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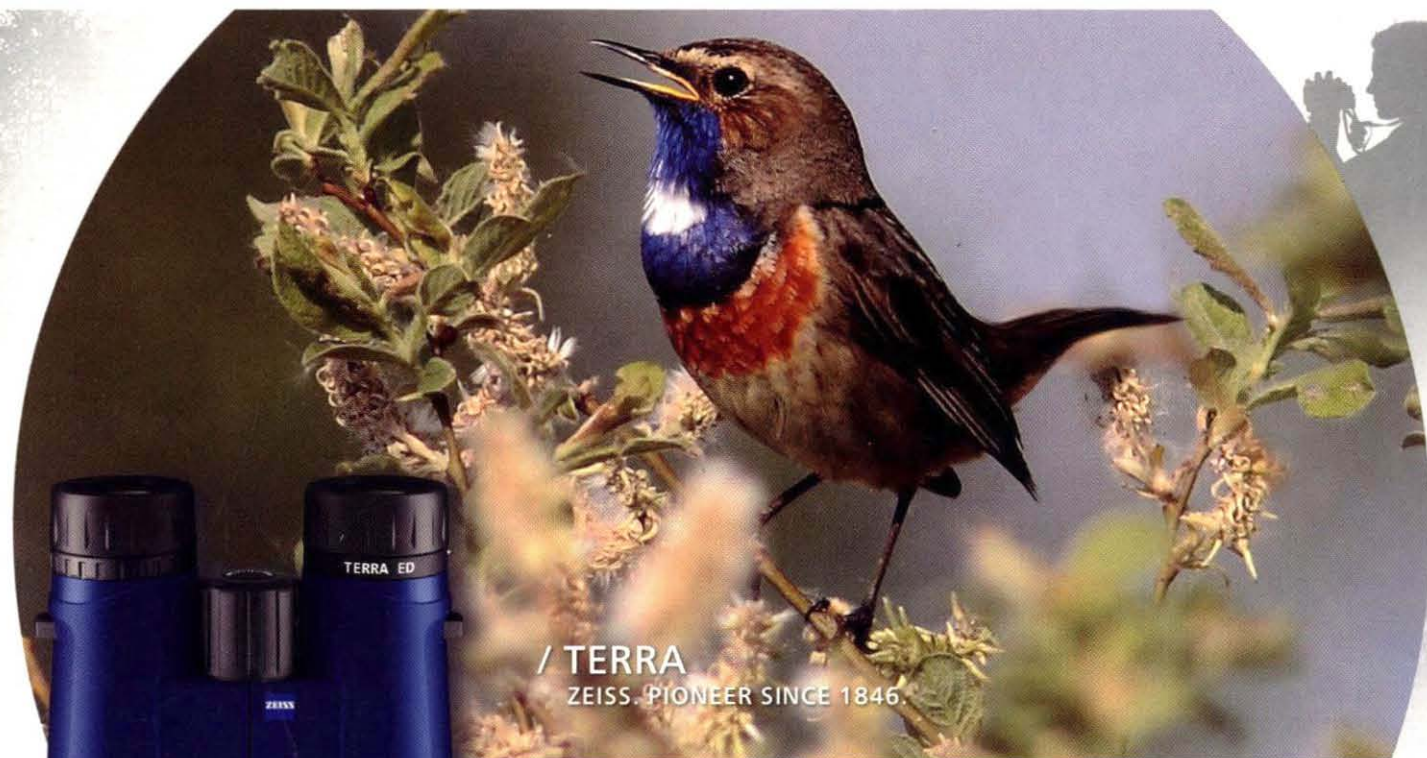


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Are we heading for an insect-free world?

Insects are one of the major components of biodiversity as they constitute 60% of the life forms of the world. Despite the importance given to large “glamorous” vertebrates, the fact is that without insects and other so-called lower life forms, no ecosystem can survive. Unfortunately, insects suffer from a bad reputation syndrome, as some of them feed on our food crops, while others attack books. It is like blaming the whole community for the misdeeds of a few. The fact is that 99% of the world’s insect species are not harmful to crops – actually they form the backbone on which whole ecosystems survive. Insects are not only incredibly beautiful, but they also have amazingly intricate and complex life cycles which raise questions in the mind of the most diehard supporter of evolution as to how such elaborate dependencies evolved between different species in the first place. Our insect world, like other taxa, is threatened by the numerous chemicals, ostensibly termed pesticides, that we have brought into this world over the last 100 years or more. Some of them are so lethal to all life forms that they should be termed biocides. Other reasons for the decimation of insects are habitat destruction, habitat fragmentation, invasive species, and climate change. Some insect species may have disappeared even before they could have been described for science.

In India, most of the studies on insects are either on taxonomy (necessary as new species are described almost every day) or how to ‘control’ or ‘kill’ them (for crop protection). Not much work has been done to study their life cycles or natural history. Perhaps BNHS is the only organization that conducts an entomology course for the general public, to appreciate the role of insects in ecosystems. Incidentally, this course is quite popular among women, although most of us think that women are quite squeamish about ‘creeping, crawling creatures’.

The Rothamsted Institute, UK has been studying insect numbers for 50 years (www.rothamsted.ac.uk/insect-survey). The year 2014 marks the 50th anniversary of the Rothamsted Insect Survey. Although the main purpose of this survey is to inform UK farmers about pest species, it is also used by entomologists to detect insecticide resistance. The results of this survey show worrying trends for many species. Another study in UK found that most species of moths are declining and their overall numbers, since 1968, have decreased by 28%. Nearly 60 species have become extinct in the 20th century. Insect decline in turn has a cascade effect, as many birds, bats, rodents, spiders, and even some larger mammals depend on insects for food. My own experience of 40 years in the field shows that many so-called common insect-eating bird species are not common anymore. For instance, the Indian Roller, Common Hoopoe, Black Drongo, nightjars, and bee-eaters are not seen as often as they were 20–30 years ago. We need long-term monitoring and quantitative studies on insects, birds, and bats in India to document and take timely conservation actions, like they are doing in the UK. I suggest that readers of *Hornbill* go through the State of Britain’s Larger Moths 2013 report.



The decline of bees is too well-known to need detailed repetition here. Recently, more than 100 reputed scientists wrote to President Barack Obama of the USA to initiate action against the misuse of harmful pesticides, particularly neonicotinoids and other systemic pesticides that harm bees. These scientists called on leaders of President Obama's Pollinator Health Task Force to take action against misuse of pesticides to protect and promote healthy populations of bees and other pollinators. It should be noted that between 50 and 80% of bee colonies have collapsed the world over. In China, the situation is so bad that fruit blossoms (apple, peach) have to be pollinated manually – the role that these humble bees were playing for millions of years.

A study published in the prestigious journal *Science* reveals that the number of some insect populations is down by 45% in just 35 years. In UK, the number of beetles, butterflies, bees, and wasps has fallen by 60%. While insecticides help us in increasing the crop yields by controlling harmful insects (very few species are crop pests), misuse of insecticides and other chemicals, along with habitat destruction and climate change, have resulted in a massive decline of many useful insects. Reduction in insect numbers would have a huge negative impact on crop production as up to 75% are pollinated by insects, amounting to around 10% of the world's food supply. Along with insects, slugs, spiders, worms, and other invertebrate, populations have fallen by 45% over the past 35 years, while the human population has doubled.

In a rather imaginative study, the Royal Society for the Protection of Birds (RSPB), BirdLife Partner in UK (like BNHS is BirdLife's partner in India), asked its members to count the number of insects that get stuck to car number plates. About 40,000 members responded and agreed to count the dead insects splattered on their car number plates. This citizen science survey was called the Big Bug Count. I quote from the RSPB report: "Using a cardboard counting-grid dubbed the 'splatometer', they recorded 324,814 'splats', an average of only one squashed insect every five miles. In the summers of 30-odd years ago, car bonnets and windscreens would quickly become encrusted with tiny bodies... People were asked to wash their number plates, drive for between 20 and 80 miles, and count the insects on the plate, using the grid to make counting easier. The study was prompted by fears that a decrease in insect populations could cause problems for birds which rely on them for food."

In our country, most of the zoology and forestry departments have entomology sections where the majority of studies are focused on taxonomy, or on how to control 'insect pests'. Perhaps the time has come for our entomologists and naturalists to start studying insect diversity and numbers in different parts of India. Such long-term studies should be funded by the Council of Scientific and Industrial Research (CSIR), Indian Council of Agricultural Research (ICAR), and maybe, through the CSR (Corporate Social Responsibility scheme) of reputable corporate groups, who may want to support the cause of saving useful insects that form the overwhelming majority of the insect world.

Asad R. Rahmani

THE SASWAD WOLVES

Text: Mihir Godbole, Siddhesh Bramhankar, Viraaj Apte, and Milind Raut

It was the monsoon of 2008, when we visited Nannaj Sanctuary (Solapur district, Maharashtra), starry-eyed, hoping to catch a glimpse of the Great Indian Bustard. Little did we know that this trip would provide us a rendezvous with an animal which we have come to adore immensely over the years.

This trip provided us with our first sighting of the magnificent predator of the grasslands, the Indian Wolf. Both individuals, in their prime, strode the grasslands nonchalantly, sending herds of Blackbucks scampering as they calmly sauntered across the rugged landscape. This sighting was enough to put us in awe of this extremely striking animal and just could not get them out of our minds.

We had heard about stray sightings of these animals at Saswad, off Pune, from

our friends. The thought that these supreme grassland predators could be living in packs so close to the bustling, sprawling city of Pune was itself mind-numbing. Thus, started the quest for searching these seemingly “Urban Wolves” and finding out, how they were surviving so close to a big city.

We gathered information from friends and locals who had seen them before, marked the locations and seasons, and started making frequent visits to the most probable sites. The Saswad area hardly about 30 km from Pune is a parched, rain-shadow area. The landscape is mostly undulating hills with grasslands and rocky slopes. The area has some agricultural activity, poultry farms and some fruit orchards. As the frequency of our visits increased,

we discovered that the area was pretty rich in grassland biodiversity. We came across Chinkaras, Black-naped Hare, Indian Fox, Indian Porcupine, and Hyena amongst others.

It was almost after a year and half of seemingly fruitless searches in the grasslands that lady luck smiled upon us. It was the winter of 2010, when we spotted our first wolves of the Saswad area. It was a pack of five, two adults and three subadults. This pack now became our passion and inspiration, and the urge to know more about these misunderstood animals peaked. Over the course of the next four years, we tracked them extensively and were privileged to witness some extraordinary behaviour and scenes of these wonderful animals, which we never thought possible.



MIHIR GODBOLE

The big Alpha – This male is the alpha male of a pack. His big size, aggressiveness, and skill in hunting makes him the perfect leader of the pack

Sizing up the pack

One of our first challenges was of course to find out the exact size of the pack. We had tried to build a network of local shepherds for gaining critical information and in June 2011, we were told by them that the pack had gained in size. Our initial sightings of them were sporadic, and number of wolves seen used to vary each time. We identified the track that was used most frequently by the wolves. Positioning ourselves at different locations we hoped to photograph and videograph them in a bid to individually identify the pack members and the size.

So in June 2012, we had taken up our positions and waited with bated breath. As usually happens in the wild, the unexpected happened, the pack did arrive, but from the exact opposite direction, and instead of taking the usual route on the open slopes, they moved through a small hillock full of short Babul trees. We were in an awful position and thought we had lost a golden opportunity. However, we had a hunch where they might be headed, we ran, got into the car, and drove to the other side of the hillock on a dirt-track. There was no sign of the wolves. With heavy hearts, we started driving slowly down the hill cursing our luck and suddenly one of us noticed a movement on the adjacent hill slope. It was a wolf walking calmly. We followed him closely



SIDDHESH BRAMHANKAR

The wolves often killed wild animals like Black-naped Hare and Chinkara (photo: remains of a chinkara kill after ten hours)

and to our utter delight, he walked down to finally join the remaining pack that was resting on the slope. We were in state of total disbelief when we saw the entire pack lazing on the rocky slopes. Slowly we counted each member including one which hid behind the rocks. They were ten of them, five adults and five subadults.

This was one of the most satisfying days for us in our quest to learn more about them.

Hunting

The first thought that struck us was, here is a pack of ten extremely healthy looking wolves, what could be the



ANUR GODBOLE

The Pack – The pack in the full strength sitting alert at one of their favourite lookouts



VIRAJ APTE

Wolf Pups – young wolf pups emerging out of the den

major food source sustaining such a large pack. We also knew that there were three other packs in the not too far vicinity, and we had also come to realize that these wolves do not travel far from their area. After having extended discussions with the shepherds in the area, we were told of only three instances where livestock was taken by these wolves. So, what were they feeding on? None of the locals had seen them killing Chinkaras (Indian Gazelle), which are relatively common in the area, although some claimed to have seen them killing the Indian Hare. We were hoping

to have a first-hand account of such a kill or at least evidence of such kills. We did a thorough inspection of some tracks and managed to locate four Chinkara kills, we were not able to witness the actual incident of the kill, but the tell-tale signs were all there. Our first sighting of the wolves taking prey was during a walk in December 2012 along one of their regular tracks. Our eyes caught a wolf stalking with deadly intent. We covered ourselves up immediately so as to not cause any disturbance to the event. The wolf moved very slowly towards a rock wall in front of

us and then in a burst of energy, charged at something and disappeared from our sight. When the wolf re-surfaced, it had an Indian Hare clutched in its sharp canines. On sensing us, he soon moved away with his prize catch of the day to a more remote location to enjoy his meal.

What we realised over a period of time was that this pack was not a habitual livestock-killer as is reported from many other areas, where these animals survive. This explained why there are no reports of retaliatory killings or ill-feeling towards wolves in this area. In fact, most of the locals are not even aware of their presence! Apart from natural prey, the wolves frequently rely a lot on poultry waste and dead livestock that are dumped in the grasslands, which we observed them feeding on some occasions. Detailed analysis of the scats is required to find if this is true.

Denning and raising pups

By December, we became pretty sure that these wolves were not 'migrating' to other areas post monsoon in search of food after the shepherds moved out. We kept seeing them at regular intervals throughout the year. The next biggest piece in the jigsaw puzzle was their breeding



MITHI GODBOLE

Two Brothers – We had a privilege of watching these two grow up with the pack. They were the first to become independent from the pack. We tracked them for some time after separation



MHIR GODBOLE

In 4–5 weeks, the pups start eating meat. This is brought to them in the stomachs of the adult wolves. When the pups lick around the mouth of the adult, the food is regurgitated for them

behaviour and also the most exciting part. Wolves are extremely secretive, but during their breeding period, their movements are almost ghost-like.

By November, most of the subadults in the pack had left and only the adult pair remained in the area, accompanied by a young female. Sightings after this kept on becoming scarce and it became almost impossible to track their activity.

In February, we were out searching on one of our regular locations and what followed was something that we never imagined. After many trips which went without any signs or tracks of the wolves, we were excited to see one individual standing on a rock structure. As we focused our binoculars, our delight turned into ecstasy as we were now watching a tiny pup climbing out of a crevice just below the adult. We couldn't believe our eyes. We stayed put,

maintaining an absolute safe distance. By the end of the day we had counted four pups that had been born this season in this desolate den-site.

After about a week, we witnessed the wolves moving the den-site to a safer and more remote place, mainly necessitated as the pups were now coming out every now and then to play. The wolves then disappeared for a good four months before resurfacing in June. By June, the pups (now subadults) returned to an area adjacent to the den-site. We found the subadults hanging around in one of their favourite places and managed to have them in our sights for almost the whole day. In the evening, one of the adults showed up, and after looking at us, it approached the pups followed by two more adults. The subadults came running towards them and started licking their faces, after which,

the adults regurgitated chunks of meat for them to feed on. We were absolutely thrilled to witness such an intimate moment in their lives.

All this started to make more sense now.

After the first monsoon, where we had spotted 5 adults and 5 subadults, the subsequent monsoon showed the pack size to have come down to 6, with some subadults either having not survived or moved away. Out of this, one female and two young males separated from the pack. By winter, the pack size was down to three. However, in February we saw them with pups.

The two brothers

The two males that left the pack were our favourites. They used to approach us with curiosity while the adults and the female pup kept their distance. After they



MILIND RAUT

One interesting fact about the wolves of Saswad is that their major food source can be poultry waste. Saswad area has one of the highest density of poultry, and dead birds are thrown in the open very regularly. We found many wolves feeding on such poultry waste

left the pack, we undertook many outings to look for them, making inquiries and checking adjacent areas.

In August 2013, we received news about a sheep killed by two wolves at a site 20 km away from the territory of our pack. We rushed to the spot and saw these young males playing with the remains of the kill! With their usual chutzpah, they approached our car and stood their ground, being least bothered by our presence. They soon left the area and we never saw them again. More detailed studies need to be undertaken to understand the dispersal patterns of subadult Indian wolves after they leave their pack. This will help in identifying



VIRAJI APTE

Female carrying a young

and saving corridors, essential for the long-term survival of the species.

The Newbie

After the dispersal of the two brothers and the adult female, the pack size had come down to three. However, by the subsequent year in December, an unfamiliar lone male was being seen regularly in the area. He used to hang around the pack. He was bold and allowed us to approach him on a number of occasions. He probably had gotten into fights with the old alpha male, as was evident from the scars on his body. He was eventually accepted, and all the four started hanging out together by January.



SIDDHESH BRAMHANKAR

Different morphs in the wolves are because of melanin disorder. Indian (Grey) Wolf is generally not found in different morphs, a common feature in Leopard (black panther) and Tiger (white tiger). There are a few records of tawny coloured wolves from Pune and Akola. A blackish wolf was recently reported from Solapur district

By February, we saw them denning again, four pups were born, and they started ‘hanging out’ in their usual area by June that year. The pack had come to a full circle. Our joy knew no bounds when we witnessed this entire cycle in the lives of these elusive creatures, the making and breaking of the pack.

The latest

The wolves are still thriving in the grassland / scrublands around Pune. Currently, we are monitoring five different packs around Pune. Reports of more packs are also coming in. In these extremely human impacted habitats, the wolves have adapted and miraculously thrived by minimising contact with humans and taking advantage of every opportunity that comes in their way.

But grave challenges remain confronting the survival of these wolves.

Soaring land prices means that there is huge development pressure on the land that remains and this will adversely affect corridors which are extremely critical for the movement of wolves. Stray dogs are also becoming a problem. Not only do they hunt the natural prey of the wolves (which is already scarce), but they could be carriers of deadly diseases that could wipe out packs. Hybridization is also a threat.

The wolf lies at the apex of the food chain in the grasslands. There is an urgent and dire need to accord protection to these grasslands and its entire biodiversity symbolised by this supreme predator.

Apart from wildlife, grasslands also provide fodder for nomadic livestock and are repositories for many plant species, which play a crucial role in soil and water conservation.

The need for conservation is absolutely grave or else we stand to lose

the privilege of having these urban wolves, thriving near one of India’s biggest cities. ■



Mihir Godbole has been following wolves for the past few years to unearth more information about this elusive animal.



Siddhesh Bramhankar began exploring wildlife at an early age. A curious onlooker of nature, he is devoted to broaden human perception towards wildlife.



Viraaj Apte is fascinated by wolf behaviour. He has been gathering information on wolf presence near the Saswad region since 2009.



Milind Raut, an engineer by education, is a wildlife enthusiast working on the biodiversity of grasslands around Pune.

POISONOUS PLANTS

Text: Vijay B. Tuljapurkar

The very word 'poison' causes fear and anxiety in the minds of people. Poisonous plants are those that have chemicals harmful to living beings, as there are animals that produce venom hazardous to health, or chemical compounds in nature that can lead to ill-health or death. It can be said that "a poison is a substance that when consumed, injected, absorbed, or applied to skin in a relatively small quantity may cause damage to an organ, disturb its function, or if the quantity is large, may cause death".

Indian mythology narrates an interesting story about the origin of poisonous plants and animals. In ancient times, the gods and demons churned *kshirsagar*, the ocean of milk, to obtain *amrut*, a nectar which when consumed makes one immortal. In the process, a person with terrifying looks emerged

out of the ocean. His mere presence frightened people and made them grief stricken; hence he was called Visha, the poison. Brahma, the creator of the world, realizing the agony of mankind ordered Visha to discard his appearance and hide. Accordingly, Visha changed his looks and resided in some of the plants and animals.

Mankind has known poisons since time immemorial. The knowledge of various poisons, their effects, and their antidotes gave a person the status of magician, physician, or a priest. Mystery and superstition revolved around poisons in the days when understanding about these substances was meagre and was known to a small number of people. However, there were persons who observed nature keenly, studied various aspects of poisons, and recorded their observations.



Physicians in ancient Egypt and China were aware of various types of poisons. Old Chinese texts describe different poisonous plants and their antidotes. In fact, Chinese history mentions about a wise emperor who is regarded as the father of herbal therapy. Sushruta Samhita, the ancient Indian treatise on medicines identifies different plants and their parts such as roots, leaves, fruits, bulbs, and flowers that are poisonous. Various other texts such as *Bhavprakash nighantu* and Kautilya's *Arthashastra* mention several poisonous plants and description of their effects, purification, and usages. Interestingly, Ayurveda also makes use of some of these poisons in purified form and in certain doses as lifesaving medicines. This will sound paradoxical, but Ayurveda is an ancient science and has its proponents, who have the knowledge to convert poisons into medicines.

In this article, I discuss some of the well-known poisonous plants found in India, some of which are exotic species that have been introduced in the recent past.

Glory Lily *Gloriosa superba*

A native of the tropical jungles of Africa, and parts of Southeast Asia and India, Glory Lily is the national flower of Zimbabwe and state flower of Tamil Nadu, India. The vine belongs to Colchicaceae family and is cultivated widely in many parts of tropical Asia, including India.

The underground tubers of Glory Lily lie dormant in winter and summer, and in the rainy season, the plant emerges from the earth and starts growing. The long leaves have tendrils at their tips and with the help of these the vine takes support of nearby bushes or other structures and grows. By mid August, the plant is adorned with large beautiful flowers that are greenish-yellow in their lower part and red in the upper. All parts of the vine are poisonous, especially the

tubers. The toxic substances in Glory Lily are its alkaloids, colchicines, and superbine.

The leaves and stem can cause irritation of skin on contact. The tubers when consumed begin to show the effects within 2–6 hours. It manifests as burning of throat, nausea, pain in abdomen and diarrhoea. In severe poisoning, its effects could be disastrous, presenting as lowered blood pressure, respiratory depression, lowered white blood cell count, etc., and may need critical care management. One tenth of an ounce of root can cause death of an adult.

Though a source of potent poison, it is known that the tribes living in some parts of India use this plant as folk medicine in snakebite and scorpion

stings. Specially prepared extract from the tubers is also used by adivasis to promote delivery of a pregnant woman by applying it locally to the area of the umbilicus.

Red Oleander *Nerium oleander*

A native of Morocco and Portugal, the Red Oleander is found in Mediterranean region, South Asia and southern part of China. The plant belongs to Apocynaceae family and grows to a height of 2–6 m (6–18 feet) and has long waxy leaves, which grow in whorls and have a leathery feel. The flowers are seen in different colours, such as red, pink, yellow, and white. They are located at the tip of the branches and the fruits have capsules that contain numerous seeds.



The toxic nature of the Red Oleander cannot be ignored while appreciating the beauty of its flower

VIJAY B. TULJAPURKAR



Oil of poisonous Mexican Poppy is used to adulterate edible oils

Though extensively used as an ornamental shrub in places such as parks and along highways, it must be emphasized that the whole plant is very poisonous. In spite of its toxic nature, it is often found in schools. Children who come in contact either inadvertently or while playing can suffer from its poisonous effects. Ingestion of plant either for suicidal or homicidal purposes has also been reported. In fact, contact of the sap to skin and eyes are also known to cause severe irritation and allergic reaction.

Oleander contains numerous toxins, which have a deleterious effect on people, especially children. The toxic ingredients in the plant are the cardiac glycosides – oleandrin and nerrine that are

concentrated in the sap. Oleander poisoning presents as nausea, vomiting, excess salivation, pain in abdomen, and diarrhoea that is occasionally associated with bleeding. It also has adverse effects on the heart and brain. Irregular pulse, poor circulation of blood in limbs, drowsiness, tremors, fits, and coma that could be fatal are some of the presentations of oleander poisoning.

Oleander is also toxic to animals such as sheep, horses, and cattle. Even a small quantity (100 gm) can kill a horse; cases of equine poisoning due to ingestion of this plant have been reported. Dried branches or twigs of the plant retain the poisonous effects, and hence these should never be used as fuel-wood or as skewers.

Practitioners of alternative medicine claim about its medicinal properties. However, since these treatment modalities are not widely accepted, it is best to keep a respectable distance from Oleander.

Mexican Poppy *Argemone mexicana*

A member of Papaveraceae family, Mexican poppy, also known as Mexican prickly poppy or Yellow thistle, is a native of Mexico but has naturalized in USA, India, Ethiopia, and several other countries. It is said that the plant was introduced in India about four centuries ago. The plant grows in dry uncultivated lands. The green leaves bear clear white lines, have margins that are irregular and prickles at the edges. The flowers are somewhat smaller than poppy. The seed



All parts of Devil's Trumpet, a commonly found herb, are poisonous, especially the seeds



Abrin, the toxic ingredient of Gunj seeds causes serious illness when consumed accidentally

Pods when cut open exude a pale yellow resinous substance.

The seeds look very much like that of mustard *Brassica nigra* and yield oil, which is poisonous if ingested or used for body massage. The toxic ingredients in the oil are sanguinarine and dehydrosanguinarine. Argemone oil is mixed with mustard oil as an adulterant, and even 1% adulteration shows toxicity and causes a sickness called epidemic dropsy. The victim of this poisoning presents with nausea, vomiting, diarrhoea, swelling of the limbs, and breathlessness. The poison affects eyes as well, manifesting as glaucoma and retinal changes. Prompt treatment invariably cures the patient. During 1967–1968 and in 1998, incidences of epidemic dropsy were reported from India and investigations revealed that it was a result of adulteration by oil extracted from seeds of Mexican Poppy.

Devil's Trumpet *Datura stramonium*

The Devil's Trumpet is a commonly found herbaceous plant in the tropics and subtropics. It belongs to the Solanaceae family and grows as an erect shrub to a height of 1–1.5 m. The leaves have irregular edges. The trumpet-shaped white, creamy, or violet flowers are about 7–8 cm long and emit a sweet fragrance. The seed capsule is walnut sized and is normally covered with spines. When opened, it shows four compartments filled with numerous small black seeds.

All parts of *Datura* are poisonous, especially the seeds. The toxic ingredients are the alkaloids atropine, hyoscyamine and scopolamine. According to available literature, if leaves of *Datura* are plucked by hand, subsequent accidental rubbing of eyes by the fingers causes dilation of pupils. Consumption of the plant

products in sufficient quantity manifests in impaired vision, dilated pupils, giddiness, and odd behaviour, which at times makes the person affected violent. The heart beats faster and occasionally loss of memory is observed. In large doses it causes death as well. The antidote for *Datura* poisoning is a drug called Physostigmine, which must be given strictly under medical supervision.

Gunj *Abrus precatorius*

A native of India, Gunj is now also found in tropical and subtropical areas, where it was introduced. It is also known as Ratti (Hindi), Jequirity, Crab's Eye, Precatory Bean, Rosary Pea, among others. It is a legume and belongs to family Fabaceae. A slender perennial climber, it grows taking support of trees, shrubs, and hedges. The leaves are long pinnate and leaflets are oblong in shape and have



VIJAY B. TULJAPURKAR

All parts of Yellow Oleander are toxic to most vertebrates as they contain cardiac glycosides



VIJAY B. TULJAPURKAR

Contact with Carrot Grass is known to cause dermatitis and respiratory malfunction in humans



VIJAY B. TULJAPURKAR

Warning colours are the defence mechanism for indicating the poisonous nature of the mushroom Fly Agaric

rounded tips. Flowers are clusters of whitish pink; flat, broad pods contain 3–7 oval seeds.

The seeds come in different hues, but those with bright red colour and black eye are common, whereas the white, black, yellow, and green colours are scarce. The red variety looks quite attractive but it is to be remembered that like other varieties these too are highly poisonous. The toxic ingredient in the seed pulp is called Abrin and causes serious illness when consumed accidentally or intentionally. The symptoms of toxicity are vomiting of blood, and pain in eyes. Ingestion of one to two seeds can cause death in children. The treatment of *Abrus* poisoning is mostly symptomatic and supportive. Practitioners of Ayurveda and Siddha system know the method of detoxifying the poison in the seeds and use it for medicinal purposes.

The seeds of *Abrus precatorius* are much valued in native jewellery for their bright coloration. In Trinidad (West Indies) brightly coloured seeds are strung into bracelets and worn around the wrist or ankle to ward off evil spirits and *mal-yeux* – the evil eye. One has to be very careful while making these ornaments, as an accidental prick when the seeds are being threaded could be fatal.

Formerly Indians were known to use Gunj seeds to weigh gold as they are consistent in weight. The measure was called as 'Ratti' and the weight was calculated as 8 Ratti = 1 Masha; 12 Masha = 1 Tola (11.6 Grams). The goldsmiths prepared a powder of the seeds and used this as an adhesive in making jewellery with intricate patterns.

Literature indicates that "The basic weight of ancient India was *raktika*, ... the bright red seed of Gunj was conventionally reckoned at about 1.85 grains (0.118 gm)". The Sanskrit name of Gunj is probably *raktika* and its colloquial term *ratti*?

Deadly Seeds

Seeds of some plants are quite poisonous. Castor *Ricinus communis* beans, when chewed, produce deleterious effects on body. The seeds contain Ricin, which is a toxic substance causing pain in abdomen, vomiting, and diarrhoea. In severe cases of poisoning, death may occur. Commercial preparation of cold pressed castor oil lacks Ricin, hence it is not toxic to humans in normal doses, either internally or externally. The tree is indigenous to East Africa and India and belongs to Euphorbiaceae family.

Named after a French monk, Andre' Thevet (1502-1592), Yellow Oleander *Thevetia peruviana* belongs to family Apocynaceae. A native of tropical America and West Indies, the tree grows to a height of 2–3 metres. It has long leaves and yellow flowers. Seeds of the Yellow Oleander have Thevetin A and Thevetin B, which affect the heart. Though it contains toxic substances, death due to poisoning is uncommon.

Skin Irritants

It is not only oral consumption or injectable administration, but even contact in a few cases, cause toxic effects. Velvet Beans *Mucuna pruriens* is a climbing vine, which bears white to dark purple flowers in clusters. The seed pods, which are 8–10 cm long, are covered with reddish-orange hair which when in contact with skin cause intense irritation. The itch is caused by chemicals Serotonin and Mucunain. The name of the plant species – *pruriens* – is derived from Latin, which means itching.

Carrot Grass *Parthenium hysterophorus*, also known as Congress Grass in India, belongs to Asteraceae family. Native of

American tropics, it was introduced in India as a contaminant of wheat received from USA in 1950s. This is a weed that grows during monsoon and it is estimated that approximately two million hectares of land is now covered by *Parthenium*. It bears white flowers and direct contact causes allergic reaction which may progress to eczema. Other manifestations of allergy are precipitation of asthmatic attacks, allergic bronchitis and allergic rhinitis due to pollens. The toxin isolated from this plant is parthenin. As total eradication of this weed appears difficult, attempts are made to explore the beneficial effects of this plant.

Mushrooms

Some varieties of mushrooms are good source of nutrition, while others are poisonous. The red coloured *Amanita muscaria*, also known as Fly Agaric, of Amanitaceae family is a classic example. The fungus grows to a height of 5–20 cm has a red coloured cap, which is dotted with tiny white or yellow projections. It contains toxic compounds such as ibotenic acid, a neurotoxin, and muscimol – a hallucinogenic agent. Consumption of this mushroom causes delirium, hallucinations, and convulsions. The beauty of *Amanita* therefore should be appreciated only from a distance!

The list does not end here. There are several other poisonous plant species, which affect the different systems of the human body and cause toxic effects of varying degrees. It is necessary that people, especially children, should be educated and encouraged to use disposable gloves while handling poisonous plants to avoid health hazards. ■



Vijay B. Tuljapurkar is a consultant in medicine residing in Miraj. He is interested in nature photography and enjoys writing on topics related to natural history.

Mizoram: A Bird Paradise

Text and Photographs: Raju Kasambe



The colourful Himalayan Cullia has a habit of perching motionless among bushes to avoid detection

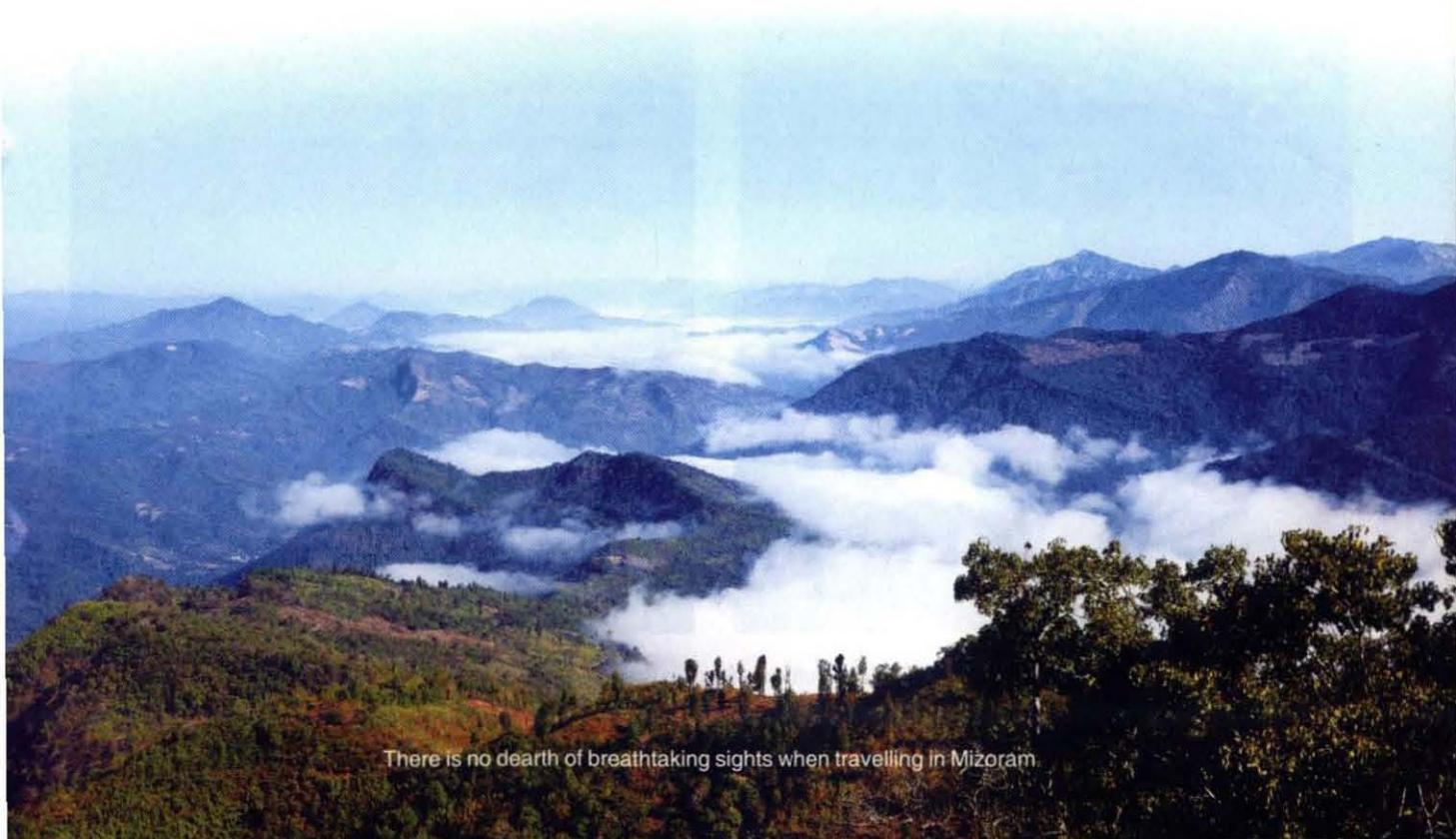
Mizoram, the land of the Mizos, is one of the 'Seven Sister States' in Northeast India sharing borders with Tripura, Assam, Manipur, and with the neighbouring countries of Bangladesh and Myanmar. Mizoram is mostly a hilly state covered with evergreen forests, mostly owned by the local communities, with rivers cascading down the hills carrying crystal clear water. The hills are of an average height of about 500 to 800 metres.

Mizoram is one of the most charismatic and unexplored hill states of India. The people are gentle, and most can speak English besides Mizo – the local language. The jungles of Mizoram are filled with a myriad species of flora and fauna, many of which have hardly been studied. It has been neglected by bird watchers, wildlifers, and even tourists. The birdlife is relatively poorly surveyed, and most of the published work is by Dr. Anwaruddin Choudhury, who has done tremendous work on the ornithology of Northeast India. He has listed 479 bird species from Mizoram. All the Seven Sister states are part of the Eastern Himalayas, which has been identified as an Endemic Bird Area (EBA) by the International Council for Bird Preservation, U.K. As for ichthyology, I met a scientist at the Pachhunga University College, who has been doing exemplary research on the fish fauna of Mizoram since the last few years, and he has described 11 new species from the state!

Before I embarked on my bird survey trip to Mizoram, I had apprehensions regarding security and food, as the area is

known for militant activity and since some items usual in the diet of the locals are 'alien' for people from the rest of India. Most of my worries disappeared when I saw the beautiful landscape through the window of the plane, which landed on a tiny airstrip in the hilly area far from the capital city of Aizawl (pronounced as Aizol). The 'first lesson' one learns in *Mizo English* (most of the Mizos now converse in English) is to pronounce any a+w as o! After meeting Prof. Lalthanzara (*aka* Zara) and his research student Lalawmawia Sailo (*aka* Moya) at the University Pachhunga College in Aizawl, all my remaining fears disappeared. The entire itinerary was in place, and I was introduced to an agile young man, Sawmtea (*aka* Somtya, remember the first lesson!), a hunter turned multi-tasking field assistant in the college. He had some wonderful images of birds, often the result of his hunting skills, and good training of using a digital SLR camera!

The next morning, my journey into the beautiful landscape started – the frame seemed beautiful in any direction I aimed my camera at! In Mizoram, every house has its own rain harvesting set-up, and each village has arrangements to tap the natural streams for drinking water in summer. The breakfast was *chana* with *puri*, and the lunch had the staple dose of rice along with a variety of dishes like cabbage, potatoes, various leafy vegetables, chicken, fish, pork, and sometimes even dog-meat (!) to choose from. Water was never served on the dining table, and everybody would get a spoon to sip soup from any of the bowls served in the buffet of dishes.



There is no dearth of breathtaking sights when travelling in Mizoram

My field work included bird surveys of two Important Bird Areas, namely Lengteng Wildlife Sanctuary and Phawngpui National Park. Covering the distance of 200 kilometres from Aizawl to Kawlhem (read Kolbem) village on the fringe of Lengteng WLS took an entire day due to the bad roads. And, the route was full of birding opportunities. We stopped at every blooming Silk Cotton *Bombax* spp. tree to click and identify the birds that had gathered to feast on the nectar, and at every river to check on waterbirds, or to be more specific, riverine birds.

At one such Silk Cotton tree, we saw two small animals effortlessly moving on the branches to the flowers, probably to feed on the nectar. Soon, we realised that they were Yellow-throated Martens *Martes flavigula*, a mongoose-like small mammal that climbs trees, and a squirrel. We could get record shots of their behaviour. Two Jungle Crow *Corvus macrorhynchos* tried to mob them, but the martens continued feeding unperturbed. Our checks on the rivers got us a River Lapwing *Vanellus duvaucelii*, now a threatened species and a Plumbeous Water-Redstart *Rhyacornis fuliginosa*, besides three species of forktails.

The Black-backed Forktails *Enicurus immaculatus* merrily played on the hilly roads, just like the wagtails that one sees in the plains. Before we reached Kawlhem, we already had recorded more than 40 species of feathered beauties. In the evenings, we could hear the Mountain Scops-owl *Otus spilocephalus* continuously calling through the valleys. The

forest guest house at Kawlhem was located at the highest point in the village. I got a breathtaking view of the mountain ranges and the villages in Myanmar at the horizon from here. Near to the guest house was a domesticated female Indian Gaur, tied to a pole and nurturing her calf!

The next three days were full of adventurous treks through the beautiful valleys of Lengteng. The valley was reverberating with a variety of bird calls of different species, but it was beyond me to identify these, as I was a novice to this part of India. Beautiful birds like the laughingthrushes, scimitar-babblers, yuhinas, fulvettas, and minlas were all around. Many species of the cryptic leaf-warblers were encountered. My diary would mostly have notes like “unidentified leaf-warbler, with or without tertial spots, yellow eyebrow, and photo taken”. We would leave it for the evening to solve these brown-yellow puzzles, where we would indulge in the hair-splitting business of attempting to identify them. I sensed that these would be mostly identified by the birding fraternity on internet! Along the road around Lengteng Wildlife Sanctuary, we saw coveys of Mountain Bamboo-Partridge *Bambusicola fytchii* searching the roadside leaf-litter for insects. During the birding trips, we enquired from every hunter carrying a gun and every young boy with a slingshot on what they had bagged, but the answer was mostly in the negative!

Watching and surveying birds in an evergreen and hilly forest is always challenging and more-so in Northeast India! The



The Himalayan Black Bulbul (left) and Black-crested Bulbul (right) are fond of figs. In Mizoram, sometimes eight species of bulbuls can be seen congregating on a fig-studded ficus tree

number of species one can see is less than the number of species that one can hear due to the dense vegetation. The valleys were so full of bird calls of myriad and varied frequencies that I could only attempt to guess a few of them. The most prominent calls/songs were of the barbets, sunbirds, besides the chuckles and laughter of the laughing thrushes. The occasional whistle from up the sky was often the work of a Crested Serpent-Eagle *Spilornis cheela*. The nights would generally be filled with calls of the Mountain Scops-Owl. On early mornings, I could hear the call of the Large Hawk-Cuckoo *Hierococcyx sparverioides*. Waiting with camouflaged clothes near a bush is no guarantee that you will get a few seconds of *darshan* of these birds. However, one gets rewarded occasionally with sightings of lesser known skulking species that keep mostly to the cover of the dense forest floor or canopy vegetation.

Photographing skulking birds like the wren-babblers, scimitar-babblers, tit-babblers, fulvettas, and minlas are challenging and test your patience and the capacities of your equipment. In our case, the colourful Himalayan Cutia *Cutia nipalensis*, Mountain Tailorbird *Phyllergates cuculatus* and Yellow-bellied Prinia *Prinia flaviventris* tested my mental strength. The sightings of colourful species like the Scarlet Minivet *Pericrocotus speciosus* and Grey-chinned Minivets *P. solaris*, Scarlet Finch *Haematospiza sipahi*, Kaleej Pheasant *Lophura leucomelanos*, thrushes and the tiny sunbirds gave me experiences to cherish that will remain for a long time! I also frequently sighted the Grey Sibia *Malacias gracilis*, an endemic species of the Eastern Himalaya.



Occurrence of the Green Peafowl from India has always been questioned, not anymore!

Sometimes, it pays to wait near some 'attractants' for birds. My favourites were the flowering trees of Silk Cotton along the roads and the fruiting fig trees in the forest. These brought out a diversity of nectarivorous and frugivorous birds that would be mostly hidden in the forest. Such waits at a fig-laden tree resulted in the sighting of eight species of bulbuls, besides ten other colourful species in an hour!

In the high reaches of Lengteng Wildlife Sanctuary, there were many 'lifers' for me like the Spot-breasted Parrotbill *Paradoxornis guttaticollis*, Great Pied Hornbill *Buceros bicornis*, Bay Woodpecker *Blythipicus pyrrhotis*, Yellow-bellied Fantail *Chelidorhynch hypoxantha*, Golden Babbler *Cyanoderma chrysaea*, Manipur Treecreeper *Certhia manipurensis*, Himalayan Red-flanked Bush-Robin *Tarsiger rufilatus*, Orange-gorgeted Flycatcher *Ficedula strophilata* and Slaty-backed Flycatcher *F. sordida*, and others like Grey Treepie *Dendrocitta formosae*, Black-throated Tit *Aegithalos concinnus*, woodpeckers, nuthatches, bulbuls, and many more.

Most of the Phawngpui (Blue Mountain) National Park is covered with subtropical broadleaf and tropical evergreen forest. At the top (2,157 m), there is a beautiful patch of montane grassland, the area is known as Farpark. While surveying up towards the peak, we recorded the Fire-breasted Flowerpecker *Dicaeum ignipectus*, Lesser Racket-tailed Drongo *Dicrurus remifer*, Common Hill-Myna *Gracula religiosa*, Large Hawk-Cuckoo, Chestnut-bellied Rock-Thrush *Monticola rufiventris*, Orange-bellied Leafbird *Chloropsis hardwickii*,



The Pin-striped Tit-Babbler is a great skulker and difficult to photograph. It loves feeding on ants



The elusive Clouded Leopard is a master in the art of camouflage. It is difficult to see this big cat as it hunts mostly during the nights

Golden-throated Barbet *Megalaima franklinii*, Blue-fronted Redstart *Phoenicurus frontalis*, Grey-winged Blackbird *Turdus boulboul* and Emerald Dove *Chalcophaps indica*, among others. The Streaked Spiderhunter *Arachnothera magna* was seen in almost every wild banana grove, and Little Buntings *Emberiza pusilla* were along the roads, wherever short grassy patches were present. I spent around two weeks exploring the birdlife of the jungles of Mizoram and was enchanted by the scenery and the birdlife, adding many lifers to my checklist.

Travelling in the hills has its own charm, as anything can spring up from any side. I was lucky to see many species of birds, besides the smaller felines and other mammals. In one incidence like that of the Yellow-throated Marten, was a sighting of a Slow Loris on a treetop in a valley near the Phawngpui National Park! Though it was on a tree-top, it was below our eye level from the road we were travelling on, which made it easy to observe. It looked like a fur ball in the tree.

The tribals in Mizoram have known the need for conservation since ages. They have been conserving the rivers and communities have declared many rivers as sacred, and where fishing is banned. A visit to Tuipui village and the

Tuipui river in Lunglei district was an exciting experience, as the river was full of large, 'tame' fish. However, all is not rosy in the state. As in the other north-eastern states of India, hunting of wildlife is very common in Mizoram, though the people are in general aware of the ban on it. Clearing of forest patches for *jhum* cultivation and selective logging of old trees for construction activities are major causes of concern. The local concept of conservation of rivers needs to be more accommodative to include conservation of forests with the flora and fauna, as forests are the mothers of rivers. Education through schools and churches can help in broadening the concept of conservation beyond rivers. Promoting bird and wildlife tourism can create hundreds of jobs for the local youth as the forests remain unexplored. This will also help in changing the mindset of the local people towards conservation of forests. ■



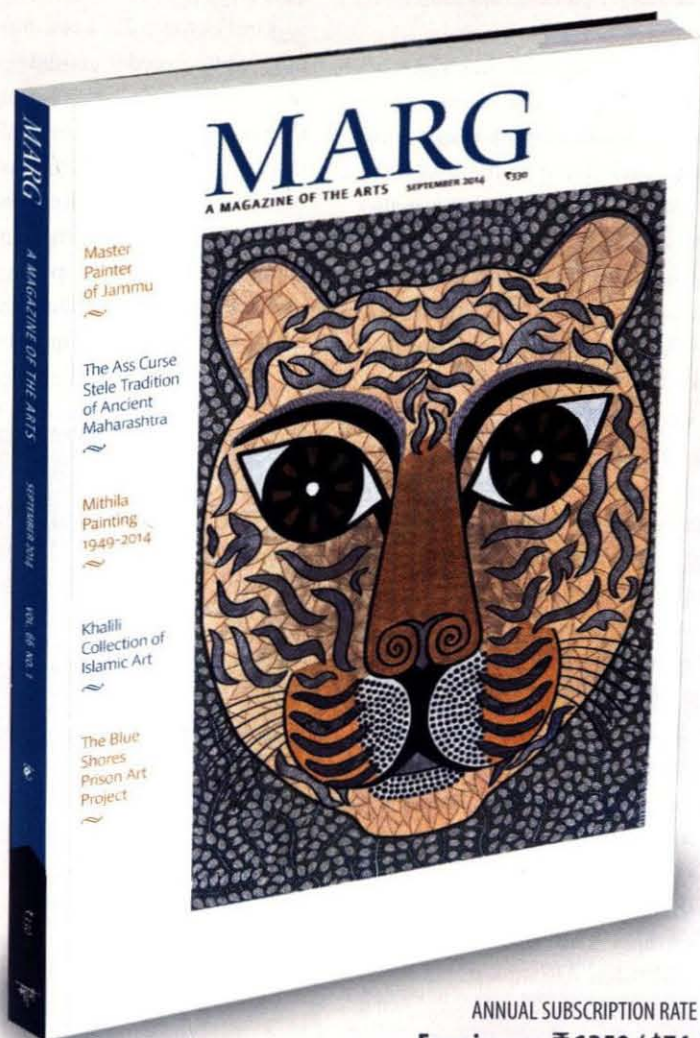
Raju Kasambe is an ornithologist and works as the Project Manager of the Important Bird and Biodiversity Area Programme at BNHS.

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Giant Redeye in Mumbai

Here is a story of the skipper Giant Redeye that Mumbai's butterfly enthusiasts would be ready to die for to have a sighting, which I was fortunate enough to watch emerge at my residence!

I live in a suburb of Mumbai, my housing society being situated exactly opposite the Western Express Highway at Malad. On February 11, 2013, I was on my normal evening walk, and stopped to admire some potted, Areca palms. Then I noticed a pure white creature with red spots, tying itself in tiny white strings onto the leaflets of the palm. What was it I thought, could it be a caterpillar? I had seen caterpillars of moths and butterflies, but had never come across something like this.

That reminded me of Mohit, a 6–7 year old child, who had once come to me holding a palm leaf along with a caterpillar saying *Ye le lo, aur mujhe butterfly banaake de do!* (Take this, make a butterfly and give it to me!). We had laughed – it was the Palm Bob Skipper. Though it was also on a palm leaflet, the appearance of the caterpillar was totally different and not 'scary' like this one. This had a few ochreous dorsal spots and marks, along with white thread-like strings spread around. As it grew, it looked increasingly scary to the extent that I was totally hesitant to touch it.



One day, I saw that it had covered itself fully in a roll of leaflet and it was not eating anymore. I watched it for two more days, and when it pupated, I took it home on February 17.

On February 22, I saw some movement in the roll and pure white powder started spreading all over. I went on observing it for a long time, and on loosening the roll, saw the pupa turning into a butterfly. But which butterfly could this be – a skipper – which one? I went on guessing, but never thought of Giant Redeye! In the morning, on checking, I got a surprise on seeing that it was the Giant Redeye! A species that was rare to spot in Mumbai had 'emerged' from my residence! I was thrilled with the experience and wish to share this with *Hornbill* readers. ■

Rekha Shahane, Maharashtra

Sálím Ali, you missed this one!

On March 29, 2014, returning from a float on the Ken river (Madhya Pradesh) at dusk, we spotted a heron sitting on a small midstream rock, happily picking off the water-skating beetles that surrounded it. My first thought was Little Green Heron (I'm of an age to still think in old 'Salim Ali names') i.e. Striated Heron *Butorides striatus*, but I was surprised to notice it had distinctly bright reddish-orange legs which made me head for the bird books on returning home.

Doubts crept in as the only books to hand, including Sálím Ali, Grimmett and Inskipps (both their Pocket Guide and the Helm Field Guide) and Kazmierczak's field guide, showed images of the bird with yellow or yellowish-green legs and descriptions that described it so also. The biggest surprise was to find no mention even in the Sálím Ali/Ripley Handbook of anything other than "yellowish leaf-green" legs. Sálím Ali is of course the guru for all of us and to date, no matter how weird and new a sighting of bird behaviour we have had, we would find that he had already recorded it.

Seems I had finally found an exception to this 'rule'. So I went to the internet – and found some red-legged Striated Heron images from other parts of the world, but not India – a subspecies characteristic, I wondered. But then with the help of more expert ornithological friends – with better access to



libraries – (thank you Dr. Asad Rahmani and Bikram Grewal) I found confirmation that it was a Striated Heron and also that the legs are recorded as changing colour during the breeding season. Since Sálím Ali records the breeding season as March to September, this would fit.

James Hancock and Sir Hugh Elliot seem to be the first to mention this in their *The Herons of the World* published in 1974 "... legs yellowish in immatures, more dusky or greenish yellow in adults, and bright yellow, orange or reddish in the nuptial phase." (London Editions Pp. 178–183). In *The Herons Handbook* published with James Kushlan in 1984, Hancock writes: "during courtship, the bill becomes glossy black, the lores deep blue-black, the iris deep orange, and the legs bright orangish red." (London Editions, Pp. 172–179). Some of the other courtship characteristics mentioned were not apparent (see photo) but the red legs did fit nicely. More recently (2005), Pamela Rasmussen and John C. Anderton

give this information in the second edition of their *Birds of South Asia – the Ripley Guide*, writing for the Striated Heron that it is “a small (*Ixobrychus*-sized) grey heron with mostly dark bill and short heavy yellowish legs... bare facial skin yellowish and legs turn orange to reddish in breeding season.”

Whether this is always the case and earlier ornithologists merely failed to record it (red/green colour blindness sufferers?) or whether it only occurs occasionally is something we can all contribute to answering. My photos show that at least in Madhya Pradesh on the Ken river, this can happen.

As a little postscript – I think perhaps Sálím Ali may have been less than enamoured of these small herons as he also fails to note an extremely interesting habit of this bird. It is well recorded (in literature and on Youtube!) that the Striated Heron sometimes uses bait for fishing. The bait may be a bit of bread stolen from a human fisherman, an insect or even a bit of twig. The bird will float it on the water (sometimes many times) to attract an appropriate-sized fish that it will then grab. Yet another non-human tool user! ■

Joanna Van Gruisen, *Madhya Pradesh*

Sunbirds in my balcony!

Last year when I returned from Delhi after a holiday, I saw a structure hanging from my clothesline in the balcony. It was made up of some pieces of polythene strips, threads, tattered cotton, and also twigs and dry leaves. It did not have a proper shape. I opened the window to get a better view to understand what it was. I had barely been there for a minute when two little birds, hardly 8 or 10 cm in size, started tweeting ceaselessly, sitting on the other side of the railing. It did not take me much time to understand that these were the ones trying to make their nest. I quietly closed the window and drew the curtains, and then my fixation for the next 45 days began!

Every morning, afternoon and till late in the evening, I would sit next to the window and watch the sunbird

couple making hundreds of trips, and bringing a variety of materials to build their nest. Hiding behind the curtain and keeping just enough parting for the camera lens, I took pictures and videos of the happenings. I saw the nest taking shape, and when complete, found the mother sitting inside, presumably waiting for the eggs to hatch. She sat there day and night, going out once in a while for her feed. When the mother went out, the father would stand guard. When the mother returned the father would go away. Then one day, I found the mother was making repeated trips again and this time returned with some worms in her beak. She would feed the eager chicks, not visible yet and go back to fetch more. The father too took active part in the feeding.

One day I found the chicks impatient. Probably, they were growing fast and needed more and more food, which the parent found difficult to cope with. Pushing each other, they tried to come out of the nest. One morning when I went near the window I found the father peeping into the nest but finding no one he flew away. The chicks were gone, which saddened me – what happened?

I do not have a very advanced camera, and did not open the glass shutters of the windows to not disturb the birds, so the results are not of good quality, especially since I took the pictures against the light, many are just silhouettes. But I felt like sharing my delightful experience, so it is. ■

Bandana Bagchi
Madhya Pradesh



ABOUT THE POSTER

KEDAR BHIDE

Theobald's Toad-headed Agama *Phrynocephalus theobaldi*

Theobald's Toad-headed Agama *Phrynocephalus theobaldi*, popularly called the Snow Lizard, is probably the only reptile found beyond 4,500 m above msl. A small viviparous agamid, it is found in large numbers around high altitude lakes of Ladakh during summers. It is active during the summer months (June–August), and hibernates during the rest of the year. Its viviparous nature helps in completing breeding in such a short

(2 to 3 months) activity period.

This terrestrial, 2 to 3.5 inch long lizard inhabits temperate deserts and montane grassland and shrubland. It is distributed from Xinjiang and Tibet to Nepal, and Jammu and Kashmir in India. *P. theobaldi* has been assessed as Least Concern because it has a large distribution and is not being impacted by any major threats.

The typical toad-headed agama strategy is to 'sit and wait' while hunting for food. You will find them on rocks around high altitude lakes waiting for insects. Their role in these specific ecological niche has not been studied yet, and not much is known about their life cycle in these cold deserts of the high altitude. If you visit the lakes in Ladakh, don't forget to look for these amazing reptiles.

The individual in this image was photographed on the banks of Tso-Moriri lake in the Ladakh region. Though a detailed taxonomic study was not undertaken, and the systematics of toad-headed agamas are quite complicated, morphological characters and distribution supports our identification of *Phrynocephalus theobaldi*. ■

Theobald's Toad-headed Agama
Phrynocephalus theobaldi



Biodiversity of Castle Rock – A Seasonal Journey

Text and Photographs: **Deepak P. Deshpande**

I have been visiting a farm near Castle Rock in Western Ghats, North Karnataka (now part of Dandeli – Anshi Tiger Reserve), almost every weekend for more than a year. Castle Rock is in the Goa Gap, where much of the transformation in biodiversity between the northern and southern Western Ghats takes place. No one knows how Castle Rock got its name as there is neither a castle nor a significant rock in this area. It used to be a check post for customs checks and verification of travel documents for travellers between Portuguese-ruled Goa into British-India; vestiges of these structures still exist. My aim for visiting the site was to identify and document photographically the fauna, both large and small. During these visits, I came across a large variety of life forms new to me and gathered knowledge about them from the internet and books. This feature depicts some of the interesting life forms, especially the smaller creatures of Castle Rock. In my experience many of these smaller life forms seen were in significant numbers for one week, only to disappear in the coming weeks and to be seen again only the next year during the same period.



Reddish Burrowing Frog: Endemic, locally common in Western Ghats in semi-evergreen forest. Remains underground to keep moist in the hot season. Emerges briefly during monsoon to breed. Has well-developed structures on hindlegs for digging to burrow into the soil.

The larvae and adults produce yellow/green cold light from the lower abdomen through bioluminescence.



Swamp Eel: Lives in the hill streams of the Western Ghats and found 'migrating' on land on rainy nights. It breathes air through the vascularised lining of the mouth. The body is smooth and scaleless, tail flat, eyes rudimentary, and gills reduced to pore. Swamp eel is often mistaken for a caecilian (a limbless, snake-like amphibian), snake or earthworm, but for the gills, smooth unsegmented and scaleless body, and laterally compressed tail.



Wolf Spider: Wolf spiders are robust, agile hunters with excellent eyesight and sense of touch. They live in the forest litter. The spiderlings after emerging from their silk case climb up the mother's legs onto her abdomen and remain there for 7–8 days.



Assassin Bug: The assassin bugs of the family Reduviidae are unusual among the Hemiptera because almost all are terrestrial ambush predators. The photograph is of a nymph. In some species, the nymphs cover and camouflage themselves with debris or remains of dead prey insects.



Indian Leaf-nosed Bat: A colonial species, it roosts in small to very large colonies in forest caves, old disused tunnels, old temples, and cellars under old buildings during the day. This species breeds once a year and gives birth to a single young after a gestation period of 260 days.



Tephritoid Flies: Commonly known as fruit flies, these small to medium sized (2.5–10 mm), often colourful flies, usually have pictured wings. The adults are often found on the host plant feeding on pollen, nectar, rotting plant debris or honeydew.



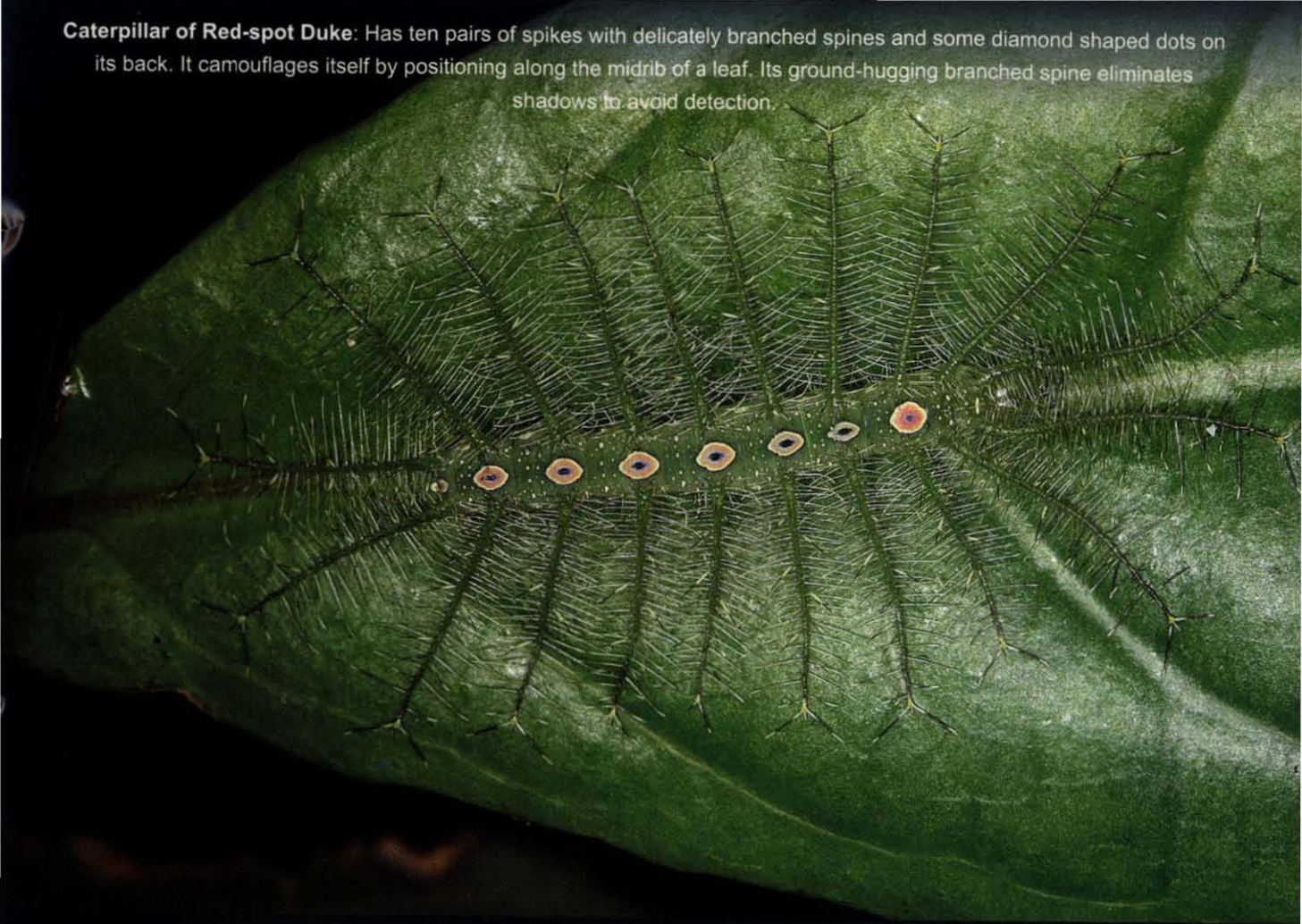
Velvet-fronted Nuthatch: A small, noisy, passerine bird found in open evergreen forests. It actively feeds on insects and spiders along tree trunks and branches. Unlike woodpeckers, it can climb down a tree trunk. Nests in tree-holes.



***Phyllochoreia* sp.:** Endemic to Western Ghats and Sri Lanka. Its head rises above the thorax, and the antennae are short. Lacks abdominal tympani (hearing organs). A good example of camouflage, it resembles a green leaf.



Caterpillar of Red-spot Duke: Has ten pairs of spikes with delicately branched spines and some diamond shaped dots on its back. It camouflages itself by positioning along the midrib of a leaf. Its ground-hugging branched spine eliminates shadows to avoid detection.



Crab Spider: The crab gets its name from its crab-like appearance and gait. It waits inside flowers, on fruit or leaves, and bark to ambush visiting insects. It uses its powerful front legs to catch the prey and extremely potent venom to paralyze it.



Deepak P. Deshpande is a doctor by profession with great interest in wildlife photography, especially of the lesser life forms.

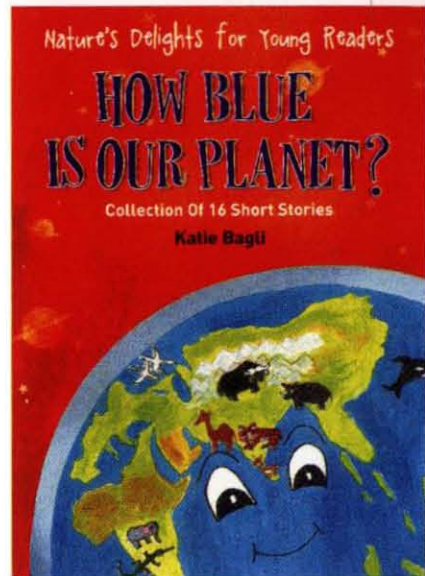


Reviewed by: **Atul Sathe**

This is the sixth book in the series written by Katie Bagli, depicting the marvels of nature, with children as the target audience. The book titled *HOW BLUE IS OUR PLANET?* is a collection of 16 short stories that are indeed a delight to read. The foreword by Bittu Sahgal starts on an intriguing note that the level of salinity in the sea and in the blood of humans is the same, which in a way highlights our connection with the sea and the earth, through the evolutionary process. In this context, it is worthwhile to note that this connection is being lost because although modern humans have evolved to invent superior technology, the discretion required in using it has faded away, with time.

The various stories with their myriad human and animal characters portray a range of pressing environmental issues, including forest destruction by dams, need for topsoil cover, rising sea levels, tiger habitat loss, vulture conservation, agricultural crises, and wild animals in captivity. Characters such as Tashi – the Tibetan lad, Gabbu – the boy from a forest village, Padmini – the tigress, Nanuk – the Polar Bear, Jillian – the foreign tourist, and Dumbo and Rumbo – the elephant calves, will linger in the imagination of young readers for some time. The conversation format used in several places makes it more dramatic. Diverse habitats, such as the polar ice caps, limestone caverns, grasslands, tropical forests, mangroves, mountains, croplands, deserts, and islands have been covered. The best part is that these issues are explained in a lively manner with a focus on positivity. Otherwise, discussion of environment normally tends to create negative vibes.

The “Interesting Tidbits” that are scattered across the book add spice to the storyline. However, except for the story on cloud forests, with Choden – the monk, the book misses out on highlighting traditional wisdom, such as organic farming, sacred groves, and



How Blue Is Our Planet?

by Katie Bagli

Published by: Shree Book Centre, Mumbai, 2014.

Size: 23.5 x 17 cm

Pages: 102

Price: Rs. 225/-

Paperback

an inherently sustainable way of life, which would be very useful in tackling the environmental problems mentioned. Nevertheless, the book will succeed in revealing to the young readers the beauty and divinity that exists in the natural world.

The cover of the book is a bright orange, blue and green, and will surely attract attention of the young and old alike. However, the sketch on the cover, depicting the distribution of animals, could have been better, on the lines of some of the wonderful sketches inside. Overall, the book doubles up as a work of infotainment and an eye opener for students, parents, teachers, and all those who wish to take a quick tour of the amazing world of nature, away from their mundane and tiring schedules. ■

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SUNIL SINGHAL

The temple Leopards of Perawa

Text: **Rakesh Vyas**

It was a very cold December night, and an inky darkness enveloped the hillock off Perawa village, Falna, Pali district, Rajasthan, where we have gone to see the famous leopard family that congenially shared their living space with villagers. As we had passed the sleepy village with the moon on the horizon, we could make out the outline of the hillock with the temple at its top. The area is enclosed with a barbed wire fence, and a locked gate stops any interloper from entering the leopard family's domain in the night.

We were guided and advised by Laxman Parangi, a local conservationist, that we stay there for the night so as to see the leopard family returning after its night out. We were to reach there well before sunrise and take up a suitable watching spot at a safe distance from the hillock. The hillocks in the area are mostly made

up of huge granite boulders devoid of vegetation or with scant growth of shrubs and trees. Sunrise was expected to be around 7:10, so we reached Perawa at quarter to seven. It was still dark but a local guard opened the gate and took us to a spot close to the inner boundary. Mohabbat Singh, the Forester responsible for the Eco-tourism Panther Conservation Plan, arrived at the break of dawn, and after pleasantries, took up a position beside us.

We began to converse sotto-voce so as to not disturb the leopards that were expected to arrive. With each passing minute, Mohabbat Singh was getting anxious and eagerly looked in the direction of a huge fractured granite boulder lying below the temple. He informed that the leopards have always been present in the hills of this area, and the locals had presumed that they would be of common

occurrence elsewhere. Gradually, the area got noticed by the local conservationists and the wildlife department, who decided to develop it as a conservation reserve. The hillock of Perawa with the adjoining grassland was chosen as the site to implement the Panther Conservation Plan by the Forest Department, under the able leadership of Dr. Satish Sharma, A.C.F., Udaipur Wildlife Division. A 50 hectare *Beel Jod* (grassland) was selected for reintroduction of Chinkara to replenish the prey base of the leopards. Presently, 15 Chinkaras have been introduced, and there is a plan to bring in more animals.

Soon, there appeared a cub from behind a rock, and Sunil Singhal finally got to click the images of the temple leopards of Perawa. The first cub was followed by another, and having sensed our presence, the first cub sat down and

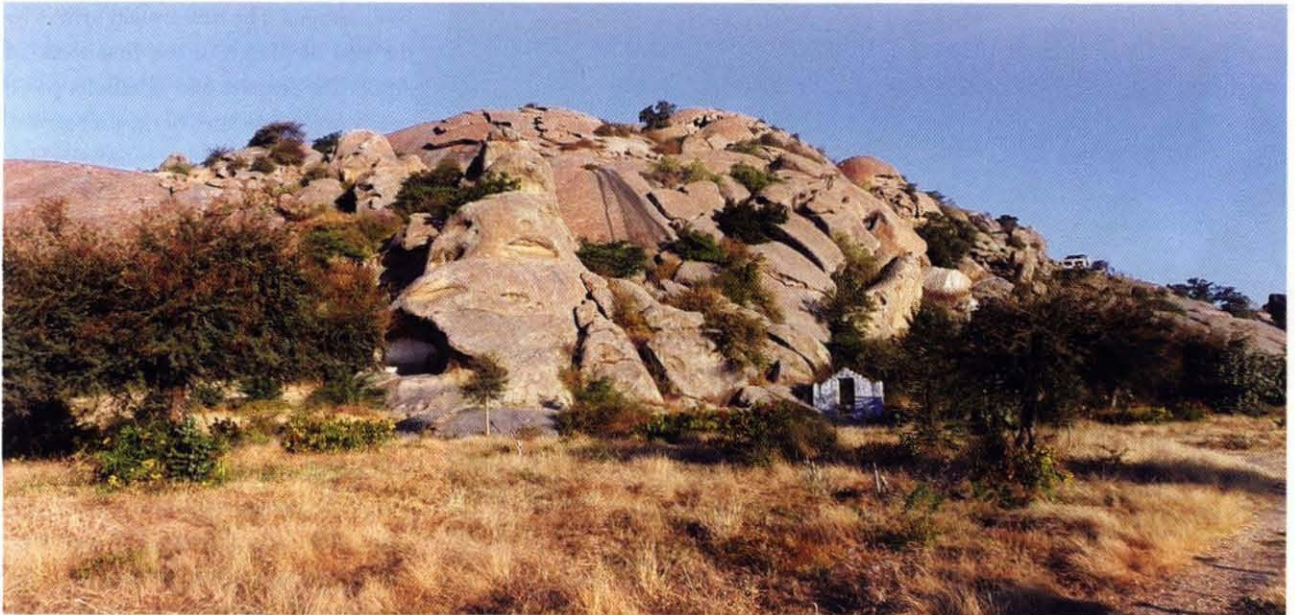
nervously glanced back to check the assuring presence of the mother. The mother followed and the cubs returned to her assuring proximity, and as if on a cue, they walked towards their shelter of the steps leading to the temple. The third cub trudged behind the mother. We were overjoyed. Mohabbat Singh explained their daily ritual and informed that the male was yet to come. He said that the male would come, pause at the stairs, and then take the steps to go to his cave – which was exactly what happened! The morning's leopard watch was over in

An old gentleman told us that he has been seeing leopards at Perawa and in the surrounding areas since he was a child. The village cattle graze in the same grasslands where the leopards prowl in the night and the devotees take the same stairs to the temple every day and in large numbers on certain festival days, but no major conflict has been reported except the disappearance of an occasional sheep or goat, which the villagers take in their stride. The village dogs disappear regularly, but no one is complaining!

We later prepared ourselves for the

leopards would arrive, and with time, the male was seen at the top of the hill. In his enthusiasm, a local clapped to draw our attention, which disturbed it and he disappeared behind the rocks. We were deeply disappointed, and admonished him, prompting him to leave the scene red-faced.

With dusk falling, we lost hope and even the locals left us alone to attend to their evening rituals. Disappointed, we started packing to leave, but the son of the guard arrived, saying that he had seen the mother and the cubs on the slope



Leopards share their space with the villagers of Perawa

about 20 minutes, but we were overwhelmed by the experience. We were told that there were two subadults from the last litter, who still lived in the vicinity, but were not allowed close proximity to the family by the adult male. The estimated number of Leopards in the area is between 35–50, living in the hills and hunting in a large area spread across the foothills near the villages of Devgiri, Kotar, Liloda, Pola, Syana, Balbana, Bali Raja ki Dhuni, Malan, and Kalambesarji.

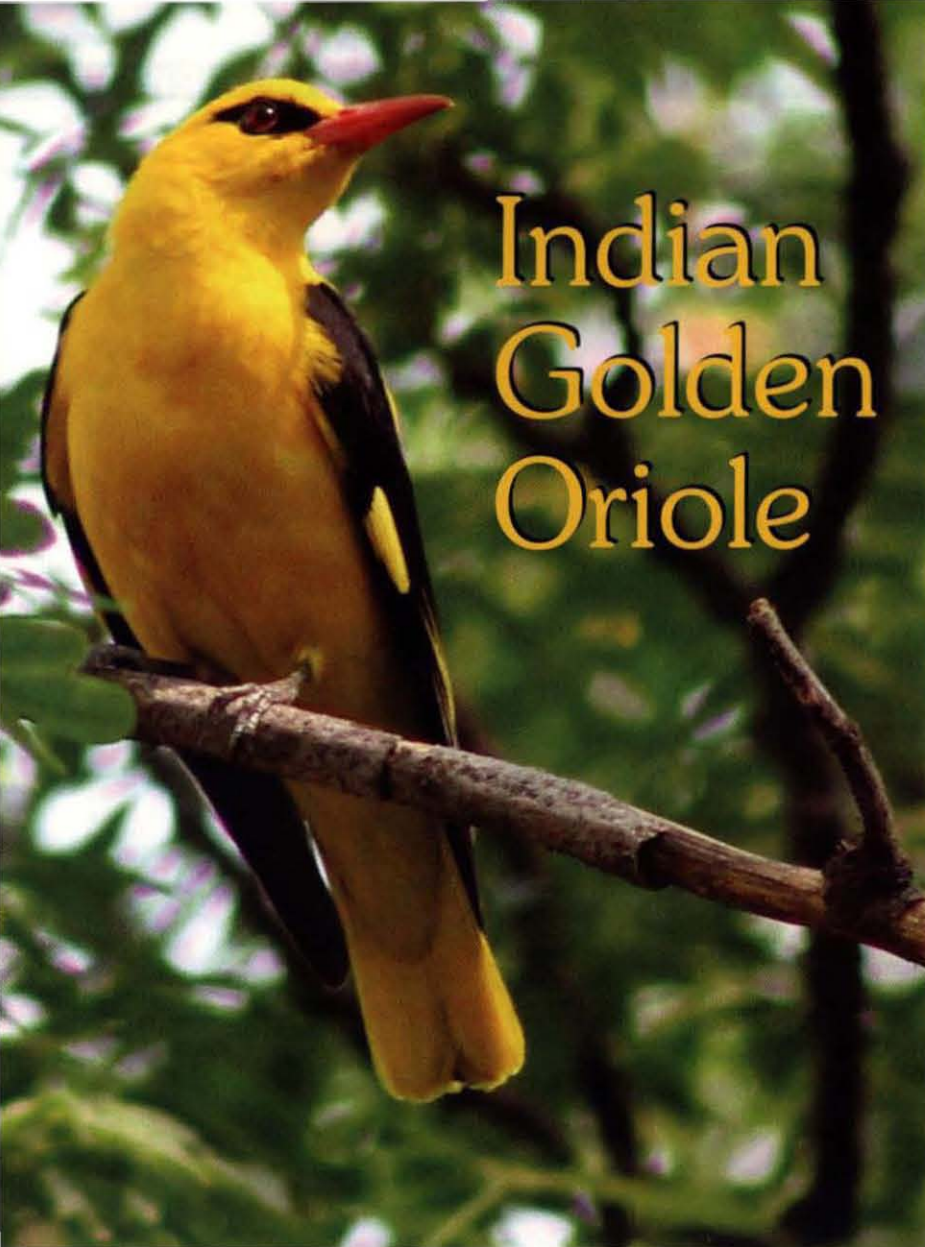
It is amazing how the villagers and leopards have coexisted without any untoward incidence for so many years.

'evening show'. We reached the scene at four in the evening. Passers-by stop over in the hope to get to see the leopards, which are the local celebrities of the area. Today, there are no devotees at the temple as the resident *mabant* has gone to Falna. A man arrives with his son looking for their cattle, which have ventured in the grassland at the base of the hillock. On being cautioned by us, they smile and say that the *Seetaro* (the local name for the leopard) would not harm them and proceed to lead their cattle home. The sun began to set behind a hill in the west; we got anxious but the locals were certain that

near the temple. With our binoculars, we saw the mother sitting contentedly, while the cubs played, jostled, and shadow-attacked each other. The light was not good enough for photography, but what we saw has been etched on the hard drives of our minds! Long live the temple leopards of Perawa, and to the people for understanding their needs and coexisting with them in harmony. ■



Rakesh Vyas has been active in the field of avian research and conservation for over three decades.



Indian Golden Oriole

Text and Photographs:
Surya Prakash

The Indian Golden Oriole *Oriolus kundu* was earlier treated as a race of Eurasian Golden Oriole *O. oriolus*. It differs from the latter – which is a vagrant to India – mainly in that the black eye-streak extends well behind the eye and the bill being relatively longer. The Indian Golden Oriole (IGO) is distributed in suitable habitats comprising of woodland, deciduous forests, orchards, and parks almost throughout the Indian subcontinent except for the arid NW, NE hill states and Bangladesh. It breeds in north and

central India, and is a migrant in the Peninsula.

The IGO male has a spectacular yellow plumage with largely black wings and tail, and sports a red bill. The female is dull yellow and drabber, with streaks on the breast. The juvenile is whitish below with blackish streaks, and has a blackish bill. In spite of the male's incredibly striking golden plumage, it remains well-camouflaged within the tree canopy and dense foliage and only gets noticed when it calls, either the flute-like, whistling *pe-lo* or *pee-lo-lo*, or the more commonly heard, harsh *chee-ab*. The sharp, stout bill is highly effective at plucking insects or berries from the vegetation and for occasionally tearing flesh off other small animal prey.

I have carried out studies on the IGO for six years (2007–2013) in New Delhi at Jawaharlal Nehru University (JNU), Hauz Khas Lake, Okhla Bird Park, Shankar Vihar, and Sanjay Van. In this article, I wish to share some of the more interesting observations I had on the species with *Hornbill* readers.

Status and Seasonality

The IGO migrate to Delhi to breed during summer and stay usually till September, but there are reports of sightings of birds till November and December in Okhla Bird Park and in the JNU campus. The male usually arrives by the end of March or the first week of April. The females and subadults come nearly two weeks later. Soon after arrival, the males establish their territories, which in most cases are the ones used during the previous year.

Song and Courtship

The song of IGO is distinctive and melodious. It is a loud, clear and far-carrying song like a flute's yodelling whistles uttered in variable short phrases. This is generally regarded as the 'full song', the territorial-courtship song. Hearing it can make anyone awestruck. The territorial-courtship song of the male can be easily differentiated from its sub-song, which is a continuous warbling, chattering and twittering medley of tunes, at times whining or of a more raucous quality. Both the sexes sing, but female has reduced repertoires of song phrases of low pitch and intensity.

Along with calling, the male also engages in spectacular courtship displays, in which it spreads its tail feathers like a fan and opens-up the wings like a cormorant drying its wings (after a dip in water). It sings different melodies like a sparrow and proposes to the female by bowing its head. During courtship, the pair hops from one branch of a tree to another for some time, and after being

satisfied that he would make an able mate, the female gives her final acceptance. She then allows him to mate by bending down in a mating posture, and they utter a typical call during the mating ritual.

Nesting and Parental Care

On completion of mating, the female starts nest building on a forked branch of a tree that is completely concealed in the foliage. Inexperienced birds sometimes make nests on exposed branches with a wrong orientation but their chicks hardly survive as they are vulnerable to predators and direct sunlight. The female constructs an impressive hammock-like nest, which is woven from grasses and other plant products, sometimes even thread and plastic strips. Interestingly, the orientation of nests of all the experienced IGO was in the north-east direction, and this direction preference is also reported in the Eurasian Golden Oriole. The exact reason behind this selection remains unclear, but is suggestive of protection of chicks from dehydration during the day when the sun is overhead. The male does not help much in nest building, but he escorts the female every time she goes to fetch nest material. The nest is a neat and cup-shaped structure, where she lays 3–5 pinkish-white eggs that have brown spots. The major part of incubation is done by the female, the male incubates, but for shorter durations. Incubation is for 16–18 days.

I recorded both the parents attending to the chicks while they hatched, the female picking up the egg shell in her beak and thus helping them to come out of the shell, and later, throwing the shell out of the nest (video of happening available with me). The parents are very protective of their nestlings and can go to extremes to save them. The main predators were crows, shikras, Oriental Honey-Buzzards,



A young female Indian Golden Oriole

Black Kite, Asian Koel, Pied Crested Cuckoo, snakes, and the Common Palm-Civet. I have seen them fighting very aggressively with all of them in defence of the chicks. In some cases, they were successful, but in most cases, they lost the battle, even risking their own lives. On many occasions, helpers (subadults and non-breeding birds) also came to the defence of the chicks and eggs of the breeding pair.

Once the chicks hatched, they were fed on a protein rich diet by their parents that included larvae and small insects. As the chicks grew, their diet was supplemented by grasshoppers, dragonflies and moths. At later stages of development, the parents provided them with figs and berries. Chicks leave the nest quite early and perch on the branch hiding in the thick foliage of leaves. The perching sites are changed quite frequently. The chicks, as they grow older, practice flight everyday to tone up their flight muscles before they can actually fly. Sometimes, the chicks fall off from the branches and these take shelter

in some hedge and bush where their parents continue to feed them, but these usually fall prey to cats and other ground animals.

Relations with other bird species

The IGO had very cordial relations with the Black Drongo, and it also made its nest on the same tree where the drongo pair nested. In fact, many other birds like Oriental White-eye, Red-vented Bulbul, and Yellow-footed Green-Pigeon also nested in the same tree! Probably, they all nested there to benefit from the drongo's presence, as it is known to be a fierce defender of its nesting area, chasing away even larger potential predators. They were very aggressive to the Asian Koel, Rufous Treepie, crows, Shikra, and Crested Pied Cuckoo.

Conservation and Concluding Remarks

The Indian Golden Oriole falls under Least Concern category of IUCN Red List, but habitat loss is a cause of concern. As for predators, during the study, I observed over a dozen nests at different places of which six chicks reached the fledging stage. Crows were the major predators, and killed and fed on the majority of the chicks (50%), with records of one kill each by Oriental Honey-Buzzard and Shikra. In one incidence witnessed, a snake reached up to the nest but could not eat it because it was scared away by the cacophony of other birds.

To end, during the six years, I 'fell in love' with these beautiful birds and am still in love with them, whose *pee-lo-lo* calls still wake me up every morning during summer in New Delhi. ■



Surya Prakash is a zoologist working in School of Life Sciences, JNU, New Delhi. He is a passionate naturalist and conservationist.



It's falling ducklings!



Unattended ducklings are looked after until they are old enough to be released in the wild

Text: Yagnesh Bhatt

Photographs: Yagnesh Bhatt
and Nidhir Bhatt

More than a decade back, I received a phone call from my friend from Dharmaj, Anand district in Gujarat, reporting of ducklings that were jumping down from a height of 7 metres and were not getting injured! This startled me, and on visiting, I saw that they were Comb (Knob-billed) Ducks' ducklings. The 25 ducklings were yellow and greenish-grey, and were moving, one following the other, in a well-disciplined line. The mother was not around, and I was told that it had flown away on the approach of a dog and had not returned. I tried to find a safe, small pond near Dharmaj to release them but was unsuccessful. I then decided to take care of them at my home and release them when they grew-up back into the lap of

mother nature. So, I raised them on bajra and rice crush and after two and a half months, I shifted them to a small pond amidst paddy fields that looked perfectly appropriate for them.

The next year I received a call from another place in the same area. This time the ducklings were seen jumping off from a cavity in the wall of an old tobacco godown belonging to Mr. Nilesh Patel. As 3–4 ducklings jumped from the cavity, their mother flew out from the cavity to join them. I was told that there were three to four ducks waiting to nest in the same cavity, which they did at different periods! Not desiring to look after a second batch of ducklings (and possibly the others to come) at my home, I with the help of others, herded the ducklings and their mother towards my town's big pond, which is about 100–120 m away. The next day, before I reached, the birds had strayed from the pond and had gone to a residential area where a mongoose had killed 5–6 ducklings. So, I transported the rest (20) of the ducklings and the mother using an airy box to a paddy farm, which appeared to be a safe habitat for them. At the farm, I kept a watch on them for two to three hours, and saw that they had found a hiding place and were foraging for food. I realised that it would be better for the survival of the ducklings if they were taken care of by their mother in the natural surroundings, and decided to follow this method for future rescues.

Besides nesting in cavities in old big trees, whose numbers are declining with the passing years, the Knob-billed Duck and also a few Lesser Whistling-Duck are now using cavities in unused, old, large houses or such structures for nesting. In case of the Lesser Whistling-Duck, nesting and rearing of young is different from that of Comb Duck. Such ducks normally keep off human habitation areas and nest near water in coconut, False Ashoka (Pendula), and Casuarina (Coast sea Oak) trees, at heights of 3–5 m. After the ducklings hatch, the parent



The ducks have occupied an old godown to rear their young



The ducklings are fed on bajra and rice crush



The adults and ducklings are shifted to a farm that gets flooded during the rain and is a safe habitat



The ducks around Dharmaj have found a safe home to rear their young

makes a peculiar loud call for gathering all the ducklings. One nested behind my medical store on the branch of a nilgiri (Eucalyptus) tree, which I used to observe regularly. When I hear the characteristic loud call, I know that the ducklings have come out from the nest, after which I guide and shift them and the parent to a nearby farm that gets flooded during the rains and is a safe habitat. Every year more than 20–25 Lesser Whistling-Duck use this pond.

My friend Nilesh has now been sheltering the nesting site in his godown for the past 12 years, and after the ducklings drop from the nest, we shift them to safe habitats in paddy fields to help them survive. Some of my friends and birdwatchers are also doing so. Orphaned birds are reared at home. In 2012, my rescued duckling numbers touched 120 (87 Knob-billed Duck and 33 Lesser Whistling-Duck), and this year, it was 103 and 47 respectively. Thus, the

faith that the birds have placed on us humans by nesting in our midst is being honoured by me and my friends, and I hope this will be adopted in other parts of India, as we have encroached on most of the areas that was their home once. ■



Yagnesh Bhatt has been rescuing injured and orphaned ducklings, and releasing them in the wild for the last 12 years.

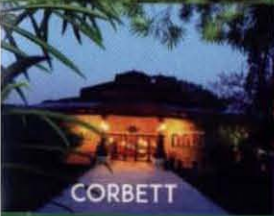
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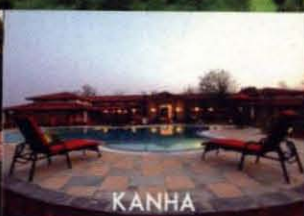
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MEADOWS OF THE SEA

Compiled by: Nishigandha Pednekar

FOR more than a century, the focus of BNHS research was almost entirely land based, except for inland wetlands and estuaries with waterfowl as the target species. The biodiversity of the seas and oceans, as such, were largely unexplored. Even the expeditions carried out to the islands of Andaman and Nicobars were to document the birds of these islands. It was only during the past decade that BNHS started its Marine Conservation Programme with its first project in Lakshadweep with funding from Darwin Initiative. The project popularly known as Project Giant Clam helped develop the giant clam species recovery plan for the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India, in 2008. Other than that BNHS has been involved in research and conservation

oriented projects on mangroves, sea-turtles, dugong, fish, and invertebrate fauna of the estuaries and coasts of India. Coastal areas explored under these projects are Great Vedaranyam Swamp, Pulicat, Sriharikota, Chilika, Gulf of Mannar, Konkan, and those of the waters off Gujarat.

Occurring in most of the coastal or maritime waters of the project sites of the BNHS is an interesting and important taxa, seagrass. Not much study has been done on seagrass, the meadows of the sea, in India. And, the level of public awareness, as reflected by the number of reports on seagrass ecosystems in the media, is far less than that for other coastal habitats, *viz.* salt marshes, mangroves, and coral reefs. In this age of developments along the coasts, global warming, and predicted rise in sea levels we need to be more aware of the seagrass

ecosystem, and compiled below is what is known about seagrass, their occurrence in India, and the threats they face. Most of the information given below has been gleaned from literature (see Suggested Reading), and the purpose of this article is to develop an interest in this taxa among readers of *Hornbill*, especially ecologists and naturalists, to undertake studies of this floral group.

What is Seagrass and where do they occur?

Seagrass are angiosperms that evolved from land plants about 70–100 million years ago, and are distributed in tropic to temperate marine environments. These unique plants flower underwater, and are different from seaweeds, which are marine algae. Just like ‘landgrass’, seagrass form vast meadows, the plants have leaves, rhizomes and roots, and produce flowers and seeds. Like all angiosperms (land plants), their flowers develop into seeds, which can travel through vast distances in water and settle on the seafloor (a few species grown on rocks).

Seagrass are distributed across the globe, but unlike other taxonomic groups with worldwide distribution, they exhibit low taxonomic diversity (approximately 60 species compared to approximately 250,000 terrestrial angiosperms). The distribution and growth of seagrass are regulated by a variety of hydrographical characteristics such as temperature, turbidity, underwater irradiance, salinity, nutrient availability, and sediment characteristics. Seagrass grow from the regularly inundated intertidal zone to a depth of 15 m in sandy, subtidal zones along coasts, and adjacent to coral reefs.

Luxurious seagrass beds are found in certain regions along India’s coast. The east coast supports a greater area and number of species than the west, mainly due to strong wave action on the continental shelf of the latter. These seagrass formations have been reported to be either in long or broken stretches, or in small to large patches. The major seagrass meadows in India occur along the southeast coast (Gulf of Mannar and Palk Bay), and a number of islands of Lakshadweep and Andaman and Nicobar.

Why is Seagrass important?

Seagrass beds play a vital role in the marine ecosystem due to their productivity level; they provide food, habitat, and nursery areas for numerous vertebrate and invertebrate species. The vast biodiversity and sensitivity to changes in water quality inherent in seagrass communities make it an important taxa to help determine the overall health of coastal ecosystems.



VISHAL BHAVE

Seagrass beds serve as nursery areas for several species



RESHMA PITALE

Clithron oualaniensis is only found in seagrass habitat



AMRUTA PRASADE

A number of molluscs species use seagrass as habitats



Halodule uninervis and *Syringodium isoetifolium*



Cymodocea serrulata can be seen in the east coast of India



Syringodium isoetifolium occurs in the east coast of India

Seagrass perform numerous functions, such as stabilising the sea bottom, providing food and habitat for other marine organisms, maintaining water quality, and supporting local economies.

Seagrass release large amounts of oxygen via photosynthesis, and this healthy oxygenated habitat provides food and shelter for many invertebrates and vertebrates to select it as a nursery ground. A number of economically important crustaceans and fish dwell in this habitat, especially during their juvenile stages, increasing the local fishery economy. Some species of animals, such as dugong, manatee, and green sea turtle feed directly on seagrass, while others get nutrients indirectly from seagrass. Others like dolphins are often found feeding on organisms that live in seagrass areas. Detritus from bacterial decomposition of dead seagrass provides food for worms, sea cucumbers, crabs, and filter feeders such as anemones and ascidians. Further, decomposition releases nutrients (such as nitrogen and phosphorus), which, when dissolved in water, are reabsorbed by seagrass and phytoplankton.

Seagrass also provide an enormous source of carbon to the detrital pool, some of which is exported to the deep sea, where it provides a critical supply of organic matter in an extremely food-limited environment. Much of the excess organic carbon produced is buried within seagrass sediments, which are hotspots for carbon sequestration in the biosphere. The structural components of seagrass leaves, rhizomes, and roots modify currents and waves, trapping and storing both sediments and nutrients, and effectively filter nutrient inputs to the coastal ocean.

Seagrass promotes sedimentation and maintenance of water quality, an important prerequisite for the health of coral reefs. Sediment establishment increases the ground area suitable for mangrove-seed germination. The mangrove cover in turn promotes sedimentation and supports seagrass beds against heavy load of sedimentation. These plants support numerous herbivore- and detritivore-based food chains, and are considered as very productive pastures of the sea.

Conservation Issues

The global distribution and abundance of seagrass has changed over evolutionary time in response to sea-level change, physical modification of coastlines, and global changes in atmospheric carbon dioxide (CO₂) concentration and water temperature. This gradual change in environmental conditions over eons of seagrass evolution is nothing much compared to the

SDMR/TUTICORIN

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SOMRIT/ICORIN

The east coast of India supports a greater area and number of species of seagrass than the west coast

rapid and drastic changes in the coastal zone in recent times due to human related pressures. In all regions, extreme climatic events like hurricanes, tsunamis, and anthropogenic activities like deforestation in the surrounding area or mangrove destruction, construction of harbours or jetties, and loading and unloading of construction material, as well as anchoring and moving of vessels, dredging and discharge of sediments, land filling and untreated sewage disposal, are just some of the major causes of seagrass destruction. Increased sediment load (another result of the above natural and anthropogenic activities) in the overlying waters of seagrass meadows, reduces the amount of ambient light, thus resulting in lower productivity due to the decline in photosynthetic processes and increased respiration. The natural threats to seagrass are sea waves, intensive grazing, and infestation of fungi and epiphytes, as well as die-back disease.

The overall effects on seagrass due to climate change and ozone layer depletion are difficult to anticipate, though some of the impact anticipated (e.g., loss of habitat due to sea level rise) are likely to be serious. Increases in water temperature would reduce the productivity and cause die-back of, especially, seagrass growing in areas already around the upper limit of their thermal tolerance. Increased temperatures may also

combine with nutrient pollution to further enhance the growth of competitive algae (i.e., seaweed and phytoplankton) – an increase in algal production can lead to reductions in sunlight and carbon that seagrass require for survival. Seagrass are highly susceptible to disturbance and will die rapidly under excessive stress, and recovery is comparatively very slow.

Sea-level rise will increase water depth restricting the amount of light reaching seagrass thereby reducing photosynthesis, productivity, and geographic distribution. Changes in tidal dynamics (e.g., water current speed, circulation flow patterns, and tidal range) could have a range of impacts including reduction in light, increased exposure of plants at low tide, and increase in water column turbidity. The increase in upriver penetration of salt water and increases in salinity levels and pulses (i.e., salinity intrusion) within estuaries is also to be expected with a rising sea level. Seagrass require specific salinities for reproduction and propagation, and shifting salinity regimes would limit the reproduction and distribution of some seagrass species and favour those that are more salt-tolerant. Increased salinities are associated with an increase in the prevalence of 'wasting disease', a highly destructive disease currently impacting eelgrass meadows in some U.S. coastal areas.



AMRUTA PRASADE

Vast meadows of *Zostera marina* can be seen at Narara, Gujarat

Some benefits may accrue (e.g., increase in seagrass growth and biomass from an increase in CO₂), as an increase in atmospheric CO₂ will cause an increase in the dissolved CO₂ concentration in seawater. This will enhance photosynthesis in many species of seagrass, but is likely to be at the expense of species with a reduced carbon-extraction capacity. This is expected to lead to shifts in species distributions. Increased CO₂ levels may also benefit the algae attached to seagrasses. An increase in algal growth would restrict light levels, and thus lead to seagrass decline.

Seagrasses are dependent on sunlight and water quality, and water clarity deterioration is a major issue that will contribute to seagrass losses. Turbidity can impede growth or even kill seagrass. Turbidity can come from sediments that are suspended in the water or from excessive phytoplankton growth. Both land-based and off-shore construction can result in sediments being carried away from the site and into the water. Phytoplankton and algal growth can be stimulated by excessive nutrients, such as fertilizer runoff from the land.

Although a high diversity and abundance of organisms live in seagrass beds, these animals are often small and cryptic. It is the large and/or dazzling organisms of coral reefs that attract the general public. The few charismatic megafauna that do inhabit seagrass meadows (dugongs, manatee, and sea turtles) are elusive and not easily viewed in the wild, and because

they are endangered by over harvesting and habitat destruction, they are not nearly as abundant as the fish and invertebrates of coral reefs. Without strong public support for seagrass and the uncharismatic but highly productive animals they shelter, conservation efforts will continue to lag behind those of other key coastal ecosystems.

The preservation of seagrass and their associated ecosystem services — in particular, biodiversity, primary and secondary production, nursery habitat, and nutrient and sediment sequestration — should be a global priority. If we take efforts to conserve seagrass ecosystems, this will benefit not just seagrasses and their associated organisms, but also the entirety of coastal ecosystems.

Suggested Reading

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Websites:

- <http://www.seagrasswatch.org/India.html>
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CORRIGENDUM

The information below should be updated in all records and databases:
 It has been brought to the attention of the Editors of *Hornbill* that the text and photographs for the article 'Vultures on the Ebb' pp. 14–18, January–March, 2014, *Hornbill*, which were credited to Mr. Nand Kishore Dimri should have been credited to Nand Kishore Dimri and Upma Manral.

Editors'

Important Bird and Biodiversity Area Programme Activities

The flagship IBA programme of BNHS, which combines the endeavours of research, conservation and public awareness, was actively involved in several initiatives in the past months. At a well-attended function in Nagpur,



THREATENED BIRDS OF MAHARASHTRA was released at Nagpur on the International Biodiversity Day

Maharashtra, on May 22, 2014, a new book of the BNHS – THREATENED BIRDS OF MAHARASHTRA – was released in the presence of several dignitaries from the Maharashtra State Biodiversity Board (MSBB), Forest Department, and Government of Maharashtra, including Dr. Dilip Singh, Director, MSBB; Shri Praveen Pardeshi, Principal Secretary, Revenue and Forest, Maharashtra, and Shri Sarjan Bhagat,

Principal Chief Conservator of Forests (Wildlife), Maharashtra. The book provides insightful information on the globally threatened bird species that are presently reported from Maharashtra. The book is an offshoot, with updates, from the earlier BNHS publication THREATENED BIRDS OF INDIA, published in 2012. The book has recommendations for the conservation of threatened species.

A team of BNHS scientists participated in the Student Conference on Conservation Science (SCCS) – 2014 in Bengaluru from September 25–28, at the Indian Institute of Science (IISc). The conference primarily focused on knowledge sharing about the science of wildlife conservation. ■



The Central Marketing Department participated at an exhibition held at the National Stock Exchange from Sept. 1–2, 2014

‘Green Wars – Dispatches from a Vanishing World’

BNHS has always promoted popular literature in the field of nature and wildlife. The book GREEN WARS – DISPATCHES FROM A VANISHING WORLD, by veteran journalist Bahar Dutt, is one such publication hosted by the BNHS on August 25, 2014. The author made an insightful presentation on the deteriorating natural environment of India, based on her own extensive journeys as a journalist. She also read out some interesting sections from the book, which was followed by a panel discussion on “Is growth possible without biodiversity loss?” The author, Dr. Asad R. Rahmani, and Dr. Deepak Apte presented their views and knowledge on the conservation challenges in India and the use of scientific research and public awareness during the discussion. BNHS



(L–R): Dr. Asad R. Rahmani, Director, BNHS, Ms. Bahar Dutt, author, Dr. Deepak Apte, COO, BNHS, at the release of GREEN WARS

work in several crucial habitats, such as Western Ghats and marine areas was also discussed. The event was reported in several

Mumbai-based newspapers and was well-attended by book lovers and nature lovers. ■

Wildlife Week Celebrations

On the occasion of Wildlife Week, BNHS hosted an exhibition at Hornbill House from September 29 to October 3 titled *Thatbhvamasi*, which is a Vedic term signifying the divinity inside all creatures. The exhibition showcased a collection of photographs by N.P. Jayan, wildlife photographer, on the biodiversity and natural beauty of Periyar Tiger Reserve (and its surrounding areas in the Western Ghats of Kerala), highlighting



The photographer interacted with the visitors at the exhibition

the problems such as garbage generated by careless visitors in forests. Over 65 frames depicting mammals, birds, reptiles, plants, and habitats of Periyar were on display. The exhibition evoked good response from BNHS members and the general public alike.

The BNHS Conservation Education Centre (CEC) at Asola Bhatti, New Delhi, celebrated Wildlife Week by organising several interactive activities including poster making, wildlife quiz, bird nest workshop, face painting, slogan writing, pot designing, tree planting, wildlife origami, and study of the wildlife occurring in the forests around the centre. ■

Children's Book Released

Children are important stakeholders of wildlife conservation, and if they imbibe the right values at a tender age, it is likely that future green engineers, lawyers, politicians, entrepreneurs and journalists will originate from them. The book, *HOW BLUE IS OUR PLANET?*, by children's author and BNHS member – Katie Bagli – was released at Hornbill House on October 17, 2014, in the presence of Dr. Parvish Pandya, Head, Zoology Department, Bhavan's College, Mumbai, and Dr. Asad R. Rahmani, Director, BNHS. After the release, there was a slide show and talk by the author, followed by a book reading session. Katie Bagli cited witty anecdotes from the book, which also creatively highlighted the need for conservation of our wildlife and their habitats. The function ended with an interesting quiz on wildlife and a general discussion. ■

Workshop on Biodiversity Management

The conservation work of BNHS seeks to involve various stakeholders while developing comprehensive plans for different habitats and landscapes. On August 8, 2014, a workshop on Biodiversity Management Committees (BMCs) and People's Biodiversity Registers (PBRs) was jointly organised by the BNHS; Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany; Maharashtra State Biodiversity Board



Participants of the Biodiversity Management workshop at Ratnagiri

(MSBB); and Gogate Jogalekar College, Ratnagiri. This was a part of the ongoing Conservation and Sustainable Management of Existing and Potential Coastal and Marine Protected Areas (CMPA) Programme in India. Dr. Rahul Mungikar from MSBB was the main faculty guiding the participants. His insightful talk highlighted the need to understand and appreciate our biodiversity, our local traditions that teach sustainable utilization, among others. Dr. Deepak Apte, COO, presented the conservation work of BNHS along the Konkan coast of Maharashtra. ■



(L-R): Katie Bagli, author, and Dr. Parvish Pandya at the book release function

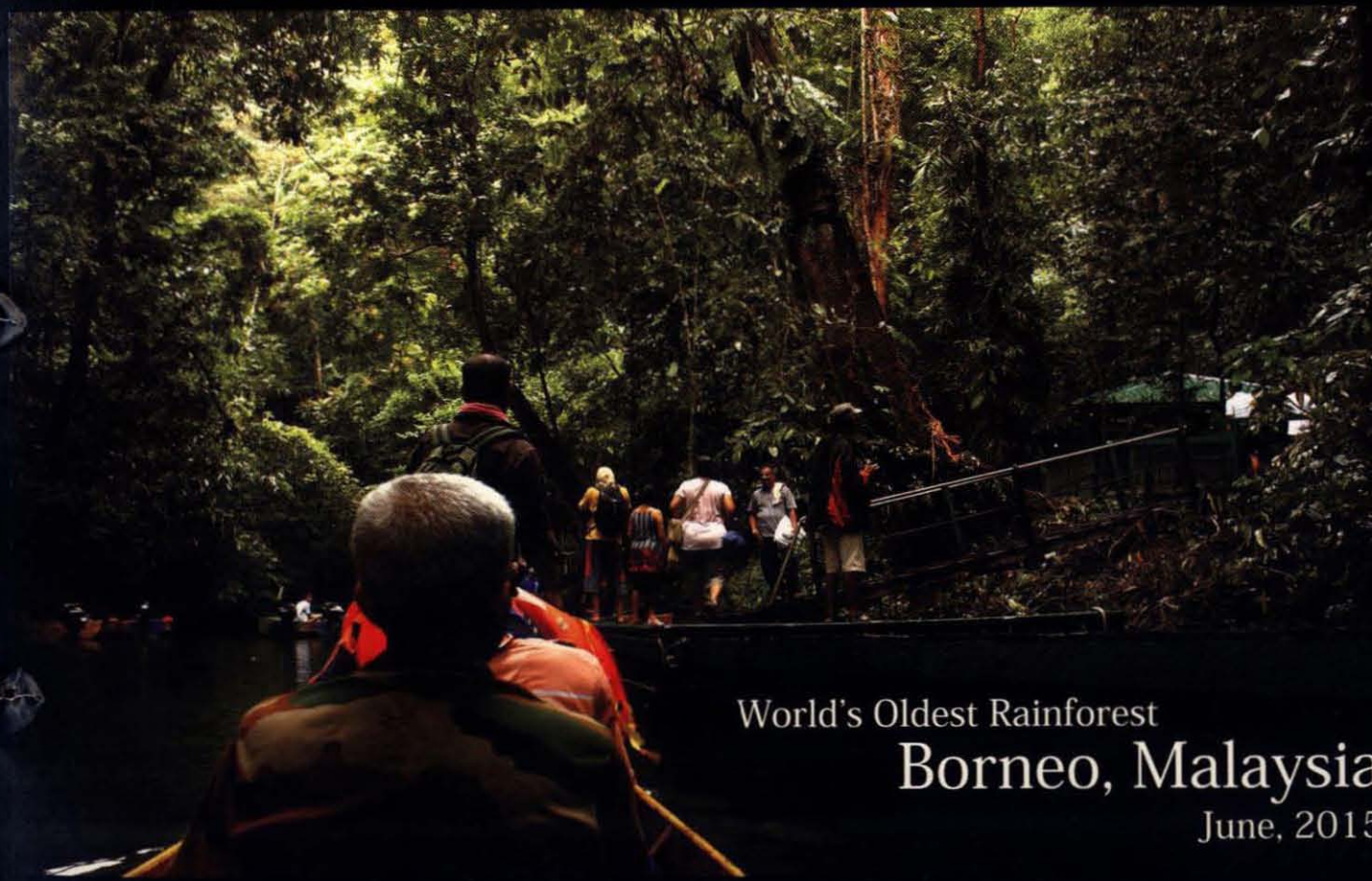
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