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Male White-bellied Minivet

The low populations of Gyps vultures remain a cause of concern. There is some evidence that the declining trend has now stabilized. To effectively promote vulture conservation all present vulture breeding sites need to be identified urgently. These sites can then be prioritized for protection and future conservation. Problems that such breeding sites may be facing can be identified and appropriate measures can be taken by the respective

forest departments with the participation of the local people and NGO's. Many breeding sites of cliff nesting and tree nesting Gyps species are in private ownership plots. The involvement of local communities is the pivot of vulture conservation.

Continued monitoring of such sites is possible with the active enthusiastic participation of sensitized local youth. Monitoring includes gathering data on

commencement of breeding, number of breeding pairs, occupation of nests, incubation and hatching, food availability, threats to nestlings, protection of nest trees and provisioning of carcasses for feeding in case of food shortage.

Provisioning of food at vulture restaurants in the form of dead and diclofenac-free carcasses can be done at the local level. The government machinery, particularly the forest department, is quite understaffed and they depend on local feedbacks for the availability of fresh carcass. The problem of handling and the cost of transport of carcasses can be jointly solved by local people and forest officials, provided the economic burden is borne by the forest department. The handling of putrefying carcasses is a demanding task, and I have personal experience of the suffocating odor and the difficulty in lifting dead animals. Availability of vehicles is not easy and people are often reluctant to offer vehicles to carry out the unhygienic job of transport of cattle or other animal carcass.

Other important manpower-free studies are continued observations by deploying motion sensing cameras on a few randomly selected nests of various vulture species. This will throw light on the behavior of breeding vultures at nests. So also, presently, we do not have any data on the movement of vultures in India, particularly the home range and feeding areas of adults and the dispersal range of young. This is possible only by satellite transmitters fitted on vultures. The forest department should promote such studies on a priority and the ornithological expertise can be taken from the experts from outside the department, if such critical knowledge is not available in the department.

Today, widespread and increasing anthropological

activities are threatening natural habitats on an unprecedented scale. Small habitat pockets are the last resorts of several species. There are several other avian species about which ornithological data on aspects such as habitat preference, feeding and breeding ecology, population recruitment success and threats is not available. Studies to gather such vital data are important for effective conservation of species.

The key to safeguarding species for future lies in getting scientific data and imparting education to our rural folk by 'Rural Outreach Biodiversity Conservation Workshops'. Ela Foundation has already completed rural outreach programs in the towns of Jejuri, Baramati, Yadavwadi, with more than 100 participants each, and at Varanasi in Uttar Pradesh, with 250 participants, from surrounding 20 or more villages in each region. Several future rural outreach workshops are in the pipeline. These interactive programs have become popular. They create sensitization and awareness about the conservation of habitats, need for conserving biodiversity, importance of species, methods of study, and use of ethno-biological perspective for conservation among the rural communities. \

Keeping with the above philosophy, in this issue, we have papers on the discovery of nests of the Red-headed Vulture in Nepal and the implementation of conservation awareness programs in rural areas; we have new ornithological data on the less known White-bellied Minivet from rural India, among others. The papers exemplify that the out come of efforts of village-based people interested in nature studies and conservation provide valuable scientific inputs – truly Peoples' Science for Nature Conservation.



Ganga and Makara

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In Indian culture *Makara* (a crocodile) is believed to be the vehicle of the holy river Ganga or the Ganges. The meaning of the Sanskrit word Ganga is “the one who takes (us or the devotees) towards God”. In Indian culture, *Makara* is believed to be the symbol of lust and attachment. When we have controlled the lust for worldly passions, we are set free and can pursue higher goals in life. That is why *Makara* is said to be a carrier vehicle of Ganga, who has a control on it.

Meaning of the word *Makara*



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The painting of goddess Ganga with *Makar* in Vishrambagwada (Pune)



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Goddess Ganga with *Makar* in a temple at Varanasi



Goddess Ganga with *Ghadiyal* in a temple on a ghat, Varanasi

1 Makara

a) An aquatic monster understood variably as the alligator, crocodile or shark but properly, a fabulous animal. It is the emblem of the god of love- *Kamadeva*.

b) One of the signs of the zodiac. It corresponds with Capricorn. (Molesworth, 1975, p.624).

2 *Nakra*- *Magar* or *Susar*. A crocodile. [in other languages : Sanskrit- *Nakra*; Kannada- *Negar*; Tulu- *Negalu*].) (Kulkarni, K. P., Vol.II, year- ? p.469).

3 *Nakra* – a crocodile, an alligator. *Nakraketana*- Name of god of love. (MW, 1976, p. 524)

Makara- a kind of sea monster (sometimes confounded with the crocodile, shark or dolphin; regarded as the emblem of *Kamadeva*).

Makaraketana- having the *Makara* for an emblem; or having a fish on his banner. (MW, 1976, p. 771).

SYNONYMS

The lexicon *Amarakosha* (1/10/20 and 1/10/21) says,

Shishumara = a child-killer, the Gangetic porpoise or a dolphin or an alligator. (MW)

Udra = an aquatic animal or a crab or an otter. (MW).

Shanku = an aquatic animal.

‘*Nakrastu kumbhirah*’ = ‘*kumbhira*’ is a crocodile of the Ganges (the long-nosed alligator).

All these are called as ‘*jala jantu*’ – aquatic animals.

ETYMOLOGY

If we see the root verb in *Makara* it is ‘*makam rati*’]

= *Ra* or *Ras* cl. 2 P = to grant, to give, to bestow or to impart.

The verb in '*kumbhira*' is '*irati*' means to go, to move, to arise from. A variation of '*kumbhira*' is '*kumbhila*'. The verb in this word '*ilati*' means 'not to move'.

The text *Abhidhanacintamani* (4.417) says, '*Mankate makarah*' = The root verb '*mank*' means to move or to adorn.

English word Muggar is for the fresh water crocodile.

In Hindi the word Magar is used.

From '*makar* to *magar*'. I think here we go from a harsh letter of alphabet to the soft letter.- (from '*ka*' to '*ga*' according to letters in the Marathi language. (This may not have grammatical justification.).

I have found that in Farsi language '*maga*' means a small river.

The *Ashtadhyayi* of *Panini* mentions *nakra* as '*na kramati*' (VI.3.75). (Panini/Vasu, 1988, vol. II, p. 1233). '*Na kramati*' means not moving, in allusion to the habit of the crocodile of staying still at one place without moving.

MYTHOLOGY

a) '*Makaradhvaja*' is son of *Hanumana*. He was born to a crocodile that was residing in the ocean (salt-water crocodile) as the drops of perspiration of Hanuman fell on her body. (Vettam Mani, 1989, p.471).

The original story is found in the *Ananda Ramayana* (*SaraKanda*, Canto 11, verses 83-90).

b) The same text has another story where a sage makes an immoral demand to a beautiful *Apsara* (heavenly damsel) named '*Dhanyamali*'. But she declines to accept and the angry sage curses her to become a crocodile. God *Hanumana* frees her spirit by killing the crocodile in whose body the *Apsara* is trapped. She regains her heavenly form. (*Ananda Ramayana*, *SaraKanda*, Canto 11, verses 54-56).

ICONOGRAPHY

With the flag bearing idol of the *Kamadeva*., a *Makara* is depicted on his flag and the face of the *Makar* is made up of five arrows. The notion of five arrows refers to five specific types of flowers – *Shveta kamala*, *Ashoka pushpa*, *Amra manjari*, *Nava mallika*

and *Neela kamala*.

(BSK, vol.II, p. 257).

I have not yet come across any other mythological story except in the *Ananda Ramayana* explaining the significance of depicting a *Makara* on the flag of *Kamadeva*. But there is a possibility to find one in the vast literature depicting Hindu mythology.

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Pavo – The Peacock

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Pavo (Peacock) is a constellation in the southern sky. It is one of the twelve constellations conceived by Petrus Plancius from the observations of Pieter Dirkszoon Keyser and Frederick de Houtman. Pavo first appeared on a 35-cm diameter celestial globe published in 1598 in Amsterdam by Plancius and Jodocus Hondius and was depicted in Johann Bayer's star atlas *Uranometria* of 1603. French explorer and astronomer Nicolas Louis de Lacaille gave its stars Bayer designations in 1756. Pavo is bordered by Telescopium to the north, Apus and Ara to the west, Octans to the south, and Indus to the east and northeast. Covering 378 square degrees, it ranks 44th of the 88 modern constellations in size and covers 0.916% of the night sky.



As one of the deep southern constellations, it is not easily visible in the Northern Hemisphere, and is circumpolar at latitudes south of the 50th parallel in the Southern Hemisphere. Some of the stars in the constellation form an asterism known as “the Saucepan” in Australia when they are used for navigation, as they point toward the southern celestial pole.

Alpha Pavonis, the brightest star in Pavo known as the Peacock—is an English translation of the constellation’s name. Alpha has an apparent (or visual) magnitude of 1.91. It is a spectroscopic binary system, one estimate is that the distance between the pair is 0.21 astronomical units (AU), or half the distance between Mercury and the Sun. The two stars rotate around each other in a mere 11 days and 18 hours. The star system is located around 180 light years away from Earth.

Delta Pavonis is one of the nearest bright stars to the Sun. It is only 19.92 light years away and has a magnitude of 3.56. Delta Pavonis was identified as the “Best SETI (Search for Extraterrestrial Intelligence) target” of the 100 nearest G-class stars by the SETI Institute. It is the nearest solar analog that is not part of a binary or multiple star system.

PLANETARY SYSTEMS AND DEBRIS DISKS

Six stars with planetary systems have been found. Three planets have been discovered in the system of the orange star HD 181433, an inner super-earth with an orbital period of 9.4 days and two outer gas giants with periods of 2.6 and 6 years respectively. HD 196050 and HD 175167 are yellow G-class Sun-like stars, while HD 190984 is an F-class main sequence star slightly larger and hotter than the Sun; all three are accompanied by a gas giant companion. HD 172555 is a young white A-type main sequence star, two planets of which appear to have had a major collision in the past few thousand years. Spectrographic evidence of large amounts of silicon dioxide gas indicates the smaller of the two, which had been at least the size of Earth’s moon, was destroyed, and the larger, which was at least the size of Mercury, was severely damaged. Evidence of the collision was detected by NASA’s Spitzer Space Telescope.

DEEP - SKY OBJECTS

The deep-sky objects in Pavo include NGC 6752, the third-brightest globular cluster in the sky, after 47 Tucanae and Omega Centauri. An estimated 100 light



The globular cluster NGC 6752.



Source: Wikipedia

NGC 6872 and IC 4970

years across, it is thought to contain 100,000 stars.

They are a pair of interacting galaxies in Pavo and have an apparent visual magnitude of 12.7 and 14.7 and are approximately 220 million light years distant from the solar system. IC 4970 is a type E7-S0 elliptical galaxy. NGC 6872 is the larger galaxy of the two. It is a barred spiral galaxy in shaped like an integral sign and is one of the largest barred spiral galaxies known. It extends across almost 380,000 light years. It has one significantly disrupted spiral arm which is home to many young blue stars. The starburst activity in the region is believed to have been caused by IC 4970 recently passing through it.

METEOR SHOWERS

Pavo is the radiant of two annual meteor showers: the Delta Pavonids and August Pavonids. Appearing from 21 March to 8 April and generally peaking around 5 and 6 April, Delta Pavonids are thought to be associated with Comet Grigg-Mellish. The August Pavonids peak around August 31 and are thought to be associated with the Halley-type Comet Levy (P/1991 L3).

First record of nests and breeding success of Red-headed Vulture *Sarcogyps calvus* and implementation of Vulture Conservation Programs in Nepal

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ABSTRACT:

The Red-headed Vulture *Sarcogyps calvus* (RHV) was historically common in the West Himalayan foothills but its population has declined in the entire Indian subcontinent (Nadeem *et al.* 2007 and Cuthbert *et al.* 2006). The objectives of our study were to detect the nest sites and document breeding success of the critically endangered Red-headed Vulture (RHV) in the West Himalayas. We surveyed 14 districts (Arghakhanchi, Palpa, Gulmi, Syanga, Pyuthan, Dang, Lamjung, Kaski, Surkhet, Baglung Parbat, Tanahu, Damauli and Jajarkot) of Western Nepal. We observed 28 RHV were encountered flying, roosting, nesting and feeding. Three nests, two from Palpa and one from Jajarkot were recorded between December 25, 2011 to January 2014. Breeding success at two nests was 100%. During the survey Vulture Conservation Awareness Programs were implemented.

INTRODUCTION:

Nine different species of vultures have been recorded in Nepal, of which six are resident and three are migratory (Birdlife International 2013), of which White-rumped vulture *Gyps bengalensis*, Slender-billed vulture *Gyps tenuirostris* and Red-headed vulture *Sarcogyps calvus* (Scopoli, 1786; RHV) are listed as Critically endangered in the IUCN Red Data Book (IUCN 2013).

RHV was once abundant with a wide distribution ranging across the Indian Subcontinent, and eastwards to south-central and south-eastern Asia, extending to Singapore. It formerly occurred in Peninsular Malaysia and Singapore but now appears to be absent there. It is usually seen in open country, cultivated



and semi-desert areas, deciduous forests, foothills and river valleys. In southern China its presence has not been recorded since the 1960s, and it is nearly extinct in Thailand (BirdLife International 2008). In Nepal, RHV population is estimated as 200 - 400 individuals (Inskipp *et al.* in press. 2013) and RHV is usually found up to an altitude of 3100 asl (Grimet *et al.* 2003). RHV were recorded feeding at Vulture Safe Feeding Sites of Rupendehi, Dang and Nawalparasi district of Nepal (Chaudhary *et al.* 2010, Dhakal *et al.* 2011). RHV in flight were also recorded in Arghakhanchi, Gulmi, Damauli, lamjung, Tanahu, Kaski, districts of Nepal (Bhusal and Dhakal 2011, Gurung R. *et al.* 2013).

The catastrophic decline in the populations of *Gyps* species of vultures in Asia in the last few decades is chiefly attributed to mortality following ingestion of the veterinary non-steroidal anti-inflammatory drug (NSAID) Diclofenac, (Oaks *et al.* 2004, Cuthbert *et al.* 2006). Habitat loss, competitors and food scarcity (Dhakal 2011) are other probable causes of vulture decline in Nepal. Diclofenac was used to treat livestock, and it is hypothesized that the same drug has been responsible for the observed declining trends in RHV populations. The population of RHV showed a significant annual decline of around 44% to 48% in 1991, 1993 and 2000 from 13 Indian Protected areas (Prakash *et al.*, 2003, Cuthbert *et al.* 2006). After the first record since 1980 (Tharparker 2002), Nadeem *et al.* (2007) reported that the population of RHV was declining and rare or absent in some parts of India, but was still fairly common in the West Himalayan foothills. In order to verify this claim, we undertook a study to detect the nest sites and document breeding success of the critically endangered RHV in the West Himalayas.

METHODS:

Study Area:

Our Study area included Western Nepal including the Western Mid-hills which comprise of tropical, sub-tropical to mixed dry tropical deciduous forests and mixed dry tropical deciduous forest in hilly regions (Figure 1). Most common tree species are *Terminalia alata* (Saj), *Dalbergia sisoo* (Shisham), *Adina cardifolia* (Karam), *Dillenia pentagyna* (Tantari), *Mangifera indica* (Mango tree), *Ficus religiosa* (Pipal tree) *Daubanga grandifolia* (Odale tree) and *Bombax ceiba* (Simal). Palpa is famous for Pine forests. The dominant

trees were *Bombax ceiba* (kapok), *Acacia catechu* (khair), *Adina cordifolia* (karma), *Aegle marmelos* (bel), *Mangifera indica* (mango), *Cleistocalyx operculata* (kamuno), *Aporosa octandra* (kali katha), *Lagerstromia parviflora* (budhodhaya) and *Pinus roxburgii* (Salla). *Shorea robusta* (Sal) was dominant in valleys.

After preliminary information gathered from the literature, 14 districts (Arghakhanchi, Palpa, Gulmi, Syanga, Pyuthan, Dang, Lamjung, Kaski, Surkhet, Baglung Parbat, Tanahu, Damauli and Jajarkot) were targeted for this survey.

- i) Nest site region of Palpa - lies in Bheri Zone in Western Nepal (27.52° N, to 83.330° E). Tansen is the district administrative headquarter of Palpa district, at about 1350 asl the town has a pleasant Tropical to Sub-tropical climate throughout the year. The annual precipitation is about 1500 mm of which 90% falls in the monsoon season.
- ii) Nest site region of Jajarkot District lies in the Bheri Zone in mid western Nepal; covers a total of 2,223 km² area with the elevation ranging 300 - 5200 asl (28°42' N, to 28°7' N 82°14' E to 82°23' E). Khalanga is the headquarter and the climatic condition ranges from sub-tropical to alpine.

Study Period:

Total of 35 days and 225 hours were spent in field surveys. The study was conducted from December 25, 2011 to January 5, 2012 in 7 districts (Arghakhanchi, Palpa, Gulmi, Syanga, Pyuthan, Dang, Lamjung). During March-April 2012 similar survey was conducted in Kaski, Surkhet, Baglung Parbat, Tanahu, Damauli and Jajarkot in different visits. We spent 1- 3 days in one district and average 9 hours (8 AM to 12 PM and 2 PM to 6 PM) were spent in the field per day. We kept records of number RHV sighted and their activity.

- a) Literature review: past records of RHV populations and nest sites were cumulated from published literature. Further, we collected secondary data about the species from different researchers, Governmental sources, NGOs and INGOs.
- b) An Informal Questionnaire Survey by random sampling was conducted to understand people's attitude, knowledge about vultures and to locate the roosting and nest sites of RHV.
- c) Direct Observations: Direct observation were made using Binoculars and these were recorded with digital single lens reflex - DSLR cameras to identify the vulture species and to record the nests of RHV.

- d) Nest Monitoring:** The nests were observed for two breeding seasons (2012-2013 and 2013-2014), monitored 3 hours in the morning (8 to 11 AM) and 2 hours in the evening (4 to 6 PM) after training a local observer. Authors (HD, KMB, TNB) visited once a month and spend 2 to 3 days to observe the nest of RHV during the two breeding seasons. The Jajarkot nest was monitored by a team from Bird Conservation Nepal (BCN).
- e) Secondary Data Collection:** Secondary data was collected from Bird Conservation Nepal who also conducted Highway surveys as transect line. Another team of BCN did absolute counts of vultures along the trails in Jagatipur, Khalanga, Dandagaun, Lanha, Sakla and Nayakbanda Village Development Committees of Jajarkot district.
- f) Nest Census:** Breeding success of RHV was studied during the breeding period from January to May. The nest was identified on the basis of the presence of nesting birds or fresh white dropping on the nest rim and nesting ledge, or fresh dropping on the rock cliffs underneath the nesting sites. Number of nests were counted and nest occupancy recorded.) We considered a nest as active in which eggs were laid, an occupied nest is one in which eggs may not have been laid but some nest building activity has taken place, and successful or productive nest' as one from which a chick fledged (cf. Postupalsky 1974). . Nests were monitoring monthly to assess the nest status and breeding success. Breeding success of RHV was determined using following formula: Breeding Success = Productive nest / Active nest x 100.
- g) The Community Outreach Program** focused on those communities where good numbers of RHV population or their nests were recorded. We distributed posters and pamphlets on vulture conservation among local people, farmers, students, members of community forests and local leaders. The color poster and A4 size color pamphlet were in Nepali language and published by BCN for free distribution. They highlighted the plight of vultures and suggested simple conservation measures that people could implement.

District Livestock Service Office Jajarkot and Barekot Environment and Development Committee, Jajarkot, organized stakeholder awareness and interaction workshop on 18 April 2014 at Khalanga, Jajarkot where RHV nest was recorded (Bhusal 2014).

- h) A Conservation Award Program** was implemented with the support of District Forest Office, BCN, Community Forest Users Groups and Local researchers to promote RHV conservation. Awareness campaign was also held in different schools and colleges during our visit by displaying and distributing posters and pamphlets.
- i) Documentary shows:** These were screened with the support of BCN and Animal rights Nepal to promote conservation. (See Map 1)

RESULTS:

We encountered 28 RHV flying, roosting, nesting or feeding in the 14 districts. In December 2012, a nest of RHV was found at 1065 msl in Palpa district (27.8 N, 083.5 E). This site was around 3 km south west from Tansen. The nest was on a *Daubanga grandifolia* (Odale) on a cliff in Saraswoti's private land (27.8 N, 083.5E). In 2013/2014 the same nest was also active. The second nest (28.8°N, 082.2° E; Elevation 1519 asl) was recorded in Lanha, Jajarkot district (Bhusal 2014). A third nest was recorded recently in the Palpa district, (BCN 2014, unpubl. data). It had one egg.

With BCN we distributed 50 posters and 300 pamphlets on vulture conservation among local people, farmers, vet professionals, students, teachers, members of community forests and local leaders.

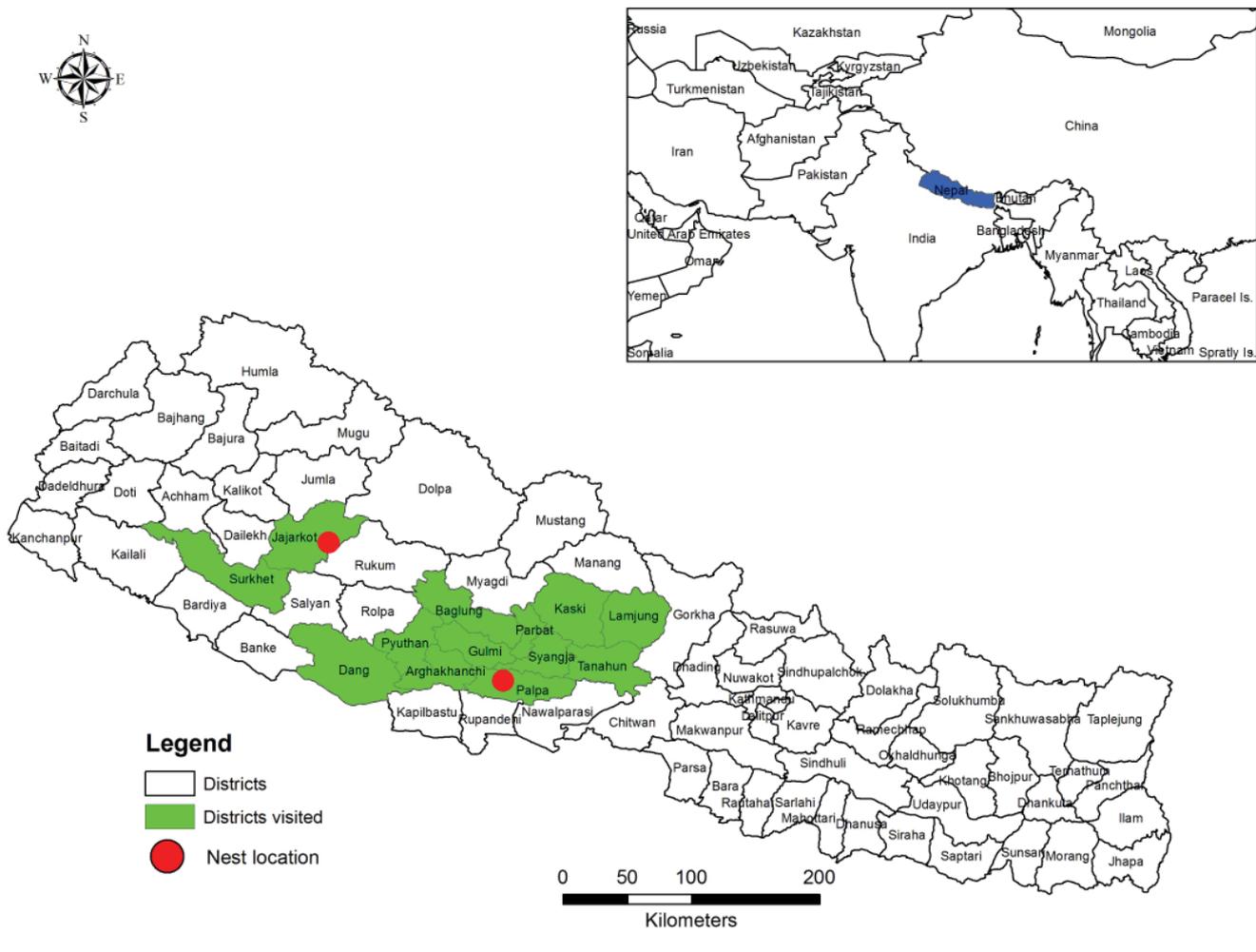
CONCLUSIONS:

The breeding success of RHV was 100% in the two nests. It appears that they nest on tall trees. This species does not live in large groups and all the nests were solitary. The breeding period begins by forming a pair and in December - January when they start building a nest. Courtship is aerobatic, with both the male and the female engaging in soaring and dramatic mutual cart wheeling displays. The large, flat nest is constructed from sticks, leaves and dry grass. A single egg is laid, with both parents sharing incubation duties. After 45 days the chick hatches and it leaves the nest by June-July.

RECOMMENDATIONS:

1. Regular monitoring of vulture nests, populations and monitoring of breeding success in West Nepal.
2. There is an immediate need to create awareness and encourage local people to save the nesting trees of vultures.

Figure 1: Map showing nest localities (circled areas) of Red-headed vulture. The red and blue lines are roads.



3. There might be other potential nesting sites in other probable districts. Efforts should be made to identify those areas and conduct further research.
5. Integrated Conservation Program should be launched to save the critically endangered RHV in the study area. The program could include Vulture Conservation Radio Program with community forest user groups and School Children.
6. The study area should be declared as an Important Bird Area of Nepal.
7. Intensive NSAIDs survey is needed for future vulture conservation..
8. Awareness Campaign and strict law enforcement should be implemented to stop wildlife hunting and deliberate poisoning of carcasses.

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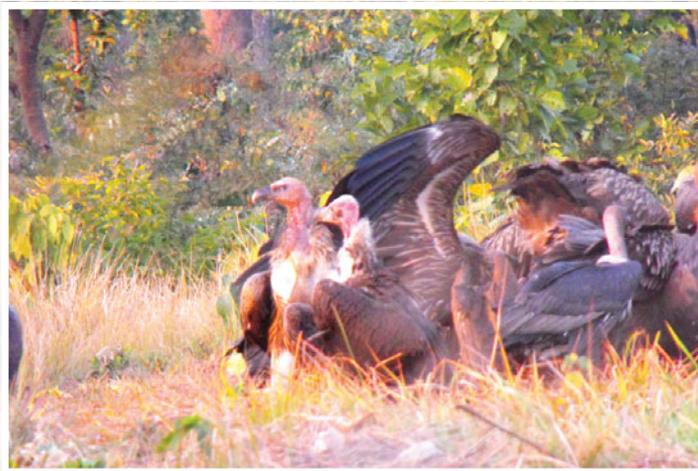
Note: Saraswati was awarded for her devotion in conserving the nest of Red-headed Vulture in her farm land. Journalist Krishna Mani Baral, Tek Narayan Bhattari and Conservation biologist, Hemanta Dhakal

were given Conservation Awards and the news was widely publicized by different national newspapers. Bird Conservation Nepal and Community Forest Users groups in Madanpokhara, Palpa are organizing Vulture Conservation Awareness and Interaction Campaign every year during Vulture Awareness Day (1st week of September). At Jajarkot, Krishna Prasad Bhusal and his group implemented awareness programs. Another awareness event was organized by Shakla VDC in Syphukhola where more than hundreds local people were familiarized with vulture conservation.

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Photographs of Red headed vultures encountered including nest in Palpa.



Red headed Vulture and other vulture species feeding on a carcass, Vulture Safe Feeding Site, Lalmatiya, Dang, Nepal



Red headed Vulture, Dang



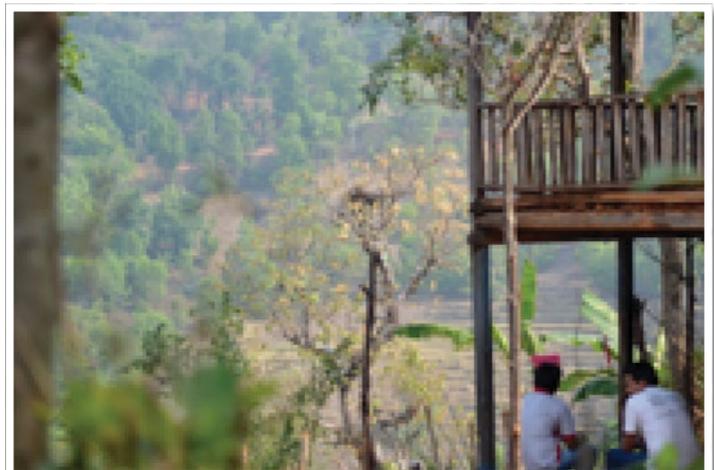
Red headed Vulture (flying), Kaski



Red headed Vulture taking sun bath, Arghakhanchi



Conservation Awareness Campaign at Arghakhanchi.



Researchers in Saraswati Rawat's house observing of Red headed Vultures nest (1st recorded nest in the history of Nepal), 2012, Palpa.

(27.8 N, 083.5E) Red-headed vulture chick, recorded at 1065 m in Palpa

Red-headed Vulture conservation effort in Tansen-12, Palpa



Hemanta Dhakal and team awarded for the record of the first nest of Red-headed Vulture in Nepal

Saraswoti Rawat



Vulture Conservation Awareness Day in Kaski. Street Rally.



Awareness at Arghakhanchi.

Habitat Preference and Breeding Biology of White-bellied Minivet *Pericrocotus erythropygus* (Jerdon) in Western Maharashtra, India

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INTRODUCTION:

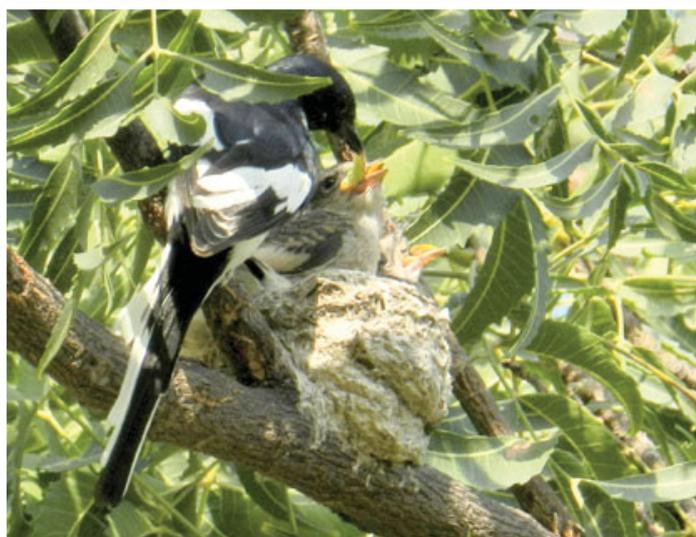
Minivets (genus *Pericrocotus*) are known for their brilliant red, yellow or orange plumage. Thirteen species of minivets are recorded from India (Rasmussen and Anderton 2005). Not much is known about the breeding biology of the White-bellied Minivet *Pericrocotus erythropygus* (Jerdon). The need to monitor and study breeding birds has arguably never been so great with rapid development, urbanization and industrialization across the globe (Gregory et al 2004). Here we present data on habitat choice and breeding biology of this species from our preliminary observations from Western Maharashtra, India.



Habitat of the White-bellied Minivet at Jejuri, Maharashtra



Female White-bellied Minivet on the nest



Male White-bellied Minivet feeding the chick

METHODOLOGY:

Ten pairs of White-bellied Minivet were observed during the study period between 2005 and 2014. Male and female are identified based on plumage dimorphism (Ali and Ripley 2001). The study area included Pune district, Maharashtra, India, particularly in the outskirts of the towns of Pune, Diwe, Kolwire, Jejuri and Pingori. Habitat data was obtained during 2005 till 2014 from all sites and data on breeding biology was obtained from 8 breeding attempts, two in 2007 and six between 2012 and 2014 from Jejuri outskirts (18°26' N and 74° 15' E). Habitat components around 100 m radius with the nest site in the center were characterized visually from high vantage point observations (Bibbey et al 1992) and were divided into four major habitat components, a) hill slopes, b) scrub country with xerophytic bushes, c) open patches of short grass and d) agricultural cropland. The data is based only on visual observations strictly in accordance with the WildLife Protection Act (1972).

OBSERVATIONS AND RESULTS:

Habitat: The biogeographic zone of the nesting sites is the ecotone region of the Western Ghats and the Deccan Plateau (Rodgers and Panwar 1988). The average percent habitat composition around the ten nest sites was characterized as 45% hill slopes, 30% scrub with xerophytic vegetation, 20% open patches of short grass and 5% agricultural cropland. The predominant xerophytic flora included *Securinega leucopyrus*, *Zizyphus*, *Lantana*, *Euphorbia* species, etc. The grasses included *Heteropogon*, *Andropogon* and *Aristida* spp. Other dominant trees were Neem *Azadirachta indica*, Babhul *Acacia arabica*, Mango *Mangifera indica* and Karanj *Millettia pinnata*.

Nesting: The nests of White-bellied Minivet were found on Neem tree in 6 instances and on *Acacia arabica* tree in two instances. The average widest nest diameter was 7 cm (range 6.8 - 7.2 cm) and the depth was 4.9 cm (range 4.8 - 5.2 cm). The nests were made from twigs of grass and other vegetable matter, were lined with soft silky grass inflorescence while the outer coating was strengthened with cobwebs. The species shows distinct sexual dimorphism and parental role in nesting could be correctly evaluated. The nest was built by both parents between 5 days to one week. Seven nests were in the fork of the tree but one nest was on a horizontal branch, a fact that has not been described earlier. The average nest height from ground was 378 cm (range 270 to 660 cm).

After a brief interval of four days, when the male alone intermittently inspected the nest, the eggs were

laid (at intervals of 24 hrs each), i.e., 2 to 3 eggs were laid in two to four days. The female alone incubated and the male fed her during this period, but the female also briefly left the nest and fed by herself, stretched or to expel excreta. Incubation started with the laying of the last egg. The incubation period was 16 days. The average daily nest inattentiveness time was 35 min (range 30 to 40 min). All eggs hatched within 24 hr and the chicks were altricial. Down appeared on the second day, while eyes opened and pins appeared on the fourth day. Body was covered with feathers by the end of the first week. Chicks fledged after two weeks from hatching.

Five of the eight breeding attempts were successful where at least once chick fledged from the nest and the nesting success was 62.5%. Out of 15 eggs laid in eight breeding attempts 11 chicks fledged from five nests (73% fledging success). Mayfield Analysis (Mayfield 1975) of our data showed that Daily Egg Survival Rate was 26.3 % and Daily Chick Survival rate was 65.3 %. The Overall Daily Survival Rate was 17.2 %. Post-fledging dependence period, during which fledglings were fed by parents, was 4 weeks. The parents attended the chicks but did not feed them up to 12 weeks. Two of 11 chicks that fledged died in the post-fledging dependence period (18% post-fledging mortality), hence the overall breeding success was 60%.

Diet: The White-bellied Minivet is predominantly an insect and spider eater. The size of diet varied with the time duration from hatching. Smaller sized prey was brought in the first few days and the size of prey increased as the chicks grew in size. The food items included grub, worms, crickets, grasshoppers, caterpillars, mantis, lepidoptera (moths and butterflies), odonata (dragonflies) and arachnids (spiders). The White-bellied Minivets mainly procured food by hovering over the short grass, an observation noted by Ali and Ripley (2001). Out of a total of 125 foraging attempts, 97 included hovering and probing the grass patches (77%) and 28 included searching in short bushes and xerophytes of less than 120 cm. This observation underlines the importance and necessity of short open grass patches for the survival of the White-bellied Minivet. Grass hovering for finding food is an interesting behavior of this species and it differs from the related and co-inhabiting Small Minivet *Pericrocotus cinnamomeus* in that the latter specie prefers to hunt in bushes and trees.

Threats: The potential natural avian predators observed in the study area were Black Drongo *Dicrurus macrocercus*, Bay-backed *Lanius vittatus* and Long-tailed Shrikes *Lanius schach*, Shikra *Accipiter badius* and Tree Pie *Dendrocitta vagabunda* while the mammalian predator was the Indian Gray Mongoose



Female White-bellied Minivet with fecal sac



Fledgling White-bellied Minivet on the nest

Herpestes edwardsii. Other threats are human habitat modification, tree felling and urbanization. At two sites the White-bellied Minivet pair abandoned the area due to human disturbance.

CONCLUSIONS:

The chicks of White-bellied Minivet are altricial and nidicolous. The incubation period was 16 days. The nesting success of the species in the study area was 62.5% and the fledging success was 73% with an overall breeding success of 60%. We recorded 18% post-fledging mortality. Daily Egg Survival Rate was 26.3 % and Daily Chick Survival rate was 65.3 % while the Overall Daily Survival Rate was 17.2 %. The foraging frequency over short grass patches was 77%.

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Two male White-bellied Minivets hunting for food in the grassland

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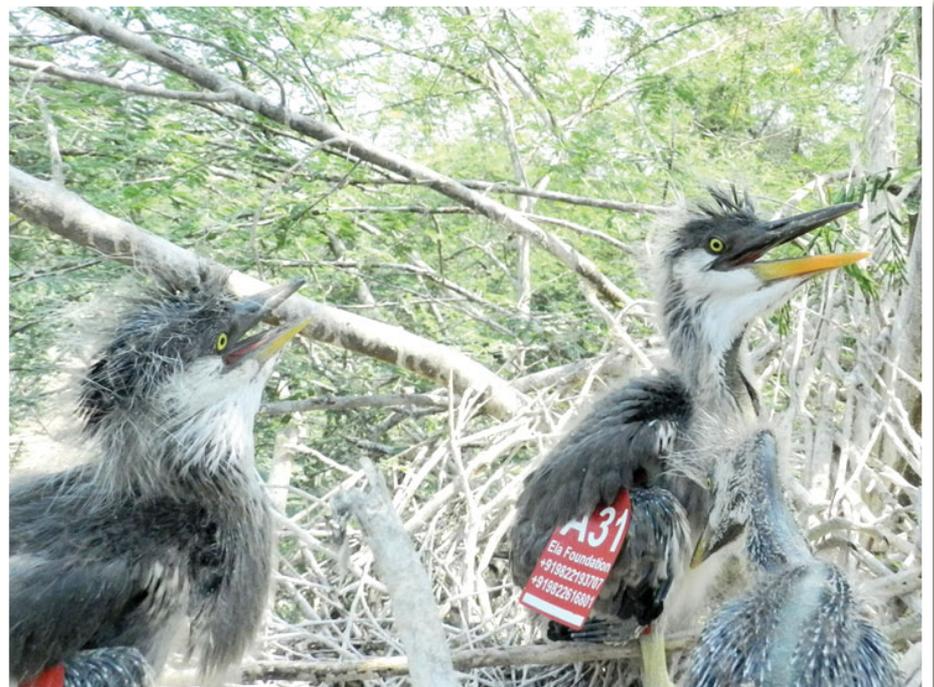
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Grey Herons wing-tagged by Ela Foundation, National Institute of Virology and Maharashtra State Forest Department in 2014 during Avian Influenza surveillance.

If you see these birds, please inform us at pande.satish@gmail.com.