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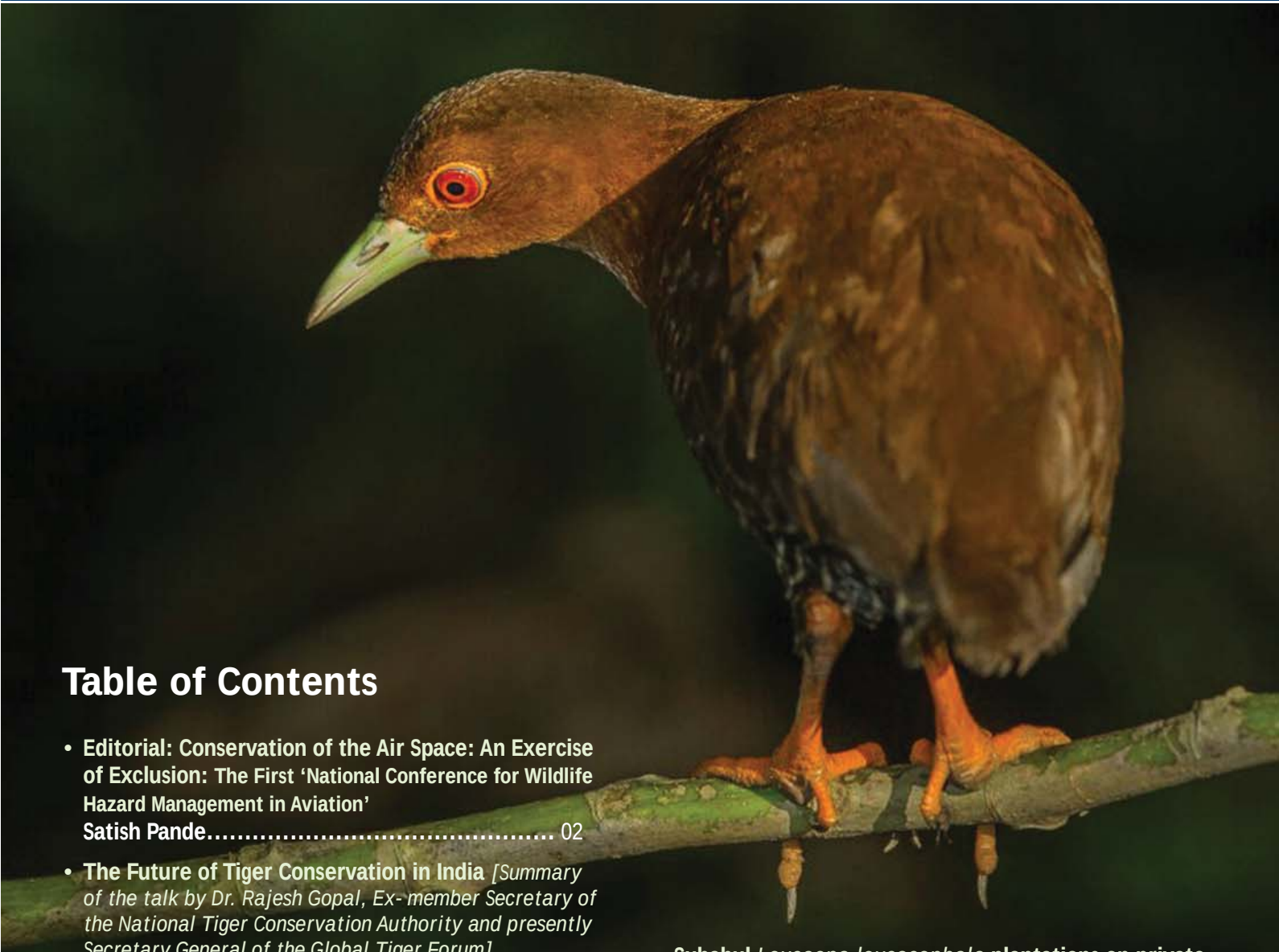

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Conservation of the Air Space: An Exercise of Exclusion

The First 'National Conference for Wildlife Hazard Management in Aviation'

Birds, the feathered bipeds, (Class: Aves), probably first evolved on our 4.6 billion years old planet Earth during the Mesozoic Era in the Jurassic period about 150 million years ago. The sky belonged to the birds for the past 150 million years. The Genus *Homo*, the evolutionary ancestor of man, first appeared on earth much later than birds, during the later parts of the Cenozoic Era, about 2 million years ago. The first anatomical equivalent of modern human is said to have evolved even later about 250,000 years ago. Just a hundred years ago man invented the flying machine, the aircraft, intruded in to the airspace and created problems both for birds and him.

Flight naturally evolved in the animal kingdom in a few taxa like the pterosaurs, birds, bats and insects. The birds evolved and naturally occupied the sky much before man artificially entered this niche using aircrafts. Man lacks the natural ability of flight. Birds have a right of evolutionary priority to fly in the sky as compared to the right of man. However, in an anthropocentric line of thought and for the purposes of safe aviation, it is agreed by man, without consulting the birds and bats that the right of way in the sky near the airports belongs to man.

The outcome of man's intrusion in to the air space led to bird and bat collisions with aircrafts. Wildlife strikes in aviation are grouped as avian (bird) and non-avian (mostly mammal) strikes and they constitute one of the causes of aircraft incidences or accidents. A wildlife aircraft strike may result in structural damage and/or engine failure. Wildlife aircraft interactions are seen at almost all the aerodromes in the world and the type of species encountered are location specific and geographic area specific. Airports are built in almost every bio-geographic zone of our country and in every bioclimatic region of the world. Birds are everywhere and they invariably interact with aviation.

Contrary to the general principle of wildlife conservation, where every attempt is made to promote wildlife to propagate, conservation of the air space in the vicinity of the airports involves preventing the entry of wildlife and sanitization of the air space. Minimizing bird activity and excluding non-avian, non-human-mammal activity at airports is a challenging and difficult task and this is done by the Wildlife Hazard Management (WHM) department at all airports in the

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interest of safety of passengers, wildlife, and aircrafts to make aviation sustainable, economical, and safe.

In principle, the various strategies used to reduce bird hazards in aviation have to respect the various legislations of that country. The important legislations concern with biodiversity, wildlife, forests and tree protection, prevention of cruelty to animals and CITES. These WHM strategies attempt to keep bird and animal activity at bay in the primary, secondary and tertiary hazard zones around the airports. Today, according to the BirdLife International Avibase (world bird database), about 10,000 species and 22,000 sub-species or races of birds are reported from planet earth. Very few of these species are hazardous to aviation.

Birds may like airports for a multitude of reasons. Several airports are located on the fringes of metropolises and have large tracts of unused, undeveloped land surrounding them as noise and safety buffers. These areas provide safety, food, water, resting, roosting, and nesting sites for birds. Large flocks of birds are particularly hazardous to aircrafts and both large birds and flocks of small birds can be equally dangerous, either by posing the risk of collision on the nose, wings or windscreen of the airplane or being ingested by the engines.

It must be emphasized that birds are intelligent, adaptable and tend to become habituated to various altered conditions and distraction measures practised by the airport wildlife hazard prevention managers. WHM measures can become successful only if the various ecological aspects of diverse bird species at the airports are kept in view. The variable perception of sound, light, color flicker and movement by various bird species is being studied by ornithologists. The avian responses vary from season to season, with the time of the day and changing ambient conditions like visibility, humidity, wind speed, precipitation, temperature, etc. A better understanding of these ecological and ethological (behavioural) aspects of avian life will improve the wildlife hazard management strategies in aviation.

In view of increasing air traffic, proliferating aerodromes, ever increasing passenger traffic, and widespread habitat encroachment / modification / destruction by humans, the problem of wildlife hazard in aviation is increasing. To draw the attention of the various stakeholders to this unique and emerging problem, and to evolve newer and better safety measures, the Mumbai International Airport Ltd. (MIAL) jointly with Ela Foundation as the scientific collaborator, hosted the first 'National Conference for Wildlife Hazard Management in Aviation' at Mumbai on the 18th April, 2015. The historic conference was attended by airport operators, airline operators, legislators; civic authorities, forest department personnel and other government officials from Airport Authority and Directorate General of Civil Aviation, ecologists and biologists, industry representatives, researchers, and engineers from all parts of our country. Both civil as well as defence airport related personnel were present and deliberated on a wide range of topics like avian sensory ecology, DNA sampling for identification of bird species involved in strikes, methods of wildlife surveillance at the airports, active and passive WHM methods, legal aspects of WHM in aviation, recent technology, challenges and stakeholders' perspectives.

The forest department also has an important role to play in the field of WHM in aviation. Till date it has been away from this interdisciplinary aspect of wildlife and aviation. It is important that the forest staff should be made aware and sensitized about this important problem that involves conservation, safety and economics of the expanding aviation industry. The first national conference is a welcome step in this direction.

- Dr Satish Pande

The Future of Tiger Conservation in India

[Summary of the talk by Dr. Rajesh Gopal, Ex- member Secretary of the National Tiger Conservation Authority and presently Secretary General of the Global Tiger Forum]

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Dr. Rajesh Gopal delivered a talk on 'The Future of Tiger Conservation in India' on 5th June 2015 on the occasion of the World Environment Day. I had the fortune of getting my first lessons in Wildlife Management from Dr. Gopal, in 1986, when he was a faculty member at the State Forest Service College at Coimbatore, where I was a Trainee Assistant Conservator of Forests, before I was selected for the Indian Forest Service in 1987.

Dr. Gopal spoke about the challenges presently faced by the tiger, without glorifying the success of the tiger conservation movement in the country, which he spearheaded for a long time. In fact, when speaking about his tenure as the head of the NTCA, he mentioned that it was like a day in the life of a tiger - full of ups and downs. In a lighter vein, he remarked that we had reached a point in time when there were more tiger experts in the country than tigers!

The age old and robust methodology, based on Pug marks, which was used to estimate the number of tigers had come in for serious criticism and for the first time in 2006 the NTCA jointly with the forest department officials and experts from the Wildlife Institute of India developed a new methodology, or rather a comprehensive monitoring protocol, known as 'Monitoring Tigers, Co-predators, Prey and their Habitats'. The technique involved state-of-the-art technology involving geographic information system (GIS), remote sensing, camera traps and the relevant computer software for analysis. This enormous task which was to be carried out in around 3.78 lakh sqkm of forest area of the country, involved around half a million data collection man-days of forest personnel and thousands of trained field biologists, volunteers and observers in a well coordinated week long program. The task was of mammoth proportions and fraught with immense possibilities of failures, considering the number of people involved with varying levels of understanding. None the less the monitoring had to be done and NTCA steered it through not only in 2006, but followed it up in 2010 and then in 2014. The tiger

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numbers have shown a steady increase in the last 3 estimations (from 1411 in 2006 to 1706 in 2010 and now to 2226 in 2014).

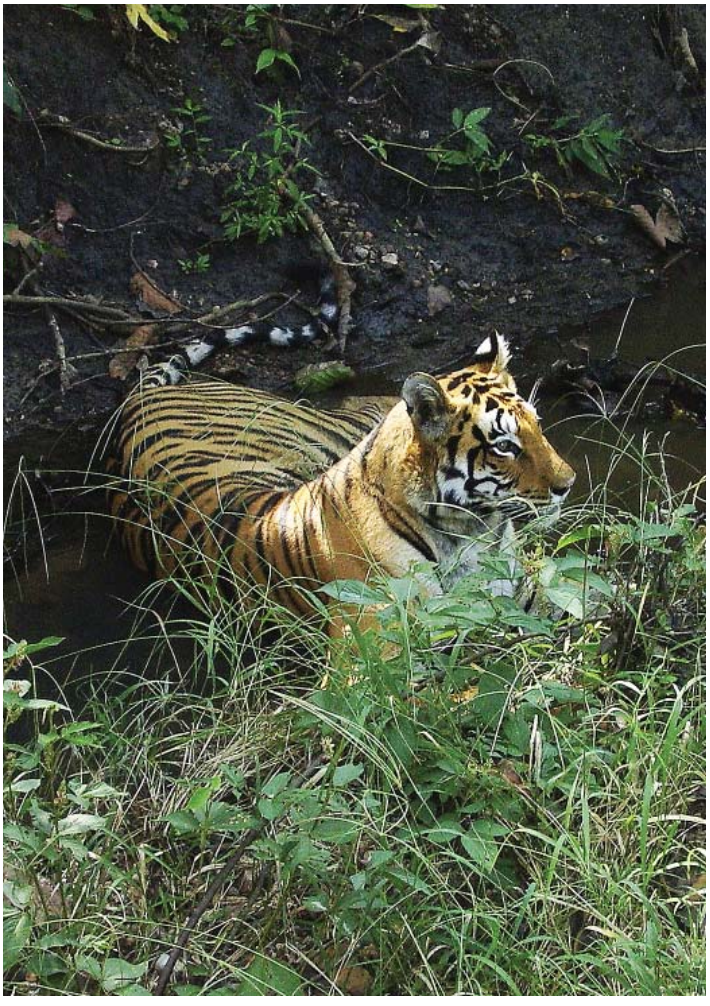
Does this indicate that all is well and can we sit back and relax? The answer is no, cautioned Dr. Gopal, as he very clearly mentioned that though the tiger numbers in most Tiger reserves show an increase due to intensive management and increased levels of protection, the biggest challenge lies in protecting the ones that are going out of the tiger reserves. He mentioned the utmost need to safeguard the Tiger corridors. Considering the present extent of suitable habitats that are available for the tigers and its prey, with concerted efforts, we can at the most add another 300 to 400 tigers, nothing more. Another measure that needs to be taken is to identify potential areas that can harbor a viable population of tigers and their prey, and bring them either into the network of tiger reserves or at least increase the degree of protection in these areas. As he put it, *"In India, we have managed to increase the tiger population, but having gene porosity,* (the ability of the species to migrate and breed outside its own territorial gene pool) *is a challenge"*.

I was reminded of the time**,** during my tenure as the DCF Tadoba Andhari Tiger Reserve (TATR) in Chandrapur, when the frequency of tiger sightings had gone up considerably. Sighting female tigers with 3-4 cubs in at least 4- 5 locations, in the year 2001-02 had become a matter of routine. This was the result of intensive management inputs and increased levels of protection as a fall out of increased levels of funding, when the area was brought under the umbrella of the Project Tiger. Although this was a matter of pride, the discussions with the ACF's and the RFO's always revolved around what would be the fate of these tigers when they start exploring fresh territories or push out the established tigers from their territories. Our apprehensions soon became a reality when there was a sudden increase in the number of man-tiger conflict incidents in the areas around TATR. Fortunately the Maharashtra Forest Department which has always been proactive reacted by declaring Buffer Areas around TATR along with increased levels of monitoring in the spill-over areas**.** The Department also undertook an awareness drive regarding the problem and responded with speed in all instances where a conflict situation occurred. All these measures helped in easing the situation to a great extent.

Dr. Gopal, while mentioning the need for electronic surveillance and use of modern technology, clarified in no uncertain terms, the importance of foot patrolling in the tiger habitats. Poaching would always be a threat in areas where the tiger is doing well and the field staff can never afford to be complacent. He also mentioned that intrusive tourism is a major issue in some of the tiger reserves and it may negatively affect the behavior of the tigers, at times making them more aggressive. He reiterated that guidelines for preventing this problem have been issued by the NTCA and these need to be followed by the States.

Having more and more inviolate areas for the tigers is the target. Tigers exhibit a territory grabbing instinct. A good territory, as one may expect, should have adequate food (prey) and a habitat where it can procreate in relative peace and safety. To achieve this, the package for rehabilitation of villages and villagers from the tiger reserves needs to be so designed that more and more villagers come forward to accept it. Today rehabilitation has got an impetus due to higher levels of acceptances, which is a good sign. However, this is not an easy option and in view of this Dr. Gopal summarized by saying that it is co-occurrence and not co-existence that we have to accept and plan our tiger conservation strategy accordingly.

(The talk was organized by Nature Walk, an NGO active in the creation of conservation awareness, jointly with the Pune Forest Division).



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A Report of *Hyalomma* tick infestation in Mottled Wood Owl *Strix ocellata* from Nagpur, Maharashtra

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Referee: Anand Padhye

A Mottled Wood Owl *Strix ocellata* was rescued in February 2015 and brought to the Critical Care Unit of the Society for Wildlife Conservation, Education and Research (Wild-CER). Mottled Wood Owl (*Strix ocellata*) is a resident endemic owl of peninsular India and prefers open wooded areas around sparse habitation in rural areas and agricultural cropland.

The owl when brought to Wild-CER was emaciated and severely dehydrated. Weight of the owl was recorded as 610 g. Physical examination of the owl revealed fracture of right wing with bleeding and of swelling at the distal end. Radiographic examination confirmed the fracture of both, radius and ulna, at the distal end.

The bird was examined for the presence of ectoparasites during our routine physical check-up. A tick from eye region was collected and preserved in 70% alcohol. It was processed and identified as *Hyalomma*

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tick based on the morphological characters described by Sen and Fletcher (1962). *Hyalomma* is genus of hard bodied ticks with inornate scutum and are found commonly in Asia, Europe and North Africa.

Tick parasitism poses a direct threat to the health causing thriftiness, restlessness and anaemia that predisposes the animal to loss of healthy condition, in addition to the transmission of various pathogens. These may cause serious health hazards to other wild animals.

Wood Lice are reported in an active nest of the Mottled Wood Owl near Pune, Maharashtra. (Pande, 2012). Scarce information is available on the prevalence of ticks in wild animals and particularly on birds from Maharashtra. Hence, the present communication deals with the occurrence of a tick on Mottled Wood Owl from Nagpur, Maharashtra. It is probably the first such report for this owl species from Maharashtra.

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ACKNOWLEDGEMENT:

We are thankful to Maharashtra State Forest Department for giving us the permission for rescue and rehabilitation of the wild animals and keeping them in captivity during their treatment, in Nagpur. We are thankful to Associate Dean, Nagpur Veterinary College for providing necessary facilities at their institution. We are thankful to the volunteers of Wild-CER for taking proper care of the bird during its month long treatment. Wild-CER is a Nagpur based conservation organization mainly involved in rescue and rehabilitation of the wild animals in Central India and works in collaboration with Maharashtra State Forest Department.

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Some important bird sighting records from Amravati District, Maharashtra

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ABSTRACT:

Wildlife awareness campaigns and activities conducted by the forest authorities as well as various NGO's have sown the seeds of conservation amongst people. It has also created many ardent bird watchers and nature lovers in Amravati District. As a result of such observations this study has added seven new species of birds to the diversity of birds of Amravati District.

INTRODUCTION:

The checklist of birds of Amravati district lists about 300 species. A checklist of the birds of Melghat Tiger Reserve(Sawarkar(1987)includes252species.Wadatkar (2001) and Wadatkar & Kasambe (2002) reported 171 species of birds from the Amravati University region and Pohra-Malkhed forest respectively. 78 previously unlisted bird species were later added by Kasambe *et.al* (2007). Pachlore and Chandrakar (2011) studied avifauna of wetlands of Amravati listing 97 species of birds, while Mahajan *et.al* (2012) gave an account on 212 species from Mahendri Reserve Forest. In this paper I report sighting records of seven rare bird species (Table No.1) for the Amravati district with annotation.

Table No.1: List of species added to Amravati Birds

Sr. No	Species	Peer Birder	Status	Remark on current sighting
1	Greater White-fronted Goose (*Anser albifrons*)	Ashahar Khan, Manoj Bind, Ahsan Sheikh	V	Species is listed under Vagrant category of birds in Amravati.
2	Eurasian Bittern (*Botaurus stellaris*)	Rahul Gupta	R	Migrant. Uncommon in its range of distribution, needs independent study on ecology & distribution in Vidarbha.
3	Eurasian Curlew (*Numenius arquata*)	Sachin Sarode, Dhananjay Bhamburkar	W	Sighted in Pohra-Mardi region. Species is listed under Sparse winter migrant category of birds in Amravati.
4	Blyth's Starling (*Sturnia blythii*)	Rahul Gupta, Ashahar Khan	W	Widespread winter migrant category of birds in Amravati.
5	Hume's Warbler (*Phylloscopus humei*)	Shashi Thawali	W	Migrant. Needs study on distribution.
6	Red Phalarope (*Phalaropus fulicaria*)	Ashahar Khan, Ganesh Akarte	V	Vagrant.
7	Amur Falcon (*Falco amurensis*)	Ashahar Khan, Vaibhav Dalal	PM	Passage migrant.

V- Vagrant, **SW**-Sparse winter Migrant, **W**-Widespread winter migrant, **PM**- Passage Migrant.

MATERIALS AND METHODS:

Data was gathered by several birdwatchers through field surveys. Field observations were made using binoculars and digital camera was used to take record shots. Field guides and literature provided by the ENVIS Centre for Avian Ecology and the library of Bombay Natural History Society were used to confirm the known range of distribution of each species. Nearest GPS co-ordinates were fixed using Google maps and names of reservoirs were noted by speaking with local people. Time and Date of discoveries were recorded by observers and were also extracted from photographic metadata.

Figure 1: Greater White - fronted Goose. Photo by- Ashahar Khan

SALIENT FEATURES ON KEY SPECIES:

1) Greater White-fronted Goose *(Anser albifrons)*

On 20th Jan. 2014 wildlife researcher Ashahar Khan was at Kekatpur (21˚ 5' 36.7'', 77˚ 57' 7.4'') with wildlife photographer Manoj Bind and Ahsan Sheikh. He noticed one odd bird. It was slightly bigger in size than the four Ruddy Shelducks (*Tadorna ferruginea)* with which it was grazing. No Hindi/ Marathi name could be recorded for this species. I have called it 'Dhaval-mukhi Kalhans' adding this name to the regional bird vocabulary. The Greater white-fronted Goose is a vagrant winter visitor to the Indian subcontinent (Grimmett *et. al*, 2011). The bird sighted in Amravati was an immature lacking black barring on the belly. A local website of Wildlife and Environment Conservation Society mentions 52 bird species in the list of new records in Amravati district by

their members during November 2010 to April 2014, which includes the Greater White-fronted Goose (http://www.wecsamravati.org/Additions_to_the_PMRF.pdf as accessed on 14 June 2015).

2) Eurasian Bittern *(Botaurus stellaris)*

Figure 2: Eurasian Bittern Photo by- Rahul Gupta

On 04th January 2014 at 0930 hrs Rahul Gupta went to Chatri Lake (20 ̊53'42.6", 77 ̊46'66.2") for bird-watching. The lake had good number of winter migrant waterfowl. RG took observations from a hide surrounded by *Ipomoea* sp. plants. He suddenly heard a loud call and saw a bird, flying approximately 3 m above the water level towards the shallow water area where RG was sitting. The call was loud and strange. RG was able to photograph it prior to its landing. After landing he could not locate the bird as it was perfectly camouflaged in *Ipomoea* vegetation. The bird is rare in Amravati district as it has been reported only twice in the district previously, first by Pachlore & Chandrakar (2011) and then by Gupta (2015).

3) Eurasian Curlew *(Numenius arquata)*

Figure 3: Eurasian Curlew. Photo by- Sachin Sarode

On 26th January 2014 Sachin Sarode was at Jalka Shahapur Lake (20°59'57", 77°52'49"). During their survey, at 1325 hr, a pair of waders landed at shore side of waterbed. SS took the photographs and the birds were identified as Eurasian Curlew *(Numenius arquata)*. The pair waded in shallow water. Both birds called intermittently in loud and distinct repeated notes. Both birds were feeding continuously close to each other. One more bird was photographed by Dhananjay Bhamburkar at Hayatpur Lake (20°45′25″, 77°36′17.6″), forty kilometers from the previous sighting location. One more bird was sighted at Chandi Project Nandsawangi (20°40′11.5″ 77°44′54.4″) by Manoj Bind. The species is categorized globally as Near Threatened by IUCN and was previously recorded as Passage Migrant by Mahajan *et. al* (2012) in the district.

4) Blyth's Starling *(Sturnia blythii)*

Figure 4: Blyth Starling. Photo by- Rahul Gupta

On 13 April 2014 Birdwatcher Rahul Gupta was at Taponeshwar Lake (20˚54'17", 77˚ 53' 14"), Near Pohara Village, Amravati, Maharashtra. While on a walk to this lake in the morning at around 0922 hr he spotted a group of un-identified birds of grey-white upper plumage. He took photographs. The flock of birds was on a Palash tree (*Butea monosperma*), feeding on its flowers. There were five birds which were identified as Blyth's Starling *(Sturnia blythii)*. This species was first described as *Pastor blythii* by Jerdon (1844). Later it was treated as subspecies *Sturnia malabarica blythii* by Baker (1926). However, Rasmussen and Anderton (2005) have recently upgraded it in to full species *Sturnia blythii* based on difference in plumage, morphometry and vocalization. After feeding on flower nectar for a while all birds flew off to an adjacent forested area near the lake. Ashahar Khan found seven individuals of the same species at Bhankheda accompanied by a flock of Common Myna (*Acridotheres tristis*). This locality is about twelve km from the previous sighting location. The species is assumed to be endemic to Western Ghats of SW India (Grimmett *et. al*, 2011) but the current sighting confirms its distribution in Central India.

5) Amur Falcon *(Falco amurensis)*

Figure 5: Amur Falcon. Photo by- Ashahar Khan

On 2nd October 2014 Ashahar Khan was surveying Akoli region of Amravati district. He found a medium sized raptor perching on a pile of rocks present in the grassland near three Indian Coursers (*Cursorius coromandelicus*). Photographs and video were taken and the raptor was identified as a male Amur Falcon *(Falco amurensis).* Two more birds were sighted on 29th November 2014 at Narayanpur Lake (21°1'32" 77°51'23") by the author and Vaibhav Dalal, Surendra Agnihotri & Sanket Dharashivkar. Amur Falcons are known to migrate in winter from Mongolia and Eastern China, across NE India, coastal Kokan and then across the Arabian Sea to South Africa (Munot, N. *et. al,* 2014). Our records from Amravati indicate that the species traverse Amravati & Vidarbha region in passage during migration. A local website of Wildlife and Environment Conservation Society mentions 52 bird species in the list of new records in Amravati district by their members during November 2010 to April 2014, which includes the Amur Falcon (http://www.wecsamravati.org/Additions_to_the_PMRF.pdf as accessed on 14 June 2015).

6) Hume's Leaf Warbler (*Phylloscopus humei*)

Figure 6: Hume's Leaf Warbler. Photo by- Shashi Thawali

On 23rd November 2014 Shashi Thawali was surveying Amravati University campus, where he photographed a Hume's Leaf Warbler (*Phylloscopus humei*). The bird was not listed in any published checklist previously (Wadatkar, 2000; Kasambe, 2007 & Mahajan *et. al* 2012) hence the proposed new record for the district. The species breeds in Himalayas and winters in plains (Grimmett *et al.*, 2011).

7) Red Phalarope *(Phalaropus fulicaria)*

Figure 7: Red Phalarope. Photo by- Ashahar Khan

On 25th November 2014 Ashahar Khan was at Chhatri Lake (21° 5' 36.7'', 77° 57' 7.4'') with Ganesh Akarte, where he photographed a single Red Phalarope *(Phalaropus fulicaria)* feeding in shallow water. The species is rare in the Indian subcontinent and the identification was confirmed from photographs sent to the Bombay Natural History Society. Manoj Bind and Sarthak Awhad assited in identification. The species was sighted at Nagpur in 2013 (Rawal *et. al* 2013) hence the current sighting of Red Phalarope is the first record for Amravati district while second record for Central India.

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Recent sighting of the Gray Wolf *Canis lupus* in April 2015 at Khandobacha Maal, Pisarave, Purandar Taluka, Pune District, Maharashtra. A pack of four wolves was seen with prey remains like the Indian Gazelle *Gazella bennettii* and sheep.

Recent Sighting of Great Indian Bustard *Ardeotis nigriceps* in Karnataka

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- Name of species: Great Indian Bustard *Ardeotis nigriceps.*
- Status- Critically Endangered. (IUCN Red List, 2015).
- Date of sighting- 31st May 2015
- Time of sighting- 8 AM
- Weather parameters-Partly cloudy.
- Number of times sighted- Once.
- Number of birds- Single.
- Gender of bird- Female.
- Locality-Near Belgaum, about three km from the city, close to village Yellur, Karnataka.
- Habitat description-Ploughed agricultural fields ready for seeding; a small stream flows through the fields. Large tracts of traditional paddy fields.
- Height of grassland-No grass land.
- Distance from human habitation-3 km.
- Any other bird/animal associates: Nil.
- Bird behavior- Saw bird flying from east to west, through binoculars. The beak was open. The bustard landed approximately 1 km from me, close to a perennial stream.
- Threats to the habitat- Encroaching human habitation.
- Photographs- Attached.
- Previous record- 2 females near Bagalkot town in 2007, which is about 110 km to the east of Belgaum. (Per. Com. with. Shashank Dalvi).

Sighting of Lesser Florican *Sypheotides indicus* in Nagpur, Maharashtra

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Citation: Sanjay Nafdey (2015). Sighting of Lesser Florican *Sypheotides indicus* in Nagpur, Maharashtra. *Ela Journal of Forestry and Wildlife* 4(2): 14-15.

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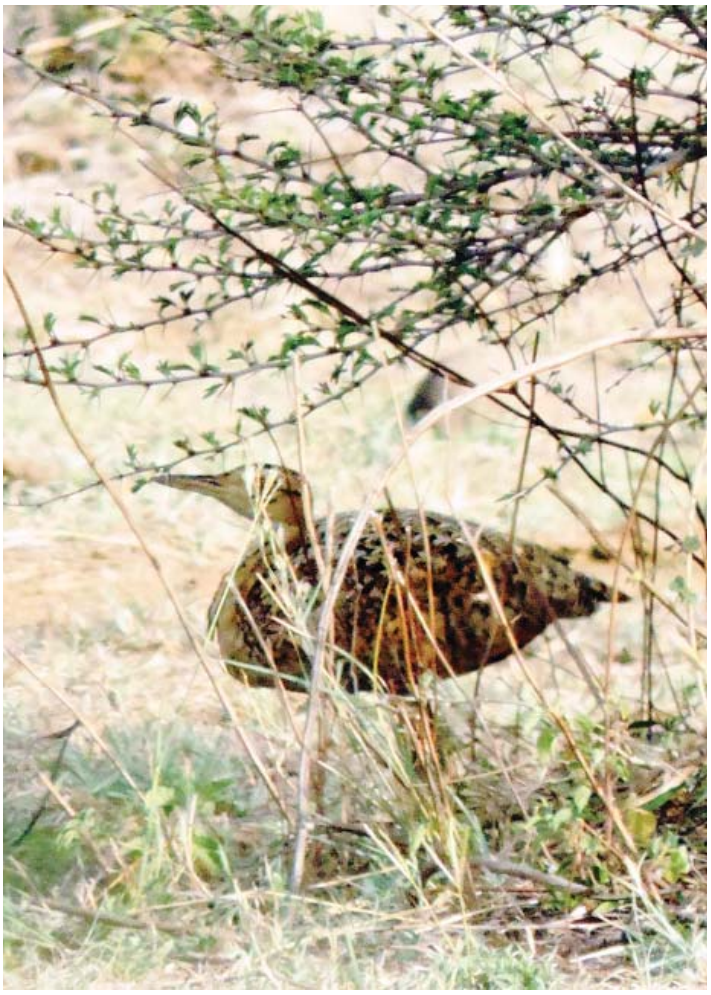
Referee: Pramod Deshpande



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- **Name of species** - Lesser Florican *Sypheotides indicus*.
- **Status** - Endangered (IUCN, Red List, 2015).
- **Date of sighting** - 25 April 2015.
- **Time of sighting** - 4 pm.
- **Weather parameters** - Clear sky; Temp. 45^{o}C.
- **Number of times sighted** - Once.
- **Number of birds** - One.
- **Gender of bird** - Female.
- **Locality** - MIHAN (Multi-modal International Cargo Hub and Airport), Nagpur the fast developing SEZ. 2 km from the Nagpur airport and 1 km from BOING Workshop.
- **Habitat description** - Habitat comprised of small bushes of 2 to 4 feet high amidst grassland. This piece of agricultural land was acquired by MIHAN, hence for the last four years grass grows abundantly. At the time of sighting no green grass but dry and fallen grass partially grazed by cattle was seen. The area has about 20 wells in the fields.
- **Height of grassland** - About 3 to 5 feet in rainy and winter season. Short grass in summer.
- **Distance from human habitation** - about 4 villages of population of 1000 each are located within 2 km radius of the florican sighting.
- **Any other bird/animal associates** - The locality has Grey and Painted Francolins, Thickknee & Indian Coursers (n=25), Rain Quail, Rock Bush Quail, and Jungle Quail. Common birds like lapwings, doves, bulbuls, Ashy-crowned Sparrow-lark and Rufous-tailed Finch-lark. In winter, both Desert Wheatear and Isabelline Wheatear.

- **Bird behaviour -** Extremely shy. Hunchbacked profile while walking quite characteristic of the Lesser Florican. Resting in standing position under a Babool tree *Acacia nilotica* & was seen first by Pradnya Nafdey. The florican flew to the other side of the dirt road behind us and was seen again on that side. Still photographs and 9 sec video photography were achieved for documentation before the bird went out of sight.
- **Status of the habitat -** The land is acquired by MIHAN and currently witnesses a lot of blasting, digging and construction activity.
- **Any previous record -** Not to my knowledge.

Recent Sightings of Great Nicobar Crake *Rallina* Sp. Nov. and Nicobar Megapode *Megapodius nicobariensis* at Great Nicobar Island

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Citation: Anil K. Bharadwaj (2015). Recent Sightings of Great Nicobar Crake *Rallina* Sp. Nov. and Nicobar Megapode *Megapodius nicobariensis* at Great Nicobar Island. *Ela Journal of Forestry and Wildlife* 4(2):16-17.

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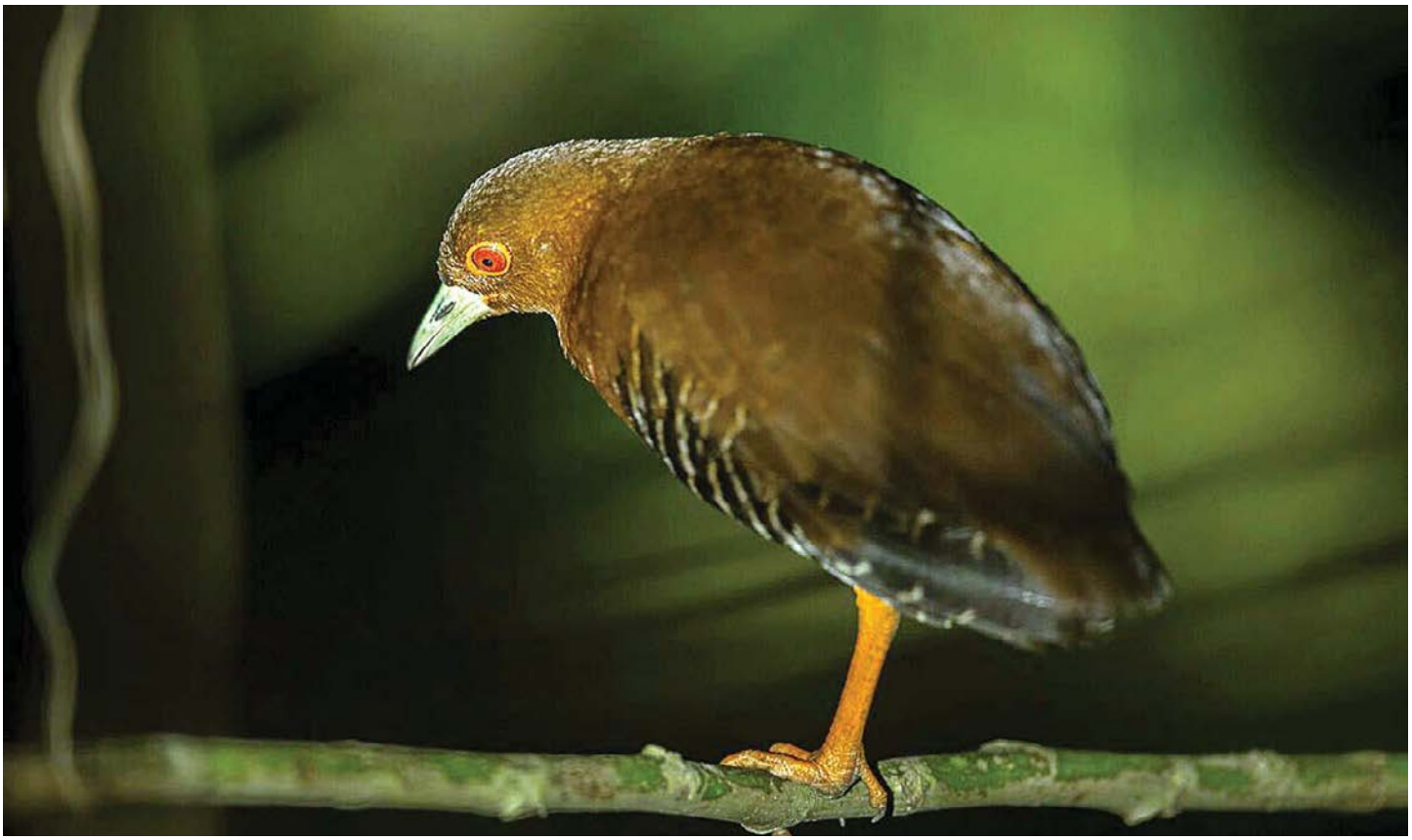
Subject Editor: Satish Pande

The Great Nicobar Island is the southernmost part of the Bay Islands of India and is the largest of the Nicobar group of islands. The 1045 sq km island is sparsely inhabited and is home to the Shompen tribe, but is now slowly experiencing development pressures. Approach to the island is either by sea or by air with a harbour and airstrip at the Campbell Bay. The island is lush with tropical rainforest supporting rich biodiversity including endemic species. The flora and fauna are protected by the government of India by declaring a large geographical area of the island as Great Nicobar Biosphere Reserve.

The tsunami of 2004 had hit the Great Nicobar Island causing much damage to human property and natural resources along the coastal areas (Pande *et al* 2007). Hence, documentation of endemic wildlife of the Great Nicobar Island assumes importance. This communication



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mentions two species of endemic birds, Great Nicobar Crake *Rallina* sp. Nov. and Nicobar Megapode *Megapodius nicobariensis* sighted during our recent visit to the Great Nicobar Island in April 2015.

1. Great Nicobar Crake *Rallina sp*. Nov.:

Conservation status of the Great Nicobar Crake is unknown and it is presumed to be an endemic bird of the Nicobar Islands. The species is yet to be fully described and designated.

It was first discovered and photographed in 2011on the east coast of Great Nicobar Island (Rajeshkumar *et al* 2012).

On the 25th April 2015, we (Anil Kumar Bharadwaj, Jainy Kuriakose and Vikram Shil, along with two forest employees) happened to spot and photograph this bird during a night bird-watching session, near Galathea, Great Nicobar Island. It was around 10 pm and the bird was found roosting on the lower branch of a small tree. The habitat, where it was found roosting was coastal deciduous forest, just about 2-3 km away from the nearest sea shores. The area was totally undisturbed and away from any human habitation or vehicular traffic. The habitat seemed to be the same as that utilized by the Nicobar Megapode, where we had found a pair earlier during the day.

2. Nicobar Megapode *Megapodius nicobariensis:*

Nicobar Megapode is a globally vulnerable species mainly due to habitat destruction. We had continuous sightings of this species from 23 April 2015 through 26th April 2015, including 3 pairs in an area of about one square km.

April 23: A single female, around 3.30 pm, near a mound nest.

April 24: A single male, around 2.pm, feeding and digging very close to a mound nest.

April 25: A pair, about 8.30 am, feeding in the area close to the mound nest.

April 26: A pair, around 7.00 am, feeding with playful mating behaviour for about 20 minutes.

Weather was very humid with an occasional drizzle. The habitat is coastal deciduous forest with secondary shrubs along the costal line. The area was undisturbed and away from human habitation. A single bird was also sighted and photographed in the same area during the first week of April 2015, by Sandeep Dhumal (per. com.).

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Subabul *Leucaena leucocephala* plantations on private lands and possibilities of using high yield return tree species after genetic improvements instead of agricultural crops: A Case study in Tapi District

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Citation: Madhav Gogate (2015). Subabul *Leucaena leucocephala* plantations on private lands and possibilities of using high yield return tree species after genetic improvements instead of agricultural crops: A Case study in Tapi District. *Ela Journal of Forestry and Wildlife* 4(2):18-22.

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Subject Editor: Nitin Kakodkar

Referee: Mandar Datar

KEY WORDS:
Leucaena leucocephala; Subabul; pulpwood; genetic improvement; Candidate Plus Tree [CPT]; clonal multiplication; root trainers; shortening rotation; advantages.

ABSTRACT:
Leucaena leucocephahla was introduced as multipurpose tree species in India for varied objectives and on an extensive scale. Discovery of an additional virtue of having early growth stage, properties that are better for wood pulping, has given it an advantage over other hard wood species by the paper pulp industry. In response to genetic improvement there is a qualitative and quantitative improvement in yield / unit area and a possibility of early returns. Its cutting cycle can possibly be reduced to twelve to eighteen months. All such factors can have cumulative effect of greater acceptance of the improved cultivars for being planted in rain fed areas as also to those areas having potential intensive irrigation facilities. Models based on this approach seem to be economically acceptable having an edge over conventional agriculture practices. From long term ecological perspective, imperatives of such an approach, however, need to be examined.

INTRODUCTION:

Forest plantations on private lands got a boost under the social forestry programs in early eighty's and the focus was on optimal utilization of marginal lands, primarily outside Government forest reserves, to meet community's forest resource based needs, thereby relieving pressures on forest lands. But industrial plantations on private lands as mandated by National Forest Policy, 1988, have specific approach; Industry needs, on an extensive scale, sustainable tailor made raw material to suit its specific requirements particularly optimal wood fiber length and low lignin and /or tannin content,. Thus area specific package of practices are essential to meet the demand for industrial wood and requires substantial research and development, for optimal utilization of available resources like soil,

water, plant genetic resources and other conditions.

Introduction of Subabul *Leucaena leucocephala* (Lam) de wit, as a multipurpose tree crop - native species of Mexico is a highly self-compatible tetraploid (2n = 4x = 104) and has a relatively narrow genetic base; it hybridizes readily with the other tetraploid species like *L. pallida* , *L. diversifolia* and *L. confertilflora,* and with the diploid species *L. esculenta, L. retusa, L. salvadorensis* and *L. shannonii.*

In the late seventies *L. leucocephala* cultivars, developed for its multiple uses like timber, fuel wood, fodder and nitrogen fixing ability in Hawaii, were introduced in India under the Swedish International Development Assistance, [SIDA]. With extension support, this species has been adopted by foresters, farmers, dairy men, etc. and is now commonly designated as Subabul. It is now recognized by the paper and pulp industry that early young wood of Subabul has better utility due to comparatively low lignin content and other administrative reasons. The focus of the industry has again shifted to this species as a preferred raw material to be grown on private lands.

OBSERVATIONS:

i) Paper Mill's catchment area and captive raw material generation: The paper mill in the study area is located close to Songad fort on Songad Ukai road in Gujarat state. Its catchment area includes parts of Gujarat, Maharashtra & Madhya Pradesh States. Following the Forest Policy in 1988, the paper industry was expected to raise its own captive plantations. Thus an era of farm forestry on private lands was ushered in to bridge the big gap between demand and supply. Since early nineties, fast growing species (e.g. Eucalypts / Poplars / Casuarinas) based industrial plantations were initiated by the Forest Departments all over the country. With the beginning of Social Forestry, forest extension to non-government lands was encouraged and has resulted in several successful tree cultivations on private lands, and provided an opportunity to the paper industries, to access such raw material for their use. Initially, Eucalypts were preferred as raw material for pulp and thus industry had a focused tree improvement program including selection and utilization of hybrid vigor. Hybrid *E. camaldulensis X E. tereticornis* was released by the then FRI, Dehradun. On similar lines, the mill in the study area considered *E. urophylla* as a potential species and has already introduced hybrid *E. urophylla X E grandis* and clonal material of the same, is being supplied to farmers.

ii) Subabul plantation models in vogue: Paper Mill extends support to farmers by providing planting material and technical support in establishing plantations. The popular model is seed sowing at 4' x 4' or 5' x 5' spacing. It is expected that trees will be harvested after three years and from its coppice shoots there will be two more harvests at three year intervals with better returns from subsequent cutting because replanting costs are avoided. There would be additional returns or scope for reducing cycle of felling. Broadly the economics of cultivation is reported as:

- Farmer's expenditure of Rs 8540/- and Inputs by Mill by way of planting material [seeds or supply of 2500 seedling] + guidance + buy back & harvesting+ transport
- Total wood yield [subject to irrigation facility], 30 to 45 MT per felling cycle + lops and tops of about 3 to 5 MT worth Rs 4,000/- .
- Financial returns @ Rs 3400/- per ton, gives total income Rs One lakh to 1,50,000 /-
- Net annual income of > 49, 500/- per acre per annum which exceeds net income from paddy [13,350], Wheat [11,500]. Ground nut [9810], cotton [39,000].

There have been recent advancements in planting techniques & patterns of planting e. g. root trainer raised seedlings or clonal material developed from Candidate Plus Trees [CPTs]. CPT accessions are from known sources of repute; however, with lack of seed source authentication or certification, authenticity of genetic configuration under tree improvement, is a grey area. Paper Mill in study area has also made selections within their own stands and has raised hedges to source local planting material. Young shoots thus obtained are multiplied in mist chamber by inducing rooting by hormonal treatment. Rooted cuttings are raised in root trainer trays. Where irrigation facilities exist, these seedlings are planted before the onset of Monsoon for initiating early growth, and derive an edge over weeds that may come up later.

During field visits, I observed some stands developed in Kotili & Nijjar villages. The mill employees as also the villagers were expecting first harvest by 18 to 24 months from planting time, thus reducing the felling cycle substantially from three years to less than two years. The clonal stand was also expected to serve additional purpose of seed orchard, thereby, offering bonus returns from the quality seeds.

iii) Tree breeding and improvement: Various approaches for qualitative and quantitative improvement to obtain the desired end product include selection of desired traits and through progeny testing zero down on plant type, carry out inter-specific hybridization,

induction of genetic engineering to obtain the desired traits. Farmers were not enthusiastic for trying agro forestry models probably due to market risk associated with non conventional agriculture crop and additional labor cost. Block plantations were easy to operate and provided attractive returns. There was a demand for reducing cutting cycle to one year in tune with agriculture calendar such that the option of switching back from farm or block planting to agriculture would be easy.

iv) *Way ahead:* It is essential to widen the genetic base and diversity of clones by developing a large number of fields tested genetically superior cultivars. A multi-pronged approach is suggested and selection of new CPT with stringent criteria and higher benchmarks be followed by field testing. Any clones giving significantly better growth rates, better disease resistance and yielding desirable wood pulp traits, compared to check clones, need to be developed for future plantations.

In the field of Subabul genetic improvement, there are leading institutions in India, like BAIF, ITC, APPM, IFGTB etc. IFGTB reports assemblage of 29 accessions from BAIF, CRIDA, TNAU, NAVSARI Agricultural University, Gujarat, IGFRI and University of Hawaii, USA which has established three progeny trials at various agro-climatic zones in Tamil Nadu. (Dr. Duraia *per com*). A quick review of such work done and taking note of outcome of trials, is recommended. Based on such a data, potential accessions can be short listed, collected and tested in multi-location trials.

CONCLUSIONS:

In most parts of Maharashtra, with limitations of rain fed agriculture and suboptimal soils, tree farming has not been accepted on the scale that one sees in Punjab, Haryana and coastal Andhra Pradesh. The present case study of Subabul plantations in Gujarat indicates an opportunity to extend block plantation on private lands in the catchment areas of Paper Mills. Better utilization of early growth of short rotation crop of Subabul for paper making is found to have an additional advantage with genetic improvement through selection and possible infusion of inter-specific hybrid vigor. The rotation period can be shortened to as less as one year from the present three years. Such an approach may contribute substantially to enhancing effective tree cover in areas wherein it is most essential. However, there is a word of caution. Detailed study is recommended to examine the ecological and economic aspects to evaluate if this approach could be a better alternative to other existing crops like high input ecologically non-sustainable sugarcane cultivation.

1. Cutting collected from candidate plus trees, rooted in mist chambers

ACKNOWLEDGEMENT:

The study area is the JK Paper Limited, Gujarat; initially established as The Central Paper Mill.

End Note:

Subabul *L. leucocephala* fell in disrepute because it was feared that being an exotic, it may become a weed as it is a prolific breeder. Sadly, the fear has realized itself. All the exotics have potential disadvantages as also some advantages. Subabul needs water for growth, but this aspect is true for certain other crops as well. As compared with banana or sugarcane crop, Subabul would be certainly more economic in terms of water requirement. Further, to assure that spill over of Subabul in the wild areas outside the private lands does not occur, prudent resource managers have to take suitable steps like limited trials under close supervision before large scale adoption of such exotics. Another question is whether the paper industries are willing to give an assurance to buy the Subabul from farmers if they cultivate it in their private lands? In my opinion, industry is offering an assurance but farmers do switch over to better alternatives when available. As far as the question of alternative indigenous plants that may potentially have an equal or better pulpwood value and which may be more eco-friendly than Subabul, the answer is that there could be alternatives but the same need to be evaluated.

2. Rooted cutting taken out from root trainer, showing profuse rooting

4. Imported cultivar "Tarramba" having potential of better growth being considered as candidate plus tree for mass multiplication.

3. Root trainer plants kept out for hardening

5. Seed sowing at 5 X 5 feet spacing

6. CPT Clonal propagation with drip irrigation by a progressive farmer, 10 month old plantation

7. Potential + tree indicated during joint visit.

Bio-diesel for the future – *Pongamia pinnata*

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Referee: Anurag Chaudhary

- **Botanical Name**: *Pongamia pinnata*
- **Synonym:** *Millettia pinnata*
- **Family:** Fabaceae
- **Range:** India, Seychelles, Malaya, Ceylon, tropical Australia & China, some Pacific islands.
- **Flowering Season**: January - March
- **Vernacular Names**: Karanj / Honge

Brief Description: This native Indian evergreen and hardy tree is widely distributed in India and is found to grow well from sea level to 1200 feet ASL. It is well adapted to arid zones.

Karanj (*Pongamia pinnata)* is a medium sized slow growing tree with a dense canopy. The small flowers vary in colour from white to pale purple. It is one of the few nitrogen fixing trees to produce seeds containing 30-32 % oil. Karanj cake is also used as a good fertilizer for plants

Karanj is normally planted along the highways, roads, avenues and canals to prevent soil erosion. It is

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often used for landscaping as an ornamental tree having showy fragrant flowers or has utility as a shady tree owing to its large canopy.

Karanj flowers profusely. The flowers are used by gardeners as compost for plants requiring rich nutrients. The bark of Karanj can be used to make twine or rope and it also yields a black gum that has historically been used to treat wounds caused by poisonous fish. The wood is said to be beautifully grained. Oil made from the seeds, known as honge oil, is an important asset of this tree and has been used as lamp oil, in soap making, and as a lubricant for thousands of years. In India, Karanj is used in land reclamation, as a soil stabiliser and now most importantly as a bio-diesel crop.

Medicinal Uses: Almost all the plant parts such as fruits, leaves, root bark, stem bark, seeds, and twigs are used as medicine. Karanj is the basis for an important Ayurvedic medicine used predominantly in skin diseases. Karanj twigs are also used as tooth brush in several rural areas of our country.

The following properties are recorded in the Ayervedic perspective –

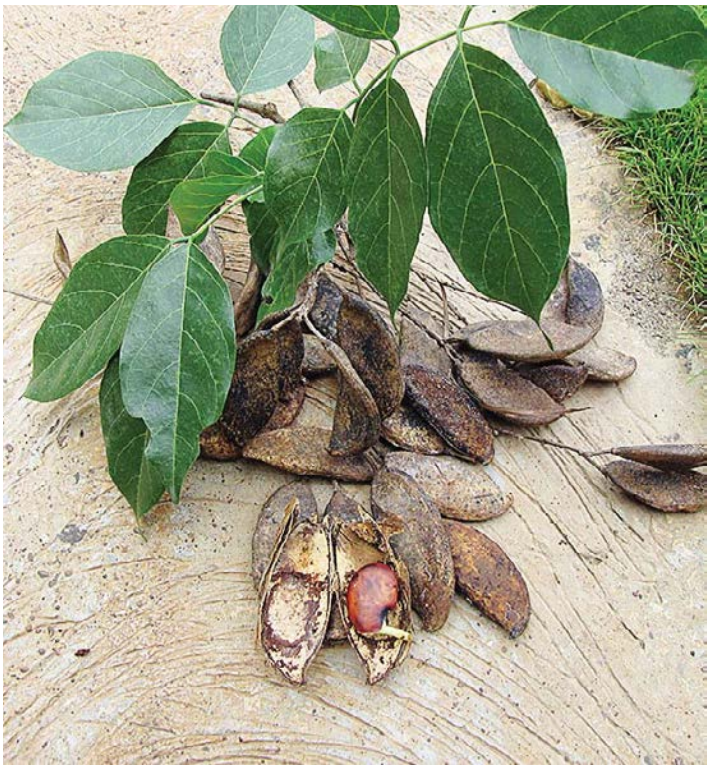
Leaves:
- Kaphavatahara – balances Kapha and Vata.
- Arshahara – Useful in piles / haemorrhoids.
- Krumihara – relieves worm infestation.
- Shothahara – relieves inflammation.
- Bhedana – induces diarrhoea, relieves constipation.
- Pittala – increases Pitta.

Fruits:
- Kaphavataghna – balances Kapha and Vata.
- Mehahara – useful in urinary tract disorders and diabetes.
- Arshahara – Useful in piles / haemorrhoids.
- Krumihara – relieves worm infestation.
- Kushtajit – useful in skin diseases, psoriasis.

Economic and Ecological Utility Its oil is also tested for use as bio-diesel. It also attracts butterflies like the Cerulean, Blue Tiger and Common Crow.

Afforestation: Karanj has proved to be a very successful tree for afforestation. Direct seed sowing or planting the saplings during monsoon has shown better survival. Regular over-harvesting of the plant parts for medicinal and other uses has shown some decline in the natural populations. With fossil fuels getting exhausted, Karanj oil is likely to play an important role in the problem of fuel crisis. Hence, Karanj needs a lot of attention for protection of natural populations, conservation and propagation of this beautiful and useful plant.

Research: Research and development of Karanj as a biofuel crop has largely been centred in India, where scientists have been assessing new crops to support sustainable rural development since the 1990's. The plant has attracted research interest due to its reputation as a drought tolerant crop and its traditional use as a source of oil for lamp fuel



Behavioural Observations of the Gray Slender Loris *Loris lyddekerianus*

Swapnil Thatte*, Nivedita Pande*, Satish Karmalkar*, Prashant Deshpande*, Anuprita Deshpande*, Kiran Ghadge*, M. K. Rao[#1], Jeet Singh[#2], Satyajeet Gujar[#3], Chandrakant Gujar[#4], Sadashiv Tadavalekar[#5], Rajan Desai[#6] and Satish Pande*

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Citation: Swapnil Thatte, Nivedita Pande, Satish Karmalkar, Prashant Deshpande, Anuprita Deshpande, Kiran Ghadge, M. K. Rao, Jeet Singh, Satyasheel Gujar, Chandrakant Gujar, Sadashiv Tadavalekar, Rajan Desai and Satish Pande (2015). Behavioural Observations of the Gray Slender Loris *Loris lyddekerianus*. *Ela Journal of Forestry and Wildlife* 4(2):25-30.

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Subject Editor & Referee: Sunil Limaye

INTRODUCTION:

Gray Slender Loris *Loris lyddekerianus*, is an arboreal primate weighing 200 to 300 g. It is a nocturnal mammal found in tropical and subtropical rainforests, evergreen & semi evergreen forests of India & Sri Lanka. It is native to the Western Ghats of India and the geographical distribution of the Gray Slender Loris extends from southern parts of Maharashtra & stretches up to the Nilgiri Mountains and Kerala. Habitat destruction and illegal poaching are the major threats to the existence of this animal. (Prater, 1993; Menon, 1993). In the vernacular Marathi language the Gray Slender Loris is called *Laajavanti* (one who is shy) and *Vanamanav* (Jungle man), *Aadimanav* (Ancient Man).

Status of the Gray Slender Loris:

The Gray Slender Loris is an uncommon mammal included under Schedule I of the Wildlife Protection Act (WPA) 1972. The International Union of Nature

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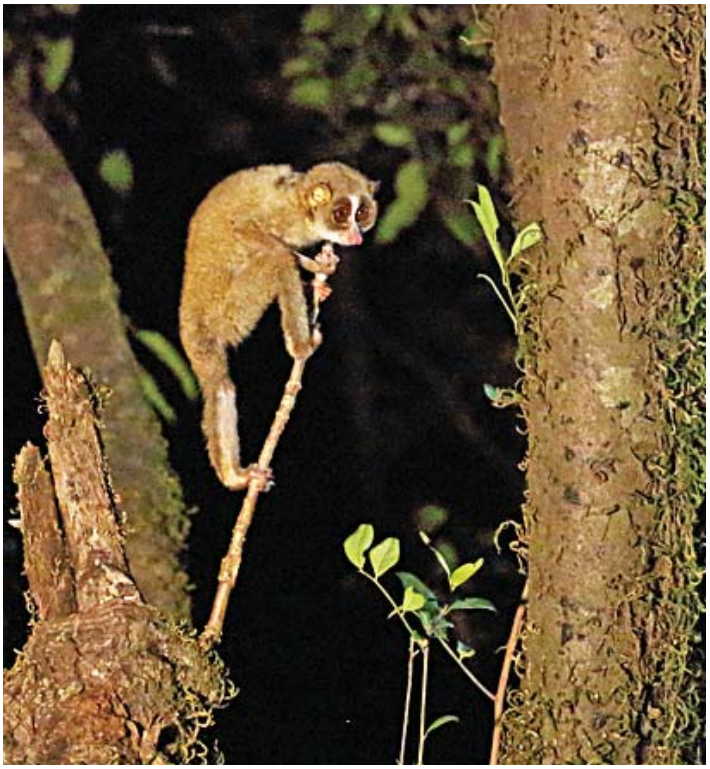

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The loris in the cage shows a small and narrow lower jaw with tiny sharp teeth.

and Natural Resources (IUCN) has declared this species as vulnerable. Convention on International Trade in Endangered Species (CITES) has placed the Gray Slender Loris in Appendix 2. (Traffic Post, 2012).

Observations on rescue and release:

On the night of 4th May, 2015, we were informed that a Gray Slender Loris was seen in the garden of society adjacent a slum on Sinhagad Road in Pune at 11.30 PM. The attention was drawn to this incidence due to a domestic cat that was growling loudly at the Loris but from some distance. In the morning of 5th May 2015, the Loris was taken into custody with the permission of the Forest Department. The weight of the Loris was 220 g and the animal was a male. It was decided to release the animal immediately in its natural habitat. The place of release was shortlisted as Kodali, Tilari Forest, Kolhapur, because there were previous records of sighting of the Gray Slender Loris in the rich evergreen forests of this area. The transit pass was issued and at 0200 PM the rescue team departed for Tilari along with a forest guard. It was heavily raining that day. The due permission of CCF (T) Kolhapur was obtained for the release of the Gray Slender Loris at Tilari. With his full support the onward journey was resumed. Fortunately the rains had diminished. At Ajra, the Loris was fed with geckos & insects. At about 0200 AM in the night we reached Tilari Nagar. The Loris was removed from the cage and was found to be in a healthy condition. At 0315 AM the Loris was released in the wild in the presence of the Forest Department personnel and it immediately climbed a tree and disappeared in the canopy.

Feeding Behaviour:

During the period from rescue to release we made careful observations of this secretive and rare mammal. Not much information exists about this species, hence the observations assume importance. The diet of the Gray Slender Loris generally includes insects, reptiles, small birds, amphibians and fruits. (Prater, 1993). Keeping this in view, in a time period of 19 hours

Time	Date	Cockroach	House Gecko	Papaya fruit	Time to eat
0630-0700 AM	5th May	3	NIL	2 Pieces	2 to 15 min
1200 PM	5th May	3	NIL	2 Pieces	5 to 15 min each
0530-0600 PM	5th May	2	NIL	NIL	2 to 5 min
0100 AM	6th May	NIL	2	NIL	20 min each
0200 AM	6th May	NIL	1	NIL	20 min
Total		8	3	4	140 min

This primate shows almost human expressions and is unfortunately in demand as a pet.

It walks on the branches in a quadruped manner. It never jumps.

the Loris rescued by us was fed with Cockroaches (*Periplanata americana*) (n=8), Common House Gecko (*Hemidactylus frenatus)* (n=2) and papaya fruit (n=4 small pieces). These were consumed by the Loris without any reservations. The observations are recorded in a tabular form as follows:

The Loris has long slender upper and lower limbs. It has a reddish-brown-silvery soft to woolly fur on the body and a dark face mask with a central pale stripe. The teeth are tiny, pointed and sharp. The snout is longish and it is frequently used for smelling. The great toe opposes the other four toes and can effectively take a pincer grip on branches or on various food items. Being a primate, it had a complete control over the fruit pieces, cockroach and the gecko, owing to the presence of the thumb and bulbous enlargements at the terminal phalanges. The Loris grasped the cage wires or branche sof trees with the toes of both the legs while simultaneously using one or both hands for eating.

When the Loris was offered a live gecko in the rescue cage it quickly caught it with agility, held it firmly and grasped the gecko in the fist. It started eating the gecko in the manner akin to how we eat a biscuit and started eating it from the cranial side. It took 20 minutes for it to eat the head. The Loris was frequently biting on the head of the gecko, probably for crushing the cranium, before eating the pulpy flesh and brain. The cockroaches were eaten effortlessly. The Loris ate only live cockroaches and refused to eat a dead cockroach. When a live cockroach was released in the cage in which the Loris was kept, surprisingly, this slow moving mammal reacted immediately and quickly caught it with its agile fingers. It moved in the cage when the cage was briefly left uncovered. As soon as the cage was covered with cloth, it stopped moving and slept curled up in a ball with both eyes closed..

Climbing Behaviour:

When the Loris was taken out of the cage and released in the wild, we observed that while moving on a tree it used the toes and fingers to grasp the small branches and moved to the more distal and thinner branches. It also swung on the slim branches with the branch grasped in its fists and slowly lifted the legs to grasp the branch when needed. It also walked over the branches with all four limbs for support in a quadruped manner. With the assistance of its arms it swung from one slender branch to another adjacent branch, swiftly and safely. It always looked around and remained motionless when there was any noise.

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The Loris is seen eating a gecko.

Three other Gray Slender Lorises rescued at Mumbai by the enforcement agency. Two animals can be seen sleeping characteristickly in the curled-up position. Loris 1: Female 228 g; Loris 2: Female 248 g; Loris 3: Male 256 g.

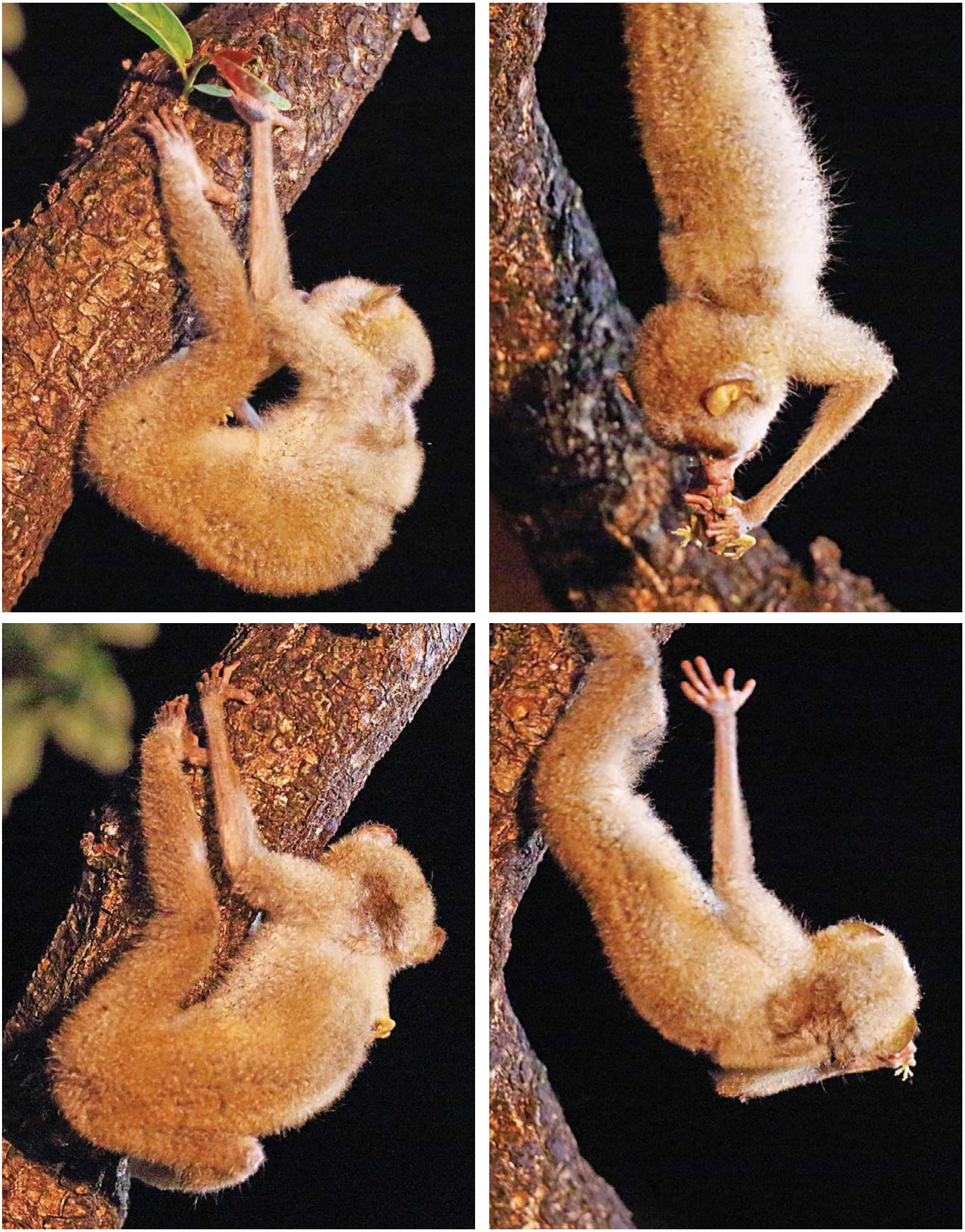
Recent and previous rescues, release and need for conservation education:

1. One Gray Slender Loris rescued from Pune was released at Kodali, Patne, Chandgad, Kolhapur on 5th May 2015.
2. Three Gray Slender Loris individuals were confiscated and rescued at Chhaptrapati Shivaji International Airport, Mumbai and were released on 8th December 2015 in the forest at Waghotre, Chandgad, Kolhapur in December 2014. One of the released Loris was found dead the next day. It was subjected to taxidermy after due permissions were taken from the appropriate forest authorities and the specimen is now at SGNP, Mumbai, and will be shifted to the NIC at Patne, Tal. Chandgad. The other two animals were successfully released.
3. One Gray Slender Loris was rescued near Kolhapur and released in Chandgad forest in 2008.

The above observations indicate that clandestine trade in Gray Slender Loris is ongoing in our region. The need for education and creating conservation awareness is important. This can be done with the help of brochures for educational purposes to ensure the long term conservation of this species.

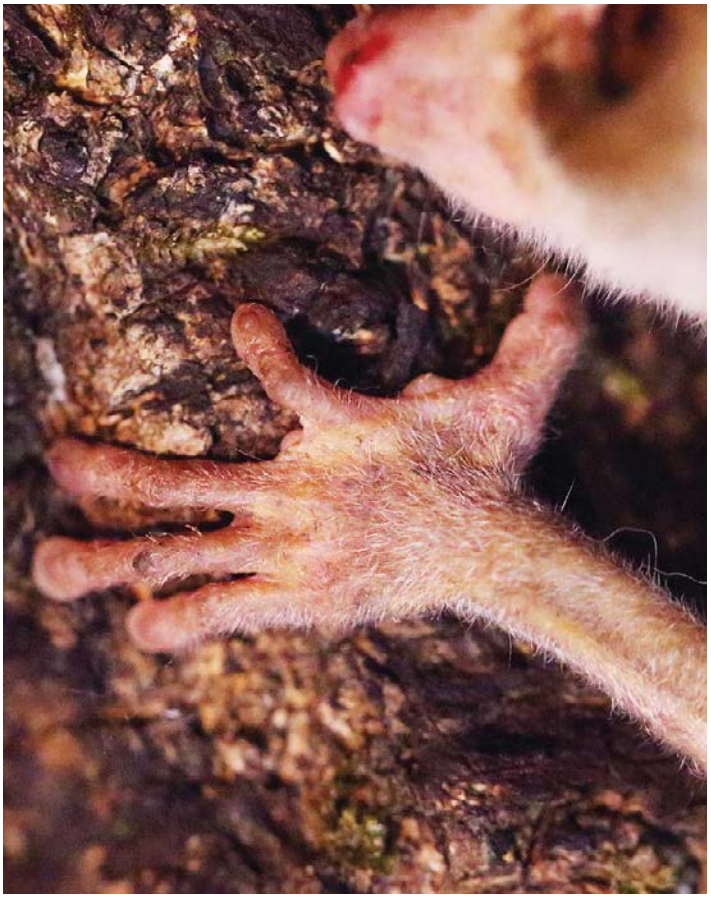
Frequent awareness programs involving local people from the Kolhapur and Sindhudurga districts, where the Gray Slender Loris naturally occurs in the forests of Maharashtra, are of utmost importance.

A short documentary on this species can serve the conservation purpose very well.



A rare photographic depiction of the balancing act of the Gray Slender Loris. During this maneuvering it has not lost its grip on the prey. The series is shown clockwise.

The ear is rounded, yellowish and the upper margin has sparse hair.



The second finger and the second toe are short. The tips of all the fingers and toes are bulbous and the nails are small, except of the seond toe, which is elongated and curved. It is called the 'toilet claw' and is used for grooming.

Durga and the Tiger

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'*Durga*' is the name of a goddess who is the consort of lord *Shiva*. The word '*Durga*' literally means one who is invincible.

Tiger : In Sanskrit language the tiger is called '*vyaghra*'. The analysis of etymology of the word '*vyaghra*' is interesting.

"*vyaghro vyaghranaat |*
vyaadaaya hanta iti vaa |"
('Nirukta'. Chapter 3)[1]

The stanza means that the '*vyaghra* is known for its keen sense of smell.'

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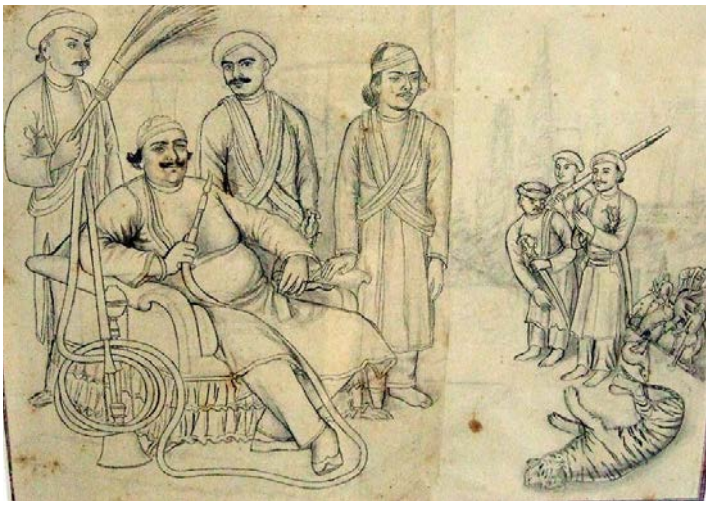
Amba riding a tiger - Raja Dinkar Kelkar Museum, Pune.



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Tiger hunt - painting - Bharat Kala Bhavan, Varanasi

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Goddess Durga riding a tiger and accompanied by her eight divine powers - National Museum, New Delhi

The tigers use the acute sense of smell more for intra-specific communication than for hunting. Such uses could be for establishing territorial ownership or during pairing and courtship. It is obvious that our ancestors have observed the unique behavior of tigers, though they may not be aware of the anatomical details regarding the size of the olfactory lobe in the tiger's brain.

The references to the tiger are found from the Vedic period. An archeological evidence from Chandoli (Maharashtra) shows a vase shaped as a tiger and it dates back to 1200-1500 BCE.

Generally, the tiger is believed to be the carrier vehicle of goddess like *Chandraghanta*, *Kushmanda*, *Amba* and *Padmavati* who are the symbols of strength. The tiger is worshipped by some Indian families. Hence, the tiger is the family deity of many tribal communities in India.[2]

In Maharashtra, along the forested tracts of the Sahyadri mountains, one can still see several small temples of the deity called '*Waghjai*' (the tiger goddess), and probably indicate the places where tigers were regularly sighted. Many such temples that were once in forested areas are now on the edge of human habitations, if not surrounded by them. This indicates the effect of habitat encroachment leaving ever-diminishing forested tracts necessary for the very existence of the great hunter of the forests.

I feel that the correlation of *Durga* and the tiger not only symbolizes strength but it also symbolizes the importance of control exercised by divinity on the use of immense power available to it. Traditionally, these cultural and spiritual aspects no doubt contributed in tiger conservation in India.

Eventually, it is evident, that the feeling of respect of the indigenous communities towards the tiger was overpowered by several reasons and was negatively influenced by cultural influences from outside India as well. Various aspects contributed to tiger decline over the past century. These were hunting for valor during the pre-independence period which took a great toll on tiger population till the formulation of the Indian Wildlife Protection Act (1972); use of tiger parts in certain *tantric* and black magic recipes, intolerance, destruction of habitats suitable for the tiger, increasing human population and other selfish interests such as trade led to increased poaching and diminishing tiger populations, driving the tigers to the brink of extinction.

The revival of ancient wisdom, re-evoking a sense of respect that was once deeply imbibed in our culture and meaningful interpretation of traditions will enhance the efforts of the forest department and several other organizations to effectively promote tiger conservation in India.

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Laila with her friend - National Museum, New Delhi

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Painting from National Museum, New Delhi

Orienting Using Astronomy Using the Sun

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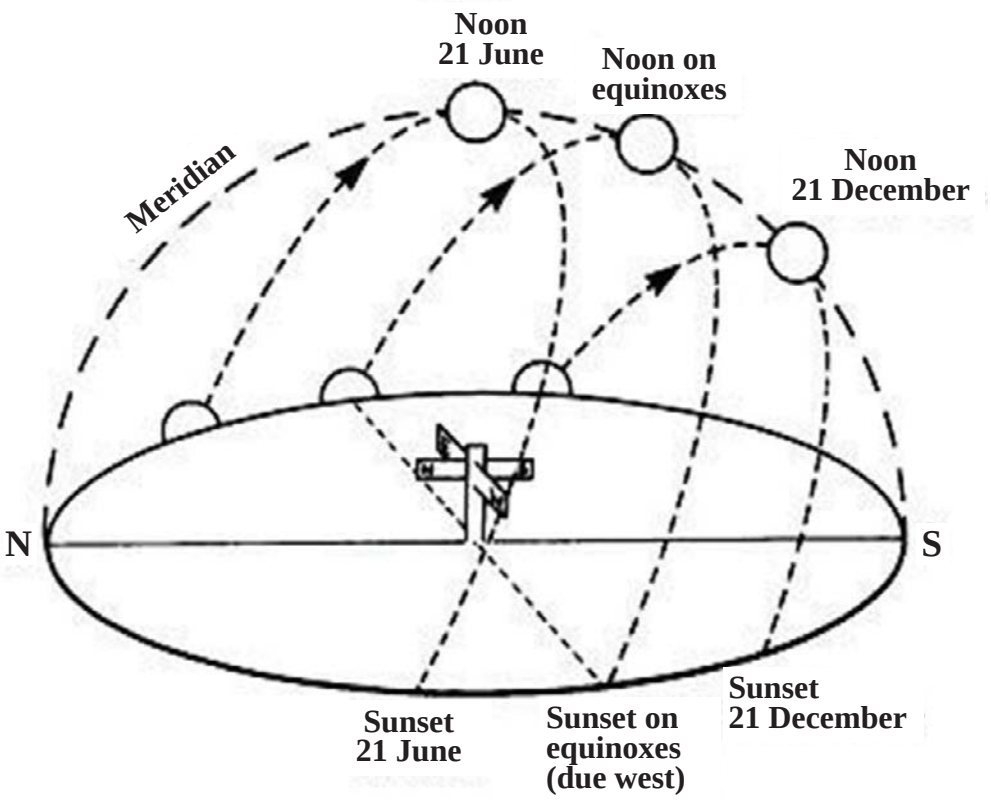
Many of us go rambling for sport, but some of us are required to go exploring as a part of our professional requirements. Many professions including foresters, prospectors, geologists, archeologists or wildlife experts are working in the wilderness, away from civilization, for extended periods of time. Whether for sport or professional purposes, exploring requires us to move around in unknown terrain. One may not always have state of the art gadgets like GPS in the bag. There is a fear of getting lost. People who are lost are known to move around in circles, or at least not in a straight line.

Today, with high technology available in our pockets, it is not easy to get lost, however in remote areas, the signals may be weak, or the batteries may be dead.



It is under such extreme situations, that orienteering becomes a matter of life and death. Basic knowledge of astronomy then becomes a tool of survival and it is quite reliable, primarily because astronomical objects have been around for millions of years and are known to be completely dependable. But only to those who know how to use them.

The Sun, the Moon and the stars can enable anyone to know important pieces of information such

- **Direction**
- **Time**

In the first part of this series we shall consider how to use the Sun as a beacon to find and ascertain directions. Our observations pertain to India, especially Maharashtra. Roughly speaking the Sun rises in the east and sets in the west, but not always exactly to the east or west. In summer, it is north of east or west and in winter a little more southerly. There are a few trustworthy methods of using the Sun for orientation.

Method 1: Using a stick

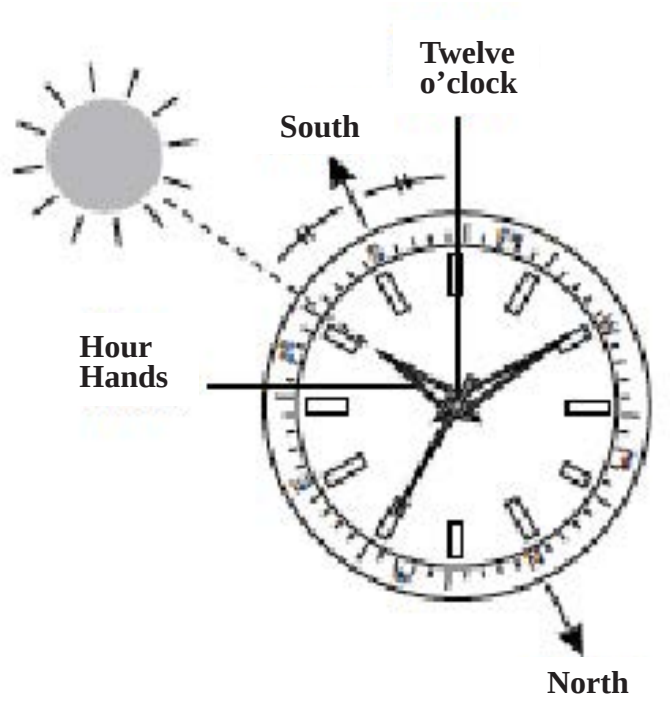
In its daily movement from east to west the Sun does not go directly overhead, but takes a path as shown in Figure 1. Thus the shadow of any object traces a path that moves clockwise in India for most part of the year. If you are stationary at a point for some part of the day, then you can use the movement of the shadow to define the cardinal directions as shown in Figure 2. Mark the shadows, say every hour, and after a few hours, draw a large arc with the stick as centre. Join the points where the arc cuts the two longest lines by a straight line. This will be the east-west line. A line perpendicular to this will be north-south.

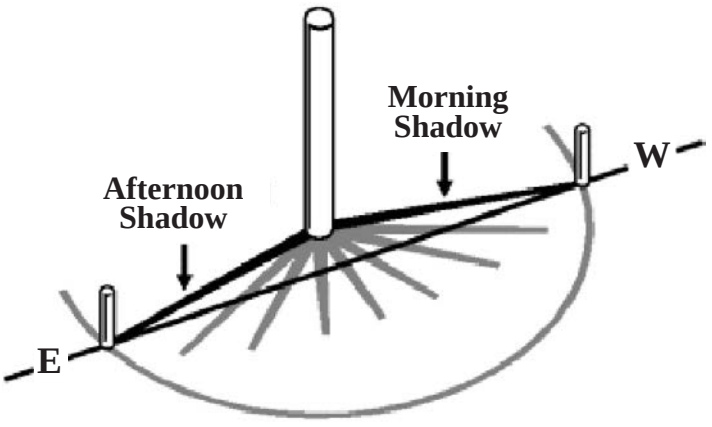
Method 2: Using an analog watch

You can use an analog watch to show directions too. If you align the hour hand to the direction of the sun, by using the shadow of a vertical body such as a stake, a pole or the edge of a building or a tower or just a stick held vertically. The line that divides the angle between the hour and 12 o'clock position shows the north-south line. From movement of the Sun, you will know whether it is north or south. The Sun always moves from east to west. See figure 3.

If you don't have an analog watch, but a digital one, or even a watch on the mobile, then use a simple circle with twelve divisions. Align the shadow to the position where the hour hand would have been on an analog watch. The bisector of the angle between the shadow and the 12 o'clock position is your N-S line.

Note: If one is in a dense forest, one can still use the sun, but for that, one has to locate a small forest clearing. If this is not possible, there are other was of orientation.





(All diagrams are taken from free internet sources.)

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