



Index

- Editorial: Managing Man
- Status of Red Junglefowl *Gallus gallus* in Katarniaghat Wildlife Sanctuary, Uttar Pradesh, India
Ahmad Masood Khan and Satish Kumar 89
- Notes on the Feeding and Drinking Behaviour of a Female Great Indian Bustard *Ardeotis nigriceps*
R.V. Hippargi, P.M. Bolde, A.M. Bolde 96
- Subabhul *Leucaena leucocephala* plantations on private land and possibilities of using high return tree species after genetic improvement as an agriculture crop: Case study in Tapi district [part II]
Madhav Gogate 101
- Smooth-coated Otter *Lutrogale perspicillata* (Geoffroy Saint-Hilaire, 1826): Recent Record near Pune, Maharashtra
Pallavi Shivalkar 106
- Mammal Species in Patan Tehsil, Satara, Western Maharashtra
Vaibhav Sankpal 109
- Snake in Sanskrit Literature and Indian Culture: An Ethno-biological Interpretation
Suruchi Pande 115
- Korku Names for birds in Melghat Tiger Reserve, Maharashtra
Raju Kasambe, Jayant Wadatar & Gajanan Wagh 121
- Orienting Using Astronomy: Using the Moon
Mujtaba Lokhandwala 125
- Recent Sightings of Partial Albino White Throated Kingfisher, Laggar Falcon and Lesser Kestrel in Western Maharashtra
Swapnil Kiran Thatte 126
- Recent Sighting of Forest Owlet *Heteroglaux blewitti* in Maharashtra
Prateik Kulkarni, Siddhesh Maldikar 129
- Recent Sighting of Orange-breasted Green Pigeon *Treron bicinctus* in Maharashtra
Akshay R. Khare, Swapnil Kiran Thatte 130
- Recent Sighting of Masked Booby *Sula dactylatra* in Maharashtra
Akshay Khare 131
- Recent sighting of Black Stork *Ciconia nigra* in Pune
Rohan Joglekar and Atharva Bahirat 132
- Recent Sighting of Spinner Dolphin *Stenella longirostris* and Indo-Pacific Humpbacked Dolphin *Sousa chinensis* in the Arabian Sea at Rewas, Alibag, Maharashtra
Satish Pande and Sudip Mahajan 133



Managing Man

Dr. Satish Pande

Man has irreversibly and rapidly altered the world to suit his requirements. In this process he has found several species of animals and plants to be unsuitable and troublesome for the advancements of his desires and comfort. He has cleared large tracts of tropical evergreen forests to accommodate his agricultural and industrial demands in view of exponentially increasing human population without knowing and caring for the consequences that may have far reaching adverse effects on his very existence, not presently cognizable.

Every exponential growth should eventually stabilize and the real question is when the human population growth will do so. In the hunter gatherer stage, about forty acres of land could have supported a small human family only, who may have met their demands of food through hunting and collecting from there. When man introduced agriculture in Asia about ten thousand years ago, the same area of land could accommodate one thousand more people. This increased the pressure on the natural resources thousand folds and this rising population trend has alarmingly increased exponentially over the past ten thousand years. Today, increasing population, industrialization, agriculture, urbanization and energy demands have made conservation of natural resources an almost impossible task.

The species associated with and totally dependent on undisturbed natural resources including plant and animal communities, soil characters and climatic conditions are at a high risk when we alter our environment on a large scale. Each species plays the invisible role of supporting other members of the community through its very existence and the niche that it occupies. The communities also play similar roles on a wider scale. The mutual restraint exerted by the communities on one another, as well as by environmental pressures, usually maintain the populations of each species in a delicate state of equilibrium. Human disturbance usually occurs on an enormous scale and this tilts the community structure in a manner unfavorable to other communities except to man. We do not realize that this chaotic state can offer only short term benefits.

It is now known that natural communities tend to be more stable and the successions of communities and ecosystems created as a result of human interference tend to be volatile. Man is not only altering the quality of his environment but is also modifying the genetic quality and diversity of the various ecological components by introducing new cultivars and species. The newer ecosystems are loaded with fertilizers, pesticides, sewage, chemicals, metal fragments, toxic waste, plastic, rubber, electronic garbage, atomic waste, emerging pathogens and various other exotic components and this makes the modern ecosystem unsuitable for most species.

The soil in the temperate regions has far more nitrogen and carbon levels that the soils in tropical regions where

these nutrients are trapped in vegetation. If vast tracts of evergreen tropical vegetation are clear felled, as is happening in many parts of our tropics, the impoverished soil can neither support agriculture nor Wildlife for an extended period of time and the nutrient run off due to heavy tropical rains and subsequent soil erosion eventually changes the landscape to barren areas in a few years. The temperate soils, in comparison, have relatively more resilience. We are directly concerned with the fragile tropical ecosystems, because we live there.

The only hope of saving our natural wealth, which is already impoverished through extinction of several species and putting several others on the brink of extinction, is by the stabilization of the economic growth, which alone will put a brake on population rise. Europe is already experiencing an economic slowdown, the oil shortage is looming on the horizon, power shortage is already troubling us, temperate and Polar Regions are witnessing consequences of earth warming, but we need to accept these stark realities and redraw our future road map in a restrained and realistic manner, not over zealously nor over ambitiously. The new thought process should pay more attention to local improvement that focuses on quality of life and not merely gathering more profits at any cost. Only if this focus is clear will our ecology have any hope. Only with a stabilized population growth rate will the Wildlife manager succeed in managing Wildlife, and protecting and conserving natural wealth because the management of our ecosystems depends more on the management of man than on the management of flora and fauna.

In this issue of the 'Ela Journal of Forestry and Wildlife' we have communications about the glimpses of otters surviving in polluted urban rivers near Pune metropolis and the records of dolphins in off shore pelagic waters near the mega polis of Mumbai. These sightings give us a ray of hope. But, this could be the last opportunity available to us. These glimpses assert the fact that microhabitats as well as macro habitats should be protected if Wildlife has to survive, that species try to adapt to unfavorable and trying conditions, but they may have already overstretched their limits. On the other hand we have an insight on the threats faced by the Red Junglefowl, the ancestor of our poultry, highlighting the importance of the protected areas. The section on ethno-biology speaks about the avenues of communicating with common man to make him a key player in the conservation efforts. Today all Wildlife exists on the mercy of man. Only a sincere and Herculean effort by a sensitized and knowledgeable common man and policy makers and a political will, not blurred by individual benefits, focused on the distant future, and bridled by a sense of obligation towards animate and inanimate nature, can be our last hope.

Status of Red Junglefowl *Gallus gallus* in Katarniaghat Wildlife Sanctuary, Uttar Pradesh, India

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ABSTRACT:

There is no data on the population of Red Junglefowl (*Gallus gallus*) both in protected and unprotected areas in India despite the fact that the species is widely distributed. We investigated the population status of Red Junglefowl using line transect sampling method in six different habitat types of Katarniaghat Wildlife Sanctuary (KWS). Thirteen transects each of 2 km length were laid throughout the 400.09 Km² study area to cover all habitat types. Data collection was carried out for one year in winter, summer, pre-monsoon and post monsoon seasons during 2013-2014. We found significant differences in density estimate, encounter rate, group size and sex-ratio of Red Junglefowl in six habitat types and across seasons. Higher density estimates were obtained from Sal forest (76.89 ± 11.64 individuals/Km²) followed by mixed forest (60.50



An old male Red Junglefowl, as can be seen from size of its spurs, is walking cautiously on the road in the Sal forest.

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± 8.52 individuals/Km²). These forest types are also subjected to different anthropogenic pressures such as livestock grazing, non-wood forest product collection and tourism. We recommend that conservation efforts should be initiated around these forest habitats of KWS to protect the Red Junglefowl. Our results indicate that KWS holds a viable population of Red Junglefowl and serve as a source population for the species thereby increasing its conservation significance.

KEYWORDS:

Red Junglefowl, distance sampling, density, group size, India

INTRODUCTION:

Preliminary information on population status, spatio-temporal variation in abundance and habitat matrix is essential for conservation and management of a species. Galliformes are one of India's most conspicuous and best known bird groups. The large galliform species, particularly the pheasants, are well known in India. The Red Junglefowl (*Gallus gallus*) is a tropical member of the pheasant family. It is widely distributed in India and its five subspecies are spread from the Indian subcontinent eastwards across Myanmar, South China, Indonesia to Java (Johnsgard, 1986). There are two subspecies of Red Junglefowl in India, the type specimen, *Gallus gallus murghii* and *Gallus gallus spadiceus* (Ali and Ripley, 1983). While the former is found in the north and central part of India, extending eastwards to Orissa and West Bengal, the latter is confined to the north eastern parts of India (Fernades *et al.*, 2007). It is listed in Schedule IV of the Indian Wildlife (Protection) Act, 1972 and has also been categorized as Least Concern (LC) by the IUCN, due to its widespread distribution in India. The species' range across India is now highly fragmented due to agricultural encroachment and other developmental activities (Kaul and Garson, 1993).

BirdLife International (2012) has described a number of factors resulting in worldwide decreasing population trend of Red Junglefowl. It is believed that the genome of Red Junglefowl in India has been contaminated due to its hybridization with Domestic chicken (*Gallus domesticus*). However, the extent to which contamination of its genome has occurred is not known till date. The species population is declining owing to habitat loss, its degradation and over-hunting for consumption almost all over its distributional range in India (Birdlife International, 2012; del Hoyo *et al.*, 1994). The present study aimed to examine habitat-wise and temporal patterns of distribution and abundance of Red Junglefowl in Katerniaghat Wildlife Sanctuary to help develop a long-term conservation and management of the species.

STUDY AREA:

The Katerniaghat Wildlife Sanctuary (henceforth referred as KWS) is very rich in avian diversity owing to the variety and variability of habitat types. It is located in the Nanpara *tehsil* of district Bahraich, Uttar Pradesh. The northern boundary of KWS lies along Indo-Nepal border. It covers an area of 400.09 Km² and is situated between 28°06' N and 28°24' N latitudes and 81°02' E and 81°19' E longitudes. The forest was declared a Wildlife Sanctuary vide Govt. of Uttar Pradesh notification no. 388/14-3-32/1976 dated May 31, 1976. The Sanctuary together with adjoining 150.02 Km² of reserve forest, which serves as buffer, constitutes a single ecological unit.

The area experiences three distinct seasons: winter (November to February), summer (April to June) and monsoon (July to September). The mean minimum and maximum temperature varies from 8 °C to 22 °C in January to 27 °C to 40 °C in May - June. The annual rainfall varies from 36 to 142 mm in winter, 34 to 662 mm in summer and 1294 to 1689 mm in monsoon seasons (Bajpai *et al.*, 2012).

It is one of the few remnants of the rich and diverse 'Terai' ecosystems, having connectivity with Royal Bardia National Park in Nepal which lies to the north and Dudhwa National Park, which lies to the west of the sanctuary. KWS is one of the most significant representatives of highly rich, diverse and fragile Terai ecosystems (Kumar *et al.*, 2011).

The Sanctuary is rich in floral diversity with 95 tree species, 57 shrubs, 28 climbers and 23 species of grasses (Management Plan of Katerniaghat Wildlife Sanctuary, 2000). The main tree species include Sal (*Shorea robusta*), Asna (*Terminalia alata*), Shisham (*Dalbergia sissoo*), Bel (*Aegle marmelos*), Kusum (*Schleichera oleosa*), Semal (*Bombax ceiba*), Rohini (*Mallotus philippinensis*), Khair (*Acacia catechu*) and *Ficus spp.* The dominant shrub species are *Glycosmis pentaphylla*, *Murraya paniculata*, *Clerodendron viscosum*. The main grass species occurring in the area are Kaans (*Saccharum spontaneum*) and Moonj (*Saccharum munja*) and *Calamus spp.* (Tripathi and Singh, 2009).

Owing to a mosaic pattern of vegetation composition, the Sanctuary has a great floral and habitat diversity. As a result, the faunal diversity is also high. Along with Tiger (*Panthera tigris*), the Sanctuary has five species of deer, namely Chital (*Cervus axis*), Hogdeer (*Cervus porcinus*), Sambar (*Cervus unicolor*), Barking deer (*Muntiacus muntjak*), and the critically threatened Swamp deer (*Cervus duvacelii duvacelii*).

METHODS:

Line transect method (Anderson *et al.*, 1979;

Burnham *et al.*, 1980; Buckland *et al.*, 1993) was used to estimate population of the Red Junglefowl. This method is widely used and found effective in estimating the abundance of galliform species (Trivedi, 1993; Abbasi and Khan, 2004; Sankar *et al.*, 2004; Kidwai *et al.*, 2011). Seasonal data were collected on 13 permanently marked transects of 2 km length each covering six habitat types, namely Sal forest, Mixed forest, Teak forest, Riparian forest, Forest-grassland interface and Village/disturbed forest. Transects were walked fortnightly in a month for one year and data on individual numbers, sex, group size and detection distances of Red Junglefowl were measured using laser range finder (Bushnell Yardage Pro 1000). Density were estimated using DISTANCE 6.0 Release 2 (Thomas *et al.*, 2009). Four key functions (uniform, half-normal hazard rate with cosine series adjustment and half normal with hermite polynomial) were used for analysis. Akaike Information Criterion (AIC) and goodness-of-fit tests were used to judge the fit of the model (Burnham *et al.*, 1980; Buckland *et al.*, 1993). Using the selected model, estimates of half strip width (μ) expressed in metres, encounter rate (n/L) expressed

as the number of groups/km walk, mean group size (GS) and individual density (D_i) expressed as number of individuals/km² were calculated.

RESULTS:

Density estimates

The overall density of Red Junglefowl during the study period (2013-2014) at KWS was 52.62 ± 4.87 individuals/Km² (Table 1). Seasonal density ranged widely from 42.79 ± 9.16 individuals/Km² in summer to 62.84 ± 11.20 individuals/Km² in pre-monsoon (Table 1). It was observed that density of Red Junglefowl showed declining trend during summer season and an increase during monsoon. The density of Red Junglefowl in the six habitats varied from 22.19 ± 3.93 individuals/Km² in Riparian habitat to 76.89 ± 11.64 individuals/Km² in Sal forests (Table 2). The density of Red Junglefowl was higher (individuals/Km²) in Sal forests when compared to Teak, Mixed, Riparian, forest-grassland interface and Village/disturbed forests. It was interesting to observe that density of Red Junglefowl in Village/disturbed forests was higher in comparison to Teak and Riparian habitat (Table 2).

Table 1. Density estimates ($\pm$ SE), effective strip width (ESW $\pm$ SE), mean group size ($\pm$ SE), and encounter rate of Red Junglefowl across four seasons within the Katarniaghat Wildlife Sanctuary

Season	Density/Km ²	Transect monitoring	Effective strip width (m)	Mean group size/Km ²	Encounter rate/km walk
Winter	45.91 ± 8.56	78	14.39 ± 1.69	2.40 ± 0.16	0.55
Summer	42.79 ± 9.16	78	19.29 ± 1.89	2.30 ± 0.18	0.72
Pre-monsoon	62.84 ± 11.20	52	18.05 ± 1.61	2.36 ± 0.19	0.96
Post-monsoon	46.64 ± 8.50	52	15.82 ± 1.82	2.29 ± 0.27	0.64
Overall	52.62 ± 4.87	260	15.96 ± 0.61	2.39 ± 0.09	0.70

Table 2. Density estimates ($\pm$ SE), mean group size ($\pm$ SE), and encounter rate of Red Junglefowl across six habitat types within the Katarniaghat Wildlife Sanctuary

Habitat	Density/Km ²	Mean group size/Km ²	Encounter rate/km walk
Forest-grassland interface	57.52 ± 21.59	2.27 ± 0.30	0.65
Mixed forest	60.50 ± 8.52	2.25 ± 0.15	0.93
Riparian forest	22.19 ± 3.93	2.00 ± 0.25	0.38
Sal Forest	76.89 ± 11.64	2.75 ± 0.18	0.89
Teak forest	26.55 ± 6.65	2.50 ± 0.40	0.48
Village/disturbed forest	49.14 ± 13.43	3.56 ± 0.65	0.40

Effective strip width

The overall estimated effective strip width (μ) was 15.96 ± 0.61 m (Fig 1). However, the best selected model to fit the Red Junglefowl data for each season suggested that μ did not vary across seasons. The estimated μ ranged from 14.39 ± 1.69 m in winter to 19.29 ± 1.89 m in summer season (Table 1).

Encounter rate

The encounter rate of Red Junglefowl during the study period at KWS was 0.70 individuals/km walk. The highest (0.96 individuals/km walk) encounter rate was recorded during pre-monsoon whereas low encounter rate (0.55 individuals/km walk) was obtained in winter season (Table 1). The overall encounter rate ranged between 0.93 individuals/km walk in mixed habitat and 0.38 individuals/km walk in Riparian habitat (Table 2).

Group size

The maximum number of Red Junglefowl recorded in a sighting was 11 individuals and the minimum 1 individual among all sightings recorded on transects and the mean group size was estimated as 2.39 ± 0.09 individuals/Km². Group size of Red Junglefowl varied from 2.40 ± 0.16 individuals/Km² in winter to 2.29 ± 0.22 individuals/Km² in post monsoon season (Table 1). The mean group size was highest (3.56 ± 0.65 individuals/Km²) in Village/disturbed forests habitat in comparison to other habitat types (Table 2).

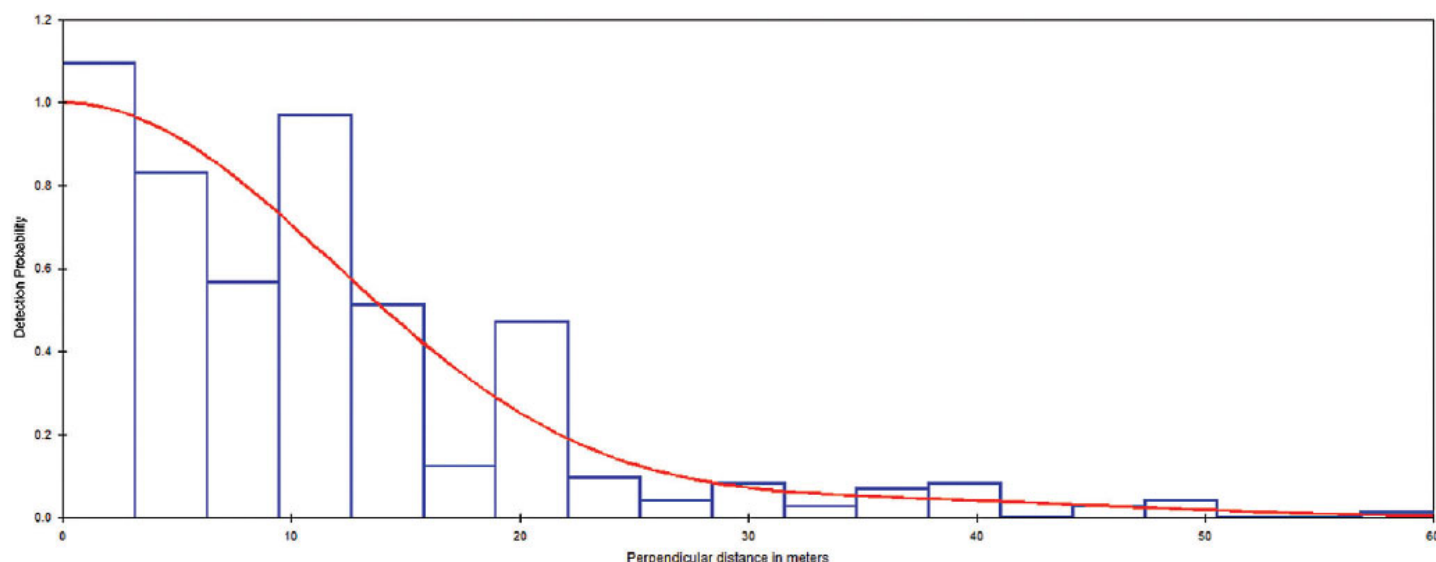


Fig. 1. The best-fit detection function model for the Red Junglefowl for pooled data (all seasons) in Katarniaghat Wildlife Sanctuary

Sex ratio

Estimated male-female sex ratio was 0.8:1 in Katarniaghat Wildlife Sanctuary during study period. The highest male-female sex ratio was found to be 0.9: 1 in summer, which was reduced to 0.7: 1 during post monsoon season (Fig. 2).

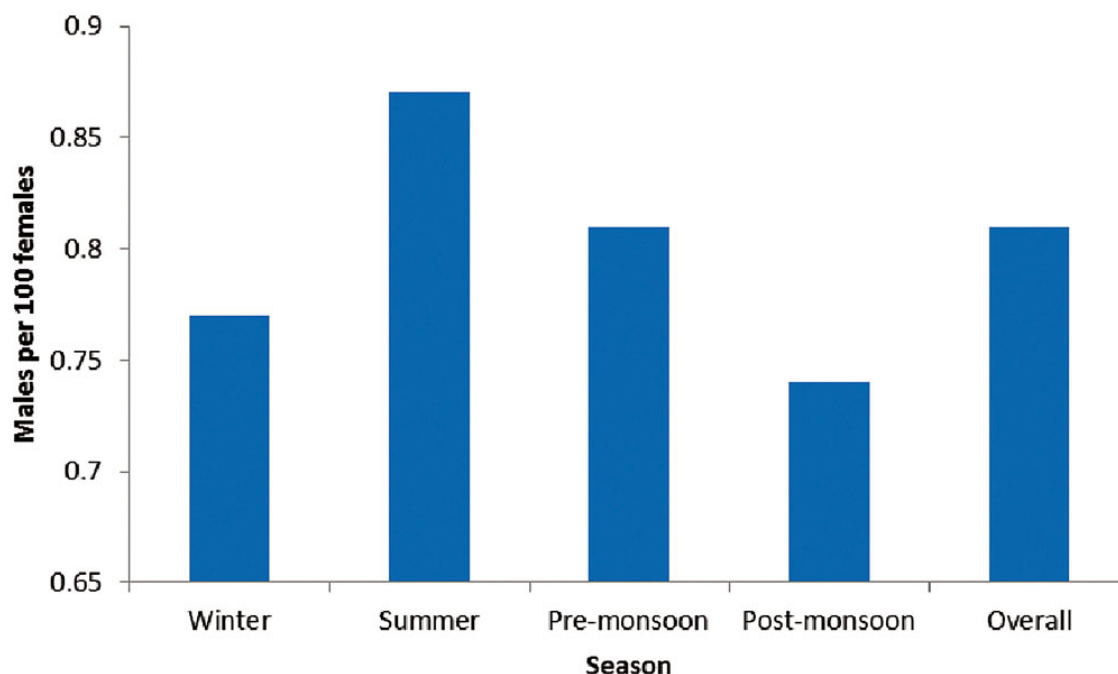


Fig. 2. Sex-ratio (males: 100 females) of Red Junglefowl in Katarniaghat Wildlife Sanctuary

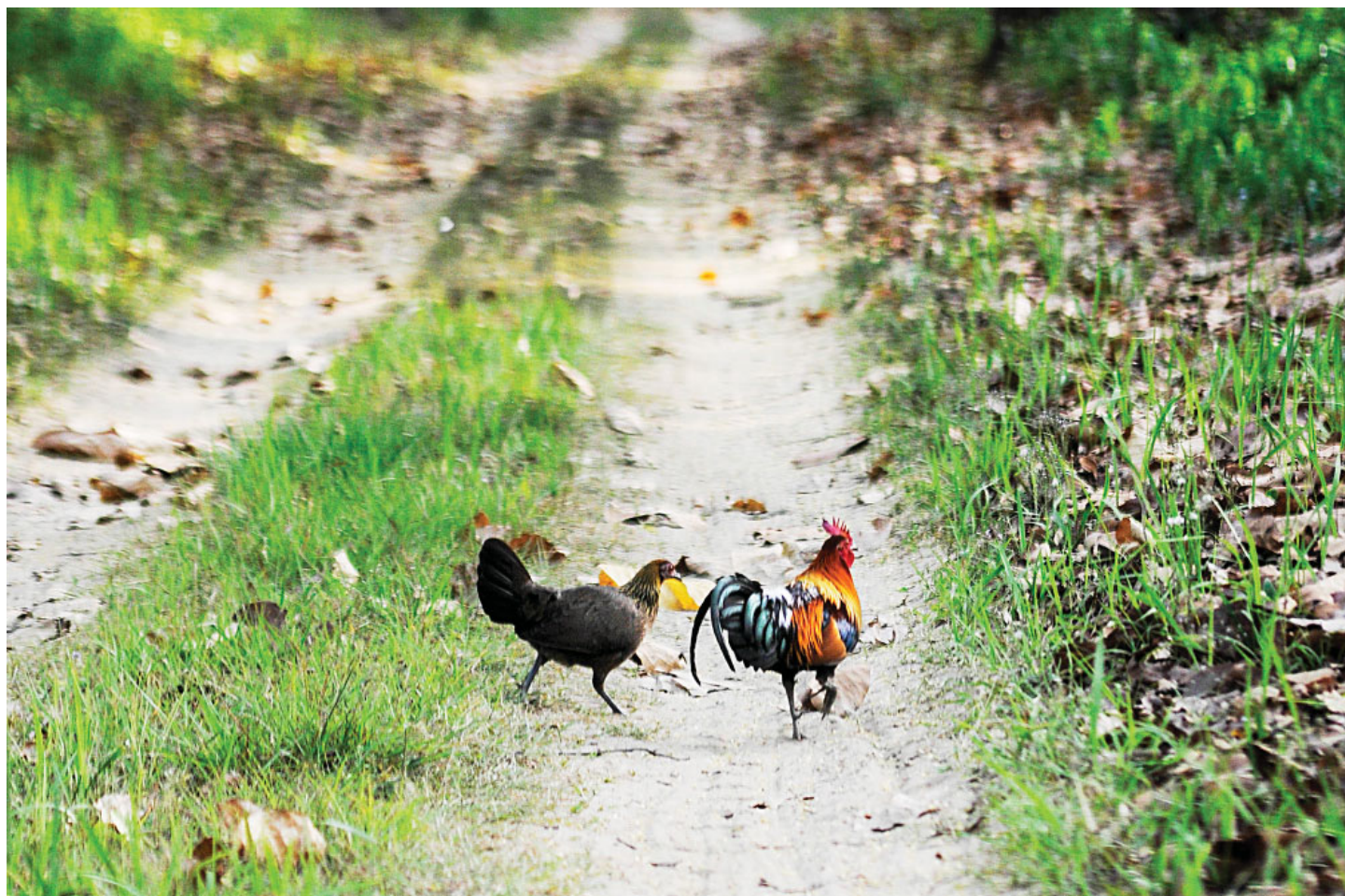
DISCUSSION:

Seasonal density estimates and encounter rate of Red Junglefowl in Katarniaghat Wildlife Sanctuary indicate distinct variations, with the species being more abundant in pre-monsoon and less abundant in winter and summer seasons. Studies on Red Junglefowl (Collias and Collias, 1967; Ali and Ripley, 1983) have indicated that the pre-monsoon season is the post fledgling period for the species and the females become more visible as they come out to feed their chicks. Various studies have also suggested that such variations in population of Red Junglefowl are due to seasonal variations in species detectability (Gaston, 1978; Harihar and Fernandes, 2010; Ramesh *et al.*, 2011).

Habitat-wise variations in density and encounter rate showed that Sal and Mixed forest is supporting the maximum number of Red Junglefowl population in the Sanctuary. Javed and Rahmani (2000) reported that this species prefer Mixed forest in Dudhwa National Park, which has almost similar habitat types as in KWS. According to Collias and Collias (1967) termites and insects are a general and an important seasonal food of Red Junglefowl. We observed a significant number of

termite mounds in Sal and Mixed Forest habitat types at KWS. These two habitats also have good supply of seasonal fruiting trees and shrubs which provide food in all seasons. Most authors have suggested that food resources influence the distribution and selection of particular habitat by the animals (Holmes and Schultz, 1988; Poulin and Lefebvre, 1997; Johnson, 2000; Johnson and Sherry, 2001; Narasimmarajan *et al.*, 2012).

When an animal forages in groups there is an increase in the probability of detecting a predator. Elgar (1989) has referred the density and type of food, competition between individuals, the proximity to both a safe place and the observer, the presence of predators, the visibility within the habitat, the composition of the group, the ambient temperature and the time of day as the major factors influencing vigilance behaviour and group size of animals. Seasonally, no significant difference was observed in group size of Red Junglefowl. However, higher group size was recorded in Village/disturbed forest in Katarniaghat Wildlife Sanctuary. This may probably be because of foraging in large groups to increase the probability of detecting human presence



Red Junglefowl visit roads in Sal forest in search of grains that are sometimes dropped inadvertently by villagers.

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as a large number of hunting bird traps were recovered from nearby villages by us.

Skewed sex ratios are common in wild bird populations, and are probably the result of differential mortality between the sexes rather than skewed offspring sex ratios (Donald, 2007). Various factors such as external environment, social environment and parental quality are responsible for skewed sex ratio favouring the male or the female sex (Sheldon, 1998). According to Javed and Rahmani (2000) females were more in number in comparison to male Red Junglefowl in Dudhwa National Park. Although, Ahmed and Khan (2011) reported higher number of males than females from the same study site; our data support the higher number of females than males in Katarniaghat Wildlife Sanctuary in all seasons, which is similar to the study conducted by Javed and Rahmani (2000) in Dudhwa National Park. Our results indicate that Katarniaghat Wildlife Sanctuary holds viable population of Red Junglefowl and serve as a source population for the species increasing thereby its conservation significance.

REFERENCES:

- Abbasi, F., and Khan, J. A. (2004). Abundance and habitat use of Grey Francolin *Francolinus pondicerianus* in Gursikaran Forest, Aligarh District, Uttar Pradesh, India. Third International Galliformes Symposium, India.
- Ahmed, K and Khan, J. A. (2011). Congregation pattern of Red Junglefowl *Gallus gallus* in Dudhwa National Park, Uttar Pradesh, India. Journal of Bombay Natural History Society, 108: 133-134.
- Ali, S., and Ripley, S. D. (1983). Handbook of the birds of India and Pakistan (compact edition). Oxford University Press and BNHS, Mumbai.
- Anderson, D. R., Laake, J. L., Crain, B. R., and Burnham, K. P. (1979). Guidelines for line transect sampling of biological populations. The Journal of Wildlife Management, 43(1): 70-78.
- Bajpai, O., Kumar, A., Mishra, A.K., Sahu, N., Behera, S.K., and Chaudhary, L.B., (2012). Phenological study of two dominant tree species in tropical moist deciduous forest from the Northern India. International Journal of Botany 8(2): 66-72.
- BirdLife International (2012). *Gallus gallus*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Accessed on 03 March 2015.
- Buckland, S. T., Anderson, D. R., Burnham, K. P., and Laake, J. L. (1993). Distance sampling: estimating abundance of biological populations. Chapman & Hall.
- Burnham, K. P., Anderson, D. R., and Laake, J. L. (1980). Estimation of density from line transect sampling of biological populations. Wildlife monographs, 62(2): 7-202.
- Collias, N.E., and Collias, E.C. (1967) A field study of the Red Junglefowl in North-Central India. The Condor, 69: 360-386.
- del Hoyo, J., Elliott, A., and Sargatal, J. (1994). *Handbook of the Birds of the World, vol. 2: New World Vultures to Guineafowl*. Lynx Edicions, Barcelona, Spain.
- Donald, P. F. (2007). Adult sex ratios in wild bird populations. Ibis, 149(4): 671-692.
- Elgar, M. A. (1989). Predator vigilance and group size in mammals and birds: a critical review of the empirical evidence. Biological Reviews, 64(1): 13-33.
- Fernandes, M., Mukesh, Sathyakumar, S., Kaul, R., Kalsi, R., and Sharma, D. (2007). Conservation of Red Junglefowl *Gallus gallus* in India Paper presented at the 4th International Galliformes Symposium, , Chengdu, China.
- Gaston, A.J. (1978). The seasonal occurrence of birds on the New Delhi ridge. Journal of Bombay Natural History Society, 75: 115-128.
- Harihar, A., and Fernandes, M. (2010). Estimating the seasonal densities of Indian Peafowl *Pavo cristatus* and Red Junglefowl *Gallus gallus* in the northern Indian deciduous forests of Chilla Range, Rajaji National Park. International Journal of Galliformes Conservation, 2: 31-35.
- Holmes, R. T., and Schultz, J. C. (1988). Food availability for forest birds: effects of prey distribution and abundance on bird foraging. Canadian Journal of Zoology, 66(3): 720-728.
- Javed, S., and Rahmani, A. R. (2000). Flocking and habitat use pattern of the Red Junglefowl *Gallus gallus* in Dudhwa National Park, India. Tropical Ecology, 41(1): 11-16.

- Johnsgard, P. A., and Jones, H. (1986). *The pheasants of the world*. New York: Oxford University Press.
- Johnson, M. D. (2000). Evaluation of an arthropod sampling technique for measuring food availability for forest insectivorous birds. *Journal of Field Ornithology*, 71(1): 88-109.
- Johnson, M. D., and Sherry, T. W. (2001). Effects of food availability on the distribution of migratory warblers among habitats in Jamaica. *Journal of Animal Ecology*, 70(4): 546-560.
- Kaul, R., and Garson, P.J. (1993) Present distribution and status of Pheasants in India. In: *Proceedings of the fifth International Symposium on Pheasants in Asia 1992* (ed. D. Jenkins). World Pheasant Association, Reading, U.K. 157 pp.
- Kidwai, Z., Sankar, K., Qureshi, Q., and Khan, J. A. (2011). Abundance and habitat utilization by Galliformes in the Sariska Tiger Reserve, Rajasthan, India. *International Journal of Galliformes Conservation*, 2: 54-60.
- Kumar, A., Bajpai, O., Ashish, K., Mishra, Sahu, N., Soumit K., Behera, L., and Chaudhary, B. (2011). Assessment of Diversity in the Genus *Ficus* L. (Moraceae) of Katarniaghat Wildlife Sanctuary, Uttar Pradesh, India. *American Journal of Plant Sciences*, 2: 78-92.
- Narasimmarajan, K., Barman, B. B., and Puia, L. (2012). Population density and group size of the Grey Junglefowl *Gallus sonneratii* in the Melghat Tiger Reserve, Maharashtra, Central India. *Journal of Threatened Taxa*, 4(7): 2723-2726.
- Poulin, B., and Lefebvre, G. (1997). Estimation of Arthropods Available to Birds: Effect of Trapping Technique, Prey Distribution, and Bird Diet (Estimación de Artrópodos Disponibles Para las Aves: Efectos de la Técnica de Atraparlos, Distribución de Presa, y dieta de las aves). *Journal of Field Ornithology*, 68(3): 426-442.
- Ramesh, N., Sathyanarayana, M. C., and Lloyd, H. (2011). Abundance of grey junglefowl *Gallus sonneratii* at Theni Forest Division, Western Ghats, India: implications for monitoring and conservation. *International Journal of Galliformes Conservation*, 2: 14- 21.
- Sankar, K., Qureshi, Q., Shah, N., Mukherjee, S., and Dave, C. (2004) Monitoring of Gir: A Technical consultancy report submitted to the Gujarat Forest Department under GEF-India eco-development program, Wildlife Institute of India, pages 44–54.
- Sheldon, B. C. (1998). Recent studies of avian sex ratios. *Heredity*, 80(4): 397-402.
- Thomas, L., Laake, J.L., Rexstad, E., Strindberg, S., Marques, F.F.C., Buckland, S.T., Borchers, D.L., Anderson, D.R., Burnham, K.P., Burt, M.L., Hedley, S.L., Pollard, J.H., Bishop, J.R.B., and Marques, T.A. (2009). Distance 6.0. Release 2. Research Unit for Wildlife Population Assessment, University of St. Andrews, UK. <http://www.ruwpa.st-and.ac.uk/distance/>
- Tripathi, K. P., and Singh, B. (2009). Species diversity and vegetation structure across various strata in natural and plantation forests in Katarniaghat Wildlife Sanctuary, north India. *Tropical Ecology* 50(1): 191–200.
- Trivedi, P. (1993) Habitat selection by Indian peafowl (*Pavo cristatus*). M.Sc. Dissertation. Wildlife Institute of India.
- Uttar Pradesh Forest Department (2000). Management Plan for Katarniaghat Wildlife Sanctuary 2000-2010.



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A displaying male Red Junglefowl - courtship behaviour. (Also see page 134)

Notes on the Feeding and Drinking Behaviour of a Female Great Indian Bustard *Ardeotis nigriceps*

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ABSTRACT:

We describe the behaviour of the Great Indian Bustard (*Ardeotis nigriceps*) feeding on the leaves of shrub *Capparis divaricata* and on the hemipteran insect Cicada from grassland habitat near Great Indian Bustard Sanctuary, Nannaj, Solapur. A detailed account on the behaviour while drinking of water is also discussed. The significance of observations is correlated with habitat variables important for protected area management.

INTRODUCTION:

A great deal of research work provides detailed accounts on diet, feeding behaviour and habitat of Great Indian Bustard (Hume & Marshall, 1879; Elliot, 1880; Dharmakumarsinhji, 1957; Ali & Ripley, 1969; Bhushan and Rahmani, 1992). Patil *et al.*, (2013) provide an ethogram of Great Indian Bustard (GIB), which gives an overview of various behaviours exhibited by Great Indian Bustard, including feeding and drinking. According to these studies, food of GIB consisted mostly of locusts, grasshoppers, beetles, crickets, ants, spiders, centipede, scorpions, worms, frogs, lizards, bird eggs, small snakes and mice. Vegetable matter recorded as food included shoots of vegetables, lemon-grass, mustard, wheat, grains of millets, and fruits of *Zizyphus* sp., *Capparis* sp. and *Salvadora* sp. GIB usually assumes a plantigrade sitting posture and drinks water using the principle of suction (Ali & Ripley, 1981-82; Hallager, 1994).

STUDY METHODS:

Study was conducted at selected sites surrounding the Great Indian Bustard Sanctuary, Nannaj. The basic objectives of the study were to record the habitat variables preferred by bustard during various seasons. Direct visual searching was employed using binoculars and camera to search bustards in grasslands and agricultural areas. Notes on food, feeding behaviour, habitat variables etc. were recorded in field note book.

Observations reported in his manuscript are based on our studies held between 5 to 7 May, 2015 during morning hours between 7.30am to 10.30am. The female GIB was mostly traced following clear footprint

(pad) impressions along a soft silt and gravel path near Narotewadi agricultural area. Most of the tracks, as we followed ended at a nearby water source. As it was the peak of summer and the temperature was an average of 44 degree Centigrade, the bird may have come for drinking water on the previous day. With the hope that the bird will turn-up again for drinking water the next day and to confirm for the presence of bustard in the nearby grassland and agricultural habitat we took shelter behind a natural hide and waited patiently for birds reappearance. The vegetation of the area is dominated with sparse thorny shrubs, herbs and tree species adapted to semi-arid conditions. On all three days the behaviour of GIB was recorded meticulously during the act of feeding and drinking with a video camera (Sony: DSC-HX300 with 50x zoom).

RESULTS:

I) Feeding Behaviour:

a) Behaviour While Feeding on Arthropods:

The bustard was observed mostly targeting Cicadas (Hemiptera, Cicadidae) on the bark of shrubs and trees and made successful foraging attempts by intentional searching, pinpointed locating and chasing in a rush to catch the sitting as well as flying cicadas from vegetation. Three



Fig 1: Female Great Indian Bustard (GIB) actively searching and feeding on Cicadas

successful attempts were made with the stretching of neck and body in perpendicular position to grab cicadas located at an approximate height of 4-5 ft. On one instance the bird feasted on a ground web spinning spider, *Hippasa* spp.

b) Behaviour While Feeding on Vegetation:

The bustard, while on its way towards water source, took a sudden turn towards *Capparis divaricata* (Family: *Capparaceae*) and fed on its leaves. This bushy shrub known commonly as



Fig. 2: Female GIB feeding on spider belonging to the family Lycosidae

Spreading Caper has spreading branches, rough bark and stipular straight stout spines. Leaves are short stalked, thick, leathery, linear or elliptic-lance shaped 4 to 6 cm long and 1 to 1.7 cm wide. The bustard could easily pluck the leaves as the height of the shrubs ranged between 3 to 4 feet. We observed the bustard feeding on two *Capparis divaricata* shrubs. The bird took 4 to 5 minutes and made a total of 115 pecks to feed on leaves. Mostly, leaves were consumed half cut and in some instances nearly entire from the base of stalk depending upon birds ability to hold and pull the leaves through the stout and spiny branches.



Fig 3: Female GIB feeding on the leaves of the shrub *Capparis divaricata*



Fig. 4: *Capparis divaricata* leaves consumed by GIB

II) Drinking Behaviour:

The drinking behaviour described here is based on three incidences of drinking water by the same female bustard at the same water source. Observations were made from 5 to 7 May, 2015 between 7.30am to 10.00am and a video camera was used to record the behaviour. GIB drinks water using sucking method as described earlier (Hallager, 1994). Based on our observation we discuss herewith few additional behavioural details of the female GIB while drinking water.

a) Approach towards water source: Out of three incidences, on two occasions the bird approached the water walking and once by flight. Mostly, during summer season the bird feeds during morning hours and drink water after feeding. In one incidence, we could record the bird feeding vigorously on insects and vegetation matter before actually venturing towards the water source. Normally, when the bustard approached the water source, from a distance of approximately 20 to 30 meters it follows a straight path towards water without any stops till it reaches the water's edge. Surprisingly, we never saw the bird in any alert mode during its walk towards water.

b) Pre-drinking Behaviour: Once near the edge of water body the bird becomes wary and takes enough time to look for any possible threats. Then it selects a proper site which allows it to bend in the plantigrade manner preferably on dry or semi-solid clay to avoid wetting its legs. Tarsometatarsi of both legs rest on the ground when the bird fully bends down to drink. Before it takes its first sip of water the bird keeps a constant vigil.

c) Drinking Behaviour: The bustard stretches its neck, immerses tip of the beak in water and starts drinking (sucking) water by a pumping action. The sequence of events while drinking involves: Immersion of beak; pumping in of water by suction; lifting of neck to get

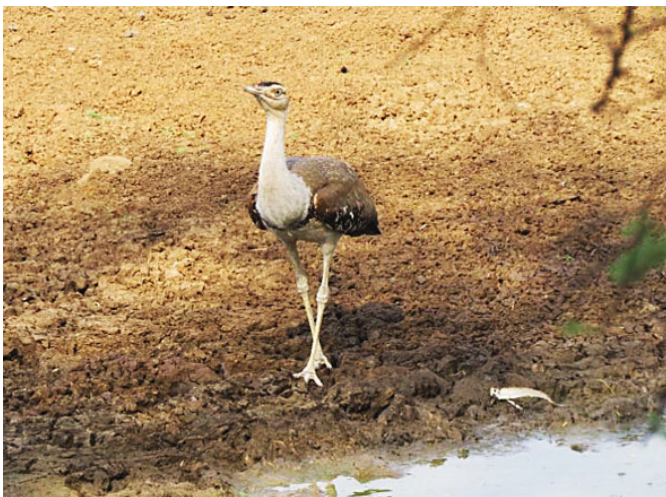


Fig.5: Female GIB approaching the water source



Fig.6: Plantigrade posture of the female GIB while pumping water using suction

water down the oesophagus. Each pumping event has many suction and the bird takes few seconds to scan the area for any possible threat before venturing for the next pumping event. This sequence is repeated again till the thirst is quenched. The average number of times these sequences are repeated along with the time taken during each step are given in the table 1.

d) Post-drinking Behaviour: After completing drinking, the bustard gets up and with an initial pause of a few seconds it slowly moves towards plantation without showing any intent to feed on insects or vegetation matter. Normally, the bustard takes refuge in dense vegetation under the shadow of a shrub or tree.



Fig. 7:-Female GIB after each pumping event takes A pause to scan the area for any possible threat

DISCUSSION:

Our observations of GIB feeding on leaves of *Capparis divaricata* appear to be the first such record because most of the previous records have mentioned the GIBs feeding only on the fruits of *Capparis* sp.



Fig. 8: Post-drinking, the female GIB slowly walks towards dense vegetation

(Dharmakumarsinhji, 1957). Looking at the quantity of leaves ingested by the GIB and time invested during feeding on leaves, *Capparis* sp. proves to be its major food source during the summer. Studies on the distribution of *Capparis* sp. in GIB habitats across India have recorded it as well distributed (Gopal Singh, 2011; Munjpara et al., 2013; Sengar, 2014). Other species of bustards which relish the fruits of *Capparis* sp. include *Ardeotis australis* (Ziembicki, 2009) and *Chlamydotis undulata* (Nadeem et al., 2004).

According to our observations Cicada forms a major food of GIB during the summer season. During summer months (March to May), when the population of Cicada peaks, GIB prefers dense woody vegetation for feeding on them. The female bustard which we studied was found to occupy a dense habitat for more than 45 days. We assume that a combination of factors, such as availability of water, safety, food in the form of Cicadas and *Capparis* sp. as well as the availability of food in the surrounding agricultural habitats may have provided optimal conditions for the female GIB. Feeding on Cicadas was also recorded by us in male bustards during the summer season.

While drinking water GIBs assumed the plantigrade sitting position only and never attempted to drink water in standing position as recorded for the Kori Bustard-*Ardeotis kori* (Hallager, 1994). Like other bustards, GIB also drinks by pumping the water using the suction method.

These observations are valuable in protected area management as they signify the value of habitat variables that determine the distribution of the GIB. The main components of the habitat occupied by female bustard during the summer season included a contiguous stretch of grassland, woodland, traditional agricultural cropland and a safe source of water. *Capparis* sp. constitute an integral part of habitat and

food in many species of bustards like the Australian Bustard, Houbara Bustard and GIB. These observations necessitate further detailed study with respect to the distribution, density and utilization of *Capparis* sp. fruit and leaves as food component by bustards and it is suggested they should be present in the GIB reserve.

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AUTHOR CONTRIBUTIONS:

The details of contribution of work by each author should be given under one or more of the following heads:

1. Original Idea:
Dr.R.V.Hippargi & P.M.Bolde
2. Design of the study:
Dr.R.V.Hippargi & P.M.Bolde
3. Survey and Data collection:
Dr.R.V.Hippargi, P.M.Bolde, A.M.Bolde
4. Laboratory Experimental work:
Dr.R.V.Hippargi & P.M.Bolde
5. Data analysis:
Dr.R.V.Hippargi & P.M.Bolde
6. Manuscript Preparation:
Dr.R.V.Hippargi & P.M.Bolde

REFERENCES:

- Hume, A.O. and Marshall, C.H.T. 1879. *Game Birds of India, Burmah and Ceylon*. Vol.I. 8 Hasting Street, Calcutta.
- Elliot, W. 1880. Notes on the great Indian bustard with special reference to its gular pouch. *Proc. Zool. Soc. London.*: 486-489.
- Dharmakumarsinhji R.S. (1957). Ecological study of the Great Indian Bustard *Ardeotis nigriceps* (Vigors) [Aves : Otididae] in Kathiawar Peninsula, western India. *J. Zool. Soc. India* 9:139-52.
- Ali, S. And Ripley, S.D. 1969. *Handbook of the Birds of India and Pakistan*. Vol. 2. Oxford University Press, Bombay.
- Bhushan B & A.R. Rahmani (1992). "Food and feeding behaviour of the Great Indian Bustard *Ardeotis nigriceps* (Vigors)". *J. Bombay Nat. Hist. Soc.* 89 (1): 27-40.

- Patil P., Rahmani A.R. and Hallager S. (2013). Behavioural Ethogram of the Great Indian Bustard *Ardeotis Nigriceps* (Vigors) 1831. *J. Bombay Nat. Hist. Soc.* 110 (1): 22–34.
- Ali, S. And A. R. Rahmani. 1981-1982. Study of ecology of certain endangered species of wildlife and their habitats. The Great Indian bustard. Ann. Rept. I. Bombay Nat.Hist. Soc.
- Hallager, S.L.(1994). “Drinking methods in two species of bustards”. *Wilson Bull.* 106 (4): 763–764.
- Gopal Singh, H. (2011). Draft management plan for Ranebennur Blackbuck Sanctuary from 2010-2011 to 2014-15, *Karnataka Forest Department Wildlife wing.* 49pp.
- Munjpara S.B., Pandey C.N. and Jethava B. (2013). Habitat use by the Great Indian Bustard *Ardeotis nigriceps* (Gruiformes: Otididae) in breeding and non-breeding seasons in Kachchh, Gujarat, India. *J. of Threatened taxa* 5(2): 3654-3660.
- Sengar, Y. S. (2014). Habitat analysis of Great Indian Bustard and evaluation of grazing pressure in Ghatigaon Bustard Sanctuary. B.Sc. dissertation submitted to H.N.B. Garhwal University, Shrinagar. 30pp.
- Mark Ziembicki (2009). Ecology and Movements of Australian Bustard *Ardeotis Australis* in a Dynamic landscape. Ph.D. thesis Submitted to University of Adelaide, Australia. 296pp.
- Nadeem, M. S., Ali, F., and M. S. Akhtar (2004). Diet of Houbara Bustard *Chlamydotis undulata* in Punjab, Pakistan. *Forktail* Vol.20: 91-93.

Table 1:

Average No. of pumping incidences/ drinking events	Average No. of suctions/pumping event	Average Time taken/pumping (seconds)	Average Time taken in between two pumping events (seconds)	Total Time taken for Drinking in (minutes)
15	10.68	3.24	15.46	7.16



Subabhl *Leucaena leucocephala* plantations on private land and possibilities of using high return tree species after genetic improvement as an agriculture crop: Case study in Tapi district [part II]

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KEY WORDS:

Leucaena leucocephala, tree improvement, hybrids and cultivars, Hawaii / Australia, historical background

ABSTRACT:

Reported multi utility of genus *Leucaena* and tree improvement generated considerable interest amongst the policy makers at international level. This resulted in its introduction and quick spread across the country. Lack of focused introduction resulted in mixed results and the eventual setback. However, its acceptance in paper pulp industry has opened opportunities for inclusion under agro forestry in partnership with the industry. Future genetic improvement within our country and import of suitable cultivars is discussed in this paper.

INTRODUCTION:

In part I of this paper (EJFW dated 30-6-2015) background of 'Subabhl' introduction in India and its acceptance as one of the preferred species by the paper pulp industry, was narrated. Observation on outreach and extension services to farmers in the mill's catchment area and farmer's response were discussed and way forward was indicated. Since 'Subabhl' has an edge over traditional agriculture crops in economic terms, genetic improvement / infusion of inter-species hybrid vigor, was suggested along with a word of caution and detailed study was recommended to critically evaluate such approaches. Editorial end note stated that "prudent resource managers have to take suitable steps, like limited trials, under close supervision, before large scale adoption of such exotics; alternative indigenous plants that may potentially have an equal or better pulpwood value and which may be more eco-friendly than 'Subabhl', need to be evaluated". This comment has lead to a second look at introducing 'Subabhl' in agro-forestry and outcome of my observations, is now presented.

Review of international level 'Subabhu' genetic improvement and its adoption in India

- a) Genus *Leucaena* has almost trans-tropical natural distribution; *L. leucocephala* is a highly self-compatible tetraploid ($2n = 4x = 104$) and has a relatively narrow genetic base. It is rather difficult to crossbreed because its bisexual flowers are small in size, open early in the morning and are self compatible; genetic base is, thus, narrow. However, it can be hybridized with other tetraploid and diploid species under genus *Luecaena*. Under favorable conditions growth of its cultivars is fast and cultivars start profusely regenerating within a year or so, thus, conclusive progeny trials are feasible at shorter cycle.
- b) Having realized that *Leucaena leucocephala* has certain advantages over other tree species, it attracted focused genetic improvement efforts, initially in Australia [cultivars **Peru & El Salvador** developed and released in 1962 & cultivar **Cunningham** in 1976] and Hawaii [accessions **K8, K28** during 1960s to 1980s as arboreal species] and cultivar **LXL** [1996]. For forage purpose, cultivars '**Tarramba**' [1995] and '**Wonder graze**' [a recent innovation] were evolved in Australia. As such cultivars have been readily acceptable to meet special purpose objective, spread of *Leucaena* cultivars have become much wider than natural distribution and now includes subtropical region also.
- c) In India, under SIDA support during early eighties, there was considerable extension activity on Subabhu by the national level research organizations like FRI, Dehra Dun, IGRI, Jhansi, as also institutions under ICAR, etc. Social Forestry wings of the Forest department introduced certain cultivars of *L. leucocephala* as a part of extension activities; Subabhu seedlings were initially distributed free or at highly subsidized rates. Non Government agencies like Bharatiya Agro forestry Foundation [BAIF] also contributed in a major way; early introduction of *Luecaena* on BAIF campuses became its seed multiplication area. Being a prolific breeder *leucaenas* multiplied almost exponentially and seed purity that was already doubtful diluted further. As a pioneer agency in popularization of *leucaena*, BAIF has catered to market needs by selling seeds under brand name "Hawaiian Giants" or K8, K28, K686, etc. and BAIF has a major source of Subabhu seed supply, across the country. In India except Himalayas, Subabhu has become almost ubiquitous.
- d) May be, in over enthusiasm (or as a marketing

gimmick), the genus got projected as a species with multiple uses that encompassed nitrogen fixing, source of timber, firewood, forage, and even supplier of protein rich seeds for human consumption!! It was accorded the status of "panacea for all ailments / a tool for poverty alleviation". One fact that was over looked was that the Indian subcontinent has varied agro-climatic zones and practices followed for biomass utilization vary from region to region; expecting successes across India as reported in Australia or Hawaii, was thus, a fallacy. Extension program lacked critical multidisciplinary evaluation studies and it lead to controversies that arose soon after introduction, e. g. apprehension of adverse impact of 'mimosine' in tender shoots on the cattle as also on those who consumed cattle products or that this exotic may become an obnoxious weed in our landscape and thus need be banned, can be cited as examples of such controversies.

Seed certification or regulatory mechanism outside and within India

- a) Seed supply document made in Australia is observed to be very comprehensive and provides details in the certification issued by government agencies or seed suppliers in Australia; from a document issued by - Australian Plant Genetic Resource Information, relevant details like local & scientific name, location of farm, donor's name, seed origin/person responsible for supply, his contact details, etc., were readily available. Moreover, seeds were pretreated [machine-scarified with abrasive discs] to ensure uniform and early germination and along with seeds, Rhizobium inoculums were also provided so that nitrogen fixing ability is optimally utilized. Literature with "Wonder Graze" seeds includes an advice note on insuring presence of rumen bacteria *Synergistes jonesii* by first inoculating their cattle for successful colonization of the rumen. In short it was a professional job.
- b) It is observed that *Leucaena* tree improvement in Australia / Hawaii, etc., has been focused on its use as forage or minimizing damages by aphids or optimal utilization of local agro-climatic conditions for biomass growth, or their permutations and combinations. With such a highly professional approach yields in extensive hedgerow plantings in the dry tropics and subtropics, generally range from 2-6 t/ha/year. With plants 0.5-1.0 m apart in rows and rows 1-3 m apart, very high yields (>15 t/ha/year) in south-east Asia and Hawaii are reported. Fuel wood yields compare favorably with the best tropical trees, with wood increments of 20-60 m³/ha/

year for arboreal varieties i. e. K8 /K28 /or K626, etc. Research in Australia has been focused on biomass use as cattle feed that has resulted in rich dividends; reported yield of foliage corresponds to a dried mass of 2–20, MT/ha/year, and that of wood 30–40 m³/ha/year, with up to twice those amounts in favorable climates. It is also efficient in nitrogen fixation, at > 500 kg/ha/year.

c) In India *Leucaena* was projected is a multiple use species that would address several issues and lead to poverty alleviation. This kindled Interest in the then political leadership and gravitated extension activity to such a high pitch that a sincere and science based “extension from lab to land” that was a pre-requisite, suffered a serious setback. Instead of controlled introduction trials of genetically superior material [unadulterated], seed was obtained in a bulk and got distributed widely in number of states, each state having varied agro-climatic conditions within it. Whereas genetic improvement in the donor area was for catering specific agro-climatic conditions and to achieve a focused objective, plantation models adopted for Subabhl in India included wide range of models i.e. field bund planting / avenue or canal side plantations / planting on private or community lands to achieve multiple benefits including soil and moisture conservation / alley crop for forage / small timber / firewood, etc. Being an exotic and plantations being made mostly on community and private lands the species has been exempted from regulations on tree felling and transport in states like Maharashtra, Gujarat, etc. Suitable planting material [cultivars] as also plantation models ought to have been gradually evolved to suit local conditions and to achieve expected end results, e. g. production as source of green manure, forage, fuel, and paper pulp; small size timber for rural construction or sawn timber and each end use could have different qualifiers. For example, issue of dry matter / palatability / mimosine percentage would assume significance if forage was the expected end product.

d) Under Indian context, ranching system has limited application and thus, though initial work at BAIF on forage production through alley cropping was laudable, it was not pursued consistently thereafter. There were introductions of species like *L. diversifolia* or *L. pallida* at BAIF, however, over time, identity of such accessions has been lost; there are no records of intra or inter specific cross breeding for cashing on hybrid vigor either at BAIF or other research institutions mandated with such a program.

e) Compared to standards in Australia, in India, no details are given on the seed lot supplied. Like generic term Eucalyptus “hybrid,” most of the Subabhl is traded under generic brand names – without any authenticity. Subabhl gained popularity like a proverbial ‘tsunami’ but has ebbed soon thereafter and an opportunity to optimize returns from local resources, by utilization of fast growing cultivars was missed.

Tree improvement at Songad, including introduction of *Leucaena* cultivar, Tarramba

a) Officers of the Mill have initiated program of selecting “Candidate Plus Trees” [CPT] from 2 to 3 year old plantations from farmers fields, based on multiple criteria of growth, stem form, association with soil micro flora, suitable attributes for papermaking, from representative agro-climatic zones. With prospects of shorter rotation in irrigated zone, selection will be made from 18 to 24 month old plantations as well. After rigorous screening it was proposed to short list CPTs and collect seeds; Seeds will be screened for better size and given scarification treatment for uniform germination as also inoculated with suitable micro flora for optimal nitrogen fixing ability. Material will also be collected from coppice shoots for clonal propagation. Such planting material will be utilized for multi-location F1 generation plantations to validate desired traits.

b) Mill officials reported introduction of high productivity cultivar developed in Australia, under inter specific breeding program in the University of New Queens land K 636 X K 584 [*L. leucocephala* X *L. pallida*] and designated as “Tarramba”. (Cedar Park, North of Brisbane). Introduction trial is located within the JK Mill premises close to Sonagad- Ukai road that runs south to north. The site was first inspected in March, 2015 [1130 hrs]. Planting was reported to be around two and half years old and reported to have been pollarded for getting more shoots. At that stage otherwise healthy looking seed origin pole crop had started seeding, however all the south facing lower portions of the poles had signs of sun scorching. Similar scorching was noticed by the author in case of poplars introduced in Pune during 1993 from FRI, Dehradun on the farm of Agriculture College; it was a collaborative agro-forestry project. By the end of second summer after planting, south facing parts of the lower bole were found to be affected. A senior forester had commented that it could be because the poplars were brought down to lower latitudes [Chaturvedi, A. N. personal communication].





**Two year old cultivar
“Tarramba”**



Pollarded tree



**Sun scorching on south facing
side**



Scar on southern face



**Fruit bodies of
root rot fungi
at ground
level**



**Current year plantation of Cultivar “Tarramba”
– linear planting on private farm.**

c) During the subsequent visit three months later, in September, 2015 it was observed that deterioration had advanced further and few trees had symptoms

of pathogenic attack – fruit bodies of root rot fungi, were noticed at the ground level. Approximately 30% trees succumbed.

DISCUSSION AND CONCLUSIONS

- a) The dream of 33% tree cover will remain a slogan unless degraded lands with high sustainable productivity are restored using technology based plantations and agro-forestry is practiced on massive scale. The economically attractive and environmentally safe models should be based on genetically improved planting stock. This needs planned and integrated development of agro-forestry plantations and wood based industries to use end product. Farmers are already making major contributions to the production of wood and improving tree cover and productivity of intensively managed agro-forestry plantations is high, both in qualitative and quantitative terms because of progressive adoption of genetically improved planting stock and planting techniques e.g. > 20 million genetically improved clones of Eucalypts are being planted in Andhra; average productivity of such clones is 20 -25 m³/ha/ann compared to hardly one M³/ha /year from Govt. reserves. Many farmers have achieved trend setting productivity levels of > 50 M³/ha /year. Thus planting of high yielding cultivars in the catchment of the paper mill is a step in right direction.
- b) Processes of selecting CPTs and their multi-location field trials are expected to result in development of cultivars. Validated cultivars for different agro-climatic zones in turn, is expected to result in optimal use of local resources and providing economic benefits to farmers as also the industry.
- c) Option of introducing new material is open but plant introduction will not be random. It will be based on proven science of introduction; empirical knowledge suggests comparable conditions in the donor and intended recipient areas on parameters like geographic location [latitude]; altitude; type of soil and its depth; climatic conditions like precipitation in terms of type [snow/ rains /dew etc] and its spread over the year [uniform/ winter/ summer rains]; temperature [average/ maximum/ minimum; humidity and its spread over the year etc. Plants do have certain degree of adaptability designated as phyto-plasticity.
- d) Taking into account ever changing conditions and struggle for survival through competition based on genetic variability, the selection of desired genetic traits that are heritable occurs slowly in nature. Man induced selection merely enhances the pace.
- e) Development of cultivars at local level should be encouraged. Exotics do have an edge over local

species in their performance and reported high returns. Hence, prudent resource managers have to take suitable steps, like limited trials under close supervision before large scale adoption of such exotics. Local species need be used as a marker for comparing performance.

- f) Improvement of indigenous plants also need be given similar treatment as these may have an equal or better potentials and also will be more eco-friendly than the exotics.

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The study area is the JK Paper Limited, Gujarat; initially established as The Central Paper Mill and my observation could be recorded thanks to their support. Special thanks are due to Dr. Nandini Nimkar, NARI, Phaltan for technical support. Tarramba cultivar has been planted very recently on a farm as a block planting close to Songad - Ukai Road near Paper Mill campus and has good demonstration value. Farmer is being given hand holding support to develop the site as seed production area as also hedge grove for clonal propagation at subsequent stage.

It is rather too early to conclude about the introduction trial of cultivar "Tarramba" but there is concern on its performance and the possible reasons for the setback could be as under:

- i] Basic principles of introduction have not have been taken into account- geographical location of the donor and recipient area are mismatched; donor area is Location latitude 27 34 50, south; Cedar Park North of Brisbane where as Songad is around latitude North 21°
- ii] Winter tolerance under sub-tropical conditions was an important attribute for selection of cultivar "Tarramba" but in Songad there is marked high summer temperature period and 'monsoon' rains.
- iii] For forage production, planting has to be denser than that for wood production and management practices include pollarding either man induced or a result of cattle browsing. In this case there is more open plantation and the trunks were exposed to direct sun light; resulting in scorching.
- iv] Optimal dry biomass productivity and resistance to insect damage was accorded priority in cultivar selection; in this case 'goal posts' have changed to attributes suitable for harvesting / transport / processing in the mill and wood quality that match preferred traits suitable for economic pulping and processing.

Smooth-coated Otter *Lutrogale perspicillata* (Geoffroy Saint-Hilaire, 1826): Recent Record near Pune, Maharashtra

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INTRODUCTION:

The Smooth-coated Otter is an aquatic carnivorous mammal found inhabiting major freshwater wetlands throughout much of south and south-east Asia (Nawab 2009). In the vernacular Marathi language it is known as 'Udmanjar' and 'Udbilao' in Hindi. It is one of the most commonly occurring otters in India. There are no recent sighting reports from the Pune region. Bharucha and Gogte (1990) have reported occurrence of otters in the Ujani dam backwaters. The otters were seen in the bushy forested and unapproachable areas near Khanota and Khed. A survey conducted by Zoological Survey of India in September 1990 revealed the otter population in the Ujani backwaters had shifted to the upper parts of Bhima River near Shirur (Pradhan 1996). Smooth-coated Otter were occasionally sighted in Parvati canal in the 1950s and very rarely sighted near the Khadakwasla dam in 1990s (Nalavade 2000-2001).

The Smooth-coated Otter inhabits lakes, large rivers, dams, irrigation canals, swamps, shallow rice fields and coastal mangroves and prefers sloping banks with vegetation (Menon 2003). Ample bankside vegetation provides cover and escape and deep soil is needed for digging holts. The prey includes mainly fish, supplemented by crabs, insects, mudskippers, frogs, birds and rats (IUCN Otter Specialist Group 2015). The status of otter population in India is poorly documented. This species is under pressure due to habitat destruction. Large hydroelectric projects, wetland reclamation, pollution from pesticides and agricultural run-off, over-fishing, and conflict with fishermen who kill them as pests are some of the major threats to the otter population. Otters are major victims of poaching, illegal wildlife trade and otter pelts are much in demand. Though the otter is legally protected under the Wildlife Protection Act of 1972, the Otter is a relatively neglected species (IUCN Otter Specialist Group 2015).

Smooth-coated Otters are indicators of the health of a wetland ecosystem because they are sensitive to environmental changes (Nawab, 2009). The presence of otters gives accurate and direct knowledge about the health of a wetland.

The International Union of Nature and Natural Resources (IUCN) have declared this species as



vulnerable, population trend decreasing (IUCN Red List 2015). It is included under Schedule II of the Wildlife Protection Act (WPA) 1972. Convention on International Trade in Endangered Species (CITES) has placed the Smooth-coated Otter in Appendix II.



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OBSERVATIONS:

1) Sighting: A single Smooth-coated Otter was first spotted by Urvi Shivalkar on 9th August 2015 at 3.30 p.m. in the Mula-Mutha River at Ashtapur village north of Uruli Kanchan near Pune, Maharashtra and was swimming in the westward direction. The weather was partly cloudy. The habitat has riparian vegetation and farmlands along both the banks. It is primarily an agricultural zone. Some plastic and other garbage and grazing cattle were also seen along both the banks even during subsequent visits. At subsequent visits, some fishing activity was noted. Human habitation is less than 1 km away. Otter was



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not sighted again.

2) Behaviour: The Smooth-coated Otter attempted to come ashore at the riverbank. It showed a sleek smooth looking fur, round head, bare diamond shaped

nose devoid of hair, short stout legs and a flattened tail. At the same location about 15 feet away, there was a pack of five stray dogs. As soon as the otter attempted to come ashore, two of the dogs rushed at it. It immediately entered the water uninjured. Again, it tried to come ashore some distance away. Unfortunately, it was again bothered by the dogs. The otter went back into the river and was not spotted thereafter. Still photographs were taken for documentation before the otter went out of sight.

Follow up surveys for otter re-sighting:

1. Examination of the surroundings in the Ashtapur village at the sighting location was done during eight subsequent visits in September and October 2015 for otter tracks, spraints, den sites, etc. by walking wherever possible to check for indirect evidence of otter occurrence. No evidence was found.
2. Interviews were conducted with the local fishermen in the Ashtapur village regarding any previous otter sightings by them in that area, otters getting trapped in their nets, torn nets, etc. For reference, they were shown photographs of the Smooth-coated Otter. No previous sighting were reported by the local fishermen.
3. Inquiries were also made with the fishermen in the Ashtapur village about the commonly caught variety of fish in that area. These fish were tilapia, soul fish, catfish, eel, rohu and katla.

River water samples from the sighting location were taken to check for the river water quality and pollution

PARAMETERS	METHOD OF ANALYSIS	SAMPLE
pH	pH meter	7.89
EC	EC meter	468 μ S/cm
BOD Biological Oxygen Demand	Winkler's Iodometric Method	85
COD Chemical Oxygen Demand	Reflux Digestion Method	224
Sulphates	Barium Chloride Method	20.1 mg/l
Nitrates	Brucine Method	10.5 mg/l
Phosphates	Stannous Chloride Method	2.5 mg/l
Heavy Metals	AAS (Cr, Pb, Zn, Cr, As)	Nil

levels. The results in the tabulated form are as follows:

DISCUSSION:

The present report is a stray recent sighting of a single individual of Smooth-coated Otter in Bheema River near Pune. Our sighting confirms that this elusive species is still present in the Bhima River near Pune and also indicates their local migration along the course of this river or its tributaries. We correlated otter presence with water quality. The CPCB Effluent Discharge Standards (<http://www.water-research.net>) mention permissible limits for disposal of sewage water into inland surface water where its BOD < 30 mg/L and COD < 250 mg/L are allowed. For sulphate levels in water the secondary maximum contaminant level (SMCL) standards allow levels less than 250 mg/l; nitrates less than 10 mg/l; phosphate levels less than 1 mg/l and heavy metals should be absent. We found that the water tests for BOD, sulphates and nitrates were within permissible limits but were marginally higher for phosphates and COD. The water samples at the otter sighting site showed marginally higher phosphate levels indicating contamination due to agricultural runoffs.

A careful survey needs to be undertaken to identify and monitor the existing otter populations and to conserve their habitat by identifying threats.

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I express my gratitude to Dr. Nitin Karmalkar, Mr. Rohit Bhagwat and Mr. Pawan S. Soyam of the Department of Environmental Sciences, Savitribai Phule Pune University for their assistance in analysing the river water samples.

REFERENCES:

- **Bharucha, E. K. and Gogte P. P. (1990)** Avian profile of a man modified aquatic ecosystem in the backwaters of the Ujani Dam. *J. Bombay Nat. Hist.*



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Soc., **87(1)** : 73-89

- **CITES (2014).** Convention on International Trade in Endangered Species of Wild Fauna and Flora. Appendices I, II and III, valid from 14 September 2014. <http://www.cites.org/sites/default/files/eng/app/2014/E-Appendices-2014-09-14.pdf>
- **de Silva, P., Khan, W.A., Kanchanasaka, B., Reza Lubis, I., Feeroz, M.M. & Al-Sheikhly, O.F. 2015.** *Lutrogale perspicillata*. The IUCN Red List of Threatened Species 2015: e.T12427A21934884. <http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T12427A21934884.en>. Downloaded on 16 January 2016.
- **Geoffroy St. Hilaire, 1826:** A Review. *J. Bombay Nat. Hist. Soc.* **106**: 5-10. <http://www.biodiversitylibrary.org/page/48367072#page/9/mode/1up>
- **Hussain, S.A., De Silva, P.K., Feeroz, M.M. (2008).** *Lutrogale perspicillata*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. www.iucnredlist.org.
- **IUCN Otter Specialist Group. (2015)** http://www.otterspecialistgroup.org/Species/Lutrogale_perspicillata.html
- **Menon, V. (2003).** A Field Guide to Indian Mammals. Dorling Kindersley (India).
- **Nalavade, S. (2000-2001)** Journal of Ecological Society Vol. 13/14: 74-80 (2000-2001) titled Retreating Wild Mammals of Pune Urban Area. <http://www.ranwa.org/punealive/pamam.htm>
- **Nawab, A. (2009).** Aspects of the ecology of Smooth-coated Otter *Lutrogale perspicillata*
- **Pradhan, M. S. (1996)** Records of Zoological Survey of India, **95 (3-4)**: 299-303
- **Trivedi R.K. & P.K. Goel. (1998).** Analysis manual- Chemical and Biological Methods for Water Pollution Studies, APHA (American Public Health Association) 1998 Standard Method of Water and Waste Water Analysis, 18th ed Washington, D.C.

Mammal Species in Patan Tehsil, Satara, Western Maharashtra

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ABSTRACT:

An inventory of the mammal species observed in the Patan Tehsil of the Satara District in Western Maharashtra was made by collecting data over a period of 1 year. This preliminary study was undertaken to record the mammal species and identify threats to their existence in this region. The study identified 26 mammal species. Numbers of visual records for each species during the study period are mentioned. While it may not provide accurate data on the population estimates, it certainly provides an indication of their relative abundance. The mammal species for the Patan Tehsil are listed here for the first time and they assume importance particularly in view of the fact that the Patan Tehsil is close to the Koyna Wildlife Sanctuary of the Sahyadri Tiger Reserve recently declared by the National Tiger Conservation Authority.

KEY WORDS:

Mammals, Northern Western Ghats, Sahyadri Tiger Reserve, Patan, Satara.



Ruddy Mongoose

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Giant Squirrel and Five-striped Squirrel recorded during the survey

INTRODUCTION:

Patan Tehsil lies to the west of the Northern Western Ghats in the buffer zone of the Sahyadri Tiger Reserve. Northern Western Ghats is one of the 34 biodiversity hotspots of the world. It was generally felt that the number of mammals sighted in this area was declining over a period of time. Hence, this preliminary study was undertaken to record the mammal species and the likely threats to their existence in this area. This area is the ecotone of the Deccan Plateau and the Western Ghats mountains and includes hills, valleys, laterite plateaus and plains. A significant portion of this area is occupied by waterbodies and rivers.

Patan is on the Karad - Koyna road at the confluence of the Koyna and Kera rivers. The weather is tropical with average rainfall between 900 to 1100 mm p.a. Average winter temperature is 25 degree C and the average summer temperature is around 40 degrees C. The average elevation of 582 m asl. The area has semi evergreen forest with patches of thick jungles, vast grasslands, human habitation and ample water resources. Almost every village in the area has a patch of a jungle dedicated to the village deity – ‘Devarai’ or the Sacred Grove. These patches vary from 4-5 hectares to 40-50 hectares in size.

METHODS:

The study area is Patan Tehsil (17.20° N, 73.50° E) in Satara District of the Maharashtra State. The study period was from 1st January 2014 to 31st December 2014. Field data was collected by visually recording actual mammal sightings and in majority of instances by supporting them with photographs. Apart from the actual sightings, supportive evidence of their presence such as scat, pugmarks, scratch marks on tree trunks, horns, bones and other body parts were also recorded. Where a mammal was sighted the supportive evidence was not included in the mammal count. During one round of about 5 km the survey the area was visited 5 times a month covering five different locations. The same locations were visited during each round of the survey. The study period has covered all the three seasons and all the mammal sightings were recorded including their numbers and locality. Summer season included March, April, May, June; rainy season included July, August, September and October; and winter season included November, December, January and February. Trapping was not done during the study and the study was done strictly in accordance to the provisions of the WPA, 1972.

OBSERVATIONS:

The field observations and mammal lists are summarized in the **Tables 1 and 2**. Total of 26 mammal species belonging to 15 families were recorded during the preliminary study. Mammals were seen in diverse habitats such as semi-evergreen forests, near water bodies, hilly areas, plains, agricultural cropland and near human habitation. Flying Fox *Pteropus giganteus* was the most numerous species followed by Hanuman Langur *Semnopithecus entellus* and rodent species (Muridae). Maximum number of mammal sightings irrespective of the species were in monsoon (n= 5802) followed by summer (n= 5667) and winter seasons (n=5575). Data gathered from discussions with local villagers suggests that the presence of

mammals and the frequency of their sighting in this area are declining over a period of time.

THREATS:

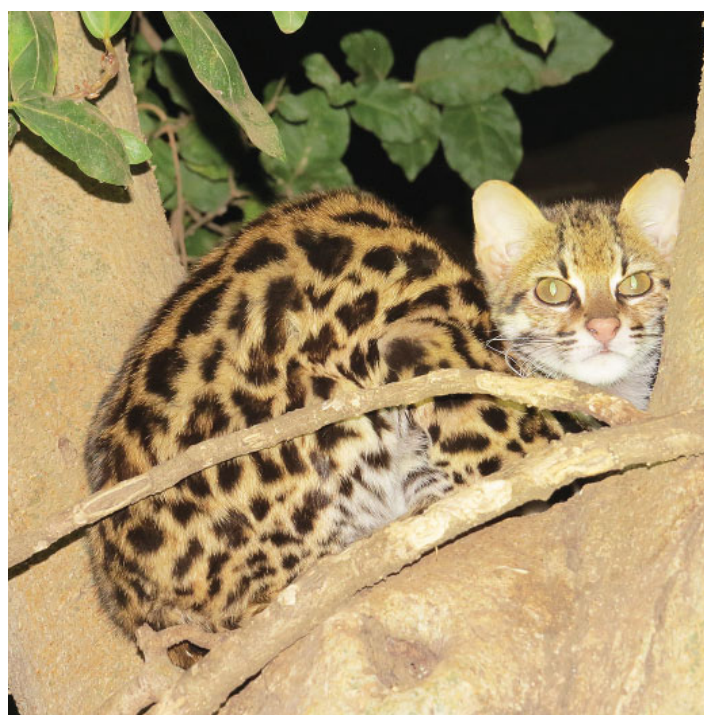
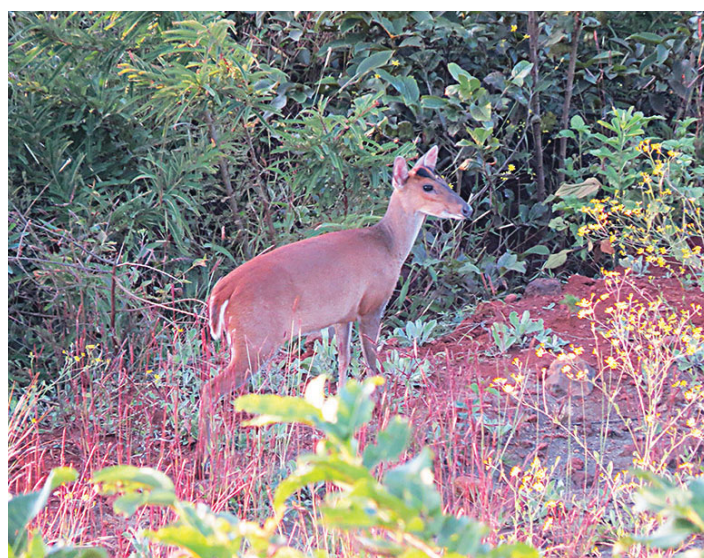
Actual field observations supplemented by discussions with villagers during the field study have identified some threats to the presence of mammals in this area. These threats are listed below.

1. Occasional Jungle fires particularly during summer.
2. Increasing instances of tree cutting for various reasons.
3. Killing of animals by the villagers out of superstitions and traditional practices. Some villagers consider wild cats to be inauspicious and hence kill them.
4. Killing of wild animals for use of animal parts in traditional medicine.
5. Killing of mammals due to attack on humans particularly by Gaur and leopard.
6. Whenever the animals like Gaur, Wild Boar, Macaques and Langurs raid the crop or fruit orchards, villagers molest them and turn them away inflicting injuries to the animals.
7. The construction of canals, wind mills, roads, dams, etc. cause damage to the habitats and the labourers working on such projects also resort to hunting.
8. Disturbance in the forested area by wind mills and associated traffic.
9. Conversion of the plains near the forests into farm land for cultivation reduces the natural habitat of the wild animals.
10. Increasing constructions particularly farm houses and plot development.

It is felt that detailed studies should be undertaken for systematic recording of mammal diversity in the Patan Tehsil and in the Sahyadri Tiger Reserve in the Koyana WLS and the Chandoli WLS. Concrete actions against hunting and unauthorised habitat destruction or modification should be effectively implemented. This will protect mammals and retain their presence in the natural environment in the Patan Tehsil. Several nature destructive activities are undertaken by people out of ignorance. Education and awareness programs focused on students in schools and colleges, villagers, farming communities, administrative and enforcement agency personnel will go a long way in mammal and habitat conservation.

REFERENCE:

- Menon, Vivek. (2003). A Field Guide to Indian Mammals.



Bonnet Macaques, Muntjak and Leopard Cat photographed during the study

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Table 1: Mammal families and species actually sighted during the study period with their populations and habitat where the species were recorded.

Sr. No.	Name of the Species	Season			Habitat
		Rainy	Winter	Summer	
	Bovidae				
1	Gaur <i>Bos gaurus</i>	100 +	50 +	20 +	Waterbodies in the Jungle, sheets of rocks on the hills
	Cervidae				
2	Barking Deer <i>Muntiacus muntjak</i>	5	8	1	Waterbodies in the Jungle, sheets of rocks on the hills
3	Sambar Deer <i>Rusa unicolor</i>	2	0	1	Waterbodies in the Jungle, sheets of rocks on the hills
	Canidae				
4	Indian Jackal <i>Canis aureus</i>	0	6	2	Rivulets and sewers near village
	Felidae				
5	Indian Leopard <i>Panthera pardus</i>	0	1	0	Waterbodies in the jungle and pathways
6	Leopard Cat <i>Prionailurus bengalensis</i>	0	1	0	Near human habitation
7	Jungle Cat <i>Felis chaus</i>	2	9	0	Hilly areas
	Sciuridae				
8	Indian Giant Squirrel <i>Ratufa indica</i>	6	15	20	Tall trees in the Jungle
9	Five Stripped Squirrel <i>Funambulus pennantii</i>	15	10	40	Tall trees in the Jungle
	Viverridae				
10	Asian Palm Civet <i>Paradoxurus hermaphroditus</i>	1	0	0	Farms on the outskirts of villages
11	Small Indian Civet <i>Viverricula indica</i>	0	3	0	Near waterbodies
	Herpestidae				
12	Ruddy Mongoose <i>Herpestes smithii</i>	1	0	0	Rivulets and sewers
13	Indian Gray Mongoose <i>Herpestes edwardsii</i>	13	0	15	Rivulets and sewers
	Cercopithecidae				
14	Hanuman Langur <i>Semnopithecus entellus</i>	175 +	175 +	> 160	Farms and jungles on the outskirts of villages
15	Bonnet Macaque <i>Macaca radiata</i>	150 +	100 +	150 +	Farms and jungles on the outskirts of villages

	Ursidae				
16	Sloth Bear <i>Melursus ursinus</i>	0	0	1	Farms and jungles on the outskirts of villages
	Suidae				
17	Wild Boar <i>Sus scrofa</i>	10	40	20	Farms and jungles on the outskirts of villages
	Pteropodidae				
18	Indian Flying Fox <i>Pteropus giganteus</i>	5000 +	5000 +	5000 +	Farms and jungles on the outskirts of villages
	Leporidae				
19	Indian Hare <i>Lepus nigricollis</i>	9	5	15	Farms and jungles on the outskirts of villages
	Muridae				
20	Lesser Bandicoot Rat <i>Bandicota bengalensis</i>	50	20 +	50 +	Villages and cropland
21	Greater Bandicoot <i>Bandicota indica</i>	30 +	20 +	30 +	Villages and cropland
22	House Rat <i>Rattus rattus</i>	100 +	100 +	100 +	Villages and cropland
23	Indian Gerbil <i>Tatera indica</i>	40 +	10 +	40 +	Plains and grasslands
	Hystricidae				
24	Indian Crested Porcupine <i>Hystrix indica</i>	2	2	2	Hills and near cropland
	Manidae				
25	Indian Pangolin <i>Manis crassicaudata</i>	1	0	0	Hills
	Total mammal sightings	5802	5575	5667	

Note: Tiger *Panthera tigris* was recorded only based on spoor and scratch marks on trees, thus making the mammal species count in the study area to 26.

Table 2: List of mammal species in Patan Tehsil based on supportive evidence like excrement or scat, pugmarks, scratch marks and body part remains.

Sr. No.	Animal	Identification marks			
		Scat	Pugmarks	Scratches	Other Body parts
1	Tiger <i>Panthera tigris</i> *	Once	Nil	Once	Nil
2	Leopard <i>Panthera pardus</i>	Many times	Many times	Nil	Nil
3	Sloth Bear <i>Melursus ursinus</i>	Many times	Many times	Twice	Nil
4	Gaur <i>Bos gaurus</i>	Many times	Many times	Nil	Skeleton, Horns
5	Indian Crested Porcupine <i>Hystrix indica</i>	Nil	Nil	Nil	Thorns

* This species is recorded only based on supportive evidence and actual sighting was not obtained.



Pugmark of a Tiger



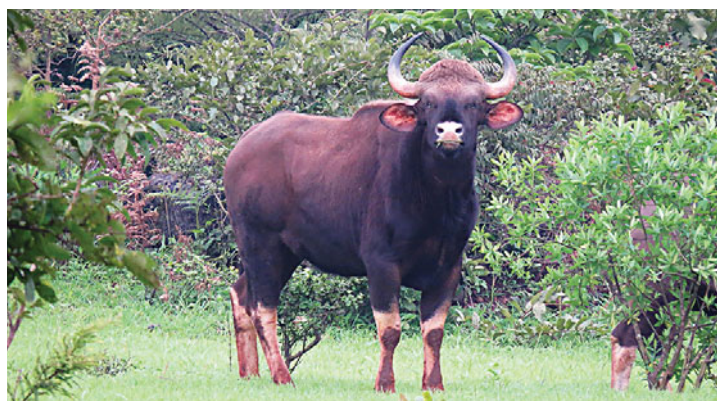
Indian Jackal



Jungle Cat



Ruddy Mongoose



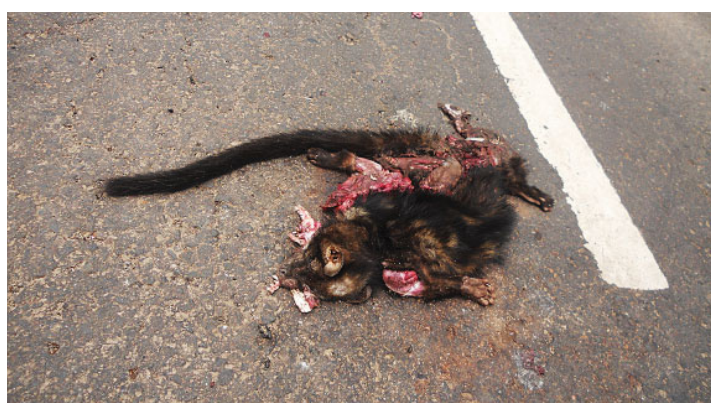
Gaur



Sambars



Hanuman Langoor



Asian Palm Civet (road kill)

Snake in Sanskrit Literature and Indian Culture: An Ethno-biological Interpretation

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In Sanskrit literature snake is termed as 'naaga' and 'sarpa'. *Naaga* means one that which resides in mountains (*naga* means a mountain.); that which burns (us with its poison). The word 'sarpa' has its root in 'srip' - to creep, to move gently or cautiously. The word has a similarity with the Latin word 'serpens'. In the Indian context, snake-worship seems to be an ancient custom. Figurines of snake couples have been found in the Indus valley civilization. Ancient Indians were impressed by the speedy slithering of a snake and its habit of molting or shedding the skin and therefore the serpent was elevated as a deity having divine power.

OLDEST REFERENCES:

In the *Rigveda* (1400 BC), there are references to *Naaga* and *Sarpa*. The sages have described the power of the serpents head, jaw and hiss. It is obvious that they were well aware of the venomous qualities of snakes. The *Taittiriya Samhita* (1400 BC) (5.5.13.1) suggest the worship of the snake named *Lohitahi* (a red serpent) and *Vayasa* (meaning not clear; its other meaning is a crow; possibly a black-coloured serpent could be intended.). Likewise the *Atharvaveda* (1400 BC) and the *Shatapatha Brahmana* text (1000 BC) refer to snakes and habit of molting.

Types of snakes mentioned in the Mahabharata (400 BC- 400 AD)

a) Mahabharata - Adiparva ; 5th Aastikaparva, Adhyaya 35; verses 5-19.

	Sanskrit name of snake	Analysis and interpretation
1	Sheshanaaga: Shesha that which remains; Naaga -one having a hood	A mythological thousand-headed serpent regarded as the emblem of eternity. The king of the Naagas inhabiting Patala or the netherworld. He is represented as forming the couch and canopy of Vishnu while sleeping during the intervals of creation; he became incarnate as Balarama, one of the incarnations of Vishnu.
2	Vasuki	A serpent king; one of the three chief kings (others were Shesha and Takshaka). 'Vasu' means the soul or spirit of the universe.
3	Airavat	A mythical serpent. (The other reference to Airavat is the eleven headed elephant, the vehicle of Indra).
4	Takshaka	Naaga prince; cutter. 'Taksha - cutting through. The name is probably alluding to the sharp teeth.
5	Karkotaka	One of the principal Naagas of the underworld. 'Karkotaka' is also a plant with yellow flowers. It may be suggestive of a grass snake. A root verb 'Kark' means to laugh and 'karka' means excellent.
6	Dahanjaya	Vital air or Praana which is supposed to nourish the body. It is a name of a serpent demon.



7	Kaaliya	it means a dark type of sandalwood. Is it suggestive of a colour.
8	Maninatha	One who possesses a jewel or gem. It may be a monocle cobra.
9	Aapurana	Name of a Naaga (making full). The root verb 'aapru' means to satisfy anyone's wish.
10	Pinjaraka	The root verb 'pinj' means to tinge, to be strong, and to emit a sound. It may be a Russels viper.
11	Elaapatra	Name of a cobra. (Elaa means any species of cardamom.)
12	Vaamana	Small in stature.
13	Neela	One having dark colour/ blue/green/ black.
14	Aneela	Air or wind.
15	Kalmaasha	Meaning is unclear.
16	Shabala	Variegated/spotted/dappled.
17	Aaryaka	Belonging to Aaryaavarta - India
18	Ugraka	Fierce, cruel.
19	Kalashapaataka	Name of a Naaga (Kalasha means a pitcher; a round pinnacle on the top of a temple.
20	Sumana	Good-minded.
21	Dadhimukha	Probably one having a white face.
22	Vimalapindaka	Vimala means spotless, stainless or bright; Pindaka any roundish mass.
23	Aapta	Aapta means full, extending or one who is in relation.
24	Shankha	Conch-shell
25	Vaalishikha	Vaali - Vaal means hair of any animal's tail. Shikha means a name of a serpent-demon.
26	Nishtaanaaka	Speaking loud.
27	Hemaguha	Hema means gold, a thorn apple; guha means reared in a secret place.
28	Nahusha	'naha' means to bind together, to put on (as armor, etc.)
29	Pingala	One who is brown.
30	Bahyakarna	Bahya means outside; karna means ear.
31	Hastipada	Hasti means an elephant; pada means a foot.
32	Mudgarapindaka	Mudgara means a hammer or mallet; pindaka means a body.
33	Kambala	a woolen cloth or blanket.
34	Ashvaratara	a mule or a better horse.
35	Kaaliyaka or Vrutta	Vrutta means rounded.
36	Padma or Samvartaka	Smavartaka means to attack or to approach; Padma means a lotus which closes towards evening.
37	Shankhamukha	Shnakha means a conch; mukha means a face.
38	Kshemaka	Kshema means rest, peace, tranquility.
39	Pindaraka	Pindara means a cowherd
40	Karaveera	Having the colour of oleander?
41	Pushpadanshtra	One who bites like a flower.
42	Bilvaka	Bilva means a wood apple
43	Bilvapadura	Bilva means a wood apple and pandura or whitish.
44	Mushakaada	One who eats mice.
45	Shankhashira	Shankha means a conch-shell and Shir means a nerve.
46	Purnabhadra	Purna means complete or full and bhadra means auspicious.

47	Haridraaka	One having yellowish colour.
48	Aparajita	One who cannot be won over.
49	Jyotika	One who is shining.
50	Pannaga	One creeps low.
51	Shrivaha	One who carries Lakshmi or Shri.
52	Kauravya	One who descendent of Kuru dynasty.
53	Dhrushtra	One who has a firm empire
54	Parakrami Shankha	A brave one whose colour is like a conch-shell
55	Virajaa	Virajas means free from dust.
56	Subaahu	One having strong arms
57	Balaadhyashaali Pinda	one who has a mighty body.
58	Hastipinda	One who is mighty like an elephant.
59	Pitharaka	Pithara means a kind of hut or store-room or pan
60	Sumukha	One who has a beautiful face.
61	Kaunapaashana	Kunapa means a corpse/ those who eat flesh of a corpse.
62	Kuthara	Kuthara means the post round which the string of the churning-stick winds.
63	Kunjara	Kunjara is kind of a step or an eminent king.
64	Prabhakara	One who is light-maker.
65	Kumuda	One who like white lily.
66	Kumudaksha	One who is lotus eyed.
67	Tittiri	It is kind of a step in dancing.
68	Halika	Hala means to make furrow.
69	Kardama	One who is slimy or muddy or filthy.
70	Mahanaaga	A great snake.
71	Naaga	One who inhabits in water.
72	Bahumulaka	It is kind of a sweet scented root of <i>Andropogon muricatus</i> .
73	Karkara	Karkara means hard or firm or a hammer.
74	Akarkara	One who is tender.
75	Kundodara	One who a belly like a pitcher.
76	Mahodara	One who is big-bellied.
77.	Kushmandaka	Kushmanda means a gourd (<i>Beninkasa cerifera</i>)

b) Snakes mentioned in the Amarakosha

(Prathama Varga; Paataala bhogi varga; verses 5-11)

Naagas are called as kaadraveya (progeny of kadru). It goes back to the mythological story where kadru is the name of the mother of the naagas. In the Mahabharata we find the names as shesha, ananta and vasuki.

Sanskrit name of snake	Analysis and interpretation
Gonasa	Cow-nosed; a kind of large snake.
Tilitsa	a kind of snake; tila means sesame; possibly spotted; root verb 'til' means to go. (Shield-tail).
Ajagara	boa constrictor; 'aja' means a goat and root verb 'gara/gila' means to swallow.
Shayu	Lying down (Sluggish after eating).
Vaahasa	Root verb vaaha means to bear down or to make efforts.
Alagarda	Root verb ala means sting in the tail of a scorpion or bee; root verb garda means to emit any sound. (Rat Snake / One striking with a tail).

Water Snakes	
Jalavyaala	jala means water; vyaala (vyaada) means a beast of prey; one who is wicked. (sea Snake)
Snakes having two heads	
Raajila	Striped or streaked species of a snake. (Earth Boa/ Banded Krait/ Sea Snakes).
Dundubha	A kind of a lizard.
Some snakes having a shape of “khtvaakaara” are described. It means a club shaped like a foot of a bedstead. It means snakes having big heads.	
Maaludhaana	Malu means a kind of a creeper. AVine Snake.
Maatulaahi	A kind of a snake. Matula means an uncle/ a thorn-apple tree.
Snakes that have recently shed their skin are called Nirmukta: - One who is free.	
Muktakanchuka	Mukta means free and Kanchuka means a dress fitting close to the upper part of the body.

Sanskrit name of snake	Analysis and interpretation
Sarpa	‘srup’ means to creep, to crawl, to move gently.
Prudaak	Viper.
Bhujaga	Going in curves.
Bhjanga	A serpent.
Ahi	(‘aha’ means to pervade). Serpent of the sky.
Aasheevisha	aashi means to sharpen. Visha means poison. It means a snake that is immediately and deadly toxic. (It must be a King Cobra.)
Vishadhara	One who carries poison.
Chakree	Means to make a circle. (Habit of a snake to remain coiled.
Vyaala	A beast of prey.
Sarisrupa	Any creeping animal.
Kundalee	Means a coil.
Gudhapaat (Gudhapaada)	One who is hidden-footed. (It must be python.)
Chakshushrava	One who uses eyes for ears. (a generic name.)
Kaakodara	Cow-bellied.
Phanin or Phanee	One having a hood. (It must be a cobra.)
Darveekara	A hooded snake. (It must be a cobra.)
Deerghaprushta	One having an extended back. (It must be a Keelback.)
Dandashooka	Mordacious or snake. (Mordant means to mock something or someone.)
Bileshaya	One who lives or rests in holes.
Uraga	One who is breast-going.
Pannaga	Unclear meaning.
Bhogin	One who has extended hood.
Jihmaga	Jimha means transverse or moving slowly. (It must be a Boa.)
Pavanaashana	One who feeds on air. (It shows a peculiar habit of a snake.)
Lelihaana	Unclear meaning.
Dvirasana	One who is double-tongued, bifid tongue.
Gokarna	One who is cow-eared.
Kanchikin	One who is covered. (A snake in molt)

Kumbheenasa	One who is jar-nosed. (It must be a Hump-nosed Seas Snake.)
Phanadhara	One who has an expanded hood. (A cobra.)
Hari	One who is yellow or green.
Bhogadhara	One who has an expanded hood.

c) Types of poison –

- 1) Sthaavara means immovable/Stationary/Stable. A neuro-poison.
- 2) Jangama – Movable. Means highly poisonous. (Muscle poison/Spreading in nerves and blood.)

Types of Sthaavara poison –

Sanskrit name of snake	Analysis and interpretation
Kaakola	poisonous substance of a black colour.
Kaalakoota	A poison causing blueness of Shiva's neck.
Halaahala	A poison.
Sauraashtrika	Sauraashtra is a part of India. Poison of the snakes found in that part of the country.
Shauklikeya	Type of poison/ White Poison.
Brahmaputra	A kind of a vegetable poison.
Pradeepana	It is inflating poison.
Vatsanaabha	A strong poison prepared from the root of a kind of aconite.

d) Those who treat poison were called Vishavaidya (one who treats poison) and Jaangulika (Jangula means venom/ A snake Charmer.)

e) Those who catch the snakes were called as Vyaalagraahee (vyaala means a snake and graahi means one who catches. 'Graha' means to catch) and Ahitundika (Snake catcher/ Tundika means furnished with a snout/ One who catches a snake by its mouth)

f) Snake in Indian mythology and religious customs

According to the Puranas, serpents are the offspring of Sage Kashyapa and his wife Kadru. The names of their progeny are Ananta, Vasuki, Takshaka, Karkotaka, Padma, Mahapurana, Shankha and Kulika which are known as 'ashta naagas'. (eight serpents). Snakes are worshipped due to fear or due to the belief that it is a symbol of fertile earth.

Hindoo deities like Shiva, Vishnu and Ganesha are seen accompanied with snakes. Vishnu is call as Anantashayana and Sheshashaayi (one who sleeps on the Anant or Shesha snake). In the vaishnava

Puranas. Vishnu is described as reclining on a snake in the ocean of milk during the intervals of creation. Shiva wears snakes all over his body and so he is named as Naaga kula bhushana (one who wears the ornaments of snakes). A cobra with its hood spread is always depicted with Shivalingas. Ganehsa wears a snake sacred thread and also uses a snake as his belt. Goddesses from the Shiva tradition are seen with snakes in various sculptures.

In Rajasthan, a goddess known as Naaganechi is widely worshipped. She is the family deity of Rathod Kshatriya clan. These people believe that neem tree (*Azadarakta indica*) is the symbol of their deity and therefore they do not cut the neem tress nor they use it as fuel.

Killing of snakes is considered as sinful act and dead snakes are cremated with religious rituals.

In India there are many holy places having the tradition of snake-worship. There are elaborate religious rituals known as Naaga Bali or Offering to snakes. People offer a snake made of gold during eclipse and the ritual is known as 'naaga bimbaadi daana.'

Naaga Panchami is the well known festival related to snake-worship. It is observed all over India on the day of shraavana shukla panchami. Fear of death due snake-bite might be the origin of this worship. In Bengal a goddess named Manasaa Devi is believed to be the queen of snakes. She is specially worshipped on shraavana Krishna panchami day. Manasaa is popular goddess in Bengal, Bihar and Assam. Particularly in Bengal there is tradition of poetry for the last 200 years that is devoted to goddess Manasaa. These compositions are called as 'manasaa mangal kaavya'. The wandering mendicants sing these poems for the common public.

It is believed that Naaga panchami was the day when Lord Krishna defeated the powerful snake named Kaaliyaa who was poisoning the river.

Though there is a long tradition of snake-worship there is reference in the Mahabharata (Adi Parva; Chapters 51-58), to a ritual named 'sarpa yaaga' where the snakes were sacrificed. It is story of destruction of various snakes and how they were saved by the timely intervention of a young sage named Astika.

Snakes are symbolized as the Shakti – energy in human body which is believed to be in the form of

Kundalini (a shape of a coiled snake). It is said to be lying asleep at the base of the spinal column. When she is roused with a proper guidance, she reaches upwards to the brain and unites with Lord Shiva i.e. the person experiences the highest enlightenment.

In Malabar province, a sacred grove is known as Naagattanakaavu. In this grove, stone images of snakes are installed as the snake is believed to be the family deity of people from Malabar.

We come across a reference of an observance known as 'naaga danshtroddhaarana vrata' in order to be free from snake-bites. It starts on the day of Bhaadrapaa shuddha Panchami and is continued throughout the year.

The day of Maargashirsha shuddha panchami is called as 'naaga diwali'. In Maharashtra, there is a tradition of lighting a lamp which is placed on a food offering in the name of each male person in the family and a worship of snake image is carried out symbolizing prayers for longevity.

In Bengal, there is a folk dance called 'naaga mandala nrutya'. In this dance form, the priest is believed to

be a symbol of a snake.

We find that snake is revered in the history of Buddhist and Jaina religions too. Buddhist monks used to worship snakes. Parshvanaatha – the Jaina Teerthankar has a snake as his epithet (abhijnyana chinha).

g) Snake in Indian Classical Dance –

In the Natya Shaastra (dramaturgy) of the sage Bharata peculiar aesthetic form of fingers is described known as 'sarpa sheersha', takes its inspiration from the hood of a cobra.

h) Erroneous belief systems regarding the snakes –

There are some superstitions regarding snakes, for example: *naaga* resides in the innermost core of earth; there is a separate world of snakes which is known as *naagaloka*; the snake protects wealth kept in secret places or buried in earth; snakes possess a jewel on his head, the snake has long hair on the body, and our ancestors exist in the form snakes.



Korku Names for birds in Melghat Tiger Reserve, Maharashtra

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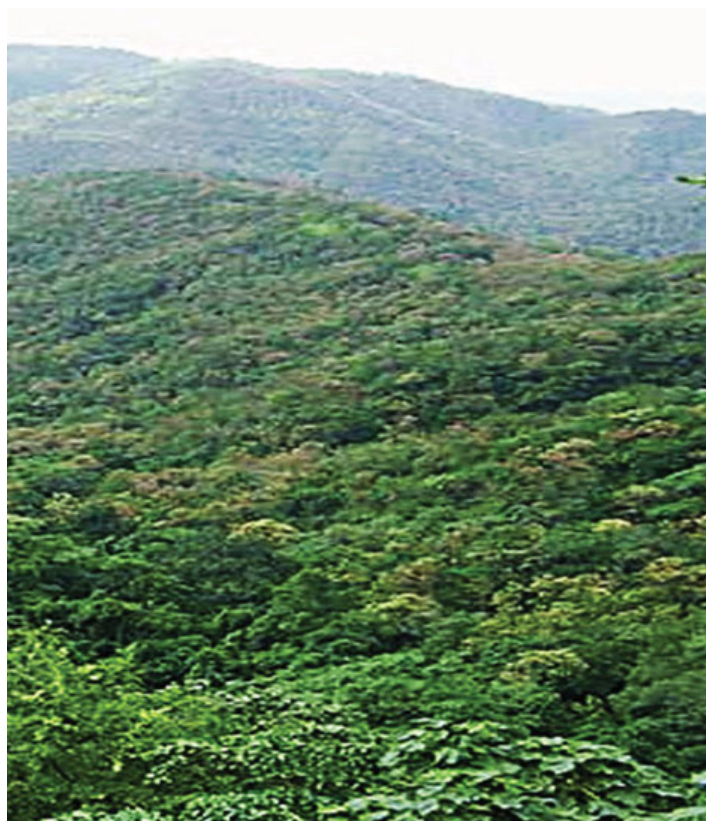
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INTRODUCTION:

Korku is a scheduled tribe (ST) predominantly found in East Nimar (Khandwa and Burhanpur), Betul and Chhindwara districts of Madhya Pradesh and adjoining areas in Melghat region of Maharashtra in India. They speak Korku language, which is a member of the Austroasiatic language family (Deogaonkar and Deogaonkar, 1990). Korkus have derived their name from the combination of the word 'koru' meaning man and 'ku' plural epithet, meaning tribal men (Russell and Hiralal, 1916). The Korkus are a branch of the great Munda tribes and are placed in the vicinity of the great tribe of Gonds (Deogaonkar and Deogaonkar, 1990). Korkus were initially believed to be a hunting gathering community dwelling in the forests of Satpura ranges on either sides of the river Tapti. The community has a unique and distinct culture, possesses a rich heritage of ancient traditional systems including indigenous knowledge, beliefs, customs and social systems. Today, the Korkus are facing poverty, hunger and malnutrition. The community is facing socio-economic challenges due to dwindling natural resources. Korku tribe mostly depends on agriculture, livestock and the forest produce for sustenance of their livelihood.

STUDY AREA:

Melghat Tiger Reserve (MTR) is situated in central part of Satpuda mountain range and at the northern extreme of Amravati, Akola and Buldana districts of Maharashtra state. The total area is about 2050 sq. km. including the core area Gugamal National Park and the buffer area which includes Melghat Wildlife Sanctuary, Multiple use area, Narnala Wildlife Sanctuary, Wan Wildlife Sanctuary and Ambabarwa Wildlife Sanctuary. Vegetation in MTR is mainly tropical dry deciduous forest dominated by Teak *Tectona grandis* and Bamboo *Dendrocalamus tulda*. There are patches of semi evergreen, moist deciduous and mixed forest with grassy meadows on hill tops and at relocated village sites. Bird diversity of MTR includes 276 species in different type of habitats.

A small population of the Korkus is resident in the Melghat Tiger Reserve area spread in about 55 small tribal villages. 10 villages, namely, Bori, Koha,

Kund, Vairat, Churni, Barukheda, Nagartas, Amona, Dhargad and Gullarghat were relocated during the last decade. Due to relocation of some villages, social and educational development, decreasing dependence of forests and migration to cities for employment and education, the bird related indigenous knowledge of the Korku tribe is decreasing with time. Therefore, the documentation of traditional knowledge of various aspects of Korkus of Melghat area assumes importance. The present study records some aspects of bird related knowledge of Korkus, particularly bird names given by Korkus in MTR.

METHODOLOGY:

The data was collected opportunistically from 2004 to 2013. During our visits to the MTR senior tribal persons and / or knowledgeable persons of the tribe dwelling in villages were identified and interviewed. The study focused on recording the names of birds in the spoken Korku dialect. We used bird field guides (Ali, 2002; Grimmett *et al.* 2011) while interviewing the tribesmen. The information was collected, collated and analysed. Only the information which was matching between two tribesmen from two different villages was considered to be valid and included in this paper. Bird names in Korku dialect listed by Chitampalli (2014) were also included in our list, but names of those species which are not found in Melghat were omitted.

OBSERVATIONS:

During the study a total of 64 names of birds and bird groups were collected from the Korkus from MTR. The names for birds in Korku dialect are listed in Table-1. Korkus generally do not hunt birds in MTR area. The exploitation of birds by Korkus is limited to occasional lifting of eggs of the Indian Peafowl *Pavo cristatus* and the Grey Junglefowl *Gallus sonneratii*. The eggs of the later are incubated with the help of the domestic hen and reared as poultry.

CONCLUSIONS:

Our initial opportunistic surveys show that the present day knowledge of members of the Korku tribe about birds is limited to a few common species found in MTR, probably because it is not a hunting community. Several bird names are not for individual species, but are used for a group of birds. The bird names can be categorized as: original words in Korku dialect (n=29), those derived from local Marathi names (Kasambe, 2015), Hindi names (n=14). Or those derived from the vocalizations of birds (n=21). The knowledge about birds of the interviewed Korku community members is less as compared to the Pardhi community in Maharashtra which is known to hunt more avian species (Kasambe, 2005; Kasambe, 2007).

Table-1: Names for birds in Korku dialect

Sr.	Common Name	Scientific Name	Name in Korku dialect	Derived from
1	Francolins	<i>Francolinus</i> spp.	Khada Hore, Chitar Hore	Korku
2	Quails	<i>Perdica/Coturnix</i> spp.	Hore, Bater	Korku/Marathi
3	Red Sprufowl	<i>Galloperdix spadicea</i>	Chotyang	Korku
4	Domestic Hen	<i>Gallus</i> spp.	Talang (F), Komba (M)	Korku
5	Grey Junglefowl	<i>Gallus sonneratii</i>	Dongar Sim	Korku
6	Red Junglefowl	<i>Gallus gallus</i>	Dongren Komba	Korku
7	Indian Peafowl	<i>Pavo cristatus</i>	Zalzya Mara (male), Simku (female)	Korku
8	Storks	<i>Ciconia</i> spp.	Dhoknam	Marathi
9	Indian Pond Heron	<i>Ardeola grayii</i>	Kitkhir	Korku, Call
10	Cattle Egret	<i>Bubulcus ibis</i>	Baglya	Marathi
11	Bitterns	<i>Ixobrychus</i> spp.	Karay, Kalwat	Korku
12	Shikra	<i>Accipiter badius</i>	Shikrya	Marathi
13	Black-winged Kite	<i>Elanus caeruleus</i>	Shikrya	Marathi
14	Black Kite	<i>Milvus migrans</i>	Cheel	Hindi
15	Vultures	<i>Gyps</i> spp./ <i>Sarcogyps</i> spp.	Bhilla	Korku

16	Crested Serpent-eagle	<i>Spilornis cheela</i>	Murar	Korku
17	Crested Hawk-eagle	<i>Nisaetus cirrhatus</i>	Dhundura	Korku
18	White-breasted Waterhen	<i>Amourornis phoenicurus</i>	Tiwli	Korku
19	Red-wattled Lapwing	<i>Vanellus indicus</i>	Tetenghoch, Tetungai	Korku, Call
20	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	Thito Goyanda	Korku
21	Sandpipers	<i>Tringa</i> spp.	Kare	Korku
22	Chestnut-bellied Sandgrouse	<i>Pterocles exustus</i>	Batar	Korku
23	Rock Pigeon	<i>Columba livia</i>	Koobadur, Kokandur	Marathi
24	Spotted Dove	<i>Spilopelia chinensis</i>	Bhuri, Bhor	Marathi
25	Emerald Dove	<i>Chalcophaps indica</i>	Kukri	Korku
26	Yellow-footed Green-pigeon	<i>Treron phoenicopterus</i>	Hariyal	Marathi
27	Plum-headed Parakeet	<i>Psittacula cyanocephala</i>	Toyle, Horya	Korku, Call
28	Rose-ringed Parakeet	<i>Psittacula krameri</i>	Chhota Mithoo	Marathi
29	Alexandrine Parakeet	<i>Psittacula eupatria</i>	Rawa Mithoo, Karan Mithoo	Marathi
30	Common Hawk-cuckoo	<i>Hierococcyx varius</i>	Piyoo	Korku, Call
31	Asian Koel	<i>Eudynamys scolopaceus</i>	Koyal	Marathi
32	Greater Coucal	<i>Centropus (sinensis) parroti</i>	Gada Kawla, Khamb Kukre	Marathi
33	Large Owls	<i>Bubo</i> spp, <i>Ketupa</i> spp.	Ghughoo	Korku, Call
34	Owlets	<i>Athene/ Heteroglaux/ Otus/ Glaucidium</i> spp.	Dooda	Korku
35	Nightjars	<i>Caprimulgus</i> spp.	Tapu	Korku, Call
36	Swallows	<i>Apus/ Hemiprocne</i> spp.	Katilav	Korku
37	Indian Roller	<i>Coracias benghalensis</i>	Kakota, Kavta	
38	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Khikkir	Korku, Call
39	Pied Kingfisher	<i>Ceryle rudis</i>	Kirkhir	Korku, Call
40	Common Kingfisher	<i>Alcedo atthis</i>	Chhota Kirkhir	Korku, Call
41	Stork-billed Kingfisher	<i>Pelargopsis capensis</i>	Bada Kirkhir	Korku, Call
42	Green Bee-eater	<i>Merops orientalis</i>	Teelu	Korku, Call
43	Coppersmith Barbet	<i>Megalaima haemacephala</i>	Pupu	Korku, Call
44	Woodpeckers	<i>Dinopium/ Dendrocopos</i> spp.	Kamba-Totari, Koombh Thotren	Korku
45	Shrikes	<i>Lanius</i> spp.	Bhardawa	Korku
46	Black Drongo	<i>Dicrurus macrocercus</i>	Sani Dhawchich	Korku, Call
47	Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	Kend Dhawchich, Dhauti	Korku, Call
48	Orioles	<i>Oriolus</i> spp.	Ambera	Korku
49	Asian Paradise Flycatcher	<i>Terpsiphone paradise</i>	Joge Titer	Korku

50	Rufous Treepie	<i>Dendrocitta vagabunda</i>	Kodiyan, Kokdya	Korku, Call
51	House Crow	<i>Corvus splendens</i>	Kawla/ Kauwa	Marathi/Hindi
52	Grey Tit	<i>Parus major</i>	Shiri Dhokya	Korku
53	Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pich-padoch, Pechila	Korku, Call
54	Common Tailorbird	<i>Orthotomus sutorius</i>	Lite Bhor	Korku
55	Babblers	<i>Turdoides</i> spp.	Titi, Kangoi	Korku, Call
56	Common Myna	<i>Acridotheres tristis</i>	Lava	Korku
57	Brahminy Starling	<i>Sturnia pagodarum</i>	Borsal	Korku
58	Oriental Magpie-robin	<i>Copsychus saularis</i>	Bada Chivich	Korku, Call
59	Indian Robin	<i>Saxicoloides fulicatus</i>	Chhota Chivich	Korku, Call
60	Purple and Purple-rumped Sunbirds	<i>Cinnyris asiaticus/ Leptocoma zeylonica</i>	Kende Bhuri	Korku
61	House Sparrow	<i>Passer domesticus</i>	Chichrej	Korku, Call
62	Baya Weaver	<i>Ploceus philippinus</i>	Zoryan	Korku
63	Munias	<i>Amamndava/ Lonchura</i> spp.	Munia	Marathi
64	Wagtails	<i>Motacilla</i> spp.	Khilich	Korku, Call

REFERENCES:

- Ali, S. (2002): The Book of Indian Birds, 13th Edn. Bombay Natural History Society / Oxford University Press, Mumbai.
- Deogaonkar, S.G. and Deogaonkar, S.S. (1990): *The Korku Tribals: Castes and tribes of India*. New Delhi, India. Concept Publication Co. ISBN 81-7022-297-4.
- Chitampalli, M. (2014): *Pakshikosh*. Second edition. Sahitya Prasar Kendra, Nagpur. Pp. 477+12.
- Grimmett, R., Inskipp, C., & Inskipp, T. (2011): *Birds of the Indian Subcontinent*. 2nd Edn. Oxford University Press, India. Pp.528.
- Kasambe R. (2005): Poaching of Vultures by Pardhis of Vidarbha. *Newsletter for Birdwatchers*. 45 (3): 42-43.
- Kasambe, R. (2007): Names of birds in Pardhi dialect of Maharashtra. *Newsletter for Birdwatchers*. 47(2): 28-29.
- Kasambe, R. (2015): Pakshyanchi Marathi Bhashetil Praman Naave. *Pakshimitra: The Quarterly Newsletter of Maharashtra Pakshimitra Sanghatna*.

April 2015. Year 5. Issue 3. Pp.10-25.

- Russel, R.V. and Hiralal (1916): *Tribes and Castes of the Central Provinces of India*. Vol.III.

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Lesser Kestrel female has dark streaked head and pale talons.

© Photograph - Swapnil Thatte.

Orienting Using Astronomy: Using the Moon

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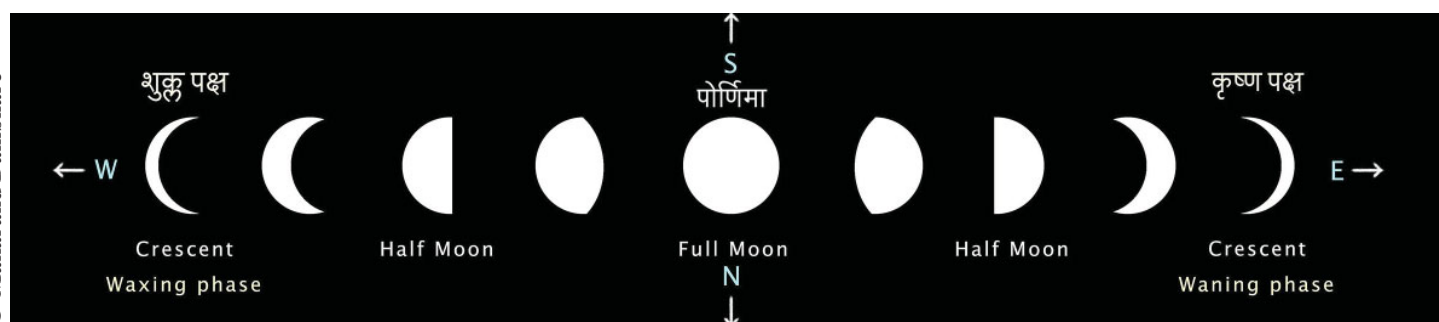
As the moon orbits the earth, we see phases, depending on where it is in relation to the Sun.

A new moon or no moon means it is in the same direction as the Sun. This is the amavasya. As it starts away we see a crescent and a gradually increasing or waxing moon till it reaches to a full moon on pournima. The moon then starts reducing in the size or waning of the illuminated area. The Indian calendar system has months based on the movement and phases of the moon, so information about it can help.

The increasing brightness part of the cycle is called the 'Shukla paksha', whereas the decreasing brightness part is called 'Krishna paksha'. You can use this information to identify direction.

If the Moon rises before the Sun sets, i.e. in the Shukla paksha, the bright side will be towards the west. If the moon rises after midnight, i.e. in the Krishna paksha, the bright side will be towards the east. In both the situations, the direction will be approximately east-west.

Additionally, the ends of the crescent if joined by a straight line will indicate the north-south direction.



Recent Sightings of Partial Albino White Throated Kingfisher, Laggar Falcon and Lesser Kestrel in Western Maharashtra

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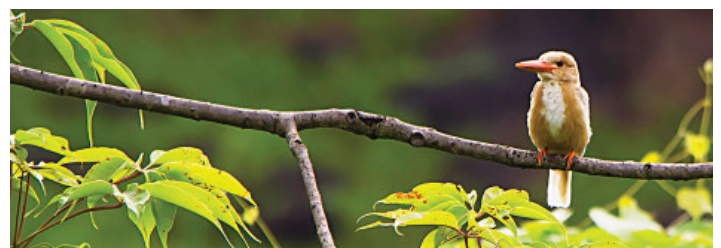
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Referee: Nitin Kakodkar and Dr. Satish Pande.



- **Name of Species:-** White Throated Kingfisher (Partial Albino) *Halcyon smyrnensis*.
- **Status:-** Least Concern (IUCN Red List, 2015).
- **Date of sighting:-** 19th July 2015
- **Time of sighting:-** 8.30 AM
- **Weather parameters:-** Sunny.
- **Number of times sighted:-** Twice.
- **Number of birds:-** Single.
- **Brief description:-** The bird had red eyes. The colour of feathers was pale cream instead of chocolate brown. The colour of primaries was almost white with a tinge of sky blue.
- **Locality:-** Near Goregaon (on the Mumbai-Goa Highway), district Raigad, Maharashtra, India.
- **Habitat description:-** Near a small stream amidst large tracts of traditional paddy fields.
- **Distance from human habitation:-** 3 km.
- **Any other bird/animal associates:-** Black Drongo, Oriental Dwarf Kingfisher.
- **Bird Behaviour:-** Saw bird sitting on electrical wire on the eastern side of the road. The bird was sighted from car and was later seen sharing a branch with Black Drongo. The bird was looking for food, was quite bold and did not pay attention to my presence.
- **Threats to the habitat:-** Probably over use of pesticides and insecticides.
- **Photographs:-** Attached.
- **Previous record:-** Two partial albino White-throated Kingfishers were recorded near Bagalkot town in 2007, which is about 110 km to the east of Belgaum. (Per. Com. Shashank Dalvi).



Laggar Falcon *Falco jugger* in Pune

- **Name of Species:-** Laggar Falcon *Falco jugger*.
- **Status:-** Near Threatened. (IUCN Red List, 2015).
- **Date of sighting:-** 29th November 2015
- **Time of sighting:-** 9.30 AM
- **Weather parameters:-** Sunny.
- **Number of times sighted:-** Once.
- **Number of birds:-** Single.
- **Gender of bird:-** NA.
- **Locality:-** Near Kanifnath Temple, Taluka – Purandar, Pune, Maharashtra.
- **Habitat description:-** Dry land with thorny shrubs, bushes & trees of average height.
- **Distance from human habitation:-** 2 km.
- **Any other bird/animal associates:-** Steppe Eagle.
- **Bird Behaviour:-** Saw the bird sitting on a branch of Neem tree (*Azadirachta indica*) & swallowing neem leaves 2-3 times. The bird was quite bold & not afraid of human presence & was there for 5-7 minutes, later on hovering.
- **Short Description:-** The bird was noticeable due to its greyish colour & size alike a falcon. It allowed us to approach from fair distance & managed to click some decent shots. But the behaviour of swallowing neem leaves was quite unusual.
- **Threats to the habitat:-** The bird is Near Threatened and destruction of habitat is a major threat.



- **Photographs:-** Attached.
- **Previous record:-** By Samyak Kaninde, in Oct-2015, Pune. By Rudraksh Chodankar, in Jan-2015, Mayureshwar and also by other several birdwatchers from Pune region. (Per. Com.)

Lesser Kestrel *Falco naumanni* in Pune

- **Name of Species:-** Lesser Kestrel, *Falco naumanni*.
- **Status:-** Least Concerned. (IUCN Red List, 2015).
- **Date of sighting:-** 20th December 2015
- **Time of sighting:-** 12.20 PM
- **Weather parameters:-** Sunny.
- **Number of times sighted:-** Once.
- **Number of birds:-** 2 pairs
- **Gender of bird:-** 2 males 2 females
- **Locality:-** Lonavala, Pune, Maharashtra.
- **Habitat description:-** Dry plains of dam backwater, waterbody.
- **Distance from human habitation:-** 3 km.
- **Any other bird/animal associates:-** Asian open billed Stork (5).
- **Bird Behaviour:-** Saw the bird sitting on a rock in the grass in search of a food. The bird hunted in fronted of us by walking on ground; a typical kestrel way to do it. Later on he sat nearby waterbody for next 10 minutes.
- **Short Description:-** The bird came into the notice

RECORDS

due to its typical bluish grey head & absence of moustachial stripe & later on confirmed from pale colour of talons. The female was sitting on the other side of the water.

- **Threats to the habitat:-** The bird is migratory to India and destruction of habitat is a major threat.

- **Photographs:-** Attached and page 124.

- **Previous record:-** Previous record:- By Samyak Kaninde, 28th October, 2013, Dive Ghat, Pune. and by Dr. Satish Pande at Saswad, district Pune in 2009 (Per. Com).



Recent Sighting of Forest Owlet *Heteroglaux blewitti* in Maharashtra

Prateik Kulkarni, Siddhesh Maldikar

(Email: prateikkulkarni@gmail.com)

Citation: Kulkarni, Prateik and Maldikar, Siddhesh (2015). Recent Sighting of Forest Owlet *Heteroglaux blewitti* in Maharashtra. *Ela Journal of Forestry and Wildlife* 4(4):129.

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Referee: Nitin Kakodkar and Dr. Satish Pande



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- **Name of species:-** Forest Owlet *Heteroglaux blewitti*.
- **Status:-** Critically Endangered. (IUCN Red List, 2015).
- **Date of sighting:-** 17th January 2016
- **Time of sighting:-** 11:22 AM
- **Weather parameters:-** Sunny.
- **Number of times sighted:-** Twice.
- **Number of birds:-** Single.
- **Gender of bird:-** Can't Specify.
- **Locality:-** Tansa Wildlife Sanctuary, near Tansa dam, about fifteen km from the city, close to village Aaghai, Thane district, Maharashtra.
- **Habitat description:-** Dry-Deciduous forest habitat including most of the Teak trees in an open small patch on a plateau.
- **Type of Forest:-** Dry-Deciduous. No grass land.
- **Distance from human habitation:-** 2-3 km.
- **Any other bird/animal associates:-** Nil.
- **Bird behaviour:-** Saw bird perched through binoculars and spotting scope. It was calling from the top of the tree giving out continuous notes. The remarkable behaviour was that the bird did not call in flight whenever it changed its place from one tree to another.
- **Threats to the habitat:-** Not really as the forest comes under protected area.
- **Photographs:-** Attached.
- **Previous records:-** 1 individual was spotted for the first time in Tansa Wildlife Sanctuary by Sunil Laad & Rohidas Dagale in October 2014. On subsequent visits to the sanctuary, many individuals of the same species had been spotted by the birdwatchers in the recent past.

Recent Sighting of Orange-breasted Green Pigeon *Treron bicinctus* in Maharashtra

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Citation: Khare, Akashay and Thatte, S.K. (2015). Recent Sighting of Orange-breasted Green Pigeon *Treron bicinctus* in Maharashtra. *Ela Journal of Forestry and Wildlife* 4(4):130.

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Referee: Dr. Satish Pande



- **Name of Species:-** Orange-breasted Green Pigeon *Treron bicinctus*.
- **Status:-** Least Concern; further Uncommon . (IUCN Red List, 2015).
- **Date of sighting:-** 4th April, 2015.
- **Time of sighting:-** 5.30 PM
- **Weather parameters:-** Sunny.
- **Number of times sighted:-** Once.
- **Number of birds:-** Single.
- **Gender of bird:-** Male.
- **Locality:-** Near Guhagar, about seven km from the city, close to village Veldur, Ratnagiri, Maharashtra.
- **Habitat description:-** Open flat lands in Kokan region called “ sada ” in vernacular Marathi, surrounded Semi-evergreen & moist deciduous forest, a small stream flows through forest cover.
- **Distance from human habitation:-** 3 km.
- **Any other bird/animal associates:-** NA.
- **Bird Behaviour:-** Saw bird sitting on branch of fruiting tree, on the left side i.e Eastern side of the road, sighted while taking photos of White browed Bulbul. The bird was in search of food. The bird was quite shy & afraid of human presence.
- **Threats to the habitat:-** Though it is least concern; deforestation & encroaching human habitation.
- **Photographs:-** Attached.
- **Previous record:-** Frequent sightings by Akshay Khare in the same region. Usually seen in fruiting season.



Recent Sighting of Masked Booby *Sula dactylatra* in Maharashtra

Akshay Khare

(Email: akshaykhare22@gmail.com)

Citation: Khare, Akshay (2015). Recent Sighting of Masked Booby *Sula dactylatra* in Maharashtra. *Ela Journal of Forestry and Wildlife* 4(4):131.

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Copyright: © Khare, Akshay 2015

Referee: Pramod Deshpande



- **Name of species:-** Masked Booby *Sula dactylatra*. (Juvenile)
- **Status:-** Least Concerned. (IUCN Red List, 2015).
- **Date of sighting:-** 16th July 2015
- **Time of sighting:-** 4 PM
- **Weather parameters:-** Partly cloudy.
- **Number of times sighted:-** Once.
- **Number of birds:-** Single.
- **Gender of bird:-** Could not be ascertained.
- **Locality:-** Guhagar, Taluka Guhagar, District Ratnagiri, Maharashtra, India.
- **Habitat description:-** In a coconut grove 10 m from the beach.
- **Distance from human habitation:-** 0.1 km.
- **Details about the sighting:-** Storm blown bird was found and was rescued.
- **Any other bird/animal associates:-** Nil.
- **Bird behaviour:-** Sat motionless without any signs of external injuries but was weak.
- **Threats to the habitat:-** Excessive fishing and oil discharge from container ships.
- **Photographs:-** Attached.
- **Previous record:-** No previous record from Guhagar.



Recent sighting of Black Stork *Ciconia nigra* in Pune

Rohan Joglekar and Atharva Bahirat

(Email: rohan97.jog@gmail.com)

Citation: Joglekar, Rohan and Bahirat Atharva (2015). Recent sighting of Black Stork *Ciconia nigra* in Pune. *Ela Journal of Forestry and Wildlife* 4(4):132.

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Referee: Dr. Satish Karmalkar



- **Name of species:-** Black Stork (*Ciconia nigra*)
- **Status:-** Least Concern
- **Date of sighting:-** 24 January 2016
- **Time of sighting:-** 1.45 PM
- **Weather parameters:-** Sunny, Clear
- **Number of times sighted:-** 2
- **Number of birds:-** 17
- **Age of birds:-** Both adults and juveniles
- **Locality:-** Near Saswad, Bhuleshwar Road
- **Habitat description:-** Grasslands, a small water body
- **Height of grasslands:-** Medium
- **Distance from human habitation:-** 0.5 kilometer
- **Any other bird/animal associate:-** Cattle Egret
- **Bird behavior:-** Saw the birds at the standing near the water body, they flew away from a long distance, shy species, followed a specific pattern while flying.
- **Threats to habitat:-** Heavy reduction in wetland habitat
- **Photographs:-** Attached
- **Previous record:-** By Swapnil Thatte, Garade, 14 Jnauary, 2016.
- Pande, S., Sant, N., Bhate, R., Ponkshe, A., Pandit, P., Pawashe, A. & Joglekar, C. 2007. Recent records of wintering White *Ciconia ciconia* and
- Black *C. nigra* storks and flocking behaviour of White-necked Storks *C. episcopus* in Maharashtra and Karnataka states, India.
- Indian Birds 3 (1): 28–32.



Recent Sighting of Spinner Dolphin *Stenella longirostris* and Indo-Pacific Humpbacked Dolphin *Sousa chinensis* in the Arabian Sea at Rewas, Alibag, Maharashtra

Satish Pande and Sudip Mahajan

(Email: pande.satish@gmail.com; sudipcmahajan@gmail.com)

Citation: Satish Pande and Sudip Mahajan (2015). Recent Sighting of Spinner Dolphin *Stenella longirostris* and Indo-Pacific Humpbacked Dolphin *Sousa chinensis* in the Arabian Sea at Rewas, Alibag, Maharashtra. *Ela Journal of Forestry and Wildlife* 4(4):133.

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Referee: Dr. Vaibhav Deshmukh



Indo-Pacific Humpbacked Dolphin *Sousa chinensis*



Spinner Dolphin *Stenella longirostris*

- **Name of Species:-**
 1. Spinner Dolphin *Stenella longirostris*
 2. Indo-Pacific Humpbacked Dolphin *Sousa chinensis*
- **Status:-** *Stenella longirostris* – Data Deficient; *Sousa chinensis* - Near Threatened. (IUCN Red List, 2015).

- **Date of sighting:-** 10th January 2016. .
- **Time of sighting:-** 10.40 AM
- **Weather parameters:-** Sunny.
- **Number of times sighted:-** Several.
- **Number of mammals:-** 6 to 7 Spinner Dolphins and 2 Indo-Pacific Humpbacked Dolphins.
- **Gender:-** At least one male Spinner Dolphin.
- **Locality:-** Near Rewas, Alibag Maharashtra in the Arabian Sea between 100 m to 200 m from the coast.
- **Habitat description:-** Off- shore marine waters with some ongoing fishing activity.
- **Distance from human habitation:-** 1 km.
- **Any other bird/animal associates:-** Brown-headed Gull and Black-headed Gulls swimming in the marine waters.
- **Behaviour:-** The dark grey spinner dolphins were breaking water and surfacing and spinning on the longitudinal axis while leaping out of water. This was witnessed for at least 30 minutes and at least five leaps were recorded every 5 to 6 minutes. The pale coloured Indo-Pacific Humpbacked Dolphins were swimming slowly and breaching but did not jump..
- **Threats to the habitat:-** Pollution and fishing activity with nets deployed in the sea.
- **Photographs:-** Attached.
- **Previous record:-** Probably this is the first sighting for the Rewas coast. Author is not aware of any previous published reports from this locality. However, the Spinner Dolphins are seen at the Nagao coast that is about 20 km from the Rewas coast (Per. Com. Archit Karpe.) Pande, S., N. Sant, S. Pednekar & M.S. Pradhan (2009). Definite records of Sperm Whale *Physeter catodon* (Linnaeus), Spinner Dolphin *Stenella longirostris* (Gray) and Bottlenose Dolphin *Tursiops truncatus* (Montagu) in the Arabian Sea. *Journal of Threatened Taxa* 1(3): 180-181.



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