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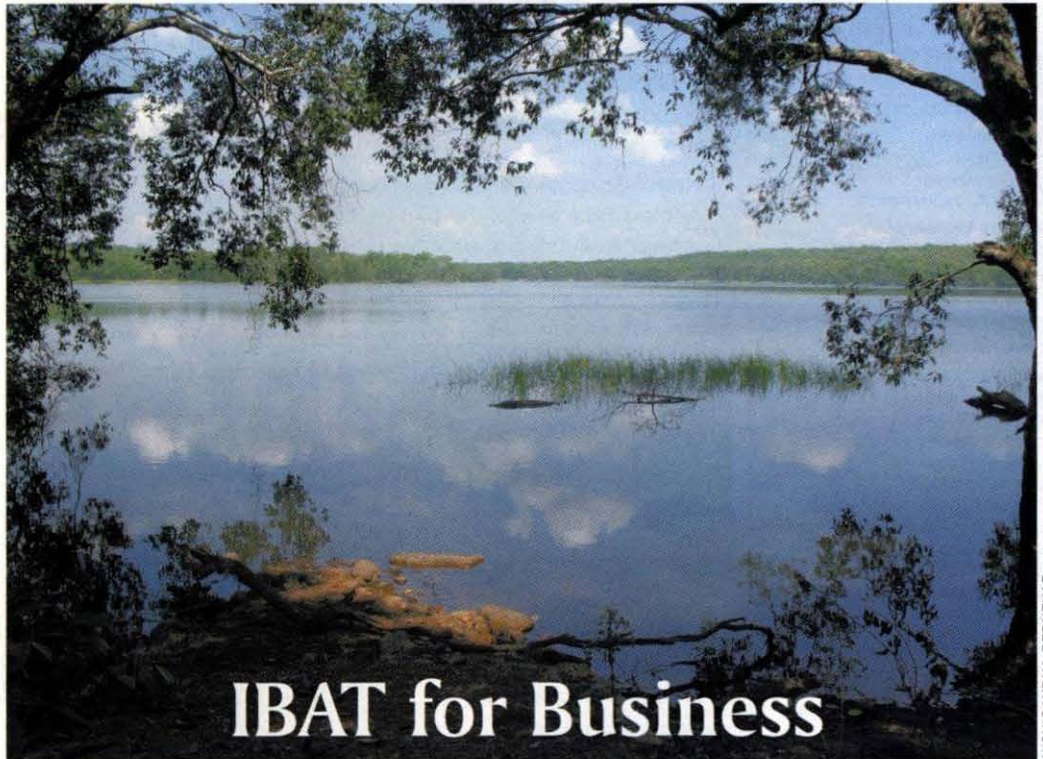
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NISHIGANDHA PEDNEKAR

## IBAT for Business

**T**here is an unnecessary conflict between development and environment protection, as if both can not go together. Actually, environment protection leads to better and sustainable development of a country. For me, they are not mutually exclusive. It all depends on proper land-use planning. With good land-use planning, we can have industrial zones, even Special Economic Zones (SEZs), strict nature protection areas, ecologically and culturally sensitive areas co-existing with certain specific industries, agricultural areas, well-planned cities, better road/railway connectivity, even extractive industries, such as oil and mines.

Many a times infrastructure projects are planned without completely understanding the socio-cultural and ecological importance of the area. One of the most common pleas for allowing an infrastructure project to continue is that the proponent has already spent crores of rupees and if we stop it for environmental concerns, the proponent will lose money.

Thanks to India's environmental, wildlife, and right-to-information laws, a strong NGO movement, and increasing awareness of stakeholders, extractive industries are now realizing that neglecting environment and social issues can not only bring great risks and lower profit, but also revoke the companies permission to operate (as in the case of Vedanta). It is, in the companies' interest to go beyond basic legal requirements and ensure environmental/social concerns at the planning and at all operational stages.

The four environmental pillars of locating an industry is what is known as AMMC: Avoid, Minimize, Mitigate and Compensate. In order to avoid an ecologically, socio-culturally and biologically important area from industrial damage, we now have a new programme called Integrated Biodiversity Assessment Tool (IBAT). It has been developed to provide finer-scale spatial information to industries and companies, so they can avoid high biodiversity rich areas altogether, and integrate sound environmental management planning options in other areas. Through IBAT, companies and decision makers can access critical information at the site level.





IBAT's vision is collection, update and management of critical biodiversity data with the aim of data-driven decision support.

IBAT was created through alliance of four major international organizations: BirdLife International, Conservation International, International Union for Conservation of Nature (IUCN), and United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC). The first output, IBAT for Business ([www.ibatforbusiness.org](http://www.ibatforbusiness.org)), was launched during IUCN World Conservation Congress in 2008. IBAT for Research and Conservation Planning, and other tailor-made versions are under production.

IBAT gives accurate spatial information of Protected Areas, Important Bird Areas, Key Biodiversity Areas, and culturally sensitive areas. On a finer scale, it provides information on critical habitats that includes areas with high biodiversity values, including habitat required for survival of critically endangered and endangered species; areas having special significance for endemic or restricted-range species; sites that are important for survival of migratory species; areas supporting globally significant concentrations or number of individuals of congregatory species; areas with unique assemblage of species or which are associated with key evolutionary processes or provide key ecosystem services; and areas having biodiversity of significant social, economic or cultural importance to local communities.

IBAT encourages industries to comply with international and national laws, follow best practices, be sensitive to needs of local communities, and develop management action plans and develop long-term environment monitoring. IBAT collates, holds and regularly updates information on globally threatened species of the IUCN, Important Bird Areas of BirdLife International, Key Biodiversity Areas of Conservation International, and World Databases on Protected Areas of United Nations Environment Programme - World Conservation Monitoring Centre. By following IBAT and integrating environmental concerns at the planning stage itself, industries can benefit by having social and legal licenses to operate, access to land and resources, access to capital and investments and keep high standard, reputation and competitive advantage. Access to biodiversity information at an early stage of project planning makes it easier for an industry to look for alternative plans, approaches and sites at a time when such a change is still economically viable. It should be clearly understood that IBAT is an information service and not a replacement or substitute to the existing environmental and social laws which have to be followed anyway by every industrial house.

In the four issues of *Hornbill*, we have dealt with the International Year of Biodiversity (IYB), the Economics of Ecosystems and Biodiversity (TEEB), Reducing Emission from Deforestation and (Forest) Degradation (REDD), and in this issue Integrated Biodiversity Assessment Tool (IBAT). While the aim of the IYB is to highlight the importance and values of biodiversity, the later three are new concepts to help in biodiversity conservation. TEEB and REDD are very important arguments to use by conservationists for biodiversity conservation, particularly to decision makers and the Planning Commission of India (which gives meagre funds for conservation). IBAT should be popularized amongst industrial houses so they can avoid ecologically sensitive areas and avoid conflict between development and environment.

Asad R. Rahmani

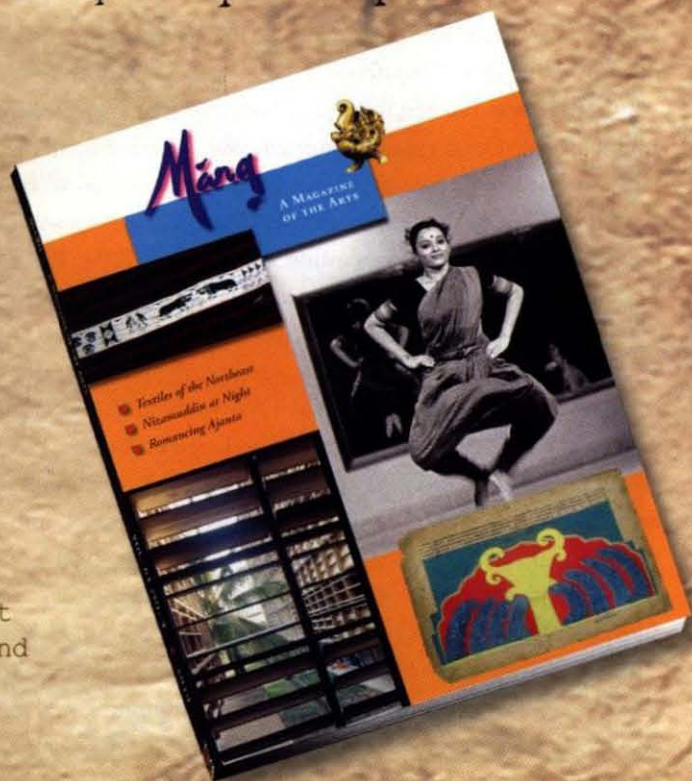


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# Diversity featuring in this issue

Himalayan Marmot



Desert Cat



Hoolock Gibbon



Angiosperm



Fire-tailed Sunbird



Ganges River Dolphin



Red-headed Falcon

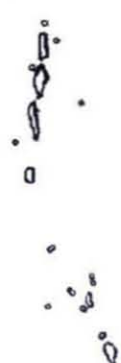
Painted Bat



Yellow-browed Bulbul



Black-tailed Godwit







PRIYANKA IYER

# Retracing Evolution, Bountiful Biodiversity

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Nikhil Bhopale

**Tiger painting by**  
Paul Barrel -

©THE BOOK OF INDIAN ANIMALS

*Flowers have been the source of happiness, peace, love, affection and other such positive emotions since time immemorial ... but there is more to flowering plants than pleasing humans.*

*The passion to conquer the skies began with the Wright brothers (the creators of the first successful flying machine)! Birds, the first vertebrates to claim the skies, did it with easy grace and unmatched elegance! Along with the masters of the sky, we will take a look at the true ancestors of Man – the mammals!*





Compiled by : **Priyanka Iyer**  
Experts consulted : **Mr. Sagar Satpute,**  
**Mr. Rushikesh Chavan**  
Sources : COLLEGE BOTANY by H.C. Gangulee,  
THE BOOK OF INDIAN ANIMALS  
by S.H. Prater,  
TIMETREE OF LIFE  
edited by S. Blair Hedges and  
Sudhir Kumar,  
PLANT ECOLOGY GENETICS &  
EVOLUTION  
by P.L. Kochchar

**A**ngiosperms or flowering plants have diversified on our planet to a large extent. Most trees that we see around us in the cities are angiosperms. The word Angiosperm means 'covered seed', in other words - seed is covered by ovary.

But how did these flowering plants come into being? There are some trees that clearly show themselves to be a possible evolutionary link between gymnosperms and angiosperms. These are exceptions to the characteristics of the angiosperms. In some angiosperms the ovules are not completely enclosed within the ovary; likewise, in some gymnosperms the ovules are enclosed nearly as completely as in an angiosperm. This gives us a rough picture of how the angiosperms may have originated.

So once the angiosperms evolved, how did they diversify? They did this in a systematic manner through pollination, inhabiting newer habitats, developing toxins to ensure safety, etc. Pollination took place through agents such as wind, water, birds, and insects. The flowers and fruits evolved so that they may attract the pollinating and seed dispersing agents. The colours of some flowers are unseen to the human eye but visible to insects, especially to specific pollinators. The nectar offered by the flowers or the fruits is the price for the 'courier service', i.e., carrying the pollen from one flower to another and dispersing seeds from one location to another. These were their means to colonise, for e.g., the *Ficus* fruits dispersed by the pigeon may end up on a ledge of a roof, but that tiny seed has enough 'sense' or information fed into it to germinate there itself if the conditions are specific. Some seeds have complex and perfect structures to be able to travel far from the parent tree and colonise newer areas. The Mahogany seed's wing enables the seed to glide and land far from the parent tree. *Urena lobata* fruit is nature's version of velcro as it attaches to the fur/feather/scale of passing animals and falls off at a distance.

But, the story does not end here; there are more reasons for this incredible and awe-inspiring diversity. Angiosperms have colonised every possible niche or habitat with special adaptations according to the area they inhabit and the climate. Xerophytes (xero meaning dry, phyte meaning plant) have special adaptations to conserve water as they inhabit desert regions; cacti have modified their leaves to thorns and have invested their energy in creating magnificent flowers that attract attention from far and wide. The evergreen trees grow in a habitat with a lot of rainfall, sunshine and minerals. As a result, these trees are of astronomical sizes and have adapted to deal with the excess rain and compete fiercely for sunlight. This battle for sunlight can be clearly seen if one visits an evergreen forest often wherein the fall of a single mammoth tree creates opportunities for all the dormant seeds that have been patiently waiting their turn to rush to the canopy. Mangroves have developed specific salt glands to expel salt as they inhabit brackish waters, which are the meeting of river and the sea. The angiosperms of deciduous forests drop their leaves during summer, but do not mistake the tree to be dead or dying. In fact, they do this to conserve energy and water. Some angiosperms, in colder regions, grow very small and close to the ground to avoid the harsh winds.

And then again there are other reasons why plants adapted the way they did. They evolved thorns and other such adaptations to protect themselves. Some plants even evolved chemical toxins to avoid being eaten by the herbivores and omnivores. But how did these herbivores and omnivores evolve? How did the birds and mammals that helped as well as hindered the path of plants evolve? Well, let us take a look ...

The elegance and graceful beauty of a bird's flight has always mesmerized us. But what is a bird? Well, the simplest and most apt definition given by Dr. Salim Ali is - 'Bird is a feathered biped'. Birds have undergone massive changes to master the flight that we admire so much; be it their body temperature, their warm-bloodedness, their light skeletal frame or their aerodynamic shape. Birds are believed to have sprung from reptilian ancestors in bygone 'aeons'. At first sight this appears a far-fetched notion, for on the face of it there seems little similarity between the 'creepy-crawly' cold-blooded reptile and the graceful, soaring warm-blooded bird. But palaeontological evidence to which we have access - the Archaeopteryx - and modern researches on the skeletal and other characteristics of our present day birds, tend in a great measure to support this belief. The periodical moulting of birds is also essentially the same process as the sloughing of reptiles.



Of the senses, those of sight and hearing are most highly developed in birds, whereas that of taste is comparatively poor, while smell is practically absent. The focus can be altered from a distant object to a near one almost instantaneously. India has over 1,200 species of birds. We can start with our magnificent and regal national bird – the Peacock! But all across India we find our feathered friends in various shapes and sizes from the tiny Pale-billed Flowerpecker to the tallest Sarus Crane; a myriad coloured pheasants, and the secretive and illusive Jerdon's Courser. There are also migratory birds like waders and some other water birds that travel great distances to complete their life cycle.

Birds also have interesting nesting behaviours which they have adapted according to their unique habitats niche. Nests can be a simple scrape in the ground with camouflaged eggs and nestlings, as seen in lapwings, to as elaborate, a creation as the Baya weaver nests created from grass blades and other vegetative material intricately woven together to form a hanging nest. But this does not end with nesting, the birds themselves have adapted to their habitats and the food they consume. The Asian Openbill feed on Apple snails for which these birds require the special bill they are endowed with. The sunbirds are nectarine birds and have curved bills for the same. Raptors have beaks to tear out flesh. Also, the shape, structure and patterns of the wings differ as per their needs. Owls have flight feather that enable silent flight, pelagic birds have strong flight to help them live the rough life at sea where they are always on the wing, some of the Himalayan birds change plumage according to the season to camouflage with their surroundings.

But all across the world there are a few birds that have some amazing yet drastic adaptations; they have lost flight. Penguins have wings but they fly under water and ostriches have strong legs that enable them to run at speeds that are seen by a few other living beings. But the birds were in close competition with another group to which we ourselves belong – the mammals!

The earliest, the most primitive mammals are believed to be the descendants of primitive reptiles. A study of their fossil remains reveals that the earliest mammals, lineal ancestors of tigers, elephants, mice, whales, of all present day species, great and small, were little timid animals.

The characteristics of a Mammal are Mammary glands, hair/fur, middle ear bones, etc. But these timid animals are, today, among the most physically diversified group (in terms of shape and size) with adaptability to colonise in almost every part of our planet. These primitive mammals inherited some of the reptilian characteristics,

but there were some adaptations that worked drastically to their advantage. These animals were warm-blooded so they did not rely on the surrounding temperature to regulate their own body temperature. And they also had one unique characteristic that gave the entire group its name – they produced milk through special mammary glands.


Egg-laying mammals and marsupials were among the first mammals. The Duck-billed Platypus and Echidna are egg-laying mammals with such a winning design that they are flourishing till date. Marsupials are mammals that give birth to live young, which is not totally developed. Till they are totally developed they are kept safe in a pouch. These animals can be seen in Australia and South America as they were part of a large continent that split up millions of years ago. As they became islands the animals inhabiting the islands never interacted with other animals on the mainland continents and hence remained unchanged.

Then, came the placental mammals wherein the offspring develops completely inside the mother. These include the herbivores, carnivores and of course - man! Deer, elephants, rhinoceros, tigers, lions, whales, dolphins, bats, monkeys, apes are all the different mammals we see today. They all have adaptations and unique body types as per their specific habitat. Man is also a mammal and in turn a crucial part of nature, but with time man seems to have forgotten this truth. Today there are many problems that are faced by man and all the other life forms on earth as a result of many activities of man. Poaching, Agriculture, Habitat loss, Logging, Mining, Illegal trade are some of the major issues that are gifts of man to nature of which he is a vital part.

The gradual change in the life forms of different periods that we see throughout the "Retracing Evolution, Bountiful Biodiversity" series of articles speaks volumes against fixity of species and special creation. But there is more to life than the aspects discussed in these articles. Our planet, the living planet, has an incredible array of diversity marred by none. Species appear, flourish and then become extinct; their place is taken by new species that are adapted to the conditions then prevailing. And we as humans are a part of this life we see around us. The beautiful life forms we see outside our window or in the yard outside are not separated from us, we are also nature. A part of this cycle! And we are managing to speed up the process of our own extinction along with the others around us. The earth will go through this cycle, just like it has in the past and new forms will take our place, they will be adapted to the conditions present then.

The sooner we understand and give this information the significance it demands, the better! ❀





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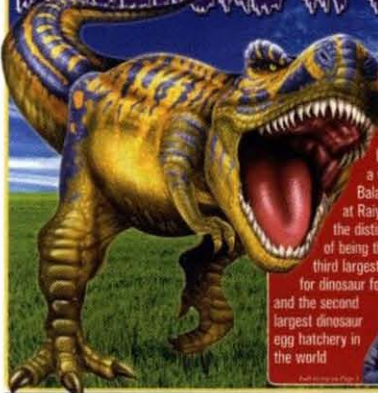
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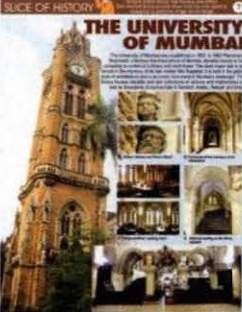
## DINOSAURS IN INDIA



Aaliya Babi, Princess of Balasinor, also called 'Doctor Dinosaur', takes a walk across the Balasinor Fossil Park at Raiyoli. The site has the distinction of being the third largest site for dinosaur fossils and the second largest dinosaur egg hatchery in the world.

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4. You find a note pinned to your door.  
5. You see a stranger peering into your window.

MY PAGE




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Indian Jungle Nightjar's excellent camouflage eludes it from detection

NIKHIL BHOPALE

# Bird Identification Simplified

Field Guide  Note book  Dull coloured clothes  Binoculars   
 Are these, the only things that one requires for bird identification? A person new to 'birding' once jokingly responded to my excited state on seeing a particular bird, 'You mean a big bird. As for me, there is no white-breasted or black-capped or crested bird. For me a bird is either small, big or very big.' Considering that most of us refer to a flying animal as a bird, I was considerably amused at the plight of the amateur 'bird watcher'. The basic understanding of birds around us and the nature of their existence is interesting to note considering the rich bird diversity of India.



Nikhil Bhopale is the Programmes Officer at BNHS, and an avid bird watcher.







Text: Nikhil Bhopale

So, what exactly is a bird? Most of us refer to any flying animal as a bird. Then again, bats are flying animals too, but they are not birds, they are mammals! And ostriches cannot fly even though they are birds! Then, how does one define a bird? 'Feathered Biped' – this is a close-to-perfect description of a bird.

For most of us, when asked to list say five birds, we would immediately list a crow, sparrow, myna, bulbul and pigeon. But did you know, there are more than 10,000 species of birds known to science in the world and no less than 1,220 species exist in India. Do not panic! Do not even think about identifying them all at once. Slowly but definitely, the next time somebody asks you to list five birds you will probably list ten and these will not include sparrows, crows etc. Let us begin exploring the avian kingdom and learn how to begin looking for birds around us and identifying them correctly.

Bird identification is a puzzle; it is the collection and assimilation of various pieces of information such as habitat, distribution, size and shape, colour, bird call and behaviour. It ends by matching the result and eliminating similar birds.

### Habitat

India is a diverse land, with natural habitats ranging from high altitude Trans-Himalaya and the Himalayas to terai/duars, deccan plateau, the desert and the coast. Birds are generally habitat

specific. One will not find a forest bird in another habitat or vice versa. For e.g., Great Indian Bustard can be seen only in grasslands, you will never see one in a forest or along the coast. But, as in any concept, there are a few exceptions to this rule, i.e., there may be situations when birds may be common in two or more habitats, or may step over these borders. According to habitat, they can be divided into four types -

- *Grassland birds*

As the name suggests, these are birds belong to habitats dominated by grass with a few patches of scrub, depending on its geographical location. Some of the birds of this habitat are bustards, larks etc.

- *Off-shore birds*

These are our 'sailors' and are almost always at sea. They are generally seen on land only during breeding or when blown off-course by a storm or any other natural calamity. These birds include shearwaters, boobies, skuas, frigatebirds, petrels etc.

- *Water birds*

These are, as one can easily guess, birds generally seen close to a water body, be it freshwater or marine. These include ducks, wagtails, kingfishers etc.

- *Forest birds*

These are birds found in different types of forested areas that our country is so rich in. For e.g., wood pigeon, malkoha, leafbird etc.

### Distribution

Most of the field guides provide distribution maps depending on personal observations and previous records. While looking at the distribution, it is necessary to look for the bird's status in that region, i.e., whether it is a resident (seen all year round), summer or winter migrant/visitor and so on. For e.g., Ruddy Shelduck, a winter visitor to most parts of the country, is a breeding visitor to only Jammu & Kashmir. One might find new records for the region, even if the respective bird may not be shown in the map of that region.

### Size and Shape

Most of us can identify some birds like sparrows, crows, bulbuls, mynas, ducks and kites. Instead of classifying birds as small, big and very big, we can measure them with reference to the



Black-rumped Flameback Woodpecker – a wood borer

NIKHIL BHOPALE

NIKHIL BHOPALE







Grey Wagtail - wags tail while moving



Purple Sunbird - long and curved bill



Blue-throated Barbet - canopy dweller

above mentioned birds that we already can identify, like sparrow+, crow+ or kite- etc. One can also associate an unidentifiable bird to a well-known bird, on the basis of its common characteristics. One need not necessarily aim at identifying a bird by its exact species at start, but can associate it with a known bird. For e.g., a Green Pigeon can be identified as pigeon and need not necessarily be related to a myna! From the shape of the bill, too, the search can be taken further. For e.g. a bird smaller than a sparrow with a slender, long and curved bill, has to be a sunbird.

**Colour**

In most cases, the colours may be considered after 'id-ing' the bird by its physical size and shape; the red vent of the Red-vented Bulbul may be observed once you are certain that it is a bulbul. Here, colour refers not general body colour but the colour which attracts one's

attention. For e.g., almost all parakeets in India are green coloured and Rose-ringed and Alexandrine Parakeet are amongst the most common urban birds of India. Other than their size, to confirm the identification of Alexandrine Parakeet, one must look for the red/maroon patch on its shoulders; or else it might be the Rose-ringed Parakeet.

To exemplify further, bee-eaters are almost of the same size and shape, but the Blue-bearded Bee-eater, is also completely green in colour, with a long down curved bill but with a distinguishing turquoise blue forecrown, throat and breast. In India, all bee-eaters are green coloured, but in this case you should observe its blue colour which can distinguish it from other bee-eaters.

**Bird call**

In case of cryptic coloured birds (not easy to locate) like warblers and nightjars, interpretation of the bird call,

will be the key for its identification. As a beginner, it is a little difficult to interpret a call in the field by just referring to a book. For e.g. the call of Puff-throated Babbler is a mellow *tee-tee tee 'too tee-tee tee 'too too too too*. Instead of imagining how it will be, it can be converted to 'Pretty sweetly I will beat you'. It is better to interpret bird calls according to one's understanding. It is also important to count the time gap between two notes. For e.g., the call of the Large-tailed Nightjar is a resonant *chaunk* at a rate of 1-2/sec, this call is very similar to Jerdon's Nightjar, but it calls at rate of <1 call every 2 sec. There are also some birds that can mimic the call of another bird.

**Behaviour**

This is a wide criterion and important too. A brief account of the factors to be considered while identifying a bird according to its behaviour are -

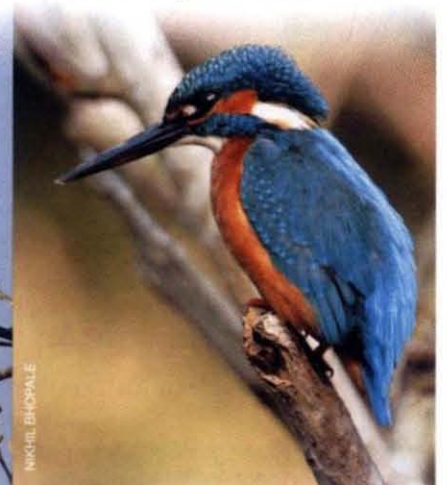
Crested Lark - A grassland bird



Bay-backed Shrike - open forest



Common Kingfisher - water bodies







Ruddy Shelduck - a short migrating visitor



Wood Sandpiper - long distance migrator



Spotted Owlet - nocturnal

- Flight – Depending on the flapping of the wings it can be divided into two, viz. fast (pigeon), slow (raptor). In addition to this, there some typical flights – undulating flight of oriole and wagging (zigzag, turning right-left continuously) flight of plover.
- Sitting position – close to branch or bark like woodpecker, parallel to the ground like nightjar, perpendicular to branch like Serpent Eagle and so on.
- Place of inhabiting – on the tree top, like birds of prey; in the middle of the canopy, like leaf-warblers; close to the ground, like babblers and reed warblers; on the ground, like bustards.
- Shy or sulking birds like wren-babblers; solitary birds and social birds like parakeets.
- Creepers like nuthatches and treecreepers, hopping birds like babblers and warblers.
- Diurnal birds (day time) and nocturnal, like owl or nightjar.

- Diet – carnivores like birds of prey, granivores like munias, frugivores like green pigeons, insectivores like warblers, scavengers like vultures or wood borers like woodpeckers.
- After going through this you can come down not only to the group of birds but also very close to the similar species level. There are many groups which are confusing and difficult for identification like raptors, warblers, waders, flycatchers and nightjars. In bird identification one should not forget geographical colour and size variations; races, various stages like juvenile and adult, eclipse plumage and more important sexual dimorphism. Contrary to human beings, male is brightly coloured or attractive as compared to drab females. Fewer exceptions to this are Greater Painted snipe and Red-necked Phalarope. Most of the time it is easier to identify males than females.

Identifying and recognizing a bird is

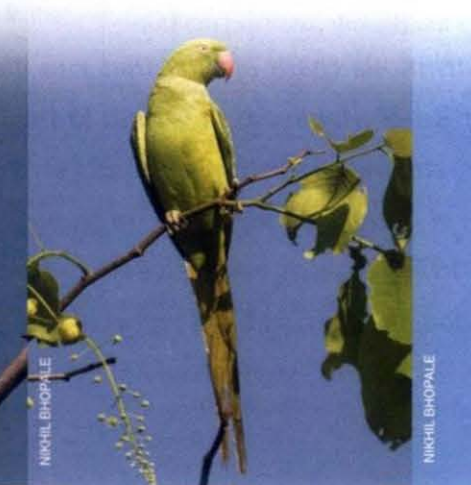
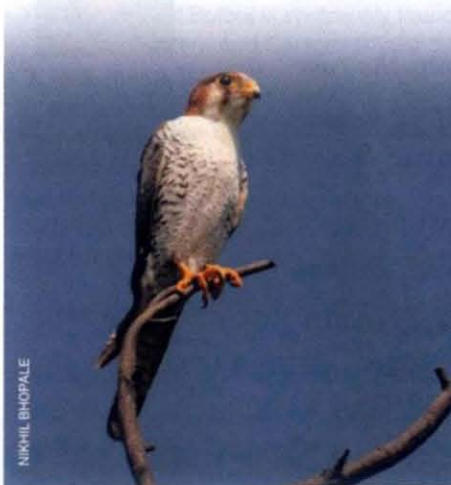
not always possible in the field or by just observing photographs, it comes with the observations and learning that comes with practice. Experience, certainly, is the best teacher but experience cannot be always counted in years. It completely depends on the observations one makes. Practicing to observe common urban birds will help increase any beginner's observation skill and thinking.

So, while bird watching, before confirming the identity of a bird, one needs to ask questions like, 'Why this? Why not the other one?' This will give an idea about the other bird to be identified and know the bird better. Moreover, the name of the bird itself usually describes a visibly prominent physical characteristic. I am not a taxonomist, scientist or an expert on ornithology, but I have shared what I learnt during my experience in the field and merely pointers for any beginner to identify birds. 🦅

Red-headed Falcon - aerodynamic body

Rose-ringed Parakeet - gregarious

White-bellied Sea-eagle - sea coast







VIJAY CAVALE

Small Sunbird *Leptocoma minima*

## Eastern Ghats: A Neglected Bird Paradise

The Eastern Ghats are a discontinuous chain of hills that run along the east coast of India, from the south of River Mahanadi in Orissa to the River Vaigai in Tamil Nadu (a length of approximately 1,750 km spanning an area of 75,000 sq. km.) Around the small town of Gingee, located 160 km from Chennai (then Madras), I had long ago in the 1970s sighted my first Yellow-throated Bulbul *Pycnonotus xantholaemus*, soon after a friend had reported this avian beauty of the hill (rocky, scrub parts).



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Text: V. Santharam

**G**ingee located only 160 km from Chennai, is better known for its fort; spread over low, boulder-strewn hillocks; and amongst these moves the Yellow-throated Bulbul, in the sparsely vegetated hillside. The occasional *Ficus* or other fruiting trees that manage to survive in the otherwise barren hillock, provide sustenance to this bird. It is a wonder as to how such an arid habitat could provide for the rich birdlife of the Eastern Ghats!



Yellow-throated Bulbul is commonly found in the Western and Eastern Ghats

Around the southern part of the Eastern Ghats, where I had spotted the Yellow-throated Bulbul, one also spots sunbirds, munias, several babbler species, the Sirkeer Malkoha *Taccocua leschenaultii*, and Painted Spurfowl *Galloperdix lunulata*, to name a few. It was also at Gingee that I had my first encounter with the Eurasian Eagle-owl *Bubo bubo*, when it made its presence felt with its haunting calls that reverberated amongst the rocks, in the scrub-covered valley beyond the Hanuman Temple. This was one of the most cherished memories of the trip apart from the

sightings of the Yellow-throated Bulbul and a pair of nesting Peregrine Falcon, *Falco peregrinus perigrinator* which was encountered half way up the 240 m high Rajagiri hills.

Until its discovery and the reporting in the *Newsletter for Birdwatchers* in 1979 at Gingee by Mr. T. Koneri Rao, there was hardly any recent record of the Yellow-throated Bulbul. This article sparked a renewed interest in the bird. This triggered a series of visits to other hills of the Eastern Ghats by a team lead by Mr. Rao and others, opening up a series of places one could go to, over the weekend from Chennai. The Chitteri, Shevaroyis, Kalrayan and Javvadi hills in Tamil Nadu and hills of Kambakkam, Nagari, Tirupati and Horsley in Andhra Pradesh, all part of the less-studied Eastern Ghats are also places where one could spot plenty of birds.

The average elevation of the hills of the Ghats is 750 m, though some peaks go up to 1,600 m. To enable better understanding and study, these hills are divided into three parts – the northern portion which extends from Orissa to the south of Krishna river; the middle portion that covers the rest of Andhra Pradesh and the last section located exclusively in Tamil Nadu. It is at the Nilgiris, where the two ranges converge. The Eastern Ghats receives rains from both the South-west as well as the North-east monsoons. The northern most parts of the Ghats receive more rainfall on an average than the southern parts and hence, correspondingly the northern parts of the Ghats are covered by moist-deciduous to semi-evergreen forests while the drier hills of southern portions have dry deciduous forests. However, there are pockets of moist forests even in the southern portions, though not very extensive. As a whole, the forests that are found in these hills range from scrub to evergreen type of forests.

The bird life of the Eastern Ghats that we know of today is all gathered from the scattered work by several ornithologists over the last 170 years or so. T.C. Jerdon was the first to study the birds of this region. Ornithologically, the most comprehensive study of the region as a whole was carried out by V.S. LaPersonne of the Bombay Natural History Society (BNHS) during the 'Vernay Survey of the Eastern Ghats' in 1929-1930, named after A.S. Vernay, who funded the whole survey through BNHS. The results of this







survey have been published by Hugh Whistler and Norman B. Kinnear during 1930 and 1939 in the *JBNHS* in sixteen parts. This important publication does not confine itself to the Eastern Ghats alone but also discusses bird distribution and taxonomy and contains an important summary of ornithological knowledge of peninsular India. Studies like Sálím Ali's 'Hyderabad State Ornithological Survey' (published in the *JBNHS* in five parts during 1933-34); Humayun Abdulali's 'Birds of the Vizagapatam District'; studies by Trevor Price, K.S.R. Krishna Raju and those by

**Some birds of the Himalayas and the North-east found in the Eastern Ghats**

- Pale-capped Woodpigeon  
*Columba punicea*
- Green-billed Malkoha  
*Phaenicophaeus tristis*
- Himalayan Flameback  
*Dinopium shorii*
- Grey Treepie  
*Dendrocitta formosae*
- Abbott's Babbler  
*Malacocincla abbotti*
- Ruby-cheeked Sunbird  
*Chalcoparia singalensis*

Himalaya.

Very little is known about the distribution of these 'relict' species in Eastern Ghats, as is borne out by the more recent reports of the Thick-billed Green-Pigeon *Treron curvirostra* in Orissa, the Yellow-browed Bulbul *Iole indica* in the Tirupati and Nallamala Hills, Malabar Parakeet *Psittacula columboides* in Kolli Hills, Rufous-bellied Eagle *Hieraetus kienerii* and Grey-fronted Green-Pigeon *Treron affinis* from Tirupati hills, the Nilgiri Woodpigeon *Columba elphinstonii* and Small Sunbird *Leptocoma minima* at Nandi Hills (in



White-rumped Vulture, according to the IUCN List is critically endangered



Egyptian Vulture is a widespread resident of India

S. Dillon Ripley, Bruce Beehler and Krishna Raju in the 1970s and 1980s, have all contributed to our knowledge of birds of the different areas of the Eastern Ghats. In more recent times, several birdwatchers have been visiting other parts of the Ghats and updating the knowledge of birds of this region. In particular, Tirupati Hills, Biligiri Rangan and Satyamangalam Hills, Sirumalai, Shevaroy, Nallamala, Horsley Hills, Kolli and Javvadi Hills have received quite a lot of attention. Yet there are several gaps as many of these studies have been of short duration.

Based on our knowledge of birds from these studies, it is, but certain that the Eastern Ghats supports a rich birdlife with more than 400 species

found there. Though there are no endemic species exclusive to this region, it is interesting that the presence of several 'relict' species of birds that were earlier known to occur in the more humid forests of Western Ghats and the Himalayan and North eastern regions, are also found in the Eastern Ghats. Many of these species were designated as new subspecies by Whistler and Kinnear. These findings have postulated that the Eastern Ghats might have been a dispersal route that connected the Western Ghats to Eastern Himalayas. This theory appears to be an alternative to the 'Satpura Hypothesis' proposed by S.L. Hora that suggested the Satpura range was a bridge that enabled the dispersal of these birds in the Western Ghats from the north-east and

Karnataka). There are also unconfirmed reports of the rare Forest Owlet *Heteroglaux blewitti* from the north of Eastern Ghats in Orissa. The wetlands lying on the coastal regions adjacent to the Eastern Ghats, known for the large number of water birds and waders that they support are the Kolleru Lake, Chilika Lake, Pulicat Lagoon and Kaliveli Lake, apart from the mangrove habitats of Bhitarkanika, Coringa and Pichavaram. The Eastern Ghats also support some of the endangered birds of India such as White-rumped Vulture *Gyps bengalensis*, Indian Vulture *Gyps indicus* and Egyptian Vulture *Neophron percnopterus*, Greater Spotted Eagle *Aquila clanga*, Lesser Kestrel *Falco naumanni*, Pale-capped Woodpigeon *Columba punicea*, Yellow-throated Bulbul,





White-naped Tit *Parus nuchalis* and Green Avadavat *Amandava formosa*. The rare and endemic Jerdon's Courser *Rhinoptilus bitorquatus*, till recently believed to be extinct, occurs in extremely small numbers on the foothill-fringes of the middle portion of Eastern Ghats in Andhra Pradesh near Kadapa.

The Eastern Ghats, apart from being a paradise for birdwatchers, is also home to a diverse span of flora and fauna. Floristically, the Eastern Ghats supports over 2,500 species of flowering plants; of which about 95 species are known to be endemic to Eastern Ghats. Moist

(especially bauxite in the northern parts). There are several protected areas in the region, spread over the various states like the Nagarjuna-Srisailem Tiger Reserve, Biligiri Rangan Wildlife Sanctuary, Sri Venkateswara National Park, Sri Lankamaleswara Wildlife Sanctuary, Satkosia Gorge Wildlife Sanctuary and the most recently notified Sathyamangalam Wildlife Sanctuary. Many of these also happen to be Important Bird Areas (IBAs). However, a closer look reveals that several of the IBAs of Eastern Ghats are not legally protected sites and are threatened by

developmental activities. As many of the sites are poorly known, potential sites that support good bird life have even been left out of the IBA network. This is especially true in Tamil Nadu, where not a single IBA is in the Eastern Ghats! A recent study undertaken by us at the Sirumalai Hills, near Dindigul, Tamil Nadu, revealed a high bird diversity (over 170 species) that included Yellow-throated Bulbul, Mountain Hawk-eagle *Spizaetus nipalensis*, Pied Ground-thrush *Zoothera wardii*, apart from Western Ghats endemics like Yellow-browed Bulbul. Besides, we reported an



VIJAY CAVALE

Yellow-browed Bulbul feeds on fruits and insects



CLEMENT FRANCIS

Pied Ground-thrush forages on leaf litter below forest undergrowth

deciduous forests account for highest number of endemic plants and hence are valuable from a conservation perspective as several birds inhabit these forests. The mammalian life of the Ghats includes a large list of which many are threatened animals – Tiger *Panthera tigris*, Leopard *Panthera pardus*, Sloth Bear *Melursus ursinus*, Gaur *Bos gaurus*, Chousingha *Tetracerus quadricornis*, Dhole *Cuon alpinus*, Asiatic Elephant *Elephas maximus* (in the southern and northern portions only, where they are making a comeback), besides several other species.

As in many other parts of the country, the Eastern Ghats too face severe environmental threats – deforestation, habitat degradation through fire, overgrazing, *podu* or shifting cultivation and mining

#### Some birds of the Himalayas and the Western Ghats found in the Eastern Ghats

- Jerdon's Baza  
*Aviceda jerdoni*
- Crested Goshawk  
*Accipiter trivirgatus*
- Blue-eared Kingfisher  
*Alcedo meninting*
- Blue-bearded Bee-eater  
*Nyctornis athertoni*
- Speckled Piculet  
*Picumnus innominatus*
- White-bellied Woodpecker  
*Dryocopus javensis*
- Heart-spotted Woodpecker  
*Hemicircus canente*
- Common Hill-myna  
*Gracula religiosa*
- Crimson Sunbird  
*Aethopyga siparaja*
- Little Spiderhunter  
*Arachnothera longirostra*

unknown population of the Grizzled Giant Squirrel *Ratufa macroura* from here!

What these studies indicate is that, there is an urgent need to survey the remaining habitats in Eastern Ghats, in order to evaluate their potential as bird habitats and to take action for protecting them before they disappear. Recently, the Kerala Forest Department had undertaken a survey of all the sites surveyed by Dr. Salim Ali during his Cochin-Travancore state survey 75 years ago to evaluate the status and changes in habitat conditions and bird populations. We should similarly undertake a survey of the Eastern Ghats sites to evaluate the changes that have taken place since the Vernay Survey in the late 1920s before the beauty of this neglected paradise disappears... 🐦





DEVESH GADHVI

The white around the mouth, small tufts on ears and green eyes, are characteristic of the Jungle Cat *Felis chaus*

## Cat's Own Country

'Feline' – the word conjures up images of grace, stealth and agility, and the family that lends its character to this word, is currently comprised of 37 species distributed globally, across five continents (except Australia and Antarctica). India is the richest, with 15 of the 37 species inhabiting the country. Though globally only the larger cats are better known, it is the smaller ones that form the bulk of the family Felidae. Small cats range from a body mass of 1 kg to around 20 kg. However, this description may vary and some researchers even differentiate as small, medium and large depending on body mass. Such a grouping may run into problems when one has species from different regions with varied body masses that span from small to medium, e.g. Caracal, Jungle Cat.



Shomita Mukherjee did her M.Sc. and Ph. D. from the Wildlife Institute of India and has been working on small cats since two decades







Text: **Shomita Mukherjee**

Paintings by: **Paul Barrel** — THE BOOK OF INDIAN ANIMALS

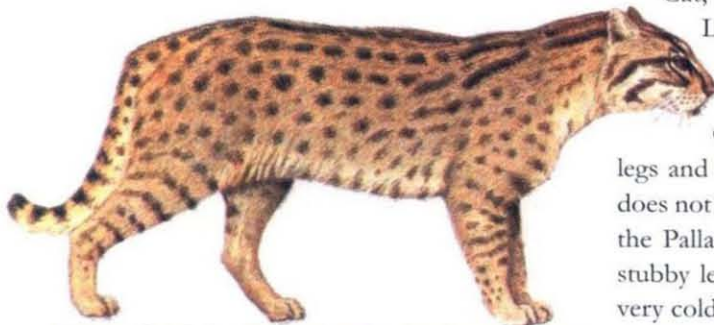
Nevertheless, body size has a significant role in ecology and in the Order Carnivora, species that weigh more than 20 kg eat large prey, often much larger than themselves. This is especially true for family Felidae, the most carnivorous of all carnivores. Felids are hyper or obligate carnivores and hence cannot survive without meat, as their peculiar physiologies are constrained in acquiring certain important dietary requirements (some amino acids and vitamins) from meat alone. Moreover, they are unable to metabolise sugars and carbohydrates efficiently and acquire most of their energy from fat and also protein. This is true for all felids, including the house cat. Not surprisingly, they have often been described as 'killing machines'. Their bodies are the epitome of natural selection where every detail, from their skull, dentition, eyes, paws, bones, tail, is moulded to a certain specific form. This prompted some to speculate that cats, with their super-specialisation, are virtually at a morphological dead-end in evolutionary potential! Even 10 million years of diversification into several species, could not produce fundamental differences. However, much of this diversification happened very suddenly and in evolutionary time scales very recently, which in addition to super-specialisation perhaps resulted in cats being so typical in form and behaviour.

Though, one can, with ease, pick a cat from amongst a vast array of creatures and even a child can tell that a tiger is a large cat, body size variability changes the way a cat would locate and kill its prey. For large cats their prey are more

prominent and often being larger than themselves, are dangerous and can cause lethal injuries. Most small cats largely prey on rodents, who being burrow-dwelling are not conspicuous, as well as on birds, reptiles and insects. Clouded leopards are also reported to kill small monkeys and deer while the fishing cat hunts fish. Nevertheless, such a variety of prey types necessitate very different strategies in locating and hunting. Large cats do not eat everyday but gorge on large quantities once they kill. But, small cats eat several times a day. Using molecular tools, currently eight lineages of cats have been identified which show strong concordance with morphological and ecological characters within each lineage. Seven of these inhabited India. The loss of the cheetah has brought it down to six.

Despite the loss of the cheetah and the subsequent absence of this lineage, India is the richest in the world of cats. Among these, four are large cats (Tiger, Lion, Leopard, Snow-Leopard) that are above 20 kg in body mass. The remaining range from the 1 kg Rusty-spotted Cat to the 20 kg Clouded Leopard. What makes India so special? India's unique geographical location has made this country, a preview or trailer for all major ecosystems and associated species, found across the globe. There are patches of desert (hot and cold), savannah, rainforest, wetlands, and mountains. Since cats are found in various ecosystems, we have representatives of this family in each ecosystem.

Broadly one can group them into open habitat and savannah/grassland cats and the closed habitat, forest cats. The former have shorter tails, bigger pointed ears—often tufted, longer legs and unmarked or slightly marked coats. Cats representing this group in India are the Jungle Cat, Desert/Wild Cat, Caracal, Eurasian Lynx and Pallas Cat. There are exceptions to this generalisation, and the Desert/Wild Cat, Lynx and Pallas Cat are spotted; the Pallas Cat has short legs and small ears while the Desert/Wild Cat does not have a particularly short tail. In case of the Pallas Cat, the very small ears and short, stubby legs are perhaps an adaptation to their very cold, open habitats with rocky outcrops in the Tibetan Plateau. The starkness of the habitat makes them vulnerable to avian predators, but



Fishing Cat *Prionailurus viverrina*: feeds on fish, small mammals and also goats and poultry in some areas

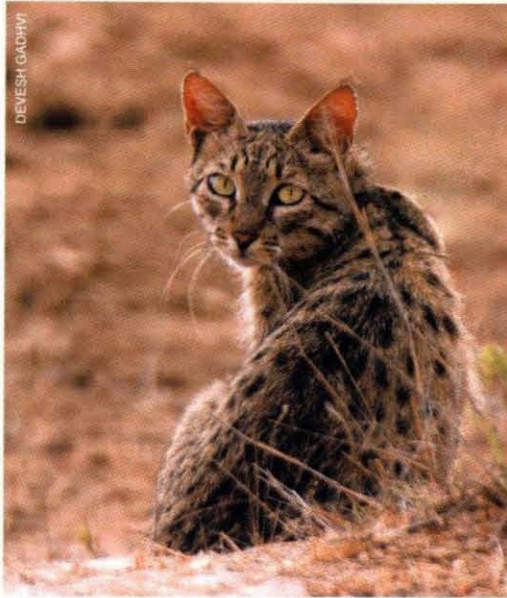






the rocky outcrops provide them with space to hide and hunt using stealth. The forest dwelling species on the other hand, follow their pattern more closely. They have profusely and strongly marked coats (spots, rosettes and blotches) longer tails and rounded ears. The Leopard Cat, Marbled Cat, Clouded Leopard and Asiatic Golden Cat fall into this category. In fact, the Marbled Cat and Clouded Leopard have tails longer than their bodies, an indication perhaps of their tree dwelling habits. However, the Asiatic Golden Cat is peculiar and while one form is strongly patterned, the other has a uniform, un-patterned coat. We do not know why this is so and if these two forms occur together or mix.

A quick glance at these open and closed habitat cats would indicate where they came from. Most open habitat species (Caracal, Jungle Cat, Desert/Wild Cat) have similarities with African and Mediterranean cats (Serval, African Wild Cat, Black-footed Cat, Sand Cat) or the Palearctic and European species (Lynx, Pallas Cat). In fact, the Caracal, Wild Cat and Jungle Cat occur in Western and Central Asia and also in Africa (the only place where the Jungle Cat occurs in Africa is in Egypt, around the Nile). The closed habitat, forest dwelling cats, on the other hand have a very eastern/oriental distribution and we have representatives of most within India. The odd ones out in India are the



Desert Cat *Felis silvestris ornata*: very closely related to the house cat and possibly hybridizes with it

Rusty-spotted Cat and the Fishing Cat both included in the genus *Prionailurus* which is eastern in distribution, but neither is a forest dwelling species the way their relatives are. The Fishing Cat lives around wetlands and mangroves. The Rusty-spotted Cat is endemic to India and Sri Lanka and is the smallest cat in the world. Its distribution within India is as yet not clearly known and there are new reports of this cat from places earlier not thought to be within its range, like much of Peninsular India. It also seems to be very widespread within India. This goes to show how little we know of this family, even of the more widespread species, some of which at times unknown to us, practically live in our backyard, like the Jungle Cat, Leopard Cat, Fishing Cat and the Rusty-spotted Cat.

For long, their elusive and nocturnal habits were an impediment to understanding their ecology and requirements. One had to conform to their habits of being nocturnal and stealthy to be able to study them. Conventional ways to study cats in detail

included fitting a radio-transmitter around their neck to follow them remotely which is still used to answer some questions related to their behaviour and ecology. However, rapid progress in technology has now made it far easier to study them without having to trap or physically follow them. As every good detective will reveal, clues are abundant if you know how to locate and interpret them. The clues left behind in this case are scats (faeces of carnivores) and the means to resolve these are molecular tools. Cells from the intestinal lining are sloughed off as a coating over scats. Since cells contain DNA and certain features of DNA (sequence, size of some genes) differ among species and

individuals, one can potentially identify the species, gender and individual. The power of this technique in unravelling the story of a species is immense. Since DNA is passed over generations, one can unfold history to read a story backwards in time.

Although much of this was known through traditional taxonomy, molecular evidence resolved ambiguities. The family originated in Asia and entered other continents by crossing land bridges, diversified further when isolated with rising and dropping sea-levels moving back and forth, tracking habitats. The eight cat lineages identified using molecular analysis along with their time of branching out from the ancestral stalk, reveals where some groups have originated. Among the cats found in India, the Clouded Leopard (genus

Leopard Cat *Prionailurus bengalensis*: feeds largely on small mammals and birds



Clouded Leopard  
*Neofelis nebulosa*: is tree-dwelling



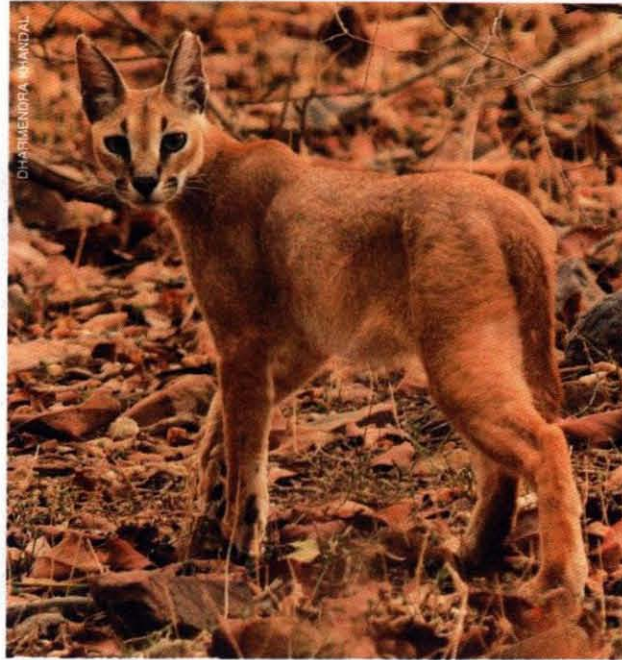
Leopard Cat *Prionailurus bengalensis*: feeds largely on small mammals and birds





*Neofelis*) with Oriental roots falls within the *Panthera* lineage with large cats. This cat, having branched out of the main cat stalk the earliest is perhaps the oldest among all 37 species. Members of the Leopard Cat lineage belong to the genus *Prionailurus* (Rusty-spotted Cat, Fishing Cat, Leopard Cat) which is Oriental in origin while those from the domestic cat lineage comprise the genus *Felis* (Jungle Cat, Desert/Wild Cat) which is Mediterranean in origin. The Pallas Cat is related to the *Prionailurus* group but has its own genus, *Otocolobus* and is the only species in it. The Asiatic Golden Cat and the Marbled Cat (genus *Pardofelis*) belong to the Bay Cat lineage that is Oriental, while the Eurasian Lynx has a genus and lineage of its own (*Lynx*) with several other lynxes, with Palearctic ancestry. The Caracal is the only species in the genus *Caracal* and is related to the Serval and African Golden Cat, which have African roots.

Although all cats in India are protected by law, it is not enough to ensure their survival. Many conservationists (including some scientists) separate academic/hypothetical information from practical applicable ones while presuming the former has little value. They could not be further from the truth. For instance, we now know that past climatic changes and rising sea levels have shaped current species distributions. From molecular




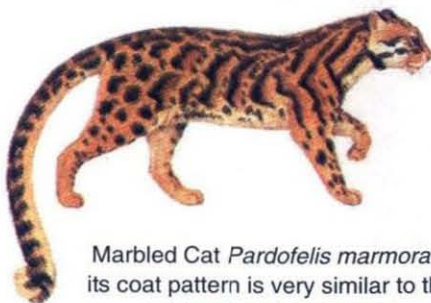
Caracal *Caracal caracal*: India is at the eastern range of this cat

studies, looking at genetic variation we deduced that leopard cats in India are separated into two major populations: the Himalayan-Eastern Indian and the Western Ghats. The Western Ghats population is an island population that is cut off from all other Leopard Cat populations and hence is genetically unique. This separation perhaps happened around the last ice-age approximately 15,000 years ago, when much of peninsular India heated up. Given the information we have, we can hypothesise that they are limited by hot summers and hence cannot colonise regions where temperatures go beyond 38-40°C. This has strong implications for its persistence in some regions with the given climate change predictions. Such studies can also feed into direct conservation applications such as re-introductions (if and when to mix populations from different regions) and illegal trade (which populations are targeted).

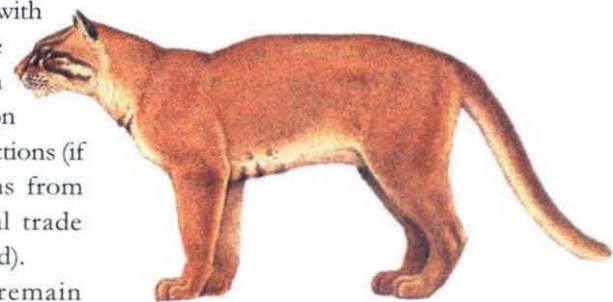
Several questions remain unanswered. We already know that ecosystems are rapidly changing with human use, destroying habitats not just

for cats but other species as well. Despite this, some species like the Jungle Cat and perhaps the Rusty-spotted Cat adapt well to these changes, provided they are not too drastic. What enables them to do that? Why have some species expanded their global ranges (Rusty-spotted Cat, Jungle Cat, Caracal, Leopard Cat) while others remain restricted (Black-footed Cat, Sand Cat, Serval, African Golden Cat) when similar habitats are found elsewhere? Were intervening regions unsuitable historically? Was it competition with other cats that determined ranges? What limits their distributions? Do different cat species hybridize in nature

and if so what happens to their conservation status? Given the vastly expanding human population, which cats will survive into the future? 'Breaking records' is so important to humans and in this, cats have made us proud. India has the maximum number of cat species representing all major ecosystems, the oldest, largest and smallest cat, an endemic species and the range limit for many. Cats have chosen to share their land with us. We have one important record to break, of ensuring that despite our enormous human population with our never-ending needs, our cats survive well into the future. 



Marbled Cat *Pardofelis marmorata*: its coat pattern is very similar to that of the Clouded Leopard



Asiatic Golden Cat *Pardofelis temminckii*: habitat loss (forests) is a major threat to its survival





## Saffron-winged Beauty

Painted Bat *Kerivoula picta*

Text and photographs: **Paresh Porob**

What comes to one's mind when speaking of Goa... its beaches, churches, other tourist attractions... But, another treasure that Goa possesses, and is little known, is its rich diversity of flora and fauna. Goa has a forest cover of 1,424 sq. km. A large percentage of this land has been brought under protection in the form of Wildlife Sanctuaries and National Parks. The Western Ghats, that covers most of eastern Goa, has been internationally recognized as one of the Biodiversity Hotspots of the world! It is here that we can see 'the elusive saffron-winged beauty'! One of the most magnificent Chiropteran beauties occurring in the forests of Goa. This priceless gem, not known to many, is the Painted Bat *Kerivoula picta*.

During my work on the diverse species of bats in Goa, I was rewarded with a captivating sight of this bat. Though these brightly coloured species have been considered as widely distributed, they have rarely been encountered by people due to their secretive habits; and very limited information is available on their behaviour and habitat. Its bright orange coloured fur and startling vermilion

and black wings make it most difficult to detect amongst the deep reds and yellows of fading leaves of banana plantations, where it usually roosts. According to the published information, this bat species has a very peculiar habit of roosting in the inflorescence of banana or at times under dried banana leaves.

Though I did not get a chance to photograph or study them in detail during my first encounter, I was hopeful of spotting these enthralling mammals whenever I passed through any banana plantation. During my tenure as Range Forest Officer at Cotigao Wildlife Sanctuary of Goa, I had a small orchard in front of my house. The banana plantations in this orchard had kept my quests going and I hoped to encounter a Painted Bat again. On every single opportunity, for almost 5 years, I had been persistently checking for these elusive species. And then it finally happened! One evening, during a stroll through the orchard, I saw some interesting movements on one of the banana inflorescence. At first glance, it seemed like an orange-coloured ball of fur. On a closer look, I was mesmerized at what I saw; I was looking at one of the most beautiful, secretive, and least known smallest winged mammal



Paresh Porob has been observing and exploring the wildlife of Goa since almost 25 years. He is presently working as the Range Forest Officer at Bondla Wildlife Sanctuary.





of India, in its natural habitat – the Painted Bat!

There I was, savouring the beauty of this mammal that had eluded itself from me for the past so many years and to my surprise there was not just one but three individuals! This was a rare moment which deserved to be captured on camera ... Initially they were huddled together but as it was getting darker, they got ready for foraging. Two of them suddenly took flight and vanished into darkness, before I could capture them on my camera. After sometime the third individual took to flight and landed on a dead banana leaf stalk nearby. I managed to photograph it, just in time before it took to flight once again. The fur on its body was brilliantly orange and the folds of the wings were black. I observed that the orange colour of the fingers was brighter than the fur on its body. During this pleasant encounter, I observed a strange behaviour, which I had not during my earlier encounter. This particular individual started urinating and after sometime the entire fur on its belly was soaked with urine. The reason for this behaviour is not known but it looks like it may be an act of self defence or nervousness.


In order to enrich knowledge of my co-workers about Painted Bat, I showed

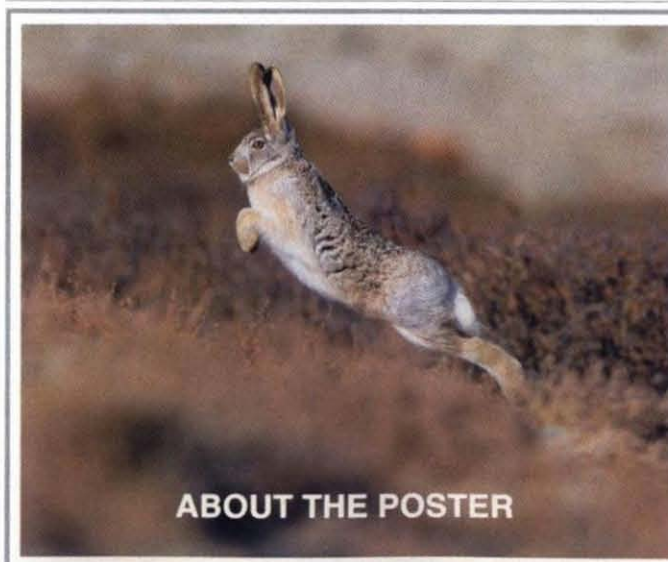


This 'tiny ball of fur' can fit into the palm of the hand of an average adult

them photographs of the species and gave some baseline information. This was so that they could gather more information about these elusive winged mammals. These efforts paid off when one of my staff members, Mr. Shabu Gaonkar managed to locate another Painted Bat just after two days in the same orchard. While removing a dead banana plant, this bat fell on the ground and was unable to take to flight as it was daytime. The bat was carefully lifted onto a leaf and brought for me to see. Mr. Gaonkar's concern and interest

towards the animal was worth appreciation. Interestingly, the belly of this specimen was soaked with its urine. After taking the required measurements, I later released it back into the same area at night. It was a very fascinating sight to see such a beautiful animal which in flight unmistakably looked like a moth.

Occurrence of elusive species like the Painted Bat proves the lack of information we face, and the eminent need for research on such mysterious species before they vanish into the darkness of extinction! 



## ABOUT THE POSTER

### Woolly Hare *Lepus oiostolus*

Hares are small mammals belonging to the Family Leporidae (Order Lagomorpha). Though there is a continuing misunderstanding when it comes to distinguishing hares from rabbits, one can relieve over the fact that true rabbits are not recognized to be found in India. India has several species of hare including Hispid Hare, Indian Hare etc. Hares are born with fur and open eyes on the grass and not in burrows, like rabbits. The Woolly Hare *Lepus oiostolus* occurs in India in Ladakh and higher trans-Himalayan region of Sikkim. This hare's extremely fast hopping movement can be attributed to its hind legs that are longer than its front pair. Their bodies have also adapted to absorb the g-force, produced while running at extreme speeds or while escaping predators. In summer, they feed and create a large store of fat in their body, which enables their survival during the harsh winter months.



Woolly Hare  
*Lepus oiostolus*





# Wings on Waves

Compiled by: Priyanka Iyer

Experts consulted: Dr. S. Balachandran and Dr. P. Sathiyaselvam

A peaceful stroll along the beach... Binoculars in hand, little brown birds skittering and scattering around as you approach. In fact these birds when in flight, come together only to separate and come back together once again; certainly a spectacle as you watch them fly in unison. And yet, from a distance, we can see they are not all the same. Being nature lovers, we would like to know more about them, we would love to identify them, but wait a minute... they all look black and white or brown or all of the aforementioned. So how do we go about it? Birds close to the water which includes 'waders' are a bit of a confusion to most of us... Let us split them into groups to facilitate easier understanding.

All the species of waders in the world belong to the Order Charadriiformes and are subdivided into the families Jacanidae, Rostratulidae, Dromadidae, Haematopodidae, Ibirdorhynchidae, Recurvirostridae, Burhinidae, Glareolidae, Charadriidae, Pluvianellidae, Scolopacidae and Thinocoridae. Among these families, plovers belonging to family Charadriidae and sandpipers belonging to Scolopacidae, are among the most diverse of the 'waders'.

Interestingly, this curiosity to understand these birds is not limited to amateurs. Even bird enthusiasts and students take special interest in 'waders' for three main reasons - firstly, they are among the world's greatest migrants; many species travel from the high Arctic to the southern limits of Australasia, Africa and South America. Secondly, the individual features which enable positive identification to be made, even of common species, are relatively poorly known and have been the subject of much debate. Thirdly, wetlands throughout the world are threatened - and waders are a good indicator of their state of health.

So now, better equipped with interest and the willingness to learn, let us plunge into the world of wonderful wings on waves!



**Godwits:** are a group of large, long-billed, long-legged and strongly migratory wading birds of the genus *Limosa*. They form large flocks on coasts and estuaries in winter. A female Bar-tailed Godwit is known to have flown over 11,000 km without food or drink from Alaska to New Zealand.

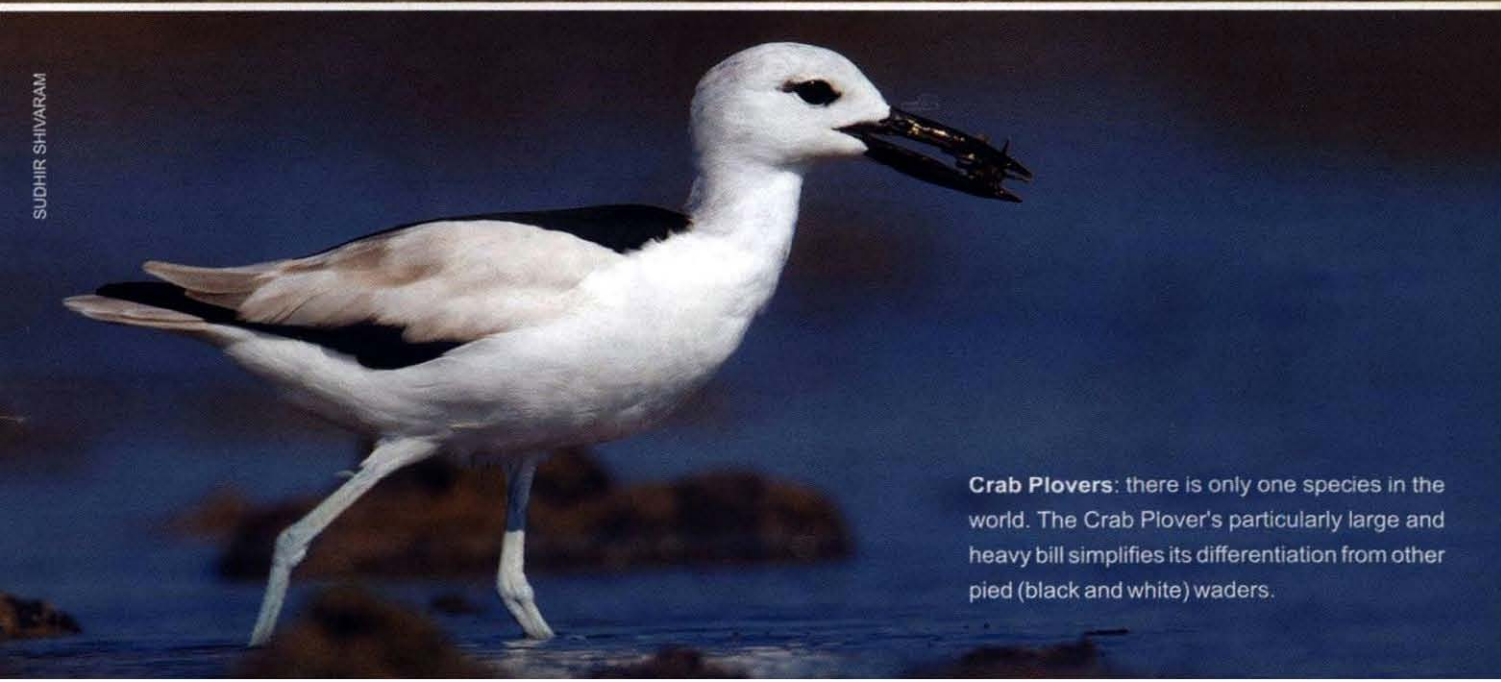




**Jacanas:** are an extraordinary group of birds with representatives throughout the tropical continents. They all have greatly elongated toes and claws that enable them to walk across floating vegetation. There are eight species worldwide.



**Painted Snipes:** though named painted snipes, these birds are not true snipes; just resemble snipes in shape. Their differences are that painted snipes are shorter-billed, more brightly coloured and have rounded wings. There are two species worldwide.



**Crab Plovers:** there is only one species in the world. The Crab Plover's particularly large and heavy bill simplifies its differentiation from other pied (black and white) waders.





**Oystercatchers:** are bulky waders with black/brown or black/brown-and-white plumage, a long stout orangish bill and fairly short pinkish legs. They are chiefly coastal. There are 11 species worldwide.



**Stilts:** are so named because of their very long stilt-like legs. These dainty birds are easily spotted due to their typical plumage and height. All the three species worldwide, have long, thin, almost straight bill.



**Avocets:** are approximately the size of a country hen and easily distinguished by their size and plumage. They have strongly-upcurved bills, and often feed by making vigorous sideways sweeps through water or soft mud.



**Stone-curlews:** are terrestrial or littoral waders with highly cryptic plumages, large heads and large yellow eyes, with a characteristically large knee joint. Most are essentially birds of arid or semi-arid open country, but some live near freshwater or on the coast.

MITAL PATEL



**Pratincoles:** feed on insects and are highly aerial, resemble terns or large swallows in flight and plovers on the ground. Their flight is fast and graceful, with an easy swallow-like or tern-like wing-action. Legs are short with four toes and connected by small webs in first three.

CLEMENT FRANCIS



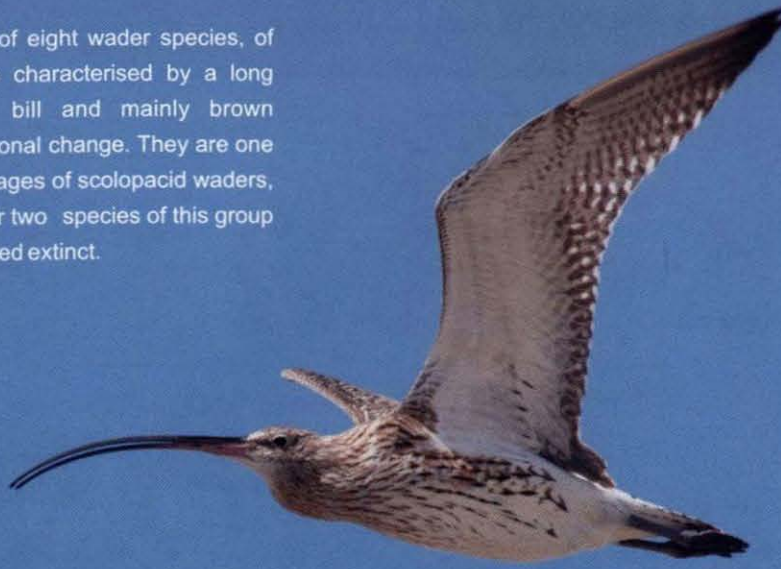
**Plovers:** are a cosmopolitan group of birds which have relatively short-bill, large head and eyes, and are chiefly visual feeders. They have a unique way of feeding which can be called as the 'run-pause-run-dip' or 'run-pause' sequences.

DEVESH GADHVI





**Curlews:** are a group of eight wader species, of genus *Numenius*. It is characterised by a long slender down-curved bill and mainly brown plumage with little seasonal change. They are one of the most ancient lineages of scolopacid waders, with the godwits. One or two species of this group have been recently termed extinct.



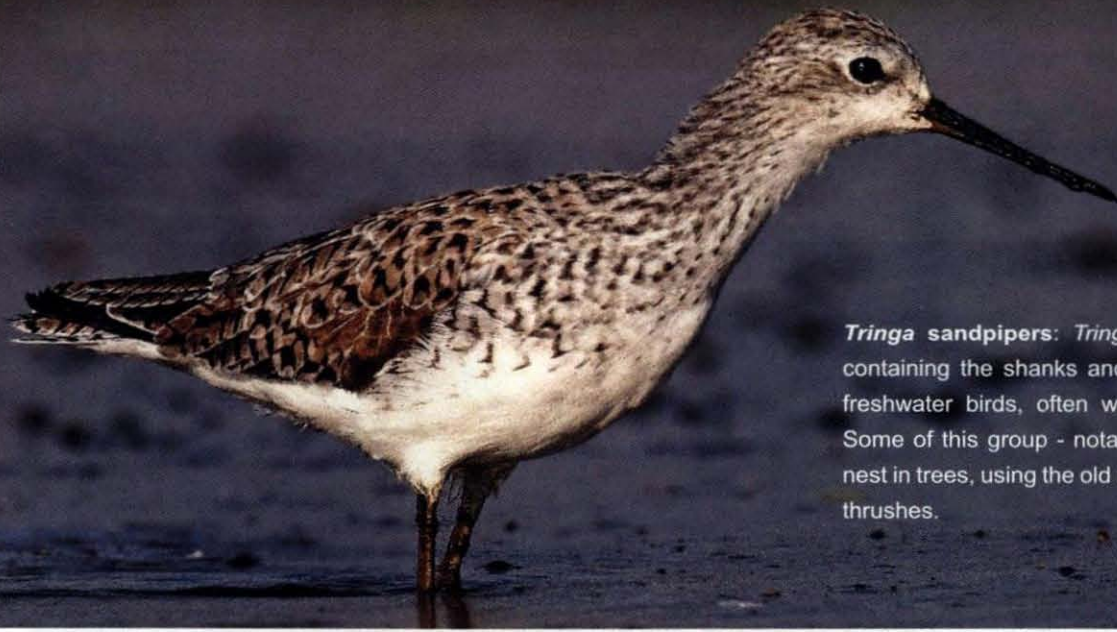
**Snipes:** are characterized by a very long, slender bill, peculiar body shape and cryptic plumage. The three species of painted snipe are not closely related to the typical snipes, and are placed in their own family, the Rostratulidae.



**Phalaropes:** are slender-necked shorebirds (genus *Phalaropus*) of the Family Scolopacidae. They are known for their unique behaviour of habitually swimming buoyantly on water, even far out at sea. In winter, it is chiefly grey above, white below, with a blackish eye-patch. This dainty sandpiper-like bird feeds on chiefly plankton, insects and larvae.







**Tringa sandpipers:** *Tringa* is a genus of waders, containing the shanks and tattlers. They are mainly freshwater birds, often with brightly coloured legs. Some of this group - notably the Green Sandpiper - nest in trees, using the old nests of other birds, usually thrushes.



**Calidrid sandpipers:** or typical waders are a group of Arctic-breeding, strong migratory wading birds. They are the typical "sandpipers" and as the common name "sandpiper" is shared with more distantly related birds such as the *Actitis* species, the term stint is preferred in Britain for the smaller species of this group.



**Turnstones:** as the name implies, these species readily turn stones or seaweed looking for hidden invertebrates. They are strictly coastal, preferring stony beaches to sand, and are often found with other waders. Their appearance is striking in flight, with white patches on the back, wings and tail. They are high Arctic breeders, and are migratory.





VARAD B. GIRI

The Asiatic Long-tailed Climbing Mouse, with its opposable toes and long tail, easily climbs on trees

## *A Little-known World of Small Mammals*

*I had been inquisitive of mammals since my school days, especially rats and mice. Although they were a menace to the crops in my village, I was curious as to how they withstood the various 'pressures' of humans, and their natural predators. How do they continue to survive? Are there any specially adapted abilities that enable them to live such a successful lifestyle? In the process of answering these questions through my research work, I have been learning a lot about the vast and interesting world of 'small mammals'.*



Sameer Bajaru,  
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Collection  
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ecology of small  
mammals  
of India.







Text: Sameer Bajaru

In the evolutionary perspective, mammals first appeared on earth about 200 million years ago, i.e., during the 'age of dinosaurs'. These earliest known mammals were said to be small and nocturnal; but the dinosaurs of that period heavily depended on the surrounding sources of heat for their survival, especially on sunlight like the modern cold-blooded reptiles. As a result, hardly any reptiles were active during night hours. Whereas mammals, with their body covered in thick hairy coat and fat under their skin, conserved the heat produced in their body, also being warm-blooded, they internally maintained their body temperature. Thus, due to mammals' warm blood, small size, and nocturnal lifestyle, they could compete successfully with the huge reptiles of that period. With the extinction of dinosaurs, mammals used the opportunity to the optimum; they spread across the deep oceans to mountain peaks; from the underground to the sky. Over an extended

period, the amazing diversity of modern mammals evolved to the 5,400 species that we see today.

Mammals belong to the Class Mammalia and are characterized by the possession of mammary glands, hair and pinnae (external ears). Mammals vary in size from a 30 m long Blue Whale to a 3 cm Bumblebee Bat. Mammals are broadly categorized as small and large mammals, but there is no universally accepted definition that describes small mammals as such. Generally, mammals having weight less than 5 kg and head and body length less than 1 feet are considered as small mammals. This is one of the reasons that makes small mammals far more common than the larger mammals like Elephants, Tigers and man, of course!

India is one of the megadiverse nations and harbours about 415 species of mammals. However, interestingly out of these about 257 (62%) species are of small mammals. They are diverse in form and occupy varied habitats in India. Generally, small mammals include mammals belonging to the Orders Insectivora, Scandentia, Rodentia and Lagomorpha, but it also comprises of some carnivores, primates etc.

So, where exactly should one look for small mammals? Simple, all around us – in the burning deserts of Gujarat and Rajasthan, in the silent and serene trans-Himalayas, in the rainforests of the Western Ghats and islands like Andaman and Nicobar. In fact, some are common among the fastest and busiest lanes of the big cities, in the backyards and fields of the countryside. The whole of India is thriving with its diverse share of 'small mammals!' These mysterious animals are active in the day as well as in the night and unnoticeably govern our ecosystem at their own pace and way. Apart from their colossal role in the ecosystem, they are highly 'neglected' due to which we know very little about their secretive habits.

Let us explore the curious and little-known world of common small mammals, the world of hedgehogs, moles, shrews, tree shrews, bats, squirrels, rats, mice, porcupines, hares and pikas...

Mammals are generally divided on the basis of relations and affinities. For e.g., all rodents are characterized by chisel-shaped incisor teeth, bats have wings and are adapted for flying. Let



VARAD B. GIRI

The horse-shoe shaped nose of the bat, gives it its name – Horseshoe Bat



KEDAR BHIDE





The Himalayan Marmot lives at altitudes ranging from 4,000-5,500 m



KEDAR BHIDE

The Pale Hedgehog feeds on insects, lizards, frogs, rats and fruits



DEVESH GADHVI

Three-striped Palm Squirrel's bushy tail makes its acrobatics on trees, possible



NIKHIL BHOPALE

us take a look at small mammals based on these characterizing factors.

**Primitive insectivores:** So, what makes insect hunters primitive? They are remnant of the original stock from which modern mammals have evolved. Most of the insectivores have a cloaca (common opening for genital, urinary and fecal matter) which was present only in primitive mammals like egg-laying and pouch-bearing mammals, thus suggesting their primitiveness. Their longer snout further distinguishes them, with upper lip projecting beyond the lower lip.

Insects are the chief source of food for these animals. They belong to the Order Insectivora. Insectivora represent three families, namely (Hedgehog-like) Erinaceidae, (Shrew-like) Soricidae, and (Mole-like) Talpidae.

Hedgehogs can be easily distinguished from other insectivores by the spines on their body. Spines are modified hair meant for defence; when alarmed, the animal rolls into a ball and lies still and if need be, throws its back up with a sudden jerk, thus driving the spines into the attacker. Shrews, usually misidentified as mice, are creatures with a long pointed head, small eyes and short, rounded ears, almost concealed under their fur unlike mice. Whereas, moles have soft thick fur, stout and clawed forelimbs and reduced hind limbs.

**Squirrel-like insect hunters:** Tree shrews are the only representatives of this group. These are chimerical animals, as they have characters of different groups of mammals. Classifying them was a puzzle for taxonomists for several years. Some taxonomists put them under the subgroup of primates, because of their exceptionally large brain, diurnal habit and large, slightly forward placed eyes. While others treated them as members of Order Insectivora because of their long snout, used for probing in leaf litter to search for insects similar to that of shrews and heavily depend on insect diet.

However, recent molecular studies suggests that Tree Shrews belong to a new order, Order Scandentia, which only includes Tree Shrews. They spend most of their time on ground and only climb on trees when danger approaches.

India has three species of tree shrews, Indian Tree Shrew *Anathana ellioti* endemic to peninsular India, Northern Tree Shrew *Tupaia belangeri*, found in North-east India, and the Nicobar Tree Shrew *Tupaia nicobarica*, endemic to the Nicobar Islands.

**Flying ghosts:** Amazing masters in air, fearsome looking and of nocturnal habits! Yes, you guessed it right. Bats were made popular by Hollywood moviemakers who created a ghastly blood-sucking image of bats in the form of 'Vampires', but in reality, bats are the real heroes of our ecosystem. As they help in dispersal of seeds of many plants (Fruit Bats) and keep a check on insects number (insect eating bats). They are truly built for flight, and thus are the so-called 'birds' of Class Mammalia. The wings of bats are actually modified forelimbs, hence the





name Chiroptera (Cheiros – hand and pteron – wing). Their fingers have undergone extreme elongation with elastic-like membrane stretching between them. These modified forelimbs of bats are used for sustainable flight. But, how they left the ground and took to the air is still an unresolved mystery. Maybe their ancestors were like gliders and then evolved into true fliers.

Chiroptera is one of the species-rich groups of the mammals. It represents about 1,100 species throughout the world, while India harbours about 110 species of bats.

**Gnawers:** A pair of continuously growing incisors in the upper and lower jaw characterizes this group of small mammals in the Order Rodentia. Morphologically, there are three forms representing three sub-orders in this order, (porcupine-like) Hystricomorpha, (mouse-like) Myomorpha and (squirrel-like) Sciuromorpha. It is the richest mammalian order in the world, represented by about 2,277 species. In other words, about 40% of mammalian species belong to this order and India has about 103 representatives of it.

Porcupines' hair is modified into quills and spines, which distinctly separate porcupines from other rodents. Porcupines are of two types, brush-tailed porcupines and crested porcupines. The brush-tailed porcupines have a long slender tail that ends in a tuft of long, stiff hair, whereas crested-porcupines have a crest extending from the top of its head to its shoulder. Porcupines feed on roots, bulbs and fruits. Brush-tailed porcupines are active climbers and feed on fruits. Often, porcupines also feed on bones and horns of other animals, which gives them calcium for development of quills and also sharpens their teeth.

Myomorpha is the most successful and recently evolved group of rodents; it includes rats and mice (collectively called murids). About 72 species of murids are reported from India. The most common question that pops up when we talk of mice and rats is 'what is the difference between them?' There are clear external distinctions between rats and mice – the ears of a rat are relatively smaller to their head, their eyes are small and head is blunt and stout, and tail is thick, heavy and shorter than its body. Whereas, mice are smaller than rats, and their ears are relatively larger than their head and the snout is sharp, triangular and pointed, with tail thin and longer than its body.

Murids show tremendous variations in habits and habitats. Almost all members of this group are herbivores. They feed on seeds, grasses, fruits and occasionally on insects. Hoary Bamboo Rat, about 28-36 cm in size, is a perfect burrowing machine. It has small eyes, ears and large protruding incisors teeth, with powerful neck muscles, enabling burrowing. Whereas a tree mouse like Asiatic Long-tailed Climbing Mouse is a small creature of 5-6 cm, with long tail and its first and fifth toes are opposable for grasping the twigs of the trees. On the contrary, gerbils inhabiting arid habitats have longer hind limbs for jumping, whereas murids dwelling in

KEDAR BHIDE

KEDAR BHIDE

RAHUL KHOT

Porcupines' hair are modified into spines

Pikas are commonly seen in the open and rocky areas of the Himalayan region

Tree shrews, unlike squirrels have a long and pointed snout





### INTERESTING FACTS

- Many shrews are believed to have a system of echolocation, similar to that of bats.
- The toxic saliva of some shrews can affect the nervous system and paralyze the victim.
- Etruscan Pygmy Shrew is the second smallest mammal on earth, weighing only 1.8 gm and 4 cm in length, reported from the southern Western Ghats and the Himalayas.
- Weight of land mammals varies from about 2 gm in Bumblebee Bat *Craseonycteris thonglongyai* of western Thailand and southeast Myanmar to a 11,000 kg African Bush Elephant *Loxodonta africana*.
- In the last millennium, rat borne diseases have taken more lives than all wars and revolutions put together.
- Incisors of rodents grow several mm per week and are worn constantly by action of one another. If misaligned, they grow continuously, pierce the skull, and cause the death of the animal.
- Rabbits and hares eat their own pellets to avoid nutrition loss; this process is called 'Coprophagy'.

marshy areas and around aquatic habitat, have partially webbed feet.

Another interesting group is that of squirrels. The bushy tail, small to medium size, sitting on haunches and manipulation of food with front paws, distinguish the squirrels from other rodents. This group includes ground-dwelling and burrowing marmots, ground squirrels, arboreal, diurnal (active during the day) tree squirrels, and nocturnal flying squirrels. The marmots due to their burrowing habit have stout heavy bodies with a short tail, while squirrels are small, slender-bodied creatures with a long and bushy tail, used as a rudder. But, flying squirrels show a remarkable adaptation for arboreal habit, by gliding from one tree to another with the help of patagium (skin fold of their fore and hind limbs). Mostly they feed on seeds, but sometimes also on grasses, leaves and insects. Squirrels have the habit of burying the seeds when available in excess, if they are unable to find them, these seeds germinate. Therefore, squirrels play a vital role in dispersal of seeds of trees.

**Chiseled jumpers:** The close resemblance of many morphological



The Indian Giant Squirrel is endemic to India

characters of hares, like long chisel-shaped incisors, made the researchers to put them under Order Rodentia. However, close examination of morphological characters such as the presence of an additional pair of small incisors (peg teeth) just behind the large incisors of upper jaw, and molecular evidences suggests that they evolved independently and their close

resemblance with rodents is merely a coincidence. Hence, the new order was created for them called Lagomorpha. This order is divided into two families Leporidae and Ochotonidae.

Family Leporidae comprises of rabbits and hares - another classic case of mistaken identity. Hares have large ears with characteristic black markings, long hind legs and are born with a full coat of fur, and live above ground. However, rabbits have relatively short ears and legs, and are born without fur and live in burrows. Family Ochotonidae includes pikas. Pikas have short front and hind legs, smaller tail and ears are short and rounded. They are a smaller version of rabbits and hares. These are creatures of the rocky slopes of mountains, and have adapted to rock dwelling and burrowing habits.

This is but a glimpse of the wonderful and little-known world of small mammals. There are many examples which are not discussed in this article, and many mysteries await to be unravelled. Understanding small mammals is important as they form a large portion of mammals of India and it is, but essential that we appreciate them. 🐿️

*"Man has been endowed with reason, with the power to create, so that he can add to what he's been given. But up to now he hasn't been a creator, only a destroyer. Forests keep disappearing, rivers dry up, wild life's become extinct, the climate's ruined and the land grows poorer and uglier every day." [Uncle Vanya, 1897]*

— Anton Chekhov

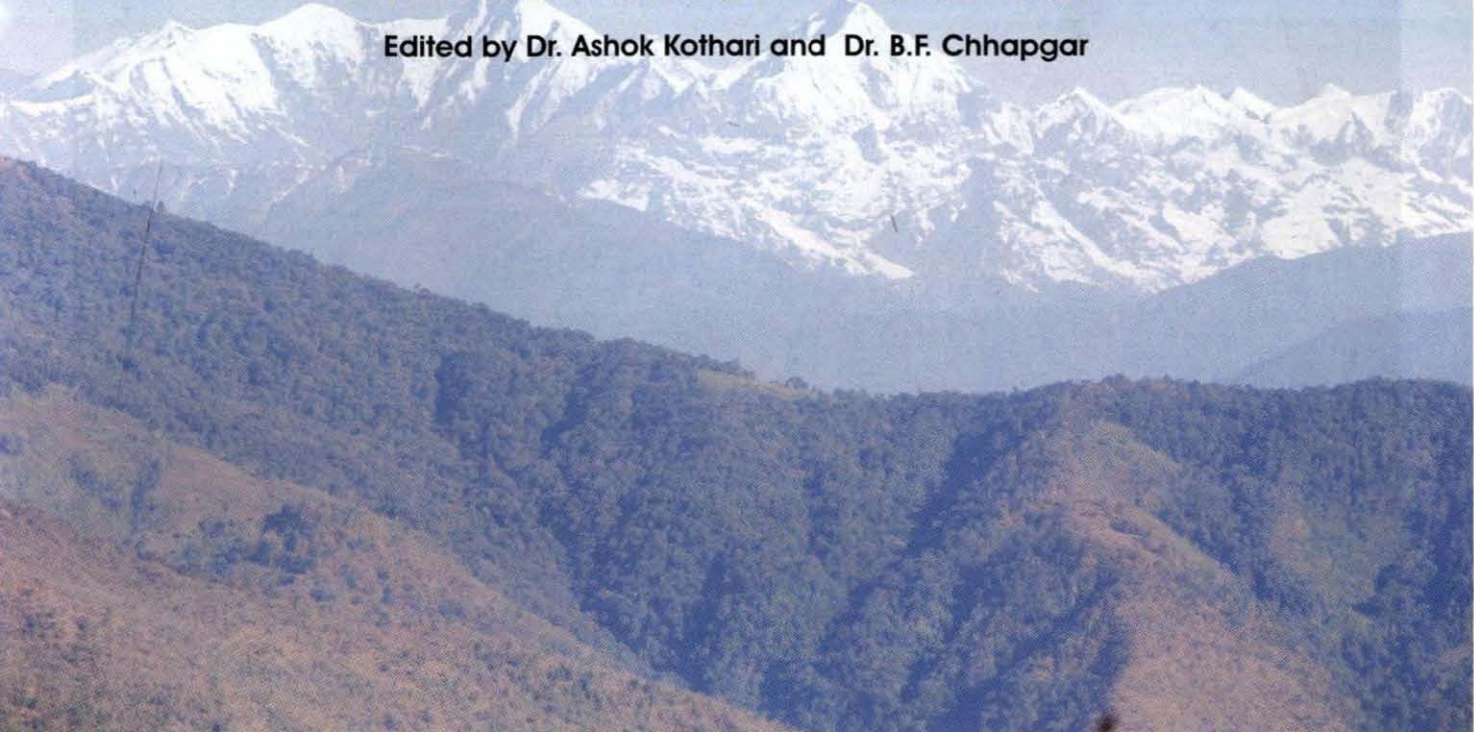


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Edited by Dr. Ashok Kothari and Dr. B.F. Chhapgar



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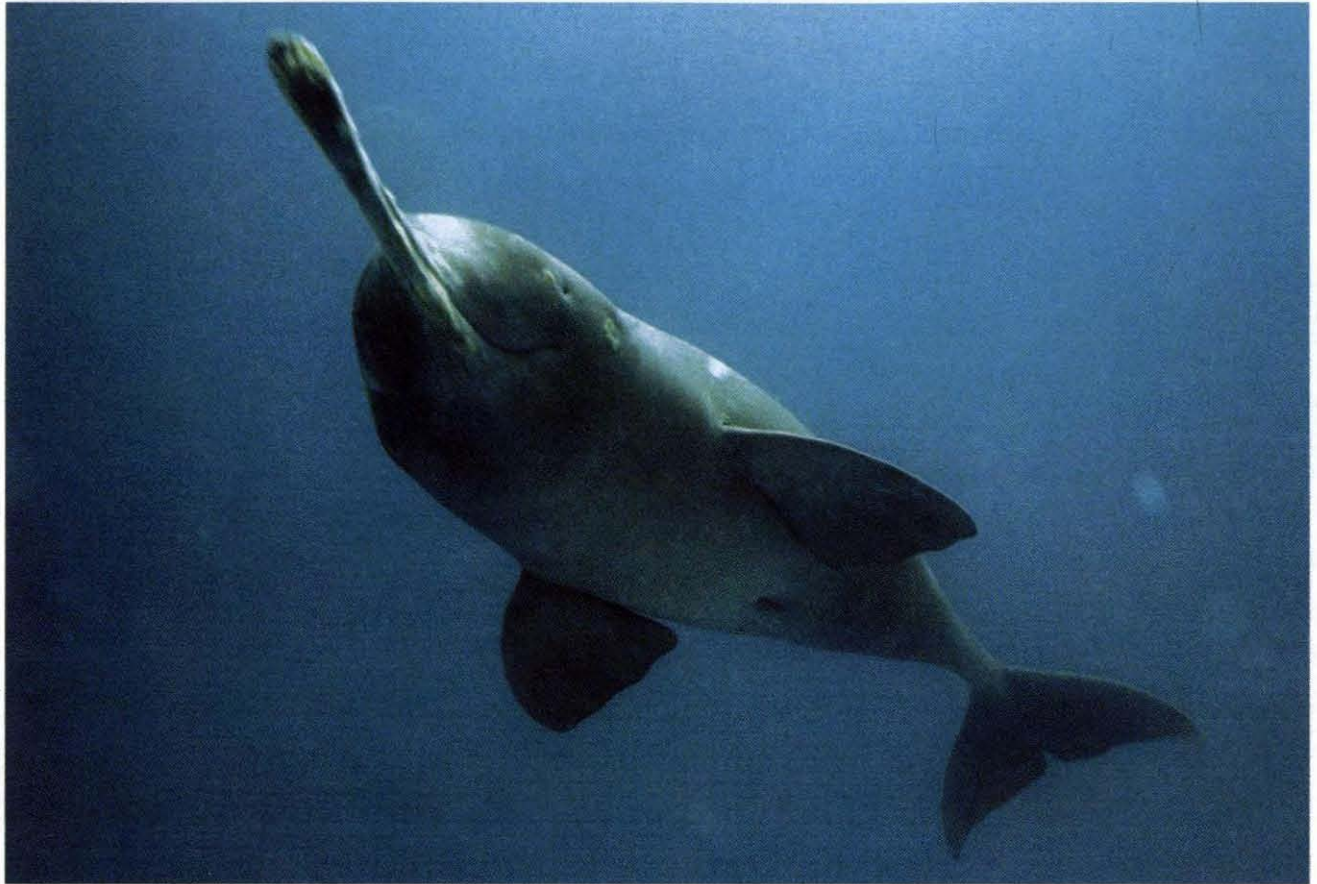
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FRANCOIS XAVIER PELLETIE, WWF



The Ganges River Dolphin *Platanista gangetica gangetica*

# Ganges River Dolphin: Going... Going... Gone?

*Beautiful River Dolphins swim in some of the world's mightiest rivers, including the Ganges, Indus, Yangtze and the Amazon. But these river basins are also home to over 15 percent of the world's human population and includes some of the most densely populated and poorest areas on the earth. Human perturbation and anthropogenic disturbances have led to drastic decline in dolphin populations.*



Sandeep Behera works for WWF-India, since 1996, for the conservation of rivers and their aquatic biodiversity, especially the Ganges River Dolphins in India.







Text: Sandeep Behera

The Ganges River Dolphin is mentioned often in our mythology and is associated with *Ganga Mata*, the deity of the Ganges River. The dolphin is said to be among the creatures which heralded the goddess' descent from the heavens and her mount, the Makara, is sometimes depicted as a dolphin. Also, it is mentioned as "Khuk-abi" in Babarnama during the Mughal period, where the rural folk supposedly burnt dolphin oil to light their homes. Though, through mythology Indians knew about this splendid creature, it was officially and scientifically discovered by Roxburgh in 1801. But, it was John Anderson who first published a scientific report on the dolphin in 1879 after which there was little or no scientific information available on this species for the next one hundred years.

Of the six species of freshwater dolphins present worldwide, three species (*Lipotes vexillifer*, *Inia geoffrensis* and *Platanista gangetica*) are recognized as true freshwater dolphins, which inhabit rivers and estuaries in Asia and South America. The Chinese River Dolphin *Lipotes vexillifer*, was declared functionally extinct in 2006. The remaining species are Amazon River Dolphin *Inia geoffrensis* and *Platanista gangetica*, that has two subspecies - *Platanista gangetica gangetica* and *Platanista gangetica minor* the Indus River Dolphin.

According to research undertaken in the 1980s, under the Ganga Action Plan project, it was estimated that around 5,000-6,000 dolphins are found in the Ganga-Brahmaputra-Meghna

and Karnaphuli river systems and its tributaries of Nepal, India, Bhutan and Bangladesh, between the foothills of the Himalayas and the tidal zones. But, there is hardly any complete scientific estimate of a range-wise abundance of the species. It is assumed that presently around 2,500 individuals are surviving across the entire range. Out of these, only around 1,800 are within Indian territory in the deep river reaches in Assam, Bihar, Jharkhand, Madhya Pradesh, Uttar Pradesh and West Bengal.

There was also a time when the Indus and Ganges populations of dolphins were considered identical, until they were divided into two different species based on differences in skull structure, but in 1972, reduced to subspecies of a single species, which was later genetically proven too. Thus, one species is recognized in the genus *Platanista*, currently the Ganges River Dolphins *Platanista gangetica gangetica* and the Indus River Dolphins of Pakistan, *Platanista gangetica minor*.

The Ganges River Dolphin *Platanista gangetica gangetica*, locally called 'Susu' or 'Soons', is blind as its eyes have no lens; its long snout enables it to browse the mud for food; and its dorsal fin is very small. Interestingly, to compensate the loss of vision, the animal has a very efficient echolocation (echo used to locate, range and identify objects). Such an adaptation is indeed unique, since the creature has to live in muddy swirling waters all the time. It is a thrilling sight to see the dolphin leap out of the Ganga! It certainly looks like a huge fish, although it is, in fact, a mammal. The dolphin respires through lungs and emerges above the water surface to inhale air through a blow-hole on its melon-like head. Inhaling and exhaling produces a typical 'soooooossss' sound, which is the basis for its vernacular names.

The female dolphin is larger than the male and can attain a maximum length of 2.67 m and the male is about 2.12 m long. A female of 2.5 m, weighed 114 kg! At the time of birth, the calf is only about 70 cm long. Their snout is a major point of



The threatened National Aquatic Animal of India

FRANCOIS XAVIER PELLETIE, WWF

SANDEEP BEHERA





distinction – a mature female has a long, up-curved snout, while a male has a straight snout. The female attains sexual maturity probably at an age of 10-12 years, and the male at 8-10 years. The gestation period is about 9-11 months and a female gives birth to only one calf once every two to three years and maximum breeding takes place during the dry season, i.e., between January and June. A dolphin calf usually

dwelling fishes and browse out mud dwellers if in shallow water. Dolphins have also been seen negotiating high rapids in River Karnali at the foothill of the Himalayas in Nepal, which is very unlike their behaviour. Seasonal habits and dispersal of the river dolphin are not well-studied; but there is some evidence of seasonal changes in distribution, with the animal dispersing upstream as the water level rises. During

and the natural flow regime has been disrupted, by the construction of dams and barrages. While there were occasional reports of dolphin sightings in some of the smaller tributaries of the Ganga during the 1980s, it is now likely that dolphins have been completely extirpated from these rivers due to insufficient and inconsistent water supplies. The large-scale diversion of river water for irrigation in the dry



SANDEEP BEHERA

Dolphins feed on the surface dwelling fishes and browse out the mud dwelling fishes in shallow water

feeds on mother's milk for about two to three months and then starts feeding on soft food like insect larvae and small fishes. The calves and juveniles are seen to be darker in colour, but as the animal grows in size, the colour fades out and the adult and old individuals become light pink.

The dolphins prefer to stay in all types of habitats: deep zones of the rivers, around the confluence of two or more rivers, at the meandering, and below sand bars where two channels reunite and create eddy-counter current system. Normally, they chase surface

the dry season many dolphins leave the tributaries and congregate in the main channels, only to return to the tributaries the following rainy season. These are a few unique and interesting observations regarding our aquatic friends.

One knows that the water levels in the Ganga are seasonal in nature. Peak flows occur between July and September when the river is fed by monsoon run-off and Himalayan melt-water, while leanest flow occurs from February to March. The flow in the Ganga and its tributaries is regulated,

season causes water flow to diminish, especially between Haridwar and Allahabad.

Although the Ganges dolphin is fluvial in habit, it may also be found in brackish water, though it never enters the sea. It is generally assumed that salinity defines the downstream limits of its distribution, while physical barriers and low prey densities at high elevations define the upstream limits. Dolphins are abundant in the long stretches of deep water in association with shallow water meanderings, confluences and mid-channel sand bars. The primary habitats





preferred by the Ganges River dolphins are characterized by an eddy-counter current system in the main river flow caused by a point bar formed from sediments and deposits, a convergent stream branch, or by an upstream meander. They are also found below sand bars and bridges where eddies are formed.

Being a mammal, the Ganges River Dolphin can survive a wide range of temperature fluctuations. It can tolerate temperatures as low as 5°C in the River Karnali in the winter in Nepal, and as high as 35°C in the summer in the Gangetic plains. They have also been found in highly turbid water in monsoon and it is thus assumed that the water temperature and turbidity are not significant factors in determining the distribution of this species.

The Yangtze River Dolphin *Lipotes vexillifer* has been declared extinct due to uncontrolled development, illegal fishing activities and intense vessel traffic in the river. Both, the Ganges River and Yangtze River dolphins have similar environmental requirements. The Indus River Dolphin has a low population estimated to be around 1,600-1,700 individuals. Therefore, urgent conservation actions are required before the Ganges River Dolphin population declines irreversibly. Freshwater dolphins in Asia are among the world's most endangered mammals and there is an urgent need to establish conservation priorities based on scientifically credible abundance estimates.

It is the need of the hour that we realize that the dolphin population is declining fast. It has already become extinct from most of its earlier distribution ranges and even in its present day distribution ranges; the density of this animal is getting thinner. Numerous factors exist for this decline, few of which are the deliberate killing of Ganges River Dolphins for oil and meat, and the construction of more

than 50 dams and barrages within the Ganges River Dolphin's historic range. This has drastically altered its habitat and fragmented the meta-population.

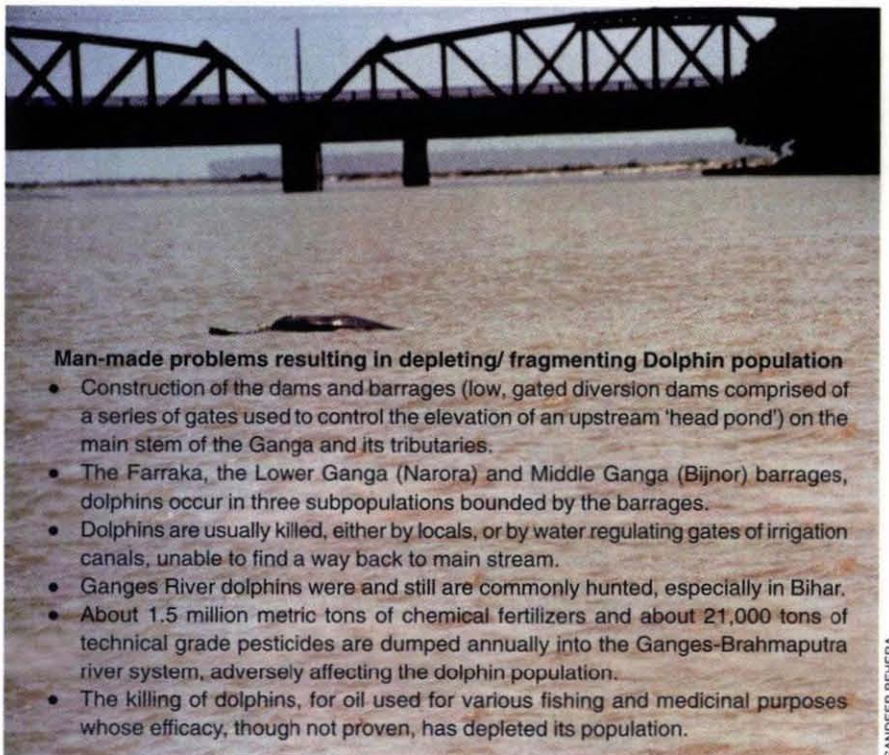
Construction of embankments as flood control measures interrupt access to the spawning habitat for floodplain dependent fish and eliminate eddy-counter currents where the Ganges River dolphins spend much of their time. Dredging and the removal of stones, sand, and woody debris also compromise the ecological integrity of the riverine environment, especially in small tributaries. Increasing pollution in the river may adversely affect dolphin health and their bioaccumulation may have serious consequences.

So, what are the possible solutions to these problems? No single strategy will facilitate recovery of depleted populations, reverse trends of population decline and habitat deterioration, and ensure that robust populations with high-quality habitat are secure. Approaches to conservation need to be multifaceted, adaptable and

often tailored to particular local or regional conditions.

Few are the major gap areas in the knowledge, potential, utilization and conservation of Ganges River Dolphin:

- Lack of proper documentation and compilation of information on the species as a ready reference is one of the biggest gap areas.
- Floodplains are an integral part of the river ecosystem, specially the food of the dolphins. Also they have direct influence on different components of the river. But these have been neglected in the policies for conservation, pollution abatement, and water quality improvement of the river. Even researches on this aspect provide scanty information.
- Lack of proper co-ordination among technocrats, ecological scientists, policy makers at local and national level is also a major gap area. This restricts the information flow from one group to another ultimately affecting the formulation of proper plans of local interest.



#### Man-made problems resulting in depleting/ fragmenting Dolphin population

- Construction of the dams and barrages (low, gated diversion dams comprised of a series of gates used to control the elevation of an upstream 'head pond') on the main stem of the Ganga and its tributaries.
- The Farraka, the Lower Ganga (Narora) and Middle Ganga (Bijnor) barrages, dolphins occur in three subpopulations bounded by the barrages.
- Dolphins are usually killed, either by locals, or by water regulating gates of irrigation canals, unable to find a way back to main stream.
- Ganges River dolphins were and still are commonly hunted, especially in Bihar.
- About 1.5 million metric tons of chemical fertilizers and about 21,000 tons of technical grade pesticides are dumped annually into the Ganges-Brahmaputra river system, adversely affecting the dolphin population.
- The killing of dolphins, for oil used for various fishing and medicinal purposes whose efficacy, though not proven, has depleted its population.





### CONSERVATION EFFORTS UNDERTAKEN

- The species has been included in Schedule I of the Indian Wildlife (Protection) Act, 1972, and is categorized as Endangered on the International Union for the Conservation of Nature's (IUCN) Red List.
- For conservation of cetacean species an Action Plan was introduced for IUCN's Species Survival Commission by the Cetacean Specialist Group during 1988.
- WWF-India had set-up a Dolphin Action Group in early 1996 and initiated some activities for the conservation of the Ganges River Dolphin.
- Children's Awareness Programme, (CAP) was established by WWF-India, which includes an age appropriate learning package on River Dolphins, their habitat and conservation.
- A Fishing Community Awareness Programme (FCEAP) has been launched within the target areas. Local language is used to train and educate the fishermen to prevent poaching, and adopt sustainable fishing practices.
- A programme has been undertaken to motivate the religious leaders (Sadhus) towards dolphin conservation where workshops are held along river banks in which religious leaders are involved. These have long term effects on the local population, especially, followers.

All these efforts resulted in increase in the dolphin population in the river stretch. The population of the River Dolphin has doubled from 22 to around 56 in last 15 years. The information gaps in the dolphin population status have been filled and identification of river stretches for priority conservation action is recognized which have resulted in motivation of the State Forest Departments and other stakeholders.




SANDEEP BEHERA

1.5 metric tons - chemical fertilizers, 21,000 tons - technical grade pesticides are dumped in the Dolphin habitats annually

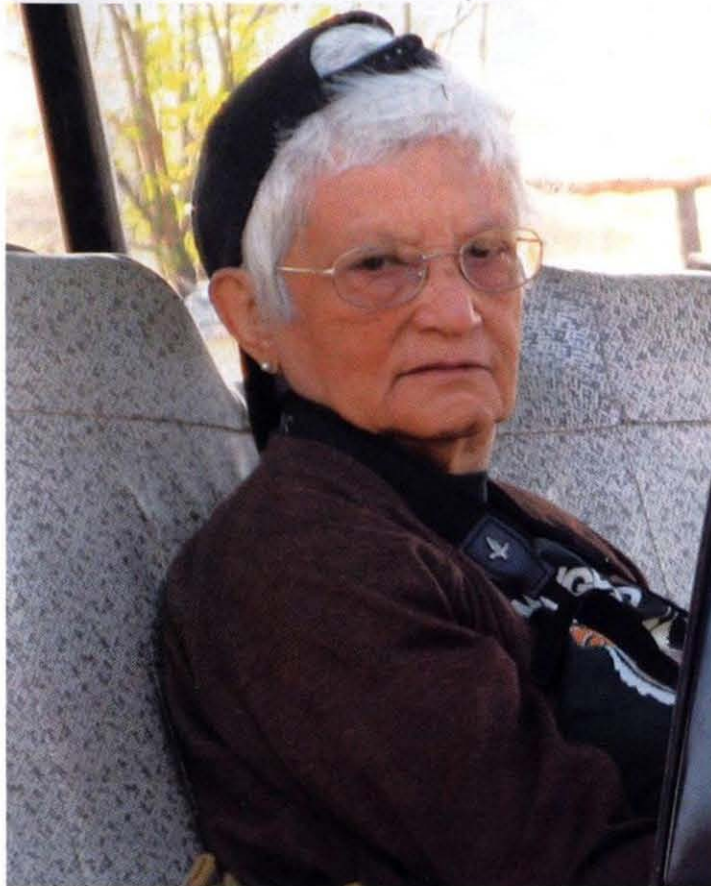
- For making decisions over issues of resource utilization and conservation, the local community were neglected, especially the fisherfolk who thrive on the resources of the Ganga, which often results in local conflicts.

Conservationists world over have given great attention to whales. The small cetaceans mainly the river dolphins, however, have received far less attention, despite the fact that many species are on the brink of extinction. In India, aquatic fauna is among the least understood biodiversity. There is, thus, a greater need for awareness about the endangered status of dolphins. This needs to be urgently addressed towards fishermen and local communities around the dolphin habitat. It is important for the government to facilitate and support a range of research programs targeted at river dolphins in order to provide a scientific basis for conservation and management actions; design and implement a national campaign through innovative media programs and establishment of information centres.

There is still a long way to go and we need your support to fit the pieces of this bigger picture. The Ganges River Dolphin is a unique charismatic mega-fauna and is an indicator species for the river ecosystem. This endemic and rare aquatic mammal is found only in the Indian subcontinent and is a part of our national aquatic heritage, as it has also been declared as India's National Aquatic Animal. 



## OBITUARY



**Rachael Reuben**  
(1934-2010)

We regret to inform that Dr. Rachael Reuben, an active member of the Bombay Natural History Society passed away on November 1, 2010, after a brief illness, at the age of 76. A life member of the Society for 44 years, Dr. Reuben was a well-known entomologist who specialized in the study of mosquitoes, and retired as the Director of the Centre for Medical Entomology at Madurai. Dr. Reuben was an active member of the Society's Executive Committee for four terms, during two of which she served as Honorary Secretary. She had a wide interest in natural history and described a new race of Jungle Bush Quail in collaboration with the well-known ornithologist, Mr. Humayun Abdulali. Rachael was carrying on the tradition of interest in wildlife instilled in her by her father, the late Justice D.E. Reuben who retired as Chief Justice of Bihar and assisted the BNHS on retirement, as a member of the Society's Executive Committee.



## A Pink Panorama !

On a fine Sunday morning, we got a visual treat of a lifetime! 'Agnipankh', as my friend Adesh calls them, the Flame birds awed us no end that day. 4,000 flamingos surrounded us – flying and feeding. And all this we encountered just within the city limits of Navi Mumbai at Airoli! We began photographing them as soon as we first sighted them. The flamingos were all around us, carefree and unperturbed by the presence of our boat, though we were right in the middle of the flock. Only when we were too near that they beat their wings and showed discomfort. This unplanned visit turned out to be a memorable one; we definitely could not have asked for more!

It was my long pending dream to visit Nal Sarovar to see the flamingos, and my dream came true just in my own backyard. We had taken a boat to get to the flamingos so as to observe and study them closely. We had waited for the high tide till 10:00 a.m. and by this time the sun was scorching over our heads. We then got into our small boat, which at the first glimpse made me think that a life jacket would be more important than carrying my DSLR camera. But soon, the small boat transferred us to a bigger boat and was



NIKHIL BHOPALE

I relieved! And thus began our wonderful journey to the flamingos.

Until 2008, Mahul was the center of attraction for flamingo watch. It used to offer a good treat to the eyes of any novice bird watcher, with its flocks of flamingos seen during high tides. Mahul, a branch of the Mithi river, but is now choked and clogged with garbage and not many birds are seen here now. However, the police supervision has become stricter after acts of violence against these birds; there have been incidences of illegal trading of flamingo meat in Uran and

Navi Mumbai. Fortunately, such insensitive acts are addressed and worked upon by several NGOs which in turn sensitize people to be aware of these acts.

I leave you 'birders' with the words of William Butler Yeats, the famous poet: 'See how the sacred old flamingos come, painting with shadow all the marble steps; aged and wise, they seek their wonted perches, within the temple, devious walking, made to wander by their melancholy minds.'

Ceasar Sengupta,  
Navi Mumbai, Maharashtra

## Discovery of a great mimic

For the past four winters at Rajale, near Phaltan in Satara district, about 100 km south-east of Pune, we have had the company of a Hair-crested Drongo *Dicurus hottentottus* that had entertained us with an amazing repertoire of calls, ranging from the lyrical and mellifluous to the irate and explosive. In that week, we had come to realize that this bird is a wonderful mimic. We had noticed in previous years, that among the wide range of calls was one that sounded

remarkably like a mewling cat but didn't attach much significance to it. Dr. Sálím Ali had described the bird as a mimic of other bird calls, so we did not suspect our visitor of mimicking other sounds.

That week, our visitor had been making an extraordinary call composed of squeaks and whistles that we had never heard before. Then one morning, I realized that this call had a remarkable resemblance to the noise that our indoor clothes drying line makes, when it is raised and lowered. The pulley wheels on it never get oiled and are rusted and very squeaky, and our friend spends a

lot of time in the big Red Bottle Brush tree that grows just outside one of our bedroom windows – a close enough spot for the Drongo to hear the clothes line when it is raised and lowered.

The Drongo used to wake us at dawn, well before sun-up, with some sweet calls but later, these have been followed by its version of the clothes line call. My partner, Chanda Nimbkar and I then started getting into the habit of raising and lowering the clothes line as soon as we woke up, to let our friend know that we are aware of its presence and listening.



This bird seemed to have patent attitude towards the Bottle Brush and it seemed to feed on the blooms. However, squirrels too liked to feed on the blossoms and this I think infuriated our friend. He would often swoop on the offending squirrels with an explosive range of whistles and flap his wings to drive them away.

When we first noticed the visitor four years ago it seemed that he/she

had come to feed on the blooms of two, very tall Kapok trees *Ceiba pentandra* in our front garden. Unfortunately, these trees suffered some storm damage and had to be cut down. We feared then that our friend might not return but he has come back each year and spends a lot of time in the bottle brush when it flowers.

I hope that our friend continues to return every winter, to enjoy our

garden like our other regular winter visitors like male and female Paradise Flycatchers, Blue Rock Thrush, Red-breasted flycatchers, Quails, Robins, Wagtails and sometimes, if the rain has continued from October to December, White-necked and Painted Storks and Grey Heron.

Gavan Bromilow,  
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Bombay Natural History Society, Hornbill House, Dr. Salim Ali Chowk, S.B. Singh Road, Mumbai 400 001, Maharashtra, India.  
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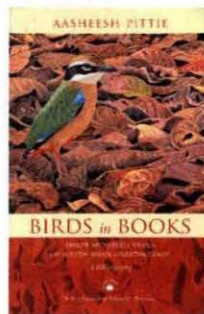
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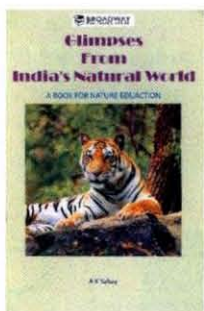
Reviewed by J.C. Daniel

This book is an essential acquisition for all institutions teaching ornithology, and essential reading for students involved in ornithological research. The book is a scholarly resume of ornithological literature of the Oriental region from 1713 to 2009 and covers all the books on ornithology published during this extensive period. Each book seen by the author, and he has seen the majority, is briefly reviewed as to its contents. A formidable task neatly executed. The author is to be congratulated on this erudite reference volume. 



**BIRDS in BOOKS**

Three Hundred Years of South Asian Ornithology by Aasheesh Pittie. 2010. Published by: Permanent Black, Ranikhet. Size: 21.5 x 14 cm Pp. 846. Price Rs. 795/-, Hardbound.



**Glimpses from India's Natural World –**

**A Book For Nature Education**

By A.K. Sahay.

Published by:

Broadway Publishing House, Goa.

Size: 19 x 12.5 cm

Pp. 179. Price Rs. 595/-,


Paperback.

on wildlife along with a clear message for conservation. The book has a wonderful foreword by Dr. George Schaller, the celebrated author of *THE DEER AND THE TIGER*. The foreword recreates the beauty of the Indian jungle right before our eyes. It also draws attention to the age-old conservation message of India quoting lines from the *Bhagwad Gita*.

But more than textual content, the book is a visual delight with the beautiful photographs. Apart from photos of various species, the book also includes rare photos from lesser known places of natural beauty in India such as Palaumu, Mamandur and Kodrebelur. This also subtly drives the message that the neglected wilderness of India needs to be protected too. After giving photos and brief description of various species of birds, mammals, reptiles and butterflies, the book explains the various forest types and habitats found in India. It dedicates an entire section to the conservation issues faced in India today,

the wildlife situation of the day, and urging the reader to help conserve whatever is left of the country's wilderness.


The book graciously gives brief information about many naturalists and environmentalists who have dedicated their lives for research and conservation of nature. It also mentions some of the leading organizations engaged in nature conservation with special reference to BNHS for the inputs from its scientists for this book and for the excellent nature camps that are organized across India. The book ends with a recommended list of books on wildlife and environment conservation. This is very useful for the reader.

However, the book has its share of lacunas and drawbacks. Firstly, it has grammatical mistakes and the English sounds amateurish. Secondly, the book looks more like a random compilation of already known information on wildlife. All in all, the book is suitable for a beginner in natural history and wildlife. 

Reviewed by Atul Sathe

Here is a book with beautiful photos of Indian wildlife with crisp description on good quality paper. As the name suggests it can serve as an introductory guide for nature education for those who want to get acquainted with India's wildlife. It is a handbook

Reviewed by J.C. Daniel

The Lions of Ashoka, presently the lions of Gujarat, are treading the narrow road to extinction. Divyabhanusinh traces the history of the lion from the late 19<sup>th</sup> century through the 20<sup>th</sup> to the present day. From the time it was looked at over the sights of a rifle to the time that serious research was undertaken on the habits, habitats and future of the lion. The researchers that the author has quoted show that if the lion is to be considered as Gujarat's wealth only and not shared, there is no future for the lion in the long run. A book that should be read by all those concerned with the conservation of the lion. 



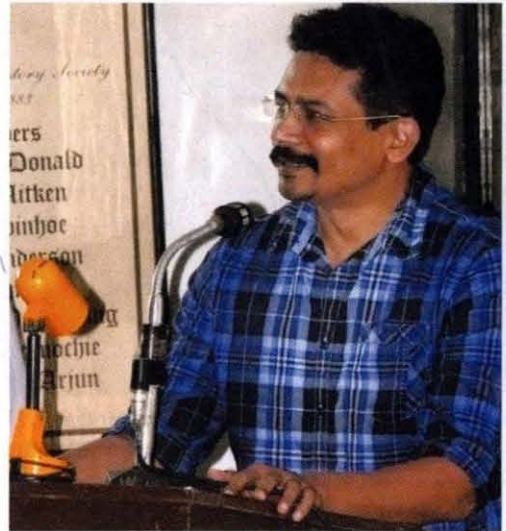
**The Lions of India**

Edited by Divyabhanusinh. 2008. Published by: Black Kite, an imprint of Permanent Black, Ranikhet and Delhi. Size: 22 x 14 cm Pp. 268. Price Rs. 395/-, Hardbound.



## Actor Atul Kulkarni's talk at BNHS

On September 14, 2010, BNHS hosted actor Atul Kulkarni at Hornbill House, where he spoke of his successful experiment of seven years at regenerating a natural forest on his land in Satara district of Maharashtra. Mr. Kulkarni and his nature-loving friends and cousins had been involved in this activity, with technical help from a Pune-based consultancy Oikos. During the talk, he also spoke about his experiences in developing a natural forest and his passion for nature. This was followed by an insightful presentation by Manasi Karandikar and Ketaki Ghate of Oikos, where they explained the work that the degraded and heavily eroded land went through by using natural materials and processes, which slowly regenerated it. The talk at BNHS further emphasized how minimal resources can help conserve nature. 🍀



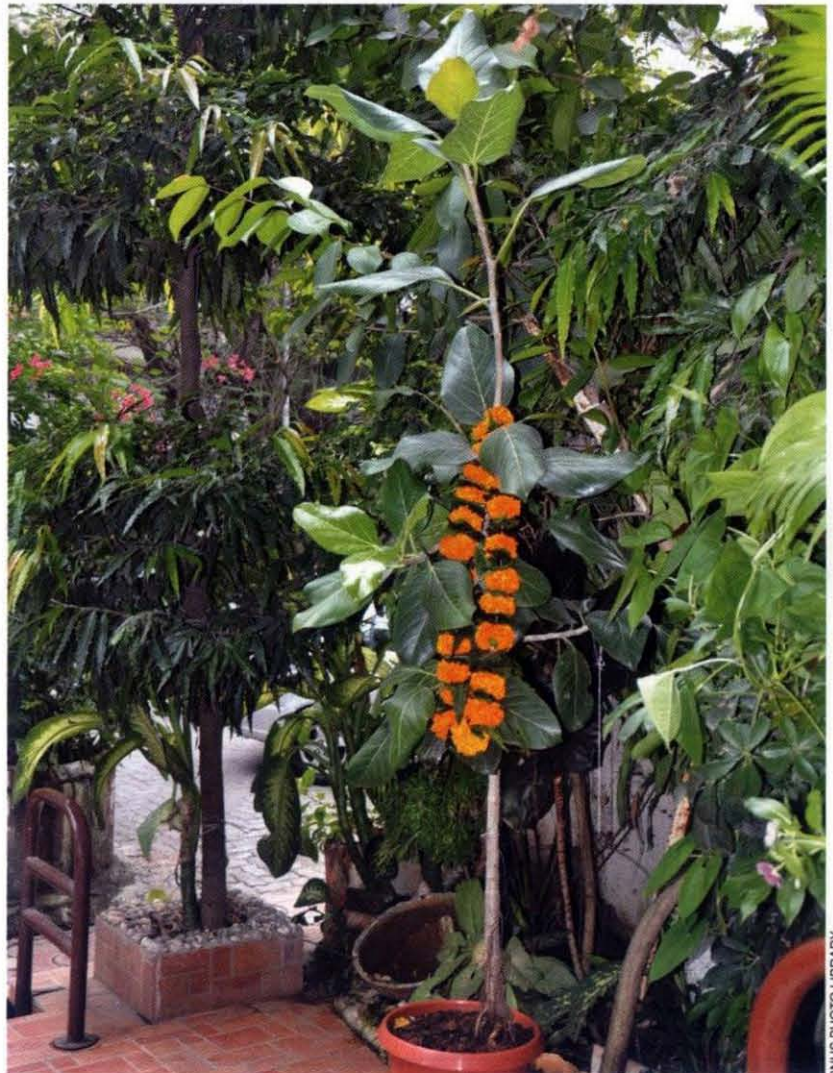
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Actor Atul Kulkarni spoke of his passion for nature

## 18-year old 'Avtar' Banyan Tree planted at CEC-Mumbai

To mark the successful afforestation activities of BNHS in its Conservation Education Centre (CEC), Mumbai, and fringe areas of Sanjay Gandhi National Park, an 18-year old Banyan Tree named 'Avtar' was planted in CEC by the BNHS President Mr. B.G. Deshmukh (Retd. IAS) on November 24, 2010. It also marked the completion of 127 years of BNHS. The Avtar Tree was on display at Hornbill House for a week from October 18-22, 2010, which evoked good response from visitors.

The 'Avtar' was originally a bonsai, which later started growing freely and now is a majestic sapling, about 3 m tall. Banyan trees live for a long time and this one will provide good shade in CEC-Mumbai in coming years, as well as become a symbol of the successful conservation activities of BNHS. Mr. Deshmukh has generously donated Rupees one lakh for the upkeep of the 'Avtar' Tree. 🍀



BNHS PHOTO LIBRARY

The 18-year old 'Avtar' tree, a symbol of BNHS' successful conservation activities





BNHS PHOTO LIBRARY

Mr. Deepak Apte, Deputy Director-Conservation, BNHS, explained the effects of the oil spill along the coast of Mumbai, to the audience

## Exhibition on Oil Spill during Wildlife Week

BNHS celebrated Wildlife Week from October 4-7, 2010, in a unique manner this year, focusing on the threats faced by wildlife, through an exhibition on 'Oil Spill and its Impact on Environment'. The exhibition depicted the major oil spills of the world, its impact on various forms of marine life, on humans, the methods of controlling oil spills, and role of various organizations and the role of citizens. Samples of sand and mangrove branches affected by the oil spill were also exhibited. 🍀

## BNHS DVD 'Indian Bird Calls' release by Hema Malini

The long-awaited BNHS 'Indian Bird Calls' DVD compiled by Dr. Erach Bharucha, was released by actor Ms. Hema Malini on November 16, 2010. The DVD is a digital field guide with bird pictures, bird videos, species information and species distribution. It includes the various types of calls that explain bird behaviour, their social life, the habitat in which they live and their interaction with other creatures.

On this occasion, Ms. Hema Malini appreciated the conservation work of BNHS and expressed her wish to participate more in its activities. Mr. Raju Kasambe, Head, Important Bird Areas (IBA), gave an interesting presentation on bird calls. The presentation depicted the different types of bird calls signifying normal communication, breeding calls, group calls and warning calls. It also covered the methods of recording bird calls and the challenges faced in doing the same. Members of Dr. Bharucha's team gave a brief demonstration of the various features of the DVD and how it can be used effectively. The event evoked a good response from members, nature lovers and the media. 🍀



SANJAY MARATHE

Cine-star, actor Ms. Hema Malini, released the BNHS 'Indian Bird Calls' DVD

We are grateful to

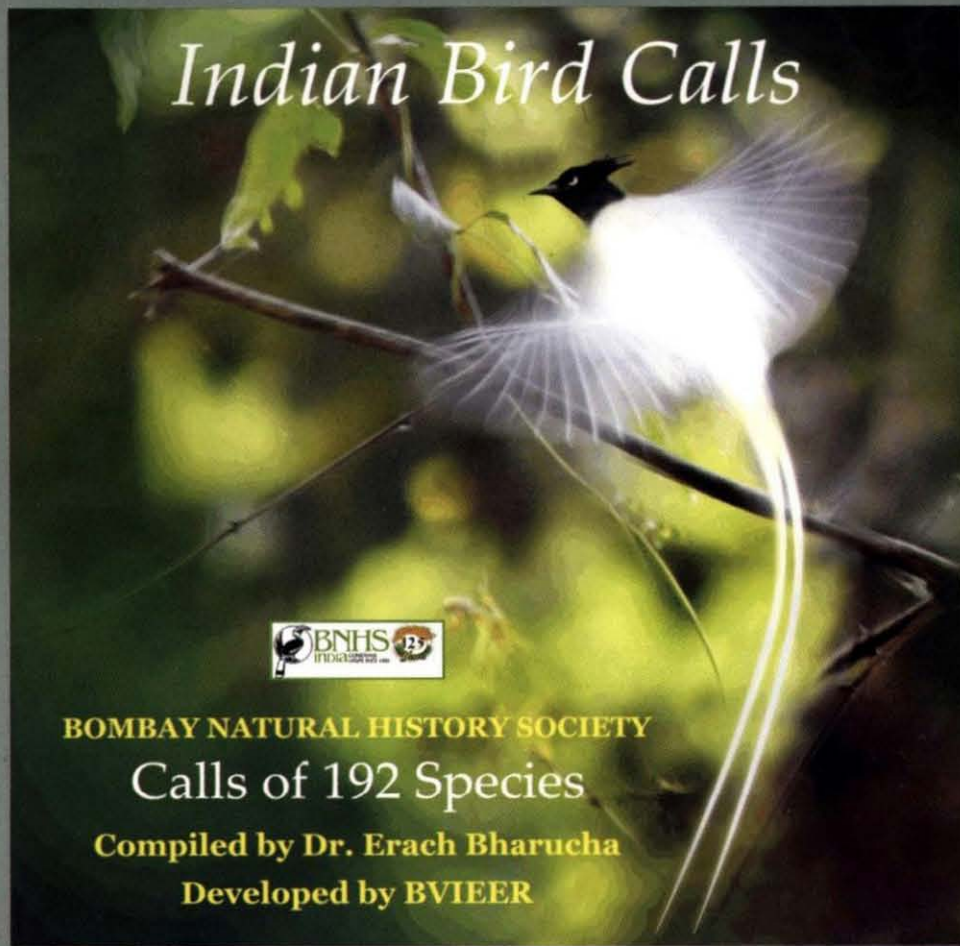
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Published on December 17, 2010, by Dr. Ashok Kothari for Bombay Natural History Society, Hornbill House, Dr. Sálim Ali Chowk, S.B. Singh Road, Mumbai 400 001, Maharashtra, India.



The DVD has 192 Indian Bird Calls with distribution, habitat, scientific and common names, behaviour, pictures and illustrations, distribution maps and sonograph



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