Lepidoptera are probably the most popular group of Insects due to their attractive colouration, large and conspicuous size of adults, pupae and larvae or caterpillars. The knowledge on moth fauna of SBR is still scarce. Recently, Kumar et al. (2014), Mitra et al. (2014) and Biswas et al. (2016 a; 2016b; 2017a and 2017b) have contributed manifold to the existing knowledge on Lepidoptera fauna of SBR. Overall number of moth species including earlier published records and present record from SBR becomes 95 (Mitra, 2017). (Table-2)

Table-2: Moth diversity in SBR

Sl. No.	SPECIES	FAMILY
1	*Azygophleps scalaris*(Fabricius, 1775)	**Cossidae**
2	*Zeuzera coffeae*(Nietner, 1861)	**Cossidae**
3	*Zeuzera conferta*Walker, 1856	**Cossidae**
4	*Botyodes asialis*Guenée, 1854	**Crambidae**
5	*Cnaphalocrocis medinalis*(Guenee, 1854)	**Crambidae**
6	*Cnaphalocrocis trapezalis*Guenée, 1854	**Crambidae**
7	*Cryptographi sindica*(Saunders, 1851)	**Crambidae**
8	*Dolicharthria punctalis*(Denis &Schiffermüller, 1775)	**Crambidae**
9	*Hymenoptychis sordida* (Zeller, 1852)	**Crambidae**
10	*Leucinodes orbonalis*Guenée, 1854	**Crambidae**
11	*Nymphula responsalis*(Walker, 1865)	**Crambidae**
12	*Parapoynx diminutalis*(Snellen, 1880)	**Crambidae**
13	*Parapoynx fluctuosalis*(Zeller, 1852)	**Crambidae**
14	*Pycnarmon abraxalis*Walker, 1866	**Crambidae**
15	*Ramila sundarbanensis* Biswas, Shah, Modak & Mitra, 2017	**Crambidae**
16	*Sameodes cancellalis*(Zeller, 1852)	**Crambidae**
17	*Scirpophaga bisignatus*Swinhoe, 1885	**Crambidae**
18	*Scirpophaga incertulas*(Walker, 1863)	**Crambidae**
19	*Scirpophaga nivella*(Fabricius, 1794)	**Crambidae**
20	*Spoladea recurvalis*Fabricius, 1775	**Crambidae**
21	*Syngamia abruptalis*(Walker, 1859)	**Crambidae**
22	*Tetridia caletoralis*(Walker, 1859)	**Crambidae**
23	*Ausaris argenteola*(Moore, 1858)	**Drepanidae**
24	*Achaea janata*(Linnaeus, 1758)	**Erebidae**
25	*Achaea serva*(Fabricius, 1775)	**Erebidae**
26	*Agyllaremelana*(Moore, 1865)	**Erebidae**
27	*Amata cyssea*(Stoll, 1782)	**Erebidae**
28	*Amata passalis*(Fabricius)	**Erebidae**
29	*Amerila eugenia*(Fabricius, 1794)	**Erebidae**
30	*Amsacta emittens*Walker, 1855	**Erebidae**
31	*Amsacta lineola*(Fabricius, 1793)	**Erebidae**
32	*Anua coronata* (Fabricius, 1775)	**Erebidae**
33	*Arctornis submarginata*(Walker, 1855)	**Erebidae**
34	*Argina astrea*(Drury, 1773)	**Erebidae**
35	*Artena dotata*Fabricius, 1794	**Erebidae**
36	*Asota ficus* (Fabricius, 1775)	**Erebidae**
37	*Asota producta*(Butler, 1875)	**Erebidae**
38	*Asura undulosa*(Walker, 1854)	**Erebidae**
39	*Brunia antica*(Walker, 1854)	**Erebidae**

Sl. No.	SPECIES	FAMILY
40	*Caeneressa diaphana*(Kollar, 1844)	**Erebidae**
41	*Ceryx godartii*(Boisduval, 1829)	**Erebidae**
42	*Creatonotos gangis*(Linnaeus, 1763)	**Erebidae**
43	*Creatonotos transiens*(Walker, 1855)	**Erebidae**
44	*Ericeia inangulata*(Guenee, 1852)	**Erebidae**
45	*Eressa discinota* Moore	**Erebidae**
46	*Eudocima hypermnestra*(Cramer, 1780)	**Erebidae**
47	*Eudocima materna*(Linnaeus, 1767)	**Erebidae**
48	*Grammodes geometrica*(Fabricius, 1775)	**Erebidae**
49	*Hamodes propitia* (Guerin, 1830)	**Erebidae**
50	*Homode scrocea* Guenée, 1852	**Erebidae**
51	*Hulodes caranea*(Cramer, [1780])	**Erebidae**
52	*Ischyja marapok* Holloway, 2005	**Erebidae**
53	*Mocis frugalis*(Fabricius, 1775)	**Erebidae**
54	*Orgyia postica*(Walker, 1855)	**Erebidae**
55	*Psichotoe duvauceli*Boisduval, 1829	**Erebidae**
56	*Spilosoma obliqua*Walker, 1855	**Erebidae**
57	*Spirama retorta*(Clerck, 1764)	**Erebidae**
58	*Thyas honesta*(Hübner, 1806)	**Erebidae**
59	*Trigonodes hyppasia*(Cramer, [1779])	**Erebidae**
60	*Utetheis alotrix*(Cramer, 1779)	**Erebidae**
61	*Utetheisa pulchella*(Linnaeus, 1758)	**Erebidae**
62	*Eupterotehi bisci* (Fabricius, 1775)	**Eupterotidae**
63	*Agathia lycaenaria*(Kollar, 1844)	**Geometridae**
64	*Cleora determinate* Walker, 1860	**Geometridae**
65	*Cleora injectaria*(Walker, 1860)	**Geometridae**
66	*Gonodontis clelia* (Cramer, 1780)	**Geometridae**
67	*Hyposidra talaca*(Walker, 1860)	**Geometridae**
68	*Timandra correspondens*Hampson, 1895	**Geometridae**
69	*Hyblaea puera* (Cramer, 1777)	**Hyblaeidae**
70	*Kunugia latipennis*(Walker, 1855)	**Lasiocampidae**
71	*Streblote siva* Lefebvre, 1827	**Lasiocampidae**
72	*Altha nivea*Walker, 1862	**Limacodidae**
73	*Thosea cana*Walker, 1865	**Limacodidae**
74	*Thosea tripartita*Moore, 1884	**Limacodidae**
75	*Aucha velans*(Walker, 1857)	**Noctuidae**
76	*Chasmina candida* (Walker, 1865)	**Noctuidae**
77	*Leucania compta*(Moore, 1881)	**Noctuidae**
78	*Lophoptera costata*(Moore, 1885)	**Noctuidae**
79	*Paectes subapicalis*(Walker, [1858])	**Noctuidae**

Sl. No.	SPECIES	FAMILY
80	*Prospalta dolorosa* (Walker, 1865)	**Noctuidae**
81	*Spodoptera litura*(Fabricius, 1775)	**Noctuidae**
82	*Gadirth apulchra*(Butler, 1886)	**Nolidae**
83	*Norraca longipennis*Moore, 1881	**Notodontidae**
84	*Eumeta crameri* (Westwood, 1854)	**Psychidae**
85	*Canthelea oegnusalis*(Walker, 1859)	**Pyralidae**
86	*Herculia marthalis*(Walker, 1859)	**Pyralidae**
87	*Hypsipyla robusta* (Moore, 1886)	**Pyralidae**
88	*Acherontia lachesis*(Fabricius, 1798)	**Sphingidae**
89	*Hippotion celerio* (Linnaeus, 1758)	**Sphingidae**
90	*Theretra latreillii*(MacLeay, [1826])	**Sphingidae**
91	*Theretra silhetensis* (Walker, 1856)	**Sphingidae**
92	*Actias selene*(Hubner, 1806)	**Saturniidae**
93	*Antheraea paphia* Linnaeus, 1758	**Saturniidae**
94	*Micronia aculeata*Guenée, 1857	**Uraniidae**
95	*Thyrassia subcordata*Walker, 1854	**Zygaenidae**

Mangroves as host for moths having pest status in Agriculture:

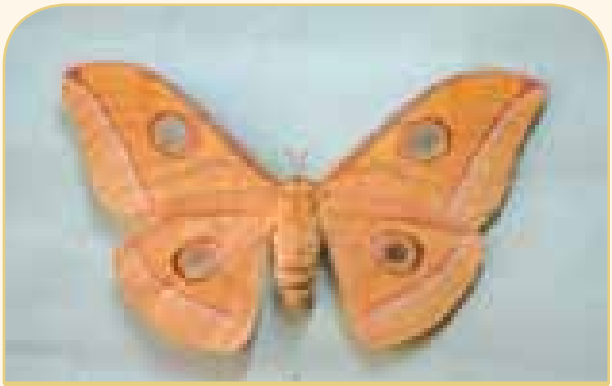
Changing environment demands organisms to change in order to survive. Organisms respond to their environments by making different types of adaptations. Adaptations are essentially a product of natural selection. As populations are subjected to vagaries of climate,the genetic characteristics that are well suited to the environment are selected.Insects are found in a wide range of environment experiencing extremes of biotic as well as abiotic factors. To survive the environmental extremes, to escape or alleviate adversities of environment, insects have evolved a number of physiological, behavioural and morphological adaptations. While many other groups, such as dinosaurs, were affected by mass extinction events, insects seem to have sailed on regardless. Because they have adapted to virtually every terrestrial environment, many insect groups survive extinctions and then diversify by quickly adapting to new situations and opportunities that appear after such biodiversity crises. In many ways evolution is a numbers game, and the large population sizes of many insects mean that there is a good chance that favourable mutations will arise somewhere, sometime that allow insects to exploit new situations quickly.

Several moth species which are considered as major pests in agriculture and agro-forestry are now found in mangroves of SBR. It seems that they may have adapted in mangrove ecosystem and changed their food habits. Recently Biswas et al (2016) conducted a study in SBR reported twenty five (25) species of moths which are recognised pests of different agriculturally important plants of India. (TABLE-3)

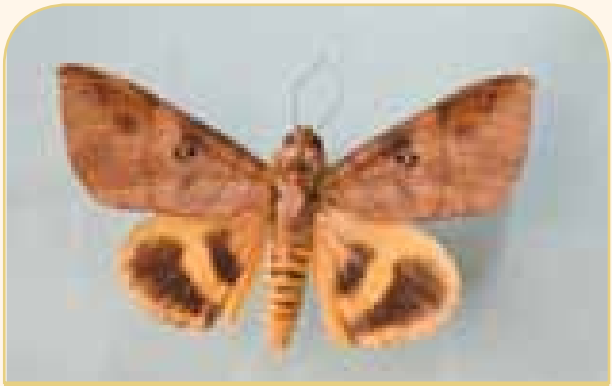
Infestation of *Hyblaea purea*

Acherontia lachesis (Female)

Altha nivea (Male Black)

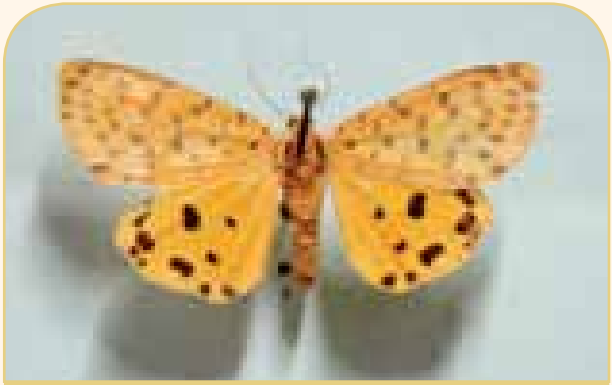


Antheraea paphia



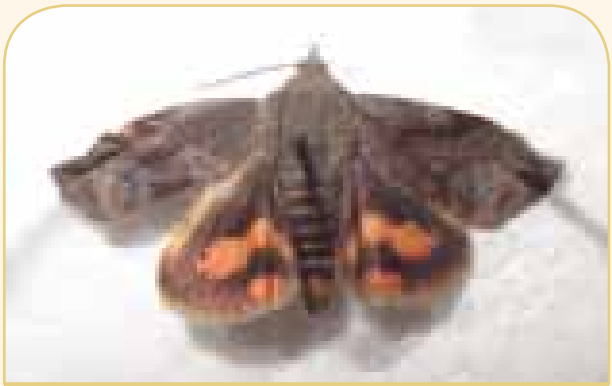
Anua coronata

Creatonotos gangis



Argina astrea

Amata passalis



hyblaea purea

Hippotion celerio

Eupterote hibisci

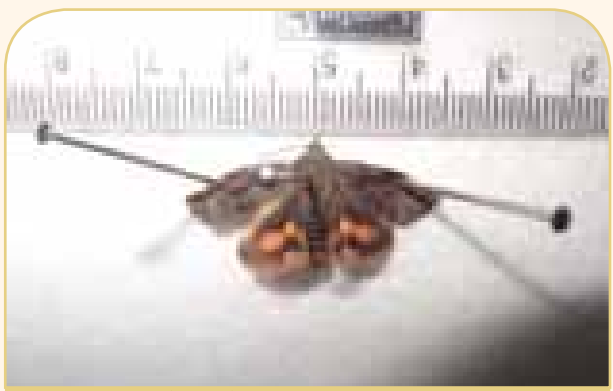
Hymenoptychis sordida (Male)

Hypsipyla robusta NZC (Female)

Syngamia abruptalis

Spodoptera litura (Female)

Theretra silhetensis (Female)



Hyblaea purea (Adult)

TABLE:3 List of moths found in mangrove which are recognised pest in agriculture:

Sl. No.	Name of Insect Pest	Family	Crops
1.	*Amata passalis* (Fabricius)	Arctiidae	Cow pea, Mulberry, Fenugreek, Mulberry, caster, Redgram, sunflower, ornamental plants, Turmeric
2.	*Argina astrea* (Drury, 1773)	Arctiidae	Tea
3.	*Ceryx godartii* (Boisduval, 1829)	Arctiidae	Mulberry and *Sorghum sp.*
4.	*Creatonotos gangis* (Linnaeus, 1763)	Arctiidae	Sweet Potato, Turmeric and Tea.
5.	*Spilosoma obliqua* Walker, 1855	Arctiidae	Sweet Potato, Potato, Cowpea, garden pea, Beans, Radish, Yam, Fenugreek, Turmeric, Castor, Jute, Black gram, Groundnut , *Cannabis* sp, Soybean, Cauliflower etc.
6.	*Utetheisa lotrix* (Cramer, 1779)	Arctiidae	*Crotalaria júncea*
7.	*Utetheisa pulchella* (Linnaeus, 1758)	Arctiidae	Sunn hem, *Heliotropium sp.*
8.	*Cnaphalocrocis medinalis* (Guenee, 1854)	Crambidae	Rice
9.	*Cryptographis indica* (Saunders, 1851)	Crambidae	All Cucurbitaceous plants, Cotton
10.	*Hymenoptychis sordida* (Zeller, 1852)	Crambidae	Fruit borer of *Heritiera sp.*
11.	*Parapoynx diminutalis* (Snellen, 1880)	Crambidae	*Nymphoides cristatum*
12.	*Scirpophaga incertulas* (Walker, 1863)	Crambidae	Paddy
13.	*Syngamia abruptalis* (Walker, 1859)	Crambidae	Sweet basil (*Ocimum basilicum*)
14.	*Eupterote hibisci* (Fabricius, 1775)	Crambidae	Drumsticks
15.	*Altha nivea* Walker, 1862	Limacodidae	*Costus speciosus*
16.	*Thosea cana* Walker, 1865	Limacodidae	Tea
17.	*Anua coronata* (Fabricius, 1775)	Noctuidae	Chillies
18.	*Spirama retorta* (Clerck, 1764)	Noctuidae	*Acacia mangium, Albizia* in forest nurseries and young plantations
19.	*Spodoptera litura* (Fabricius, 1775)	Noctuidae	Tobacco, Tomato, Coccina, Brinjal, Pea, Cabbage, Cauliflower, Chillies, elephant's foot, Cowpea, Colocasia, Radish, Beet root, Onion,Sweet Potato, Potato, Amranthus, Okra, yam, Arum, Bean, Fenugreek Turmeric , Cotton, Groundnut, Jatropha
20.	*Hypsipyla robusta* (Moore, 1886)	Pyralidae	Mahogany (*Khaya ivorensis and Swietenia macrophylla)*, Meliaceae, *Xylocarpus granatum and Xylocarpus moluccensis*
21.	*Actias selene* (Hubner, 1806)	Saturniidae	Drumsticks, *Populus alba*
22.	*Antheraea paphia* Linnaeus, 1758	Saturniidae	Telsur (*Hopea odorata*), Jujube
23.	*Acherontia lachesis* (Fabricius, 1798)	Sphingidae	Brinjal,Tobacco,Dadap tree, Teak, Gingelly, Brinjal
24.	*Hippotion celerio* (Linnaeus, 1758)	Sphingidae	Elephant Yam and Grapevine
25.	*Theretra silhetensis* (Walker, 1856)	Sphingidae	Arum

Mangrove folivory by moths:

The adults, pupa and egg stages of the moths are not damaging upon the greens but the larval stages are dependent on plant parts specially act as defoliator. Defoliating insects are also widely recognised agents of ecosystem disturbance that can have an impact on forest production and nutrient cycling, and their out breaks events can create large scale disturbance . Mathauda (1957) was reported only two species of the moths, *Hymenoptychis sordida* and *Hypsipyla robusta* as fruit borers from the Sundarban mangroves. Recently, Biswas et al (2017) was reported the massive defoliation by the teak defoliator, *Hyblaea puera* on *Avicennia* spp in Kultali, Lothian Island, Bhagabatpur, Prentice Island, Ajmalmari and Jharkhali of SBR. This is the clear indication of shifting of the host plant by the pest. Moreover, the pre-monsoon outbreak of *Hyblaea puera* in 2016 resulted in hampering the flowering of the infested plants which also effect on the reproductive biology of the plant. Scientists are yet to find out whether they have already become mangrove-pests, or are yet to multiply to the extent when they could inflict economic loss. The reasons for this shift to newer areas may be due to random use of pesticides in agriculture, global warming and climate change and humans coming in close contact with forests and wide adaptability of insect.

Conclusion:

The insets play a great role in food chain of any eco system. Insect faunal diversity in mangrove ecosystem is important for the sustenance of Mangrove as the insect plays role such as pollination, nutrient cycling and many others. The study of insect folivory in mangrove needs long term research which should include the study of parameters like economic threshold level (ETL) before declaring them as pest of mangrove, insect-host relationship, prey-predator relationship, naturally occurring entomopahagous pathogens especially nuclear pollyhedrosis viruses (NPV), grannulosis viruses (GV) and various diseases causing fungus and bacteria. Till date the study on insect in SBR have mainly conducted in buffer zone only. So, similar study in core zone of SBR will obviously enrich the present list of moth fauna. The study of infestations by moths in mangrove forests done only in case of *Hyblaea purea* only. Comprehensive studies are required in this regard as the matter is worrisome because controlling an insect pest in a small agricultural farmland using insecticides is a different issue and tackling them in a mangrove sprawling over the vast and typical landscape areas of SBR is a big challenge in future.

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Golden Jackal
(Canis aureus)
Photo: **Tapas Das,** IFS

BISHNOIS:
The Great Green Warriors

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Introduction

Bishnoi (also known as ***Vishnoi***) is a pure vegetarian religious group or sect within Hinduism, founded in the Western ***Thal*** (Indian ***Thar***) Desert of Rajasthan and also spreaded into northern states (Haryana,Punjab,MP and UP) of India. They are mixtures of many castes, mainly are Rajputs,Jats,Agarwals and Guptas etc. They follow a set of 29 principles given by **Guru Jambheshwar**. Jambheshwar**,** who founded ***Vishnoi or Bishnoi Panth(Sect)*** while preaching to his disciples at ***Samarathal Dhora (*Sand dunes of Samara sthala, near *Bikaner) on Kartik Vadi 8th, 1542 VS(1485 AD). Samarathal Dhora*** is having a magnificent temple of of *Jambhoji* where *Bishnois* from all over India come on pilgrimage. The word ***Thar*** is a corrupt form of Marwari word the ***Thal*** (*short form of Sanskrit word* ***Sthala*** *which means a place or elevated place or a particular area. In some cases Sindhis and Britishers pronounce L as R hence the word* ***Thal*** *became officially as* ***Thar***) .***Guru Jambhoji*** was an ardent propounder of ***Vaishnvaite or Vaishnavi dharma*** hence followers are also called ***Vishnois***. It is also said that ***Guru Jambhoji*** propagated ***Bish (20) plus Noi(9) or 29 principles***/tenets for his followers so they are also called as ***Bishnois(followers of unnatees or bish+noi upadeshas).***

He was contemporary of guru Nanak Dev and was greatly influenced by the ***Bhakti*** movement in India. He also adopted the ideals of ***Gorakhpanthi*** spiritualism ,in spite of only child of parents remained whole life celibate(*brahmachari*)and strongly opposed superstitions of all religions including casteism of Hinduism. Since childhood he exhibited many unusual behaviors/activities with supernatural powers thus, people of area started feeling Surprising (*ACHAMBHA*),thus they named him as ***Jambha*** (short form of ***Achambha***) and later on respectfully called as ***Jambhoji or Guru Jambheshwar Bhagwan.***Many people irrespective of castes and creeds, became his ardent supporters and which formed a big nature lover community in North India called Bishnois/Vishnois who feel pride to die for the cause of green trees and wild animals.

Sacrifice of Amrita Devi Bishnoi with her 3 daughters at Khejarli

History

Bishnoism was founded by a Kshatriya Guru Jambheshwar of Bikaner, who was born to Mother Hansa(Keshar) Devi and Father Lohatji Panwar (*Khshtriya*) at Pipasar village(Nagaur,Raj) on ***Vikrami Samvat(VS) Bhadrapad Vadi 8th, in 1508*** **(1451 AD),** and got ***nirvana*** on ***Margashirsh Vadi 9th,1593 VS(1536 AD)*** and given ***Samadhi***(buried) at Talwa/ Mukam(Nohka Tehsil) in Bikaner,Rajasthan . His spiritual name was *Jambhoji*. His tenets were contained in a document written in the Nagri script called ***Shabdwani***, which consists of 120 *shabdas*. Of his 29 tenets, nine are directed towards personal hygiene/ cleanliness and maintaining good basic health, seven for healthy social behavior, and five tenets to the worship of God. **Eight tenets have been prescribed to preserve bio-diversity and encourage good animal husbandry**. Out of these, two more profound tenets are directly for the protection and conservation of forest and wildlife firstly, **have pity on all living beings and love them(***jeev daya palani***)** secondly,**do not cut green trees(** *roonkh leela ni ghave*) **to save the environment**. These include a ban on killing animals and felling green trees, and providing protection to all life forms.

Bhagwan Guru Jambheshar Ji

Khejarli Massacre: Supreme sacrifice of Amrita Devi with 363 Bishnois

The Bishnoi narrates the story of ***Amrita Devi Beniwal***, a Bishnoi woman who, along with more than 363 other Bishnois, died while protecting the ***Khejari or Shami****(Prosopis cinenaria)* trees which are the biggest, most useful and sacred trees of ***Thal*** Desert. In early 18th centuary, the than Marwar Ruler ***Abhay Singh*** of Jodhpur- required wood for heating of lime for the construction of his new palace the *Phool Mahal* within Jodhpur fort. So the king sent his soldiers led by ***Hakim Girdhar Das Bhandari*** to fell trees in the nearby village of ***Jalnadi*** (26 Km South to Jodh-

pur city) which later on came to known as ***Khejarli***, as this village was full of dense forests of Khejari trees, which were being protected by Bishnois since ages. But, when Amrita Devi Beniwal and local villagers came to know about it, they opposed the king's men. The feudal army threatened her of life if she opposes tree felling. She did not care of threat and told them that she would consider it as an act of insult to her religious faith and would rather give away her life to save the green trees specially Khejaris. At the earlier years of 18th Centuary 287 years back suddenly a black day occurred in the Indian history, and as per Indian lunar calendar on the ***10th Bhadrapad Sudi,1787 VS(Tuesday,11th September1730 AD, and some calculate as 12th September)***this incidence occurred. Amrita Devi with her three very young daughters (***Asu,Ratni and Bhagu***) hugged khejari trees in front of their home and was first to be killed by royal cruel army of wood cutters. Three daughters also followed mother and got sacrificed instantly. Before scarification Amrita Devi said, ***"Shir saate roonkh rahe to bhi sasto jaan"*** means ,"If a tree is saved at the cost of one's head,still it must be considered as cheaper bargain/deed," This news spreaded like wildfire. Bishnois gathered and sent summons to 84 Bishnoi Villages to come and decide on the next course of action. Since the supreme sacrifice by those four head not satisfied the royal party, and the felling of green trees was continued, it was decided that forever green tree to be cut, one Bishnoi volunteer would sacrifice his/her life. In the beginning, old people voluntarily started holding the trees to be cut in an embrace as in the Chipko movement of 20th Century in Garhwal (Uttaranchal, then Uttar Pradesh ,India). When the king heard about this, he was filled with remorse and came to the village to personally apologize to the people. He promised then that they would never again be asked to provide timber to the ruler, no khejri tree would ever be cut, and hunting would be banned near the Bishnois villages. Honouring the courage of the Bishnoi community, the ruler of Jodhpur, Maharaja Abhay Singh, apologized for the mistake committed by he and this officials and issued a royal decree, engraved on a copper plate ordering the following:

"All cutting of green trees and hunting of animals within the revenue boundaries of Bishnoi villages was strictly prohibited". The Khejarli incidence is still remembered as the great Khejarli sacrifice. Some Bishnois who were killed protecting the trees were buried in Khejerli village near Jodhpur, where a simple grave

A Bishnoi Woman feeding to a *Chinkara* fawn

with four pillars had been erected. Every year, on 11th or12th September, the Bishnois from all over to India assemble there to commemorate the extreme sacrifice made by their people to preserve their faith and religion'.

Bishnois, Still carrying the tradition of supreme sacrifice for Nature

Bisdhnois are strong lovers of wild animals. It is because of their protection that in Bishnoi dominated areas, deer and antelope (such as blue bulls, black bucks, chinkaras etc) are seen grazing in their fields despite the fact that the State of Rajasthan where the Bishnois mainly live, faces severe water shortages. In year of 2008, the Bishnoi community has launched strong protests against the killing of black bucks by Salman Khan, a Bollywood film star, and also Mansur Ali Khan of Pataudi, a former cricketer and many other poachers .

Nature protection was given foremost importance in these 29 tenets. Since then, the sect has religiously followed these tenets. There are many stories about how the Bishnoi's have beaten up hunters and poachers for intruding in their area. For these

nature-loving people, protection of the environment, wildlife and plants is a part and parcel of their sacred traditions. They are teetotalers and normally they wear white shirt, dhoti and turban. This dress pattern is ideal for the hot dry desert climate. They pay special attention to cleanliness in their houses. Bisnois often

live in little hamlets called "***Dhanis***", with just a few round huts with intricate thatched roofs. The interiors are airy and clean. The heartland of the Bishnois in the forests near Jadhpur is abundant in trees and wildlife. The landscape around here is greener then elsewhere and the animals mainly antelopes, particularly the blackbuck and the chinkara, in these forests area not afraid of humans and are often seen near the villages eating out of the villagers hands. The Bishnois have indeed proved that human lives are a small price to pay to protect the wildlife and the forests around them. Bishnois never drive away the Chinkaras and other wild animals which graze their crops in their agricultural fields. More protection is given to wildlife and trees by the Bishnois than local forest and police administrations in Rajasthan and other Bishnoi inhabited places elsewhere. On hearing any gunshot,screem of wild animal or getting any information about poaching etc Bishnois rush to site without fearing of life threat. ***Akhil Bhartiya Jeev Raksha Bishnoi Sabha*** is a supreme body of Bishnois which is fully dedicated for the protection of forest, wildlife and the environment, and closely associated with nature loving NGOs and other such organizations.

Govt`s initiatives for national awards for environment protectors

The than ministry of environment and forests(MoEF) Govt of India has instituted national awards in the names of Amrita Devi and Gaura Devi, two women considered pioneers of India's environmental conservation movement, Incidentally, the awards initiated in the UN-declared the International Year of Forests (2011) to raise awareness on sustainable management ,conservation and development of forests.Amrita Devi had sacrificed her life at Kherjarli village near Jodhpur nearly 287 years ago while protecting the khejri tree form the greed of the Maharajah of Jodhpur. Later, Vishnoi woman Amrita

Devi`s story inspired Gaura Devi from Uttarakhand to lead a band of intrepid women to protect their trees at Reni villages in Chamoli district of Uttarkhand(formerly UP) in 1973 giving rise to the famous Chipko movement.

The national awards to be instituted are against the backdrop of the first recorded event of Chipko that took place in khejarli in 1730, when 363 bishnois, led by Amrita Devi, Sacrifice their lives while protecting green Khejri trees, considered scared by the community, by hugging them. That movement led by Gauri Devi from Uttrarkhand become a bench mark for socio-ecological movements in other forest areas of Himachal Pradesh, Rajasthan and Bihar in etc.The Chipko movement inspired similar, Appiko movement in Karnataka, where tree felling in the Western Ghats and Vindhyas was stopped. In Kumaon region, Chipko took on a more radical tone, combining with the general movement for a separate Uttarakhand state, which was eventually achieved in 2000.

Nature of Award and Eligibility

Two awards of Rs. one lakh cash, along with a medallion and citation each will be given to:(a) An individual (s),(b) Community based organization; from rural areas, including Gram Shabha; showing exemplary courage or valour for protection of wildlife. Eligibility: Individual (s) and community based organization (s), from rural areas, including Gram Sabha, showing exemplary courage or valour for protection of wildlife will be eligible. There will be no age limit for individuals. None of the Government official/individual is eligible for the award.

Amrita Devi Vishnoi Award

The Government of Rajasthan and Madhya Pradesh, Department of Forests, have started the prestigious state level Amrita Devi Vishnoi Smriti Award for excellent contribution of the protection and conservation of wild animals. Award consists of cash Rs.25,000/- and a prashasti/citation.

The Chipko movement: Past and Present

The Chipko movement or ***chipko andolan*** was primarily a forest conservation movement in India that began in 1973 and went on to become a rallying point for many future environmental movements all over the world; it created a precedent for non-violent protest started in India. It occurred at a time when there was hardly any environmental movement in the developing world, and its success meant that the world immediately took notice of this non-violent movement, which was to inspire in time many such eco-groups by helping to slow down the rapid deforestation, expose vested interests, increase ecological awareness, and demonstrate the viability of people power. Above all, it stirred up the existing civil society in India, which began to address the issue of tribal and marginalized people. Today, beyond the eco-socialism hue, it is being seen increasingly as an ecofeminism movement. Although many of its leaders were men, women were not only its backbone, but also its mainstay, because they were the ones most affected by the rampant deforestation, which led to a lack of firewood and fodder as well as water for drinking and irrigation. Over the years they also become primary stakeholders in a majority of the afforestation work that happened under the Chipko movement.In 1987, the Chipko Movement was awarded the Right Livelihood Award. The *chipko andolan* is a movement that practiced the ***Gandhian*** methods of *Satyagraha* where both male

and female activists played vital roles, including Gaura Devi, Sudeesha Devi, Bachni Devi and Chandi Prasad Bhatt.

In March 1973, the lumbermen arrived at Gopeshwar, and after a couple of weeks, they were confronted at village mandal on April 24, 1973, where about hundred villagers and workers were beating drums and shouting slogans, thus forcing the contractors and their lumbermen to retreat. This was the first confrontation of the movement. The contract was eventually cancelled and awarded to the *Sangh* instead. By now, the issue had grown beyond the mere procurement of an annual quota of three ash trees, and encompassed a growing concern over commercial logging and the government's forest policy, which the villagers saw as unfavorable towards them. The *Sangh* also decided to resort to tree-hugging, or Chipko, as a means of non-violent protest.Chandi Prasas Bhatt was awarded the Ramon Magsaysay Award in 1982, and Sundarlal Bahuguna was awarded the Padma Vibhushan in 2009 for their big role in modern *chipko andolan*.

However, real Chipko Movement was started by Amritadevi and her hundreds of Bisnoi followers who sacrificed their lives to save the khejri trees at Khejrali Village near Jodhpur in 1730 AD. Therefore, Bishnois are rightfully called the first environmentalist of India. They have given more to nature in compassion to what the entire country would have contributed so far. In spite of living in the arid desert regions for centuries they have been following the dictates of their religious principles. A cursory look at their lifestyle is a very humbling experience.

- Bishnois do not cut green trees and compassionate to all living beings.
- The Bishnoi settlements are made from material gathered locally and most eco-friendly measures are taken to be build their abode.
- They do not fell trees. They only collect dead wood. Even a carpenter waits patiently for the tree to fall.
- Deers, Black Bucks, Peacocks, Blue Bulls, Chinkaras, are some of the animals that you would find roaming around their settlements. Because of Bishnois and their commitment to protection of nature, many animals have survived this long. Now here else wood one find a perfect marriage of all forms of flora and fauna.
- Long before Rain Harvesting concept caught fire, to combat the severe drought and water shortage, the Bishnois build water storage tanks that can collect and store rain water. This water is not only for human but animals too.
- Bishnois appose to their religious tradition of cremating the dead. To avoid wastage of firewood they bury the deceased.
- Though a religious sect, the Bishnois do not believe in unnecessary rituals, idol-worship, caste system, etc., but continually lay emphasis on compassion, love, and peace, there by firming their foundation for love for Mother Nature.
- To minimize the use of green trees, they use cow dung cakes as fuel for cooking.
- One of the principle tenets "***Amar Rakhave That***"- means to provide shelter for abandoned animals so that they can live the rest of their life with dignity.

There are many more such humbling facts and practices of the Bishnoi way of life. We are forced to stop here and give it a serious thought. A tribal settlement, living in harsh conditions, struggling to make a living, wood still want to protect and preserve the resources that could have been exploited as a key to their prosperity. The Bishnoi community is a standing testimony of fanatical fervor for life.

Forest Martyrs Day(*Van Shahid Divas*)

About three hundred years back the martyrs who laid their lives to save indiscriminate felling of trees, people of 'Bishnoi' tribe in Rajasthan, 363 of them were killed on **11 September 1730 AD**. At last Govt of India has declared that **September 11, 2013** onwards this day will be observed as ***"Van Sahid Divas".*** To commemorate the Day of ***Khejarali*** incidence and to pay tribute to all forest staff who sacrificed their lives for the protection of the forest and wildlife. At Forest Research Institute, Dehradun(Uttarakhand) a ***Van shahid smarak*** also has been erected by ICFRE, Govt of India. Forest Department of Govt of WB vide O/O nos 1965-For/O/N/6M-12/2015 dated 1/9/2015 has directed to observe the Forest Martyrs `Day every year through a small function in the districts to pay homage to forest martyrs in befitting manner. Hon`able MIC/FD,WB also issues a message to mark this occasion.

All photographs collected from Internet

A community based conservation Effort of Open Bill stork in Bankura North Division

Bhaskar J V, IFS
Divisional Forest Officer,
Bankura North Division

Barochaka is a small village in Salboni beat under Bankura North range in Bankura North division. The village is inhabited by approximately 39 tribal families. This village has been witnessing nesting of open bill stork since about 40 years and more in numbers, precisely from 1992 as told by the villagers. The village is totally a tribal village of Santal community.

Open Bill stork usually come in the month of April and stay here up to the month of November. During this period they nest and produce new hatching before they go back. They have found safe heaven in Barochaka village only because of the protection given by villagers against poaching and illegal capture. Even the villagers have preserved all the trees where they nest there by enhancing the confidence of

birds in nesting in the village. Some families are even tolerating the foul smell that comes from the dropping of these birds as some of the nests are very near to the houses where the villagers live. Such compassion and kindness can only be expected from Tribal population who know how to live with nature than anyone else.

Barochaka has been formed into JFMC and along with Forest staff now they are jointly providing protection to these visiting birds.

Recently a survey was done where in it was found that, they nest around 43 numbers of trees and in total there are 603 nests. The total number of birds counted was 3347. Most preferred trees for nesting are Tetul, Challa and Akur. In addition nests are also seen in Sissoo, Kadam, Arjun and Kususm trees. Such community conservation efforts are praiseworthy and needs appreciation.

Wild Orientation

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Fig 1: Each of our protected areas is a storehouse of amazingly rich biodiversity. Authorities responsible for the management of such protected areas may do well to develop in-house training-cum-orientation programme for each and every incoming officers and staffs to get them familiarize with the natural heritage and conservation ethos of each such protected areas.

I have a friend, who is a zoologist by education, teacher by profession and wildlife lover by passion. Quite often he visits my place, spends his vacation with me for a couple of days and then goes back to his usual life with a renewed wild experience. During such visits he would usually accompany me while I am having a field trip. Or else, if I am otherwise busy with official works at Range or Divisional offices, I would tag him with our patrolling team. After spending the daytime wandering in the woods, we would spend our evening together in a relaxing mood. We would sit quiet for a while in the verandah of my quarter, enjoy the song of forests- cluttering sounds of various birds and insects, and then we would dwell on some idle gossiping. With an elevated feeling sparked by the chemistry of tranquility of forests combined with pale evening sips, we would discuss on various issues ranging from politics to philosophy or from

Figure 2: Supply of high quality timber in large quantity was required for rapid industrial expansion in India during the middle of the nineteenth century. Expansion of railways across the country, setting up new factories and warehouses, even construction of buildings for schools, hospitals, offices etc. required timber, as timber was till then the most prevalent construction material. 'Scientific forestry' practices were introduced in India by the colonial rulers to ensure sustained supply of high quality timber in large quantity.

Fig 3: Forest Research Institute, Dehradun. Britishers did not have any forestry tradition. When they felt the need to establish a Forest Department for the imperial government, they hired a German named Dietrich Brandis and appointed him as the first Inspector General of Forests. Dr. Brandis laid the foundation of forestry education in India by founding the British Imperial Forest School at Dehradun in 1878. In 1906, it was reestablished as the Imperial Forest Research Institute. It is one of the oldest institutions of its kind in the world. For over a century, the Institute has been spearheading forestry research and education catering to the needs of generations of foresters and scientists. FRI is now a part of an umbrella organization named Indian Council of Forestry Research and Education, or ICFRE in short, established in the year 1986.

ancient history to modern science, as if Socrates is in conversation with Steven Hawking.

During one such evening rendezvous (sometime during 2004, prior to my training in Wildlife Management at WII/Dehradun), he showed me a photograph of a very colourful butterfly, asking me whether I can identify the species.

"I don't know the name of a single butterfly species, not even the most abundant ones, let alone this exquisitely colourded butterfly", I said, "so far as having the skill of identifying wildlife is concerned, I have very little skill, next to nothing at all. I can only identify a spotted deer with a fair amount of accuracy, that too if I can spot the animal close enough!"

He was astonished at my ignorance. "How do you work in a nature reserve then? You are supposed to know the natural things found in your area!"

"Well, I am basically a forest officer and a trained forester", I said. "Forestry itself is a multidisciplinary subject. We are trained to have some working knowledge of a whole lot of subjects –Botany, Soil Science, little bit of Civil Engineering, Silviculture, Forest Management, little bit of Geology and Physiography, Forest Law, Accounting and Office Procedure, Wood Science, Inventory Management. Now we are also doing Ecotourism Management, Participatory Management, Community Development works drawing heavily from subjects like Community Leadership Development and Rural Development. We are also managing big public events as a part of our awareness generation programme. After having all these mumbo-jumbo, if you now ask me to know hundreds or even thousands of butterflies, insects and birds, then please forgive me brother! You are asking me to be a superman!"

"Oh! That's absurd! Why don't you engage some experts here?"

"Are you asking me or the Government? I am not the person to decide whom to engage as expert manager in our Wildlife Reserves. The initiative for practicing professional management of our wildlife reserves was taken during the early seventies, with the inception of Wildlife Protection Act of 1972. At that time, there was not any trained group of professionals who could be engaged for wildlife management. As these reserves were already under administrative control of the Forest Department, naturally, forest people were entrusted with the task."

"1972? A whole lot of water has flown through the Holy Ganges since then. By this time, a competent group of Wildlife professionals could have been recruited, trained and deployed. What prevented the Government from doing so?"

Slightly taken aback by his harsh questioning, I said rather defensively, "I don't know. I am an employee of the Government. I just cannot ask the Government. And I am not supposed to criticize the Government either. You can ask, if you so wish." I told him. "But it does not mean that the organization of the Forest Department is entirely lacking any knowledge of wildlife management. There are quite a few persons in the organization, who learned a great deal about wildlife and its' management by their own personal effort. And they are the leading lights of wildlife management. But the field workers like me lack this knowledge. And even if people like me acquire some knowledge, we will simply forget in few days, as because, nature of our job would not allow us to cultivate."

I could not drag the discussion on that day much further. While working as a ranger in a Tiger Reserve, the lack of knowledge on wild lives started haunting me from that day. I felt that I should know something about the wild on my own. But it was difficult. There was not much books available at my office, and I did not have any idea about where or who to look into, in order to overcome this shortfall. Luckily enough, during that very year (starting from November, 2004 and ending in January, 2005), I was sent for training in Wildlife Management in WII without my asking, as if God himself arranged for that training. That three months stay in WII, helped me immensely to understand some basics of management of the Wild. It has helped me to change the very perspective to look at Forests and its' inhabitants. Forest to me, is no longer a mere bunch of standing trees of uniform composition and structure having the potential to fetch highest revenue, but an abode of diverse life forms with varying colours and compositions, with mesmerizing sounds and smells and with amazing stories of evolving relationship among its flora and fauna. A grassy patch, a blank space or an 'open forest' inside a forest tract is not something to be ashamed of, but these are something to be desired and celebrated.

But my euphoria ended very shortly after I rejoined in Buxa Tiger Reserve after completion of my training. Another Range Officer was given posting at Jainty Range, and as a stop-gap arrangement and as a consequence of rivalry between two staff associations; I was posted as an attached ranger in the Divisional Headquarters. With that posting, I got a chance to forget much of the wild skills that I just had acquired and embark upon a mundane journey of managing stores, maintaining inventories of office stationeries of every kind, purchasing railway and air tickets for touring officials etc.! This posting appeared to me quite amusing, as out of the sixteen or seventeen rangers working then in BTR, I was the only one to have got training in wildlife management.

After being adequately humbled down by tolerating two years of existence confined in a cubicle, I again got a chance to work inside forests, this time in Bholka Range, which falls in the buffer area of the Tiger Reserve. My much beloved forest I got back, but there was nothing wild about it. Stopping timber smuggling through the roaring Rydak and Sankosh rivers, and raising some quality plantations in the low lying Bholka Forests were the primary functions of this Range. Although the true wild taste was somewhat missing, I enjoyed these works as these were quite adventurous and challenging.

It was during my stay in Bholka Range, when the then Chief Wildlife Warden of West Bengal ordered a special exercise to be carried out in BTR. We were told that a team of officers from other protected areas of West Bengal, headed by CCF/(Wildlife)HQ, will be visiting BTR to find out what problems BTR was facing then. But before that we should keep our reports ready. We compiled five years offence report compartment wise, five years animal abundance, mortality and poaching reports, that too compartment wise, updating all records of stores and others books of accounts kept in range offices and beats. The task was interesting, though very labourious. In the process of compiling those reports, I got very useful insights about the functioning of the field staffs, which I was not aware of earlier. But we were very anxious, as we were having no idea what the visiting officers will be looking at.

But the visiting officials were found to be quite cordial and encouraging. They assured us from the very beginning that it was not a fault finding exercise or enquiry for disciplinary proceedings. They will first try to grasp what challenges we are facing, and their findings will be reported to the Government through

Fig 4 & 5: "Foresters' glory". The above two photographs, one of a pure teak plantation and the other of a pure pine plantation set the ideal for practicing production forestry. Scientific forestry which was set up by the colonial rulers in India some 150 years back was based on these ideals. Such plantations have the potential to produce the highest yield of quality timber. But see the floor. There is no undergrowth, not anything that can sustain wildlife.

the Chief Wildlife Warden. Besides this, some guidelines will also be issued for improvement of our functioning. Much relieved from this assurance and propelled by the hope to receive a better guideline, we took them wherever they wanted to go, and showed them whatever they wished to see. This exercise lasted for about two weeks. Then we were all asked to gather in a meeting to be held at Jainty Forest Rest House, where the Chief Wildlife Warden, West Bengal, himself will address us. We went there, and the Chief Wildlife Warden, West Bengal, in his brief speech thanked us all for our cooperation with the visiting team for carrying out the entire exercise. He then requested the CCF (Wildlife)/ Headquarters, to brief us about the findings of the exercise. The CCF (Wildlife)/Headquarters also briefed us briefly about the findings. He mentioned that the detailed report was yet to be prepared, but what was very conspicuous was the fact that, frontline staffs of Buxa Tiger Reserve were still guided by "Hammer mentality". They seriously lack the orientation for the wildlife.

That statement sounded to me an echo of the same question which has been haunting me for the past couple of years. We seriously lack wildlife orientation, but why and what could be done to overcome this lacking? So the visiting team landed with the question, but not the solution itself. May be the solution was to come later on in the form of a thorough guideline, training etc. But the preliminary observation made by the visiting team was itself worth for a detailed scrutiny. The "hammer mentality" that the CCF(Wildlife)/Headquarters was mentioning refers to an organizational culture which is typically associated with production forestry practices. In order to suitably manage the timber operations of various kinds, foresters use different types of hammers to mark the timbers coming from various sources. So the frontline staffs deployed in those timber operations are usually adept in using hammers of various kinds. They are timber oriented, 'wild' is not anything of particular significance to them. Buxa Tiger Reserve was carved out of erstwhile Buxa Division, which was one of the largest timber producing Forest Divisions of Bengal. So "hammer mentality" which was imbibed in the organization of BTR, was actually rooted in the past practices. When the Tiger Reserve was set up, the same set of officers and staffs were made to continue to look after functioning of the reserve without

Fig 6 & 7: The backgrounds in which these two magnificent mega-herbivores stand depict certain habitat conditions which are preferable if one is aiming at conservation of those specie. Something widely different from the "Foresters' glory" as given in fig 4 & 5. Even from a cursory view anyone can understand that skill requirement for raising quality plantation and managing such wild habitat are widely different.

acquiring new skills, orientation and understanding of the new statement of organizational objectives. This is one classic example of the proverbial statement –a square peg in a round hole. (The guideline that we were expecting never came. It may be owing to the fact that the officer, who took the initiative for such an exercise as the Chief Wildlife Warden, got suddenly transferred from the Wildlife Wing.)

But the story is not same everywhere. Some five years later, when I had a brief tenure in Gorumara National Park, I got glimpses of some different scenarios.

Fig 8: One branch of Sankosh River. Lying along the Assam-Bengal border, this river act as a conduit for transit of illegal timbers from both the states as well as from the neighboring country of Bhutan.

The park itself was found to be very rich in wildlife. And the staffs were certainly not guided by "hammer mentality". During my first few days of field visits, I made some striking observations. The Beat Officer took me with him on an elephant ride through the grasslands of Jaldhaka, and showed how they track the Rhinos, and how they distinguish one animal from the other. The driver of the range vehicle showed me where a rare wild species of tree can be found. I saw how the cook of Gorumara F.R.H. scolded one gypsy driver, who, while on a safari of the park, had broken certain rule. While visiting Medla Camp where a number of elephants were kept, I saw how the mahawat took me near to each individual elephants and briefed me about them. I also saw, how nicely the elephant movement registers and medical registers were maintained. There was a very good connection with all the local veterinarians. While some people would visit me at my range office with the intension to seek entry permission in the park during odd hours, I saw how my office assistant advised me well in advance not to entertain such people. Then there was a very well regulated practice of ecotourism. And I also noticed how nicely the ecotourism practices

Fig 9 & 10: A suitable combination of grassland and woodland is required for most of the ungulates to thrive.

Fig 11: Regulation on eco-tourism activities of Gorumara NP. Only petrol fueled gypsies are allowed for jungle safari to keep pollutions at bay.

were linked to the cultural and economic activities of the local communities. The frontline staffs engaged in Gorumara may not all have the highest level of skills, but no one can accuse them of not having an orientation for the management of a National Park. (I found a nicely written management plan on Gorumara N.P., but surprisingly, unlike the Management-cum-Working plan of B.T.R., no higher authority had reviewed it, or had given any formal approval to it. This may be owing to the fact, that the practice of giving formal approval to a management plan has not yet been made mandatory.)

There may be a number of reasons for this disparity between Buxa and Gorumara; it may be due to the fact that Gorumara has long been a wildlife rich area and as such, staffs are always aware of wildlife issues. Or, it may also be due to the fact that officers posted at Gorumara took personal initiative to improve its management. Or both these reasons may be at play. Whichever may be reason, but the dissimilarities between the organizational culture and practices of Buxa and Gorumara itself demonstrates that our "Wild Orientation" has not been adequately institutionalized.

The discussion so far has been limited to a certain set of skills of frontline staffs required for better management of our protected areas. But we cannot judge our "Wildlife Orientation" entirely on the narrow limit of whether the frontline staffs are having or not having those specific skills. If we look at other aspects of management, we can find that there is a lot of scope for improvement in those areas also.

It has been scientifically established that population of any species in an isolated habitat, when a state of dynamic equilibrium is achieved, gyrates between two extreme limits. With a favourable condition, the population rises first and reaches an upper limit, when the struggle for space is also maximal. This extreme struggle put pressure on the breeding conditions and mortality rate also increases (assuming that the animals do not have a chance to get out of that isolated habitat) resulting in a decline in population. But as soon as the population reaches a certain lower limit, the living condition again begins to improve and population rises again. Fig-13 depicts this simple model of population dynamics both for pray and predators. In actual practice however, this simple model will get considerably distorted owing to the presence or absence of a whole lot of other factors. Threat of

Fig 12: Cultural programme of the Eco-development Committee at Dhupjhora, Gorumara NP. Normative guidelines for eco-tourism, as framed by WII, require that maximum possible benefit arising out of eco-tourism activities must go to the local communities to make them less resource dependant and more conservation friendly. Management of Gorumara NP did an excellent job to promote eco-tourism and linked it to the promotion of cultural activities of the local communities. However, it has been observed that crony capitalists mushroomed in the surrounding areas of Gorumara NP, by acquiring lands and establishing luxurious resorts, to take away the lion's share of the benefit arising out of recent boom in eco-tourism industry, letting the local communities to remain as impoverished as ever. Unfortunately, owing to the absence of any regulatory framework, neither forest department, nor the civil administration is in a position to suitably change this undesirable development.

poaching, degradation of habitat condition owing to the presence of excessive biotic interference from sources outside the reserve, enhanced developmental activities in the surrounding region, sudden and highly erratic changes in climatic conditions such as heavy flood or drought, an extensive forest fire, a sudden outbreak of a deadly disease may considerably affect the usual population dynamics.

The periodicity of such variation of wild population varies widely from species to species and from one habitat type to another. Such variation may range from few weeks, few months (in case of insects, annelids) to few years (for reptiles, birds and lesser mammals) and may go up to several hundred years (as in the case humans the population, it is in a state of constant rise for last couple of centuries! But they are to be excluded from the definition of the wild, I suppose!). With this variation in the size of population of a species, the requirement of physical space

needed for their living also varies. But the size of the population of a species is not the only determinant of its space requirement. During lean season, food and water may be scarce requiring the animals to move in larger areas. So, seasonal variation is also one major determinant of the space requirement of a group of animals of a particular species.

With this understanding of the variation of space requirement of various species living in a particular habitat, we must have certain mechanisms to provide for this additional space requirement for an ecosystem. As the habitat itself cannot be stretched, we must have some reserved space surrounding the habitat.

To suitably accommodate for this reserved space, modern scientific management of a Wildlife habitat incorporates the concept of "core-buffer" zonations. While the inner core comprises in providing an ideal habitat condition for a stable population, the exterior buffer serves the dual purpose. First, while the wild population rises, the buffer provides the additional space required for these excess animals. Secondly, the buffer region also acts as a cushion to safeguard the core from any adverse external influence.

Let us look at certain difficulties that our Management Plan Officers face, while writing Management Plan for various protected areas. As per the guideline issued by WII, each protected area should be managed under a management plan based on core-buffer strategy, with

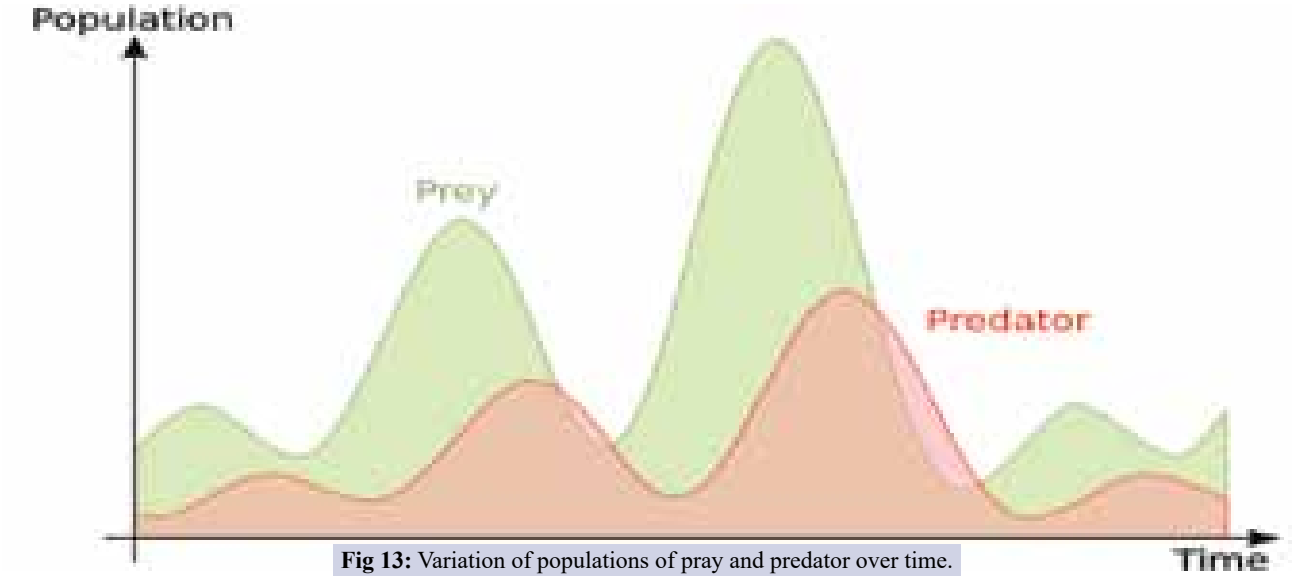


Fig 13: Variation of populations of pray and predator over time.

Fig-14: Pictorial model showing different zones of a Wildlife Reserve managed under "Core-buffer Strategy.

Fig 15: Wildlife Institute of India, Dehradun. WII was established in the year 1982. It is the only institute of its kind in India to foster education and research in the realm of wildlife and its management. Actively engaged in offering academic courses and research programmes, it also meets the requirements of providing training in Wildlife Management to professional foresters, besides serving as an advisory body catering to the needs of various State Forest Departments. But more academic oriented as it is, it only offers training to forest officials of the rank of rangers and above. Training needs of other frontline staffs in wildlife management still remains an unresolved issue.

suitable prescriptions both for the management of core zone and buffer zone. But in many cases, it is the core zone alone, which is notified as a protected area, while the buffer lies outside the protected area (usually comprising of reserved forests.) But reserved forests are, by existing rules, to be worked under a working plan. So although a buffer zone may actually exist, but practically, it is not within the purview of the MPO to prescribe something on it. This may be called as "Core-Buffer Paradox".

The reason for the genesis of this paradox was the fact, that whenever a proposal was sent to Government for notifying a certain forest area as protected area, such proposal had invariably been made by some forest officer. As the elevation of status of the proposed forest area as protected area was bound to severely restrict the usual forestry activity, thereby reducing the "territorial domain of core competence" for forest officers, they usually offered minimum possible forest area (usually the most pristine wildlife habitats) for conversion to protected area. So in most cases, we are left with protected areas, consisting of those areas that constitute the core habitat of a certain wild population.

If we take the example of Management Plan of Gorumara N.P. again, we find that, the buffer region lies with Jalpaiguri Division, which is under control of a separate administrative line, up to the level of PCCF. But even when both the core and buffer zones are under uniform administrative control, as in the case of Buxa Tiger Reserve, the Management Plan Officer cannot directly make prescriptions for the buffer region. As per existing rule all reserved forests

Fig 16: There are many different Silvicultural systems to grow and harvest forests, but clear felling system has come to stay as the most prevalent one among them, for the simple reason that it is the most easy and cost effective method of 'working' a forest. There is no need to painstakingly select mature trees or trees with exploitable diameters, no need to bother about damaging younger saplings or mid-sized trees, felling and logging is easy, so is timber extraction, and after harvesting operation is over, work of regeneration is also easy. But in spite of several advantages of clear felling system, it also earns the severe criticism of conservationists for its devastating effects on the ecology and environment. Entire habitats of many insects, birds, amphibians, reptiles and smaller mammals are completely wiped out, besides causing much annoyance to the larger mammals living in the vicinity. If conservation needs of a large number of specie are to be adequately taken care of, no one can doubt that we have to restrict such activities, especially in the proximity of wildlife rich areas.

are to be "worked" under a working plan. So in case of BTR, instead of having a simple Management Plan, we have a combined management cum working plan- management part for the Buxa NP and Buxa Sanctuary, while working plan part is for the buffer consisting mainly of reserved forests. But this put the Management Plan Officer under severe restriction to adequately prescribe suitable habitat management practice in the buffer region, if the situation so warrants.

With the constitution of National Tiger Conservation Authority (a statutory body under suitably amended Wildlife Protection Act), the entire area of a tiger reserve was also given a separate status. And as per the guideline issued by the NTCA, the entire area of a tiger reserve is now to be worked under a Tiger Conservation Plan, with suitable and coherent prescriptions for both the core and buffer regions. So this has, to some extent, succeeded in resolving the 'core-buffer paradox' in relation to a tiger reserve. But the situation remains the same for other protected areas.

There are a large number of other pertinent issues that need to be discussed. But this cannot be done within the short span of this article. Neither my limited knowledge will permit me to do so. If I am to make a conclusive observation here, I must mention that, when wildlife management was initiated in India some forty five years back, there was a sense of urgency and also a strong political will. When the story of a drastic decline of tiger population made national headlines, the then Prime Minister of India, late Indira Gandhi, took no time to take some strong actions. Wildlife Protection Act was enacted, Project Tiger was launched, suitable constitutional amendment was also done to bring the subject of 'forest and environment' under concurrent list of the Constitution, a budgetary provision was made available for preservation of threatened wild lives. All these were completed within a matter of one year or two.

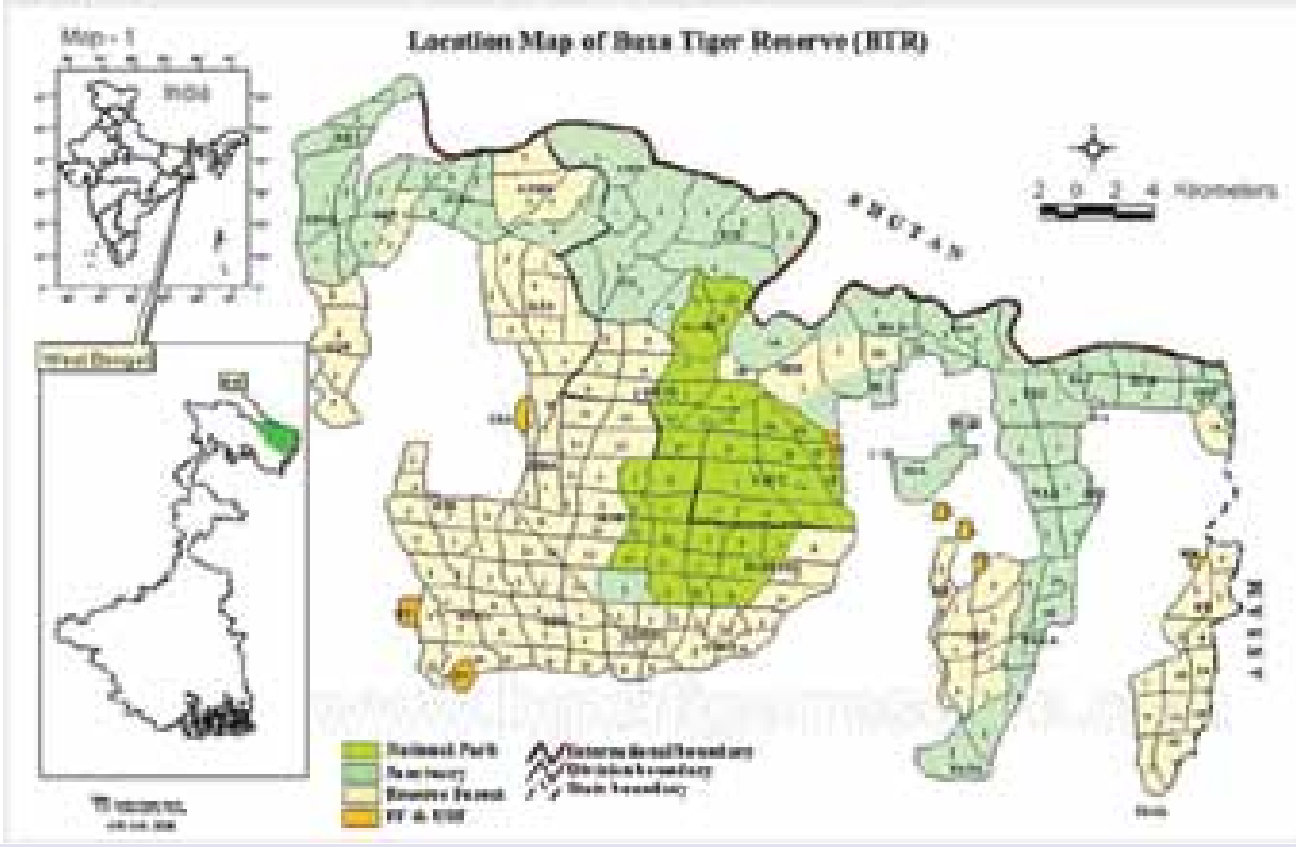


Fig 17: The ideal picture of a reserve based on core-buffer strategy as given in fig 14, is not actually found in many of our existing protected areas. As one can see in the above map of Buxa Tiger Reserve, the areas marked as National Park and Sanctuary, are not entirely surrounded by a buffer strip. In particular, Buxa Sanctuary shares a large boundary directly with human settlements and tea gardens. Besides that, international and interstate boundaries also pose serious challenges to the management of BTR.

Fig 18: National Tiger Conservation Authority or NTCA in short, is coordinating a meeting of Directors and Chief Wildlife Wardens of Tiger States. NTCA was formed during December, 2005, based on the recommendations of the Tiger Task Force. TTF was constituted by the Government of India, when a CBI probe in Sariska Tiger Reserve during the same year, revealed that the entire tiger population got wiped out by poachers. TTF recommended that the erstwhile project tiger directorate should be given more power and made a statutory body. Accordingly NTCA was formed, and Wildlife Protection Act was amended to make it a statutory body. NTCA, which functions under the Chairmanship of the Minister of Environment, Forest and Climate Change, is the apex body responsible for implementation of project tiger.

We are still acting on that old policy framework that arose out of urgency. Wildlife management still means to us giving maximum possible protection to wildlife and our regulation is merely prohibitory but not scientific. But what is applicable in an urgent situation may not hold good when we are back to normalcy. I do not claim here that we are completely back to normalcy in every possible areas of wildlife management. Tigers are still threatened, so are the Rhinos, and many other wild species. But with forty five years of experience of stringent protection based management, we have also created many new areas of trouble for us with no obvious solution visible. The horizon in the realm of management of protected area network has widened. In absence of any suitably updated policy framework and guidelines, ad-hoc-ism rules the roost. But ad-hoc-ism cannot take us very far. It is high time that we should enter a new regime of Wildlife Management based on sound scientific principles.

Fig 19: A leopard which has strayed out in a village near Siliguri, is attacking a staff of the rescue team. Last forty five years protectionist regime has taught us many things as to how to ensure protection against poachers, how to improve habitat, how to prevent the outbreak of a deadly epidemic. Some of our efforts resulted in astounding successes, while in some cases, we are still lagging behind. And in many cases, wild population increased beyond our expectation, but we are still unsure where and how to put the limit, or how can we face the conflicting situation that emerges.

The Little Man of Forest
HOOLOCK GIBBON

Novojit De, WBFS
Probationer

Out of the 25 bio-diversity hotspot in the world, India has two of them and they are in Western Ghats and Eastern Himalaya. The North –East part of India constitute of 'Seven Sisters" states viz. Assam, Arunachal Pradesh, Meghalaya, Mizoram, Tripura, Nagaland and Manipur and this region is bestowed with highest primate diversity in India that constitutes the main faunal diversity here. 11 out of 17 primate species are found in these north eastern states. Among these 11 species, Gibbons are the only representatives of apes in India (there are two species of gibbon found in India namely Western Hoolock Gibbon and Eastern Hoolock Gibbon). Till the end of 2006 western Hoolock gibbon was considered as a sub- species of Hoolock gibbon. However in 2006 both the western and eastern Hoolock gibbons were declared as two different species in taxonomy. Western Hoolock Gibbon (*Hoolock hoolock*) and Eastern Hoolock Gibbon (*Hoolock leuconedys*) are therefore two ape species that can be found in India. Both of the species are listed in the IUCN Red Data Book as 'Endangered' and schedule-I species in Wildlife Protection Act, 1972.

Among all primates, apes are more close to human and because of this closeness all apes along with human are kept in the same super order Hominoidea. Genetically chimpanzees are most close to the human and shares 98.4% of genetic material whereas gibbons shares 95% of their genetic material with human. Out of 350 species of primates, 16 are gibbon species and they are the smallest among all apes. They are much smaller than the 'Great apes' like Gorilla, Chimpanzee and Orang-utan and therefore called as 'Lesser ape' or 'Small apes'.

Male Hoolock Gibbon

Female Hoolock Gibbon

Gibbons are distributed in Southeast Asia only. Western Hoolock gibbon is distributed in Bangladesh, North eastern states of Assam, Arunachal Pradesh, Mizoram, Tripura, Meghalaya, Nagaland and Manipur and Myanmar.

They mostly inhabit the tropical evergreen, semi-evergreen to sub-tropical monsoon evergreen broadleaf forest.

Gibbons share their habitat with other sympatric primates along with other arboreal species like Slow Loris, Stump tailed macaque, Assamese macaque, Pig Tailed macaque, Capped Langur, Rhesus macaque. Various field observations confirmed that there exists peaceful coexistence among gibbons

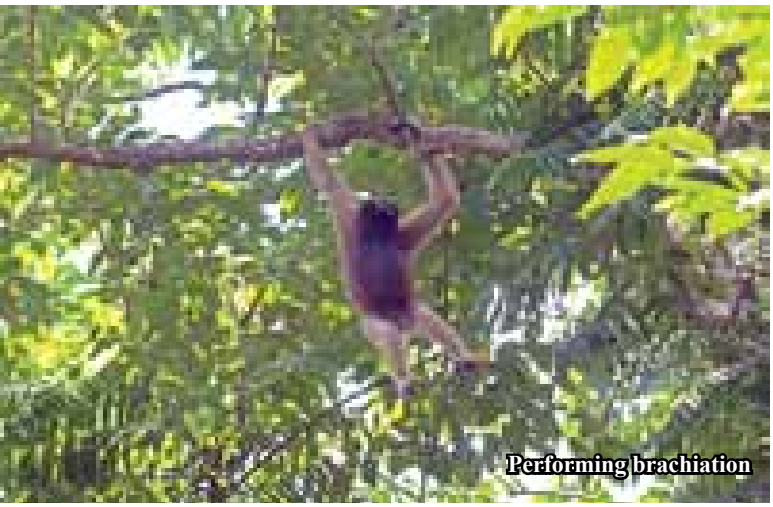
and other species though sometimes some aggressive behaviour among them has also been observed, but they are very rare.

Being completely arboreal, gibbons usually roam in the top canopy of the forest. All gibbons are excellent acrobat and rely on brachiation for their locomotion. They are highly agile in this type of locomotion and got superb anatomical adaptation for that. Extreme elongation of arms and palms. Their

arms are even longer than their body length. The elongated arms with less

body weight enables them to brachiate at a speed of 40 km/hour across the forest canopy. They rarely come down to ground to cover canopy gap between trees.

Hoolock gibbons are characterised by their long forearms, no tail and white brows. It is the only primate whose male and female can be readily distinguished as adult males are black in colour with white eye brows and females are of tanned copper coat, with a whitish eyebrow band, a whitish face band that contrast with darker brown chicks. Juvenile of both sexes are black in colour and have white eyebrows. In sub-adult stage colour of the females changes from black to tanned copper whereas the males remain the same. There is no marked difference between male and female regarding body length and weight. A male grows up to 540 cm in length and weigh about 7 kg whereas a female can grows up to 485 cm and weigh about 6 kg.



Performing brachiation

Being a primate gibbons are social animal. But the unique feature of their social life is their monogamous lifestyle. One adult male pairs with an adult female for the rest of their life unless one member is dead or abandoned.

The loud call of hoolock gibbon is a part of their social life. The call resembles to Hoo-ku, Hoo-ku…., and performed in a crescendo. The adult hoolock gibbon pair usually starts the call as a form of duet where young ones participate. This loud call usually continues for 15-20 min. The true reason behind such call is still a mystery. Some says it's for the defending their territory and others say it's a mode of communication among the adjacent groups. Whatever may be the reason this ominous call add a mystery to the forest.

Gibbons are diurnal in nature. They remain active for 8-10 hrs. a day and spend most of their time searching for food. Fruits make the 70% of their diet. Besides fruit they take leaves, flower, and insect also. Ficus are the main fruits that constitute their diet. Hoolock gibbons help in the regeneration of forest as a seed disperser and as a pollinator. Their food habit makes them to act as a natural regenerator of forest.

Though they remain in the top canopy of the forest still they have some natural threat like leopard, clouded leopard, eagle and python. But the main threat they are facing is due to human and their gradual encroachment in forest land. Destruction of forest and habitat loss is the major source of problem in these north eastern states creating forest patches. Illegal poaching, capturing neonates as pet are pretty common practice among the local.

Anthropogenic activities are the root causes for gradual deterioration of their number.

Though there are now many protected areas for the hoolock gibbons throughout the north east India as declared by Govt. but lack of stringent law against wildlife crime, shortage of staff in field level, lack of consciousness among the people, are yet to be overcome to make place for this marvellous creature. Many NGOs, wildlife enthusiasts are now working side by side with forest dept. to protect this species and their natural habitat to achieve this goal. But we have still left with a lot of challenges to create a safe heaven for our "Close Relative" of jungle.

Dragonfly and Damselfly ফড়িং

অনুপম খান, সহকারী বনাধিকারিক
পাঞ্চেৎ বনবিভাগ

ছোটবেলায় ফরিং নিয়ে খেলা করার অভিজ্ঞতা আমাদের অনেকেই আছে। এখন ভাবতে খারাপ লাগে, যে অনেক সময় খেলার ছলে আমরা ফড়িং-এর উপর অত্যাচারও করেছি। সময়ের সঙ্গে সঙ্গে বুঝতে পেরেছি ফড়িং-এর গুরুত্ব।

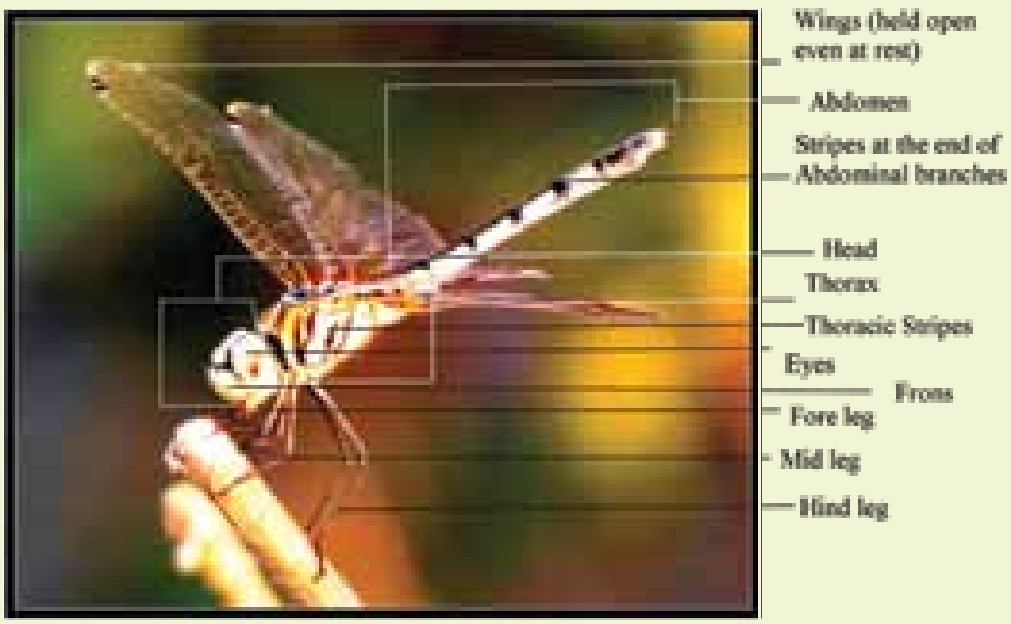
পাখিদর্শণ (Bird Wathcing) এবং প্রজাপতি দর্শণ (Butterfly Watching)-এর পর এখন ক্রমশ যে শখটি জনপ্রিয় হয়ে চলেছে তা হল ফড়িং দর্শন।

বিজ্ঞানসম্মত ভাবে এদের odonate বলা হয়, সংক্ষেপে এদের odes বলেও ডাকা হয়। পোকামাকড় গোত্র থেকে সম্ভবত ফড়িং-রাই ওড়ার শিল্প রপ্ত করেছিল। ফড়িং-রা মূলত দুই ধরনের- Dragonfly এবং Damselfly।

সারা বিশ্বে ফড়িং-এর ৬০০ টি প্রজাতি রয়েছে। এর মধ্যে ভারতে পাওয়া যায় আনুমানিক ৫০০টি প্রজাতি।

ফড়িং-এর জীবনচক্রে তিনটি দশা- ডিম, লার্ভা এবং পূর্ণবয়স্ক। পূর্ণবয়স্ক ফড়িং-রা মূলত দু'ধরনের হয় - কেউ চুপচাপ বসে খাদ্য বা জননসঙ্গীর জন্য অপেক্ষা করে (এদের Percher বলে), আবার কেউ বা নিজের এলাকাতে (Territory) ক্রমাগত উড়ে বেড়ায় (এদের cruiser বা Patroller বলে)।

পারিপার্শি তাপমাত্রা-র সাথে খাপ খাইয়ে নিতে ফড়িং-রা কখনো আকর্শনীয় তাপ-নিয়ন্ত্রক ব্যবহার প্রদর্শণ করে। ঠান্ডার সকালে কারীরের তাপমাত্রা বাড়ানোর জন্য তারা ক্রমাগত ডানা ঝাপটায়, আবার গরমের দুপুরে তারা পেট-অব্দি জলে ডুবিয়ে বসে থাকে। কিছু প্রজাতি বসে থাকার সময় তাদের শরীর এবং উদর মাটির সঙ্গে উল্লম্ব রাখে, যাতে প্রত্যক্ষ সূর্যালোকে তাদের শরীরের পৃষ্ঠ কম উন্মুক্ত হয়। এই ধরনের চরিত্র-কে "Obelisk" অঙ্গবিক্ষেপ বলে।



Body Parts of a Dragonfly

Dragonfly এবং Damselfly-এর মধ্যে পার্থক্য প্রদত্ত ছবিগুলির মাধ্যেমেই বোঝা যায়।

ড্রাগন ফ্লাই	ড্যামসেল ফ্লাই
১. তুলনায় স্বাস্থ্যবান, উদরভাগ স্থূলকায়।	১. তুলনায় কমনীয় এবং দেখতে দুর্বল। উদরভাগ পাতলা।
২. সামনের ডানা এবং পেছনের ডানা আকারে অসমান। সামনের ডানার তুলনায় পেছনের ডানা গোড়াতে চওড়া।	২. সামনের ও পেছনের ডানা আকার ও আকৃতি-তে প্রায় সমান।
৩. স্থির হয়ে বসার সময় ডানাগুলি বক্ষস্থলের উভয়দিকে খোলা থাকে।	৩. স্থির হয়ে বসার সময় (একে Percling বলে) ডানাগুলি সাধারণত উদরের উপরিভাগে বন্ধ অবস্থায় থাকে।
৪. উড্ডয়ন ক্ষমতা শক্তিশালী, প্রায়শই দ্রুতগতিতে এবং উঁচুতে ওড়ে।	৪. উড্ডয়নক্ষমতার নিরিখে তুলনামূলক দূর্বল। মাটি বা জলের কাছাকাছি ওড়ে।

ফড়িংদের জীবনচক্র জলাশয়ের সঙ্গে অঙ্গাঙ্গিভাবে জড়িত। কিছু প্রজাতি পুকুর বা লেকের মতো স্থির ইলাকা পছন্দ করে, আবার কিছু প্রজাতি নদী বা পাহাড়ি নালার মতো বহমান জলধারা পছন্দ করে।

চেহারায় ছোট হলেও ফড়িংদের অভিপ্রয়ান (Migration) স্বভাব রয়েছে।

Pantala Flavescans (সাধারন নাম- Wandering Gloder বা Globe Skimmer) নামক ফড়িং প্রজাতি পোকামাকড় গোত্রের মধ্যে সবচেয়ে দীর্ঘতম অভিপ্রয়ান (Mirgration) পথের যাত্রী, যা ভারত থেকে আফ্রিকা পর্যন্ত বিস্তৃত। যাত্রাপথে তারা মালদ্বীপ এবং seychelle দ্বীপপুঞ্জে বিশ্রাম নেয়।

- সাধারনত ফড়িং-রা সাত মাস পর্যন্ত বাঁচে।

- সর্বোচ্চ শিকারীরূপে লার্ভা এবং পূর্নাঙ্গ উভয় দশাতেই বাস্তুতন্ত্রে ফড়িং-এর অবস্থান খুবই গুরুত্বপূর্ণ। এডিকা মশা ডেঙ্গি এবং চিকুনগুনিয়া-র জন্য দায়ী)-কে নিয়ন্ত্রন করারা জন্য থাইল্যান্ডে Granite Ghost নামক ফড়িং-এর লার্ভা দশাকে ব্যবহার করা হয়। ফসলের ক্ষতিকারক প্রচুর কীট-কে ফড়িং-রা খেয়ে ফেলে নিয়ন্ত্রন করে।

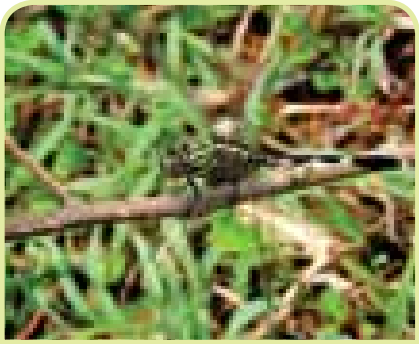
- কোন বাসস্থানের গুনগতমান (habitat quality) যাচাই করার জন্যও ফড়িং গুরুত্বপূর্ণ ভূমিকা পালন করে। ফড়িং-রা হল ভীষনরকম বাসস্থান নির্দিষ্ট (habitat specific)। ভূমিব্যবহার পদ্ধতি (landuse pattern) পরিবর্তিত হলে ফড়িংদের সম্প্রদায় গঠন (Community structure) বদলে যায়।

প্রায় প্রতিটি দেশের সংস্কৃতি এবং লোকাচার বিদ্যাতেই ফড়িং-এর উল্লেখ রয়েছে। জাপানে ফড়িং হল সুখ, শক্তি, সাহস এবং সাফল্যের প্রতীক। উত্তরভারতে ফড়িং-কে বৃষ্টির বার্তাবাহক হিসেবে গন্য করা হয়।

Common Picture Wing
(Rhyothemis variegata)

Ditch Jewel
(Brachythemis contaminata)

Fulvous Forest Skimmer - Male
(Neurothemis fulvia)



Green Marsh Hawk - Male
(Orthetrum sabina)

Green Marsh Hawk - Male Juvenile
(Orthetrum sabina)

Ground Skimmer - Female
(Diplacodes trivialis)

Ground Skimmer - Male Juvenile
(Diplacodes trivialis)

Ground Skimmer - Male
(Diplacodes trivialis)

Little Blue Marsh Hawk
(Brachydiplax sobrina)

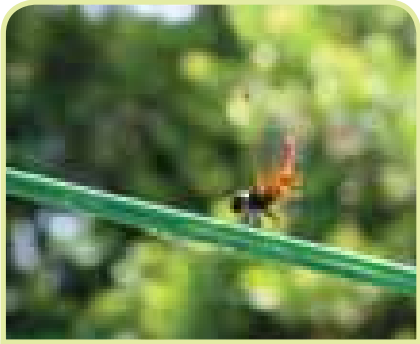
Long Legged Marsh Glider
(Trithemis pallidinervis)

Red Marsh Trotter
(Tramea basilaris)

Ruddy Marsh Skimmer - Female
(Crocothemis servilia)

Ruddy Marsh Skimmer - Male
(Crocothemis servilia)

Scarlet Marsh Hawk - Female
(Aethriamanta brevipennis)



Scarlet Marsh Hawk - Male
(Aethriamanta brevipennis)

Wandering Glider
(Pantala flavescens)

Yellow-Tailed Ashy Skimmer- Female
(Potamarcha congener)

Yellow-Tailed Ashy Skimmer- Male
(Potamarcha congener)

Azure Dartlet
(Enallagma parvum)

Brown Spreadwing
(Lestes umbrinus)

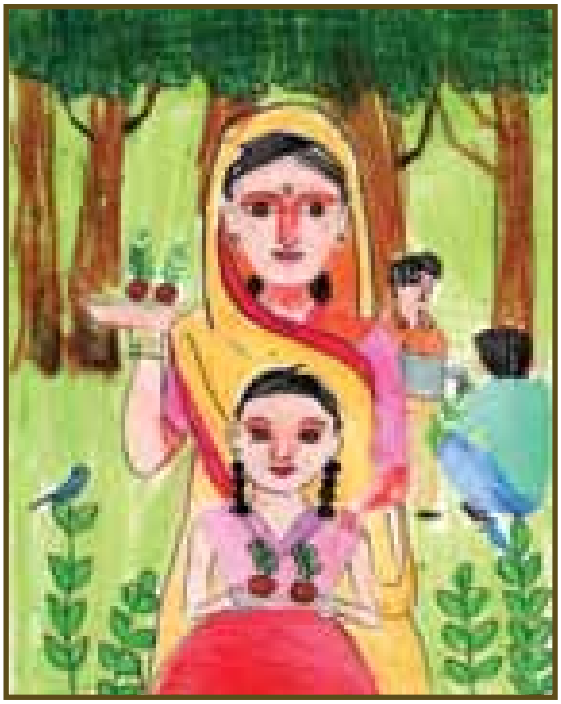
Black Marsh Dart
(Onychargia atrocyana)

Coromandel Marsh Dart
(Ceriagrion coromandelianum)

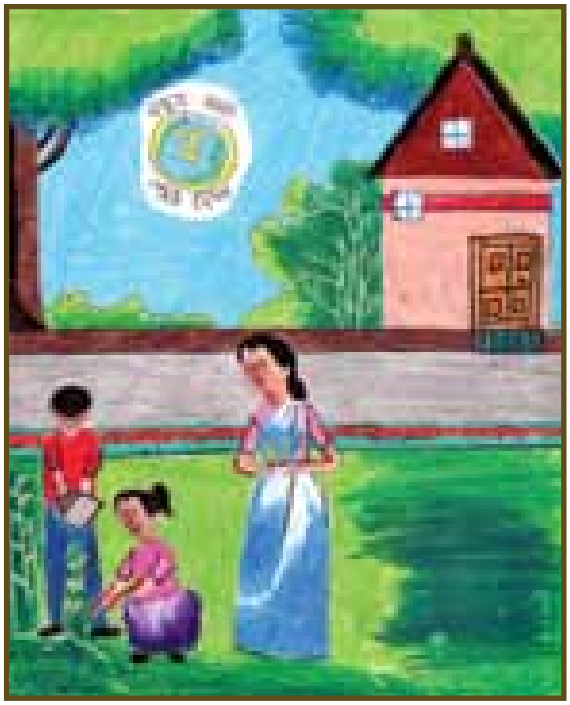
Golden Dartlet
(Ischnura aurora)

Pigmy Dartlet
(Agriocnemis pygmaea)

Paintings of Drawing competion 2017 by School students
Wildlife & Bio-diversity Conservation



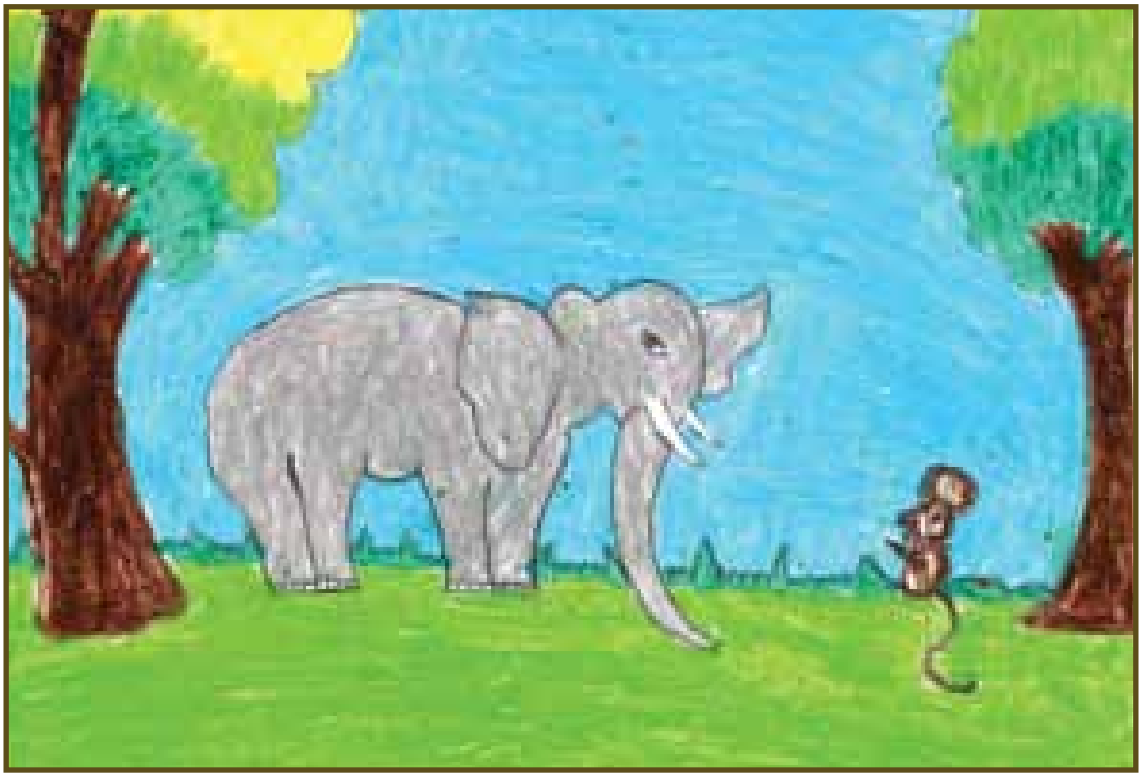
AISHANI DAS
Class-IV, 9 years
Loreto Day School



ARATRIKA BASAK
Class-IV, 9 years
Loreto Day School

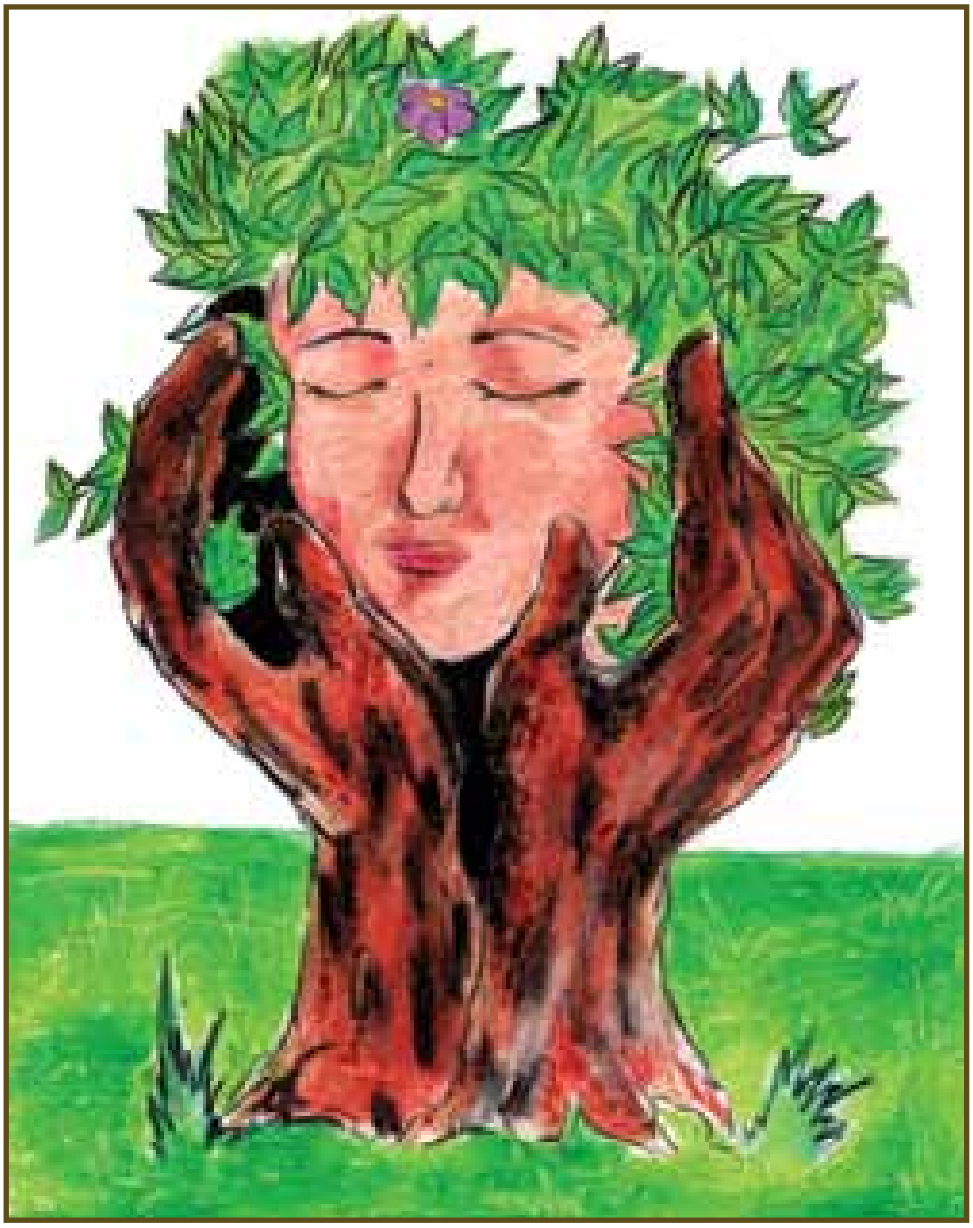
ALFIA KHATOON
Class-V, 11 years
St. Stephen's School

MD ALMAS
Class-I, 6 years
St. Stephen's School



FARHA NAAZ
Class-I, 6 years
St. Stephen's School

Paintings of Drawing competion 2017 by School students
Wildlife & Bio-diversity Conservation



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Can tiny spaces in congested urban habitation host trees safely?

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Greening of urban landscape is sine que non to prevent climate change. Apart from public land, there are private land in urban landscape which is bereft of any vegetation or used indifferently may provide space for planting trees. While there is general understanding about the need of planting trees in urban landscape but many are hesitant or reluctant to plant trees in home garden or commonplace in apartment surrounds fearing that tree roots could damage foundation of building or compound wall, so the common place in many housing estates either remain blank or concretized. There is hardly any awareness about the role of trees in controlling runoff in the high rainfall region like Kolkata. In this connection, some relevant statistics are "a mature tree can draw up to 50 gallons of water per day". In Kolkata during rains 44.15

gallons of water per square feet falls on the ground (calculated by rainfall calculator taking the average rainfall figure). A mature tree can consume up to 15 gallon per hour in hot day. Further study in university of New Mexico reveals that a fully mature Pecan tree (Cariya illinoinsis) can draw 150-250 gallons of water in hottest summer day. Tree specialist, Urban designer, landscape architect may have different views in this aspect, so there is need to struck a balance to ensure all requirements are considered to organize planting of trees for environment management including runoff water management of urban areas.

An observational study carried out in Baishnabghata Patuli area where many household had planted different kind of trees in their tiny compound and by the side of narrow road, which normally remain blank or covered with weeds. In this area, the bulk of the population started settling during Nineties. Some of the early settlers of the area took initiative of planting of sapling of different tree species by the side of several jheel and roadsides. Many seedlings procured from the social forestry nursery of Panchasyer during the period of free distribution and some purchased seedling of high value species from private nurseries. The cost planting, tending and fencing of the area for protection provided by the interested residents, this probably set the temper of greening in the area. Now the area has successful strip plantations along jheel and roadside, household and common land together has a collection of more than one hundred tree species in the area.

The study area have many households built their houses in their less than one katta of land (about 600 to720sqft or less)allotted land and used available by the side of narrow internal road adjoining houses using annual and perennial species including fruit trees. The data on species planted and also their planting distance from building or other structures,age,type of planting material used, method of planting and intercultural operation undertaken, any damage to building or structure noted, problem of pest and disease recorded and yield obtained were collected through discussion with owners and the residents of the area. Though several species have been planted, in this article i have provided information about the food/fruit yielding tree species and suggested need for proper layout, choice of species/variety, use of vegetative propagated planting material and appropriate intercultural operations for undertaking planting in the limited land available for food provisioning and ecosystem services.

Observation

The perennial trees recorded in the area includes fruit trees like Mango,Guava,Pomelo,Banana,Jackfruit,Moringa,Bael,Jamun,Coconut,Arecanut,Papaya,Pomgranate,Tamarind,JuJubebe,Star fruit, Custard apple, Banana etc other trees/shrubs are Neem, Polyalthia, Murraya, Lagerstroemia, Bauhinia, Crotons, Plumeria,Tabarnum, Oleander etc.

Mango, Jackfruit, Jam and Neem of seedling origin are growing in many household gardens and along the side of narrow internal roads within 4 feet from the boundary wall. The tree species of seedling origin have potentiality to grow bigger in size and may produce extensive lateral root system with time. The seedling origin trees start bearing fruits between 8-10 years whereas the vegetative propagated fruit trees start fruiting early and produce true to the quality fruit of the variety. Usually number of fruits per tree is variable depending on the space available for growth. Due to limited space, the growth of tree crown is affected, interfering entry of light to the building-causing problem to the household resulted pruning of the branches as a result flowering and fruiting is limited at present in many of the trees.

Coconut wherever planted within 4-6feet distance from the boundary wall are growing and fruiting. Its roots do not affect the adjoining structures. Coconut trees have fibrous root system at the base of the trunk and few roots penetrate deep inside the soil.

The middle to small sizetreelikeGuava, Pomelo, Bael,Date palm, Moringa, Falsa,Zujube and small size tree like Lime, Pomegranate growing and fruiting better regularly. Among all the fruit trees, Guava is most successful but most of the trees are of seedling origin thus fruits are of indifferent quality. The roots of these middle and small size trees do not interfere with the building or boundary wall.

Similarly, Areca nut is growing and fruiting well along the boundary of some houses.

Banana planted in the corner of the garden in many

houses is growing and fruiting well with little maintenance.

The flowering or foliage bearing shrubs of different species planted in the available space are growing well.

It appears from the observational study that there is need for choosing site for planting different species in the front and backyard of household to avoid obstruction of wind, light in the household. Presently many of the fruit trees of seedling origin have been planted within the available space without the consideration of its location which may have impact on the wind flow, availability of light to the residents(evergreen tree like mango,jackfruit,Jam planted in southern direction obstruct wind). These trees of age group10 to20 years found planted in the area from seeds. So these trees will have the potentiality to produce bigger crown and extensive root system in future, which may not be possible to adjust in the limited space available .But in the initial success of various fruit species indicate the potentiality of the area. There is scope of improvement of growth and fruiting of tree species in the limited space. The species selection and varieties of fruit trees like (Mango, Guava, Pomelo etc,) planting material mostly vegetative propagated (grafts, air layers, cutting etc) to be used depending on the availability of space. The vegetative propagated trees are of smaller stature and with less extensive root system. The primary consideration is need for selection of planting site considering distance from the structure and the possible effect of trees on availability of light/shade/air circulation of the building including its effect on neighbouring houses keeping an eye on the requirement of tree species for space, light at present and future. Besides there is need for planning for inter culture operation like mulching, manuring, pruning ,training to regulate provide for light and to avoid interference and boost flowering/fruiting and also wherever necessary, need for undertaking construction of underground structure to prevent sprawling roots reaching into building foundation etc. The fruit/food yielding species like Coconut, Areca nut, Moringa etc planted in the space available in the boundary and banana in available space in the corner, a common practice in many household. Besides there is scope of introduction of shade bearing crops like Turmeric, Colocasia, Elephant foot, Pineapple under the shade of trees.

Chinese Pangolin
Photo: **Madhurmilan Ghosh**

Mountain-Bulbul
Photo: **Ashim kumar Chaki**

Lesser Adjutant Stork
Photo: **Madhurmilan Ghosh**

Great Hornbill
(*Buceros bicornis*)
Photo: Ujjal Ghosh, IFS

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