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## Special Issue on
## Vulture Conservation
## in Maharashtra

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# Vulture conservation in Maharashtra

**Sarjan Bhagat**
IFS, PCCF (WL), Chief Wildlife Warden, Maharashtra

Vultures are an integral part of the biodiversity of India. Any scholar of mythology and history will readily appreciate the importance of this avian wonder not only in today's world but also its glorious past the world over. From the Egyptian and Greek mythology, from small populations of the Parsi community to the larger sections of the society in India, most people can associate with vulture and its place in their culture and ways of life.

Just two decades ago, there were 85 million vultures in our country. They are now estimated to be a mere 3000 to 4000. India, Nepal and Pakistan have lost 95 % of their population of vultures in the past 15 years or so. The Vulture could be used as one of the ecological indicators of the ecosystem.

In the various protected areas of Maharashtra the dedicated field staff, research fellows of the forest department, individual scientists and NGO's have spent the past few years researching and monitoring the presence and growth of this magnificent bird. It is because of their hard work that there are now five recorded species of vultures in this region in fair numbers. It has been our constant endeavor to propagate the monitoring work as well as the analysis of the outcome of research data for the benefit of the concerned stakeholders and other wildlife enthusiasts. Through one such endeavor, our department has taken efforts assuming full responsibility to compile, analyze the research data from various areas of Maharashtra and publish the details relating to the various vulture species. This data is submitted by various concerned officers and scientists from the forest department and NGO's working for vulture conservation. The forest department has made available a fund of Rs 22.50 lakhs for the monitoring and research during the year 2014-2015.

It is heartening to see that today many individuals as well as groups are working hand in hand to prevent the vulture from flying into extinction. The documentation and sharing of the vital data and conservation experiences will be a stepping stone for future work, and shall aid the future efforts in the field of vulture conservation.

During the workshop held at Nagpur by the PCCF (WL), on the occasion of the World Vulture Awareness Week, it was suggested by the Editors of the *Ela Journal of Forestry and Wildlife* (EJFW), (a joint official publication of Ela Foundation and the Maharashtra State Forest Department), that a special issue dedicated to the monitoring and research work undertaken for the purpose of vulture conservation in Maharashtra by various Forest Circles in Maharashtra and by other organizations should be published as a permanent documentation and future reference. The *EJFW* is an open access, peer reviewed, E-publication indexed with Google scholar having a global visibility. I am glad that this special issue of the *EJFW* is now published. I hope that the publication of the sincere efforts taken for vulture conservation in Maharashtra shall strengthen the resolve of other conservationists and inspire them further to protect the Critically Endangered vultures of the Indian subcontinent.



**Trap Camera photo of White-rumped vultures on the nest tree with nestling extending the wings**

# Why do we need vulture conservation?

**Mafiul Hussain***
(*IFS, PCCF - Research, Education & Training - RET)

A familiar sight in India was the circling of vultures in the sky. Today, this is no longer a reality in most parts of urban or semi urban India. One of the most painful decimations of wild life populations has been that of our vultures. And this is due to anthropogenic factors unleashed by our fellow human beings. There are 9 species of vultures in India. Out of these, three species, the White-rumped Vulture, the Indian Vulture, and the Slender-billed Vulture were decimated up to 97 to 99%. The most sudden collapse has been in the White-rumped Vulture *Gyps bengalensis*. About 35 years ago there were about 80 million White-rumped Vultures in India which was the most numerous raptor species in the world. Along with the veterinary drug, diclofenac in the carcasses and several other reasons the population has been decimated. Other reasons that could have contributed were, lack of food to the growing birds.

The decimation of vulture population has severely affected the ecological cycle. These birds play an important role in the scavenging of dead animals and resultant sanitization of the environment. The sudden drop in their population has led the way towards catastrophic end results and collapse of the ecological cycle. Some of the resultant dangers are contamination of drinking water, and the prolification of secondary predators such as rats and feral dogs.

This has proved very costly to the society. Increase in feral dogs has led to shifting of leopard populations to near human habitation and resultants attacks on children. The vulture metabolism digests and neutralizes disease causing pathogens in the dead carcasses. When feral dogs feed on carcasses this spreads rabies, anthrax, etc. to the human population. The danger of serious diseases and epidemics is imminent and this is a very expensive health problem. The Government has taken off diclofenac in 2006 and replaced it with another drug meloxicam which is harmless to vultures.

The highlighting of the vultures of India in this issue of *Ela Journal of Forestry and Wildlife*, is therefore a timely reminder of the interference of man on nature's cycle. It highlights the fact that we must not disturb the prevalent trophic structures and the intricate ecological cycles. It is a timely reminder to take corrective steps for any such dangerous designs in meddling with the intricacies of the natural food chain. The dedication of this issue of the *EJFW* is on these beautiful birds. When the vulture soars and circles in the sky, it is not a harbinger of doom and disaster. Rather the vulture is a symbol of various important and necessary facets that make up the cycle of life.

**A flock of White-rumped Vultures after feeding**

# Promising steps towards vulture conservation

**Dr. Satish Pande***

(*Director, Ela Founadtion)

The Passenger Pigeons were once abundant in the United States of America. People did not want them because they damaged their crop. One fine day, one of the most abundant birds on earth became extinct. Today the Passenger Pigeons are no more. The *Gyps* vultures were also once abundant in the Indian subcontinent. They were neglected because of their feeding habit. They always gathered on carcasses and were associated with filth and death. Suddenly the *Gyps* vultures are on the brink of extinction. They are categorized as Critically Endangered but we are at least taking notice of their rapidly dwindling precarious populations. They appear to be luckier than the Passenger Pigeons.

For the past few years several organizations are studying the vulture decline and identifying various causes behind this grim reality. Importantly, the Forest Department has also initiated serious conservation measures with the assistance of various NGO's and individuals to reduce, stop and if possible reverse this decline. In this special issue of *Ela Journal of Forestry and Wildlife*, we are presenting for the first time a comprehensive compilation of the several recent vulture conservation efforts undertaken by the forest department and NGO's in the entire state of Maharashtra. This will serve as a ready reference for all those who are interested in vultures.

The conservation efforts are multifaceted. The current population status and distribution are documented through field surveys. The missing links like vulture ecology and nesting behavior are studied for the first time by Ela Foundation and Forest Department for the *Gyps* species by deploying still and video cameras for live 24x7 monitoring of the inaccessible vulture nests in tall trees and vertical cliffs. The results are shocking and for the first time we have convincing evidence that vultures are dying due to starvation. This cause was always suspected but was partly overshadowed by the Non-steroidal Anti-inflammatory Drugs (NSAID) diclofenac, and hence was not taken very seriously for want of evidence. This issue of starvation is addressed by starting vulture restaurants near the traditional roosting and breeding sites of vultures where diclofenac free safe ungulate carcasses are offered to the vultures.

It is heartening to see that taking note of these serious efforts, the MOEFCC has now granted permission for satellite telemetry of vultures in Maharashtra to study their foraging and home range. This scientific data will help the forest department by providing hitherto unknown knowledge for short listing conservation areas frequented by vultures. People's participation is also as important as the scientific data and serious efforts are being taken to create community awareness. Now, the conservation measures need to be stepped up in scale and magnitude. The data presented in the special issue of *EJFW* is a positive beginning and will strengthen the commitment of all those interested in vulture conservation across the Indian subcontinent. Today it has become clear that vulture decline is a multi-causative problem.

After all, vultures also have a ethical biotic right to exist on our earth.



**Trap Camera photo of White-rumped vultures on the nest tree**

# Starvation Causes Vulture Decline: Ecological and Reproductive Study with Still and Video Camera Monitoring With Live Streaming of White-rumped Vulture *Gyps bengalensis* and Indian Vulture *Gyps indicus*: For Conservation Planning

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## BACKGROUND

The populations of *Gyps* vultures have globally crashed by 95 to 99 % in the past decade due to several reasons including the use of Diclofenac in veterinary practice. However, there are some sites in Maharashtra where the *Gyps* vultures continue to breed till date. We have two species of Gyps in Maharashtra. These are *Gyps bengalensis* and *Gyps indicus*. White-rumped Vulture *Gyps bengalensis* is a tree nesting species. It is an old world vulture species. Their nests are on high trees. Indian Vulture *Gyps indicus* is a cliff nesting species. Their nests are located in the vertical cliffs of the Western Ghats.

***Lacunae:*** No data for these two species is available on the ecology, breeding and behavior of the parents and the nestling during the breeding period. One of the reasons for this is the inaccessibility of the nests due to their location on high ledges in vertical cliffs in mountains or on tall and wide-girth trees in forests.

***Justification:*** In this scenario, the Forest Department Maharashtra and Ela Foundation, Pune undertook joint studies to obtain the much needed scientific data for the conservation of these two Critically Endangered species. We briefly present the initial findings and recommendations for immediate and long term conservation from this ongoing study.

PART I

# The Study of White-rumped Vulture *Gyps Bengalensis* Using Still Digital Camera Monitoring

**STUDY AREA:**

1. Forested patch on Lonawala-Tamhini road, District Pune. White-rumped Vultures are sporadically nesting in trees for the past several years.
2. Villages Chirgao, Mhasala, Anjarle, Phansad WLS, district Raigad. White-rumped Vultures are nesting in the evergreen forest patch in big trees for the past several years.

**OBJECTIVES:**

1. Nest site, Nest Tree and Habitat Characterization of White-rumped Vulture.
2. Habitat utilization around the nest site in three seasons: Winter, Summer, Monsoon.
3. Documentation of behaviour of parent and nestling White-rumped Vultures during breeding.
4. Photographic documentation of the In-Nest behaviour and of the White-rumped Vulture.

**METHODOLOGY:**

The status of each nest was assessed by climbing on the nest tree or by observing the nest from a tall vantage point from the opposite mountain with the help of a 45x telescope. Expert climbers fitted the camera during the study under ornithological guidance. All the observations were made strictly in accordance with the provisions of the WPA (1972). Chciks or eggs were not touched. Birds were not trapped. Digital trap camera with day light and IR night vision was deployed on the occupied nest. Supplementary photogrpahic documentation was done using digital SLR cameras and with digiscoping:

**STUDY PERIOD:**

Eleven visits were made to the study site between February and May 2015.

**OBSERVATIONS:**

Nineteen nests were found in the study area. The details are given in the Table 1. Total fourteen chicks were recorded. The six tree species used for nesting were Peepal *Ficus religiosa*; Mango - *Mangifera indica*; Behada - *Terminalia bellerica;* Arjun – *Terminalia arjuna;* Shidam – *Tetramelis nudiflora;* Satveen - *Alstonia scholaris.*

**RESULTS:**

**BREEDING PARAMETERS:**

Out of the 19 nests, two were abandoned. Two active nests were seen on the same tree (9A, 9B). In three nests parents were seen incubating but chicks were not recorded, and it is likely that an egg was laid in these three nests. It is known that this species lays only one egg per clutch per season. However, the eggs in the nest could not be physically verified. A total of 17 nests were active on 15$^{th}$ March 2015. Out of these 17 nests, 14 nests had chicks of 6 to 8 weeks age at the onset of the study. At the end of the study in May 2015, seven chicks died while seven fledged successfully.

A breeding attempt was one where a tree with a nest was present irrespective of whether it was occupied or not. An active nest was one where the parents were seen in the nest or adjacent to the nest; or young were seen in the nest. Breeding success is the percent of young fledged to the number of nestlings. A successful nest was one from which at least one young fledged. Total success is the percent chicks fledged in total breeding attempts.

**At the beginning of the study, there were two distinct age groups of vulture chicks in the study area.**

1. The early breeders had 8 weeks old chicks and
2. The late breeders had 6 week old chicks.

**SUCCESS:**

**i)** Out of the 19 breeding attempts, eggs were laid in 17 nests. (89.5 % egg laying).
**ii)** Out of the 17 eggs laid 14 eggs hatched, and the hatching success was 82.4 %.
**iii)** Out of the 14 nestlings, 7 fledged, and the breeding success was 50 %.
**iv)** Out of the 19 breeding attempts. 7 were successful (36.8 % nesting success).

**MORTALITY AND ONSET OF BREEDING:**

All the chicks that died belonged to the group of late breeders.

**IN-NEST BEHAVIOUR:**

**a) Sun basking** - Preliminary analysis of the still images revealed that the chick sun basks in the morning up to about 0800 AM by exposing the extended wings




**A parent and the chick of Long-billed Vultures in the cliff nest**



**A dead White-rumped Vulture in the nest due to starvation**

**Table 1:** Details of nesting of *Gyps bengalensis* at Chirgao, Ratnagiri district in 2015.

| Sr. No. | Nest Tree | Nest Status | Vultures on nest | Nest tree species |
|---|---|---|---|---|
| 1 | 1 | Chick | Yes | Strangling Peepal |
| 2 | 2 | Chick | Yes | Behada |
| 3 | 3 | Nil | Yes | Behada |
| 4 | 4 | Chick | Yes | Behada |
| 5 | 5 | Chick | Yes | Mango |
| 6 | 6 | Chick | Yes | Mango |
| 7 | 7 | Nil | No | Mango |
| 8 | 8 | Chick | Yes | Mango |
| 9 | 9 A | Chick | Yes | Arjun |
| 10 | 9 B | Chick | Yes | Arjun |
| 11 | 10 | Chick | Yes | Behada |
| 12 | 11 | Chick | Yes | Satveen |
| 13 | 12 | Chick | Yes | Mango |
| 14 | 13 | Chick | Yes | Mango |
| 15 | 14 | Nil | No | Mango |
| 16 | 15 | Nil | Yes | Behada |
| 17 | 16 | Chick | Yes | Behada |
| 18 | 17 | Nil | Yes | Shidam |
| 19 | 18 | Chick | Yes | Mango |
| | **Total** | **14 chicks** | | |

and the back to the morning sun.

**b) Thermoregulaton** - For thermoregulation, it also uniquely resorts to up-ending to keep the head in the shadow of its own body. The chick resorts to hanging the neck from the edge of the nest and salivating profusely.

**c) Night activity** - The chick is active during the night when it does preening, wing stretching, yawning, walking, flapping and upending. It sleeps in various positions such as with head tugged under the wings, or with head extended, or one or both wings extended; one or both legs stretched and one or both legs and one or both wings extended. Parent was seen on the branch near the nest on several occasions.

**d) Visitors to the nest:** Newly fledged young from other nests were seen visiting the camera fitted nest one one occasion. More than two adult vultures were seen visiting the camera fitted nest on one occasion.

## CAUSE OF MORTALITY OF CHICKS:

Evidence from camera recording confirmed that no feeding took place for ten consecutive days leading to progressive diminished activity of the chick; ultimately culminating in its death. The inference is that non-availability of food, especially for the late breeding group, was a major cause of this high mortality. Death by starvation can be prevented in the future by ensuring regular carcase supply at vulture restaurants at least during the breeding season.

## RESEARCHERS:

**Principal Investigator:** Sunil Limaye, Chief Conservator of Forests, Wildlife Division, Pune & Kirti Jamdade. ACF (Wildlife) Bhimashankar & Field staff. **Co-Investigator:** Ela Foundation, Pune. **Principle Researcher from Ela Foundation:** Dr. Satish Pande, MB, MD, DNB, PhD (Ornithology); FMASci., FLS, Premsagar Mestri, Anant Gokhale (MTech, IIT), Sanjay Khatavkar (Certificate in Ornithology), Rahul Lonkar, MSc. (Zoology), Rajkumar Pawar (Certificate in Ornithology).

**PART II**

## The Study of Indian Vulture *Gyps indicus* with Still Digital and Live Video Camera Monitoring

**STUDY AREA:**

1. Tamhini, District Pune. Cliff site behind the premises of Garud Machi. Indian Vultures were nesting at this cliff site for the past several years.
2. Kalat, Near Talegao, District Pune. Indian Vultures are nesting at this cliff site for the past several years.
3. Any other suitable site in Western Maharashtra where nests of Indian Vulture were recorded.

**OBJECTIVES:**

1. Characterization of Nest site and Habitats of Indian Vulture.
2. Habitat utilization around the nest site in three seasons: Winter, Summer, Monsoon.
3. Documentation of the breeding and behaviour of parent and nestling Indian Vultures during breeding.
4. Photographic documentation of the In-Nest behaviour and of the Indian Vulture.

**METHODOLOGY:**

One still digital camera with IR facility for night photography was installed on the nest of the Long-billed Vulture on the cliff face of the southward extension of the Tasubai Dongar surrounding the village of Kalhat, Maval, Pune. Two additional video cameras with night vision were fitted on two nests at the same site. The data were recorded on DVR in the field station at the base of the nesting cliff site. Simultaneous live streaming facility was enabled to monitor any technical and ecological problems.

**STUDY PERIOD:**

Thirteen visits were made to the study site between February and May 2015.

**DEGREE OF DIFFICULTY:**

A team of expert mountaineers from Mountain Quest, Pune, some of whom had successfully climbed Mount Everest, were part of the Ela Foundation team. Cameras were deployed precisely at about 400 feet height in the cliff on the ledge. Rules of the WPA, 1972 were strictly followed. Vultures were not trapped and eggs or chicks were not touched. Battery operated power drills were used by the climbers using advanced and safe climbing equipment. Power supply to the field station was taken from a distance of one km, from the local village school, by erecting poles and pulling the wire over it. All safety precautions were taken. Regular technical monitoring was carried out.

**OBSERVATIONS**

**Table 2:** Nesting data of *Gyps indicus* from Kalat, Pune.

| Sr. No. | Nest Site | Nest Status | Active Breeding OF VULTURE | Nest site visited |
|---|---|---|---|---|
| 1 | A 1 | Chick | Yes | Y |
| 2 | A 2 | Chick | Yes | Y |
| 3 | B 1 | Chick | Yes | Y |
| 4 | B 2 | Chick | Yes | Y |
| 5 | B 3 | White wash only, Perching site | No | Y |
| 6 | C 1 | White wash | No | Y |
| 7 | C 2 | Egg | Yes | Y |
| 8 | D 1 | Chick | Yes | Y |
| 9 | D 2 | White wash only, Perching site | No | Y |
| 10 | D 3 | White wash,<br>Contents could not be assessed | Unknown | N<br>Live Beehives above the nest site |
| 11 | E | Chick | Yes | No. Late breeder |

(**Note:** Nest # C3 was found to be occupied by Barn Owl Tyto alba during the study period.)



**The chick of Long-billed Vulture in the cliff nest**




**The chick of Long-billed Vulture in the cliff nest at night on trap camera**

**RESULTS:**

**A] BREEDING PARAMETERS:**

11 nest sites were active. Eggs were laid in 7 nests. One egg was predated. From 7 eggs, 6 chicks hatched successfully. All six chicks fledged.

**B] SUCCESS:**

**i)** Out of the 11 breeding attempts, eggs were laid in 7 nests. (63.6 %).

**ii)** Out of the 7 eggs laid 6 eggs hatched, and the hatching success was 85.7 %.

**iii)** Out of the 6 nestlings, 5 fledged, and the breeding success was 83.3 %.

**iv)** Out of the 11 breeding attempts. 5 were successful (45.5 % total nesting success).

**C] MORTALITY:**

The casues for mortality were predation of the egg (n=1) by a Bonelli's Eagle and the death of chick (n=1) due to unknown cause. Eggs were not laid by four pairs in spite of initiating breeding activity (in the form of pairing and acquiring a nest site). The reasons for this could be either that these pairs had not attained breeding maturity (age less than 6 years) or they had not been able to get enough food.

**D] PEOPLES' PARTICIPATION:**

For all field projects peoples' support and participation are crucial. We have been successful in this aspect and local support is satisfactory.

**E] IN-NEST BEHAVIOUR:**

**i)** **Sun Basking** - Preliminary analysis of the still images and video footage revealed that the chicks and parents sun bask in the morning up to about 0800 AM by exposing the extended wings and the back to the morning sun.

**ii)** **Thermoregulaton** – The chicks and parents primarliy retreat to the shelter of the cave during the hot noon and escape the noon heat. Before retreating in the cave, for thermoregulation, the also uniquely but occasionaly resorts to up-ending to keep its head in the shadow of its own body.

**iii)** **Hierarchy** – Live video footage showed that interestingly when the chick observed the parent visiting the nest, it quickly retreated to the back of the edge and keept the head down in front of the parent. This was observed on all instances.

**iv)** **Begging For Food** - The begging posture adopted by the chick included extension of the neck and partial extension of the wings, but the position of the head of the chick was close and parallel to the ground. The chick was often seen curiously looking down from the edge of the nest ledge.

**v)** **Rectal Probing:** The parent vulture always resorted to probing the cloaca of the chick before any food is given to the chick. This probably serves three functions: a) Physical stimulation of the cloaca to induce defecation and b) To confirm that there is no fecal impaction and c) Failure to defecate by the chick confirms that the bowels are empty.

**vi)** **Night Activity** - The chicks were also active during the night when they resorted to preening, wing stretching, yawning, walking, flapping and upending. They sleep in various positions such as with head tugged under the wings, or with head extended; and one or both legs stretched. Parents were seen attending the nestling.

**vii)** **Other Vultures Visiting The Nest:** On video monitoring it was observed that two adults visited the nest. The chcik in that nest was also present at that time. Inerestingly the parent of the chick arrived and drove away the two two intruders. It is likely that this is an expression of nest site competetion.

**viii)** **Visitors To The Nest Ledge Other Than Vultures During The Day:** We recorded that Common Myna *Acridotheres tristis* visited the nest ledge to glean the tit bits from left over food almost every day. The chick was seen to observe the mynas but did not take any notice of the birds on the nest ledge. The mynas are probably rendering service by eating any insect parasites in the nest . Macimum of four mynas were seen at one time.

**ix)** **Visitor To The Nest Ledge Other Than Vulture During The Night:** One mouse was seen in the nest and moving around the chick at night. The chick quitly observed the mouse and even ignored it resorting to preening.

**RESEARCHERS:**

**Principal Investigator:** Sunil Limaye, Chief Conservator of Forests, Wildlife Division, Pune & Kirti Jamdade. Asst. Conservator of Forests (Wildlife) Bhimashankar & Field staff. **Co-Investigator:** Ela Foundation, Pune. **Principle Researcher from Ela Foundation:** Dr. Satish Pande, MB, MD, DNB, PhD (Ornithology); FMASci., FLS, Premsagar Mestri, Anant Gokhale (MTech, IIT), Sanjay Khatavkar (Certificate in Ornithology), Rahul Lonkar, MSc. (Zoology), Rajkumar Pawar (Certificate in Ornithology).

## PART III

## Status of other Traditional Nest sites of Indian Vulture *Gyps indicus* In Pune and Raigad Districts, Maharashtra

**A] OCCUPIED NESTS:**

Other traditional vulture nest sites were also visited and the status of the nest sites of the **Indian Vulture *Gyps indicus*** is given below:

| Locality | Status | Number of young | Species |
|---|---|---|---|
| Nane Machi | Occupied | 8 | *Gyps indicus* |
| Pali Sudhagad | Occupied | 4 | *Gyps indicus* |
| Fort Raigad | Occupied | Atleast 1 | *Gyps indicus* |
| Madhe Ghat, Bhor | Occupied | Atleast 1 | *Gyps indicus* |
| **Total** | | **14** | |

(All above sites are in Raigad district.)

**B] UNOCCUPIED NESTS:**

Other traditional vulture nest sites of the Indian Vulture were also visited and the status of the nest sites is given below:

| Locality | Status | Number of young |
|---|---|---|
| Tamhini | Deserted | 0 |
| Khandi | Deserted | 0 |
| Nigade | Deserted | 0 |
| Pait near Karanjvire | Deserted | 0 |
| **Total** | | **0** |

(All above sites are in Pune district.)

## PART IV

## CONCLUSIONS

**A] White-rumped Vulture *Gyps bengalensis* at Chirgao:**

- Out of the 19 breeding attempts, eggs were laid in 17 nests. (89.5 % egg laying).
- Out of the 17 eggs laid 14 eggs hatched, and the hatching success was 82.4 %.
- Out of the 14 nestlings, 7 fledged, and the breeding success was 50 %.
- Out of the 19 breeding attempts. 7 were successful (36.8 % nesting success).
- The cause for 50 % mortality of chicks was starvation as proved by the evidence from still camera imaging. In all, 29 adult vultures were counted, of which 3 were Indian Vultures and 26 were White-rumped Vultures.

**B] Indian Vulture *Gyps indicus* at Kalat:**

- AT Kalat, district Pune , out of 11 breeding attempts seven nests of Indian Vulture were active.
- One nest was predated by the Bonelli's Eagle (*Hieraaetus fasciatus*) at the egg stage.
- Six young hatched from seven eggs laid (85.7 % hatching success).
- From the six young hatched 5 fledged (83.3 % fledging success).
- Out of the 11 breeding attempts. 5 were successful (45.5 % total nesting success).
- The less than 50 % total nesting success at Kalat was primarily due to less numebr of nests in which eggs were laid. The resons for this could be:
- Vulture pairs occupying nests before acquiring reproductive maturity (age less than about 6 years); or sub-optimal availability of food leading to poor reproductive status in a few pairs.
- At one time a maximum of 29 vultures were counted.
- One pair of White Scavenger Vultures also visited this site once.

**C] Estimated Total Population of *Gyps* Vultures:**

- The study reveals that atleast 55 *Gyps* vultures were present in the study sites of Chirgao, and Kalat, based on maximum counts at one time [*Gyps indicus* (n=29) and *Gyps bengalensis* (n=26)]. Atleast 12 *Gyps bengalensis* were present at Phansad WLS.

**D] Peoples' Participation:**

- Peoples' support and participation in all projects was excellent.
- School going students and adults were actively

involved in the projects by sharing inputs from the study.
- People were shown the nests through telescopes and binoculars.
- Seminars were conducted by Ela Foundation jointly with Sahyadri Mitra, Mahad and other local NGO's in adjacent villages for promoting vulture conservation.

**SHORTCOMINGS OF THE PRESENT STUDY:**
- It is not known if the same pairs come to the same sites for breeding.
- It is not known if the fledged chciks also come back to visit and and to breed.
- The post-breeding dispersal of the young is not known.
- The feeding territory and the home range of the parents is not known.

**URGENT MITIGATION MEASURES:**
**Vulture Restaurants:**

The evidence confirms that the high mortality (50 %) of chicks at Chirgao during the present season was preventable. The need for artificially provisioning continuous supply of food by running vulture restaurants vigourously at the known vulture nesting sites atleast during the breeding period, is an important aspect that emerges from the present study. This should be done meticulously and will improve the breeding success of the vulture colony. Starvation is a preventable cause of mortality.

**URGENT FUTURE STUDIES:**

**1) Tagging of vultures:**

If permissions are given on an urgent basis, to wing tag and ring the vultures (adults and nestlings) this will provide valuable ecological inputs for initiating correct and effective measures by the Forest Department for long term conservation of vultures and drafting appropriate policies.

**2] Telemetry Studies of Vultures:**

Because time is running out for this species, if permissions are given on an urgent basis, for telemetry studies (tagging and mounting telemetry devises on adults and young), invaluable data inputs can be obtained to identify important feeding areas and roost sites outside the breeding season. This can be done by Ela Foundation, Pune, who have the necessary training and expertise to execute this study and the data from the study shall assist the Forest Department to identify, protect and prioritize areas important for vultures for long term conservation.

**LONG TERM MONITORING:**

Long term continued monitoring of all vulture sites on a wider scale on a year round basis is justified, particularly in view of gaining positive conservation insights from the first half of the present study.

**ACKNOWLEDGEMENTS:**
- **For Photographs:**
  All photographs are taken by Ela Foundation, Pune. These are either from Trap Camera or taken by the researchers during the field study.
- **Team Members From Ela Foundation and Mountain Quest, Pune:**
  The team members are specialized in various faculties particularly, ornithology, ecology, forestry, conservation management, mountaineering and climbing, electric engineering, electronic engineering, and telecommunications. The studies cited above are essentially multi-disciplinary in nature.
- **Ela Foundation**:
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  Sunil Limaye, CCF (WL), Pune; Kirti Jamdade, ACF, (WL), Bhimashankar; Sattyajeet Gujar, DFO (T), Pune; Mr. Nagoshe, RFO, Mayureshwar WLS; Mr. Suryawanshi, DFO, Roha; Mr. Kanak, RFO, Mhasala, and staff.

# Vulture Monitoring in Pench Tiger Reserve Maharashtra

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## INTRODUCTION:

India's varied bio-geographical zones support an impressive diversity of 69 resident and migratory raptor species, a total of 104 forms including sub-species and races including vultures (Naoroji 2006). Vultures play acrucial scavenging role in the ecosystem (Menge et al. 1994, Ferguson et al. 2005, Pizzaro M and Gregorio 2007). Vultures occupy high trophic level in terrestrial food webs and are highly sensitive to environmental contamination and disturbances, their density and diversity often reflect the health of a given ecosystem. (Newton 1979, Ehrlich et al. 1988, Venable N.J. 1996, Prakash .V. 1989). The distribution and breeding of raptorial birds is affected by the abundance and accessibility of the prey species and it is mediated by

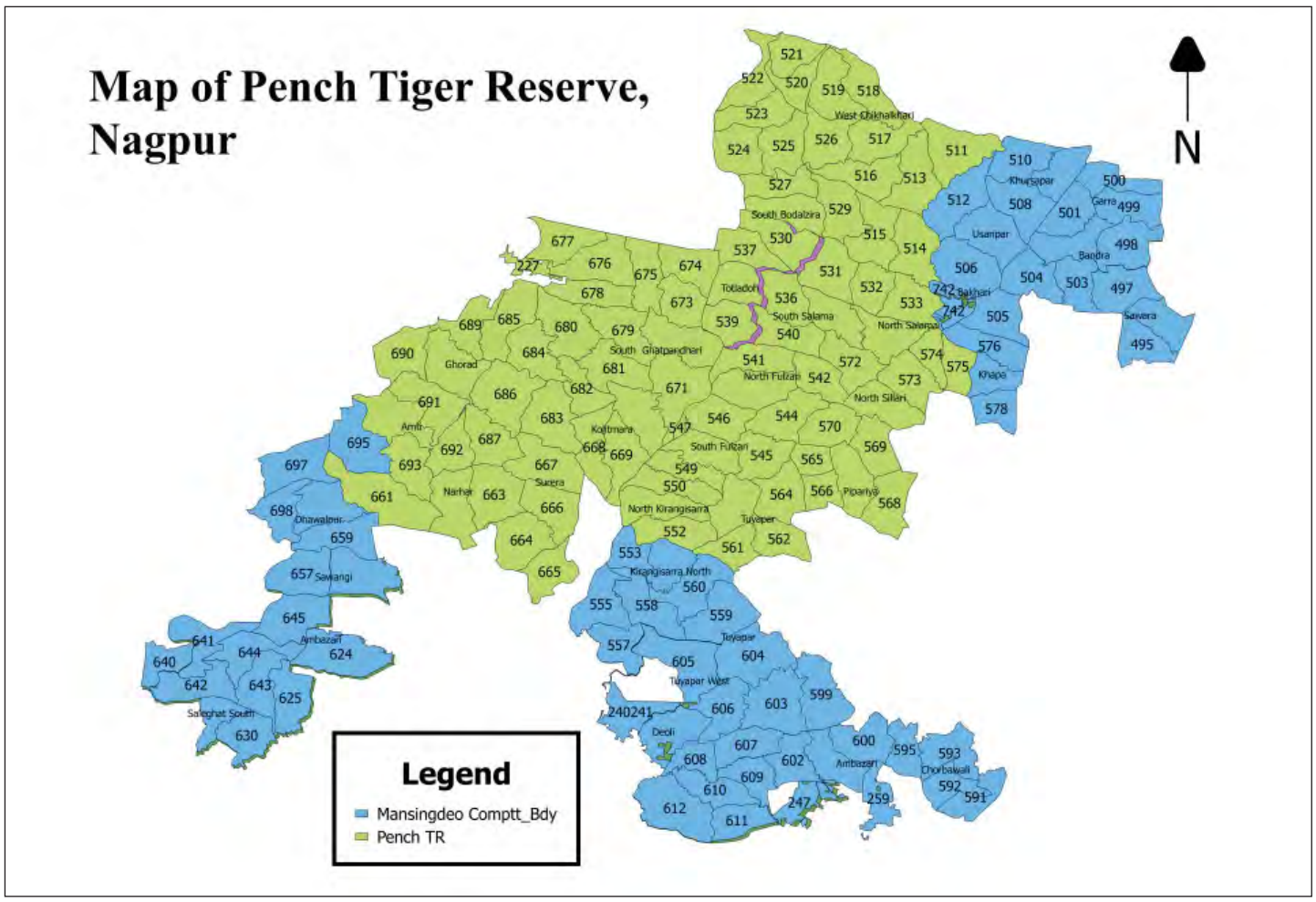


**Vultures and Wild Boar on a carcass at Pench Tiger Reserve**

the habitat structure (Gregorio et al. 2007). These birds are vulnerable to changes in prey populations, as well as changes in habitat which affect the availability of prey (Crocker-Bedford 1990). Based on diet composition, vultures can be classified in to three main categories viz: "narrow specialists" one food class accounting for more than 75 percent of the diet, "semi-specialists" one food class accounting for 50-75 percent of the diet and "generalists" at least three classes, each making up to 20 percent or more of the food (Thiollay 1985). The climatic variables play major role on the breeding success of raptorial birds. According to Namgail T and Yoram (2008) the ambient temperature is another factor known to affect breeding success in birds therefore, birds may adjust their breeding schedules depending on food availability and weather conditions. A good nesting site generally provides protection against predators, offers adequate stability and material to support and construct the nest, and access to adequate food within foraging range (Beaver *et al.*1980).

Seventy percent of the worlds diurnal Vulture are found in the tropics, and more than forty percent of all vultures, are facing threats. In the last decade, vulture populations declined in India because of several reasons like drugs like diclofenac, chemicals, habitat destruction and depletion of food (Bird Life International 2001). IUCN has classified 27% of all tropical vultures as Near Threatened, Vulnerable, Endangered, or Critically Endangered (Meyburg and van Balen 1994). *Gyps* vultures in the Indian subcontinent and South-East Asia have declined catastrophically during the last decade and current populations are estimated to be <5% of the original (Prakash et al. 2003, Green et al. 2004, Oaks et al. 2004). Counts of Egyptian and Red-headed vultures in 13 Indian protected areas between 1991 and 1993 and repeated in 2000 revealed a significant decline of around 48% for Red-headed vulture and a decrease of 22% for Egyptian Vulture (Prakash et al. 2003). The Indian White-rumped Vulture *Gyps bengalensis*, Indian Long-billed Vulture *Gyps insdicus*, Slender-billed Vulture *Gyps tenuirostris* and Red-headed Vulture (*Sarcogyps calvus*) are now categorized as "Critically Endangered" due to the high risk of extinction (BirdLife International 2001) and they are included in Schedule 1 of Wildlife (Protection) Act, 1972.

Most detailed studies were under taken in different places of northern India, where vultures occurred at their highest densities in the past and less information is available from southern India (Umapathy et al. 2009). Only a few protected areas in the country are responsible



for the remaining significant and fragile population of *Gyps* vultures. Central Indian landscape including the Pench Tiger Reserve, Maharashtra supports one of the remaining wild vulture populations. The food available to them is from the kills by major predators like tiger, leopard and Asiatic wild dog. In addition, the natural death of wild animals may also influence the food availability for these vultures. Here the population size of the vultures in the area may be directly related to the density of prey and predator and their interactions. There is a need to study these relationships. Hence a baseline study was undertaken to obtain insight about the distribution and diversity of vultures to plan long term conservation strategies.

**OBJECTIVES:**

1. To study distribution of vultures in the Pench Tiger Reserve, Maharashtra.
2. Identifying the nesting- site selection and nest-site characteristics in the study area.

**MATEREALS AND METHODS:**

**Study area:**

The present study was carried out in the East range of Pench Tiger Reserve (PTR), Maharashtra (Fig. 2.1). Pench Tiger Reserve is named after the Pench River, flowing through the low lying southern hill ranges of the Satpura. The Pench Tiger Reserve is geographically located between 79$^0$03'46" to 79$^0$21'20" East to 21$^0$11'58" to 21$^0$43'16" North and is situated along the northern boundary of Nagpur District, adjoining Seoni and Chindwara districts of Madhya Pradesh.

**Nest survey:**

Intensive exploratory randomized surveys were carried out (Fuller & Mosher1987) in the study area to find the nests and secondary information was obtained from sources such as forest watchers, forest guards and biologists. The historical records of nesting were also collected. Nest positions were determined with a Global Positioning System and their localities were plotted on a map.

**Use of camera trap for identification of species:**

With regular patrolling we searched for sites of kills and deployed camera traps on carcass for photographic documentation of vultures in the study area.

**RESULTS:**

1. With the current study we successsfuly identified five species of vulture in the study area with help of camera traps on leftover kills. These are Indian White-rumped Vulture *Gyps bengalensis*, Indian Long-billed Vulture *Gyps insdicus*, Eurasian Griffon (*Gyps fulbus*), Egyptian Vulture (*Neophron percnipterus*) and Red-headed Vulture (*Sarcogyps calvus*).

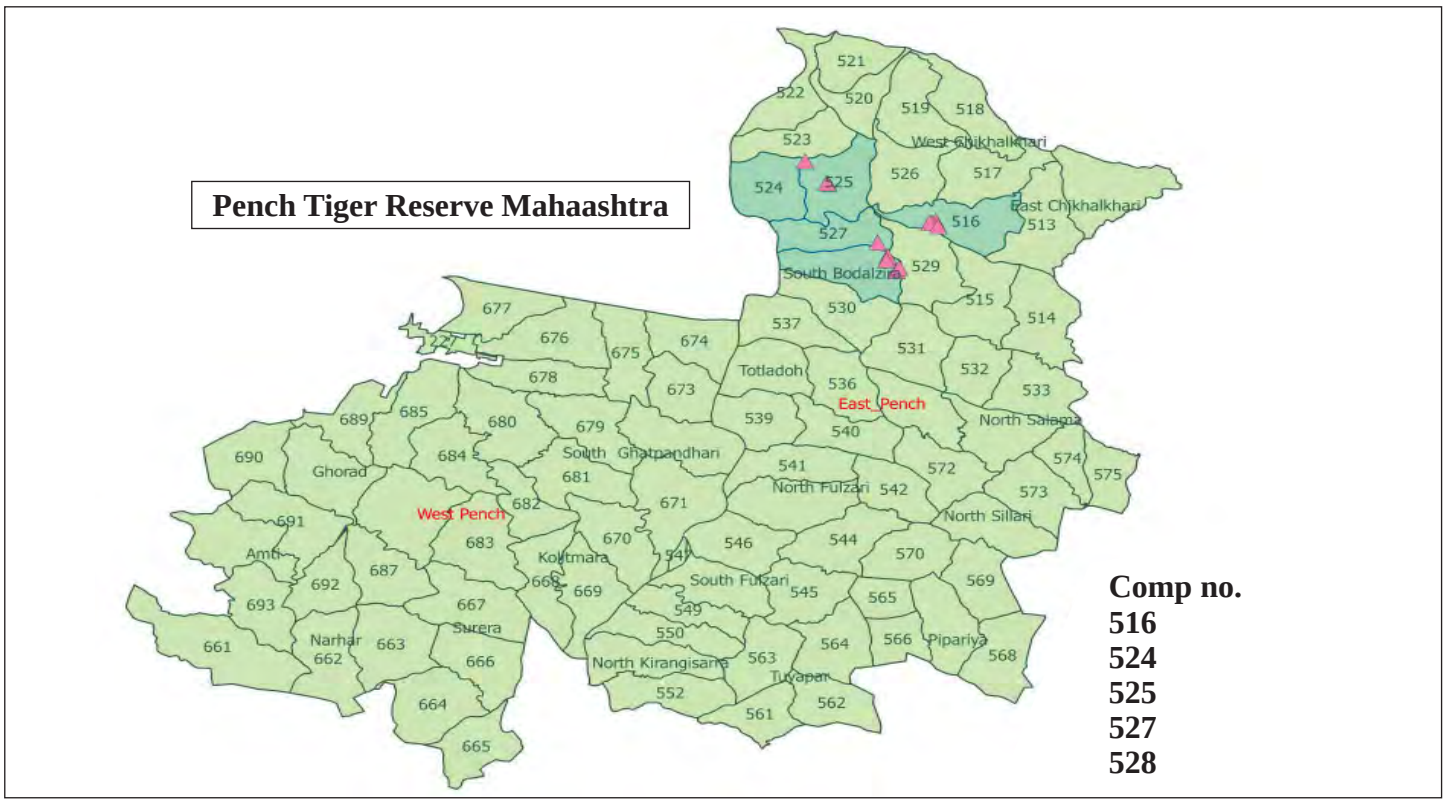
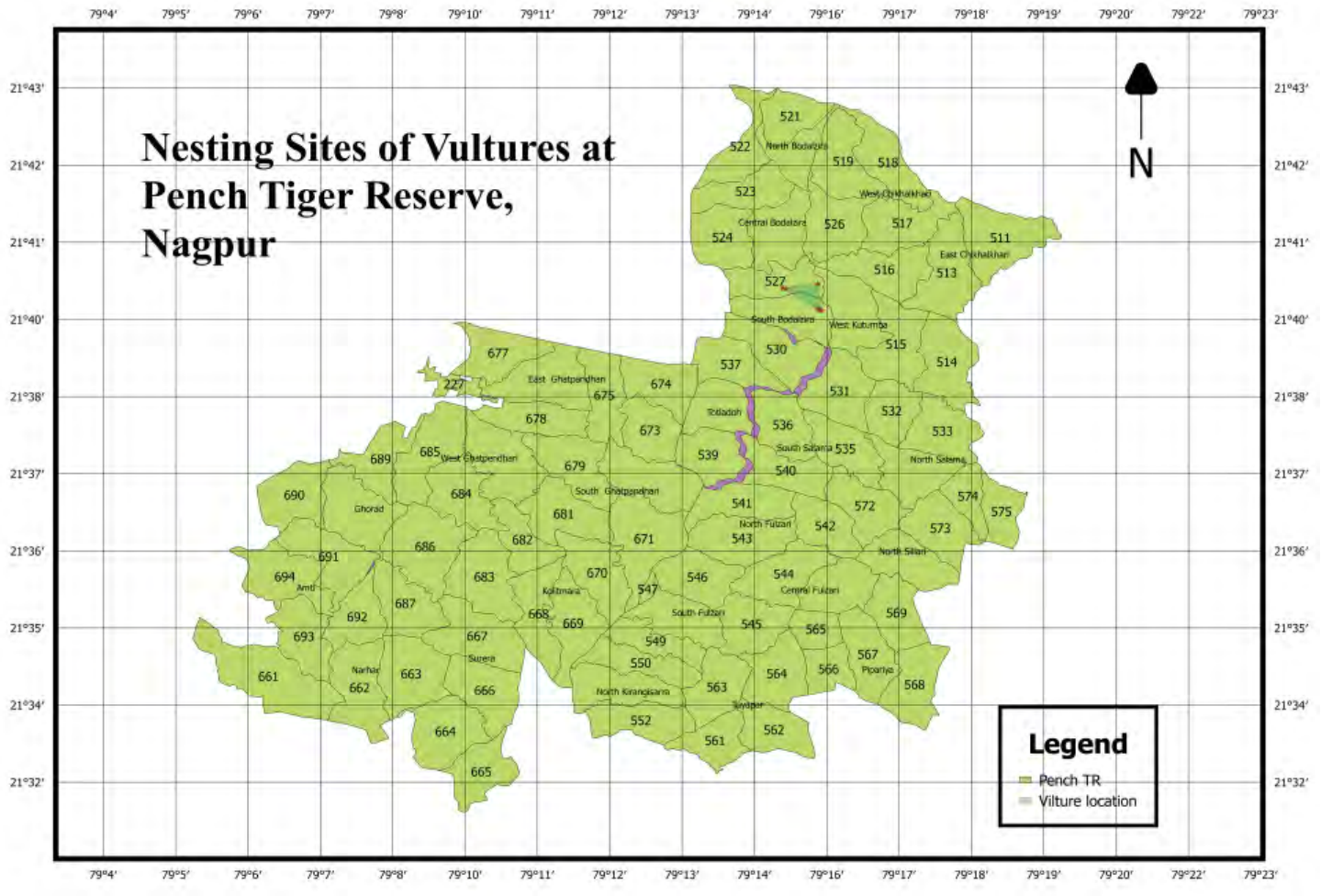



**Figure I : Old Nesting and perching sites of White-rumped Vulture.**

2. We have identified six nesting sites of White-rumped Vulture in Pench Tiger Reserve, Maharashtra where it nests regularly.
3. With the help of GIS software (Q-GIS 2.6) we have plotted GPS locations of the nests on the map for future monitoring.
4. Maximum 60 *Gyps* vultures were sighted at a kill at one time.

**Figure II : Current Nesting and perching sites of White-rumped Vultures.**




**GPS Locations for Nesting Sites of White-rumped Vultures**

| Sr. No | Tree Species | Scientific Name | Long | Lat | Activity | Juvenile | Egg |
|---|---|---|---|---|---|---|---|
| 1 | Tendu | Diospyros melaloxylon | 79.25756 | 21.66916667 | Yes | | Yes |
| 2 | Tendu | Diospyros melaloxylon | 79.24786 | 21.66816667 | Yes | | Yes |
| 3 | Ain | Terminalia tomentosa | 79.24878 | 21.66791667 | Yes | Yes | |
| 4 | Ain | Terminalia tomentosa | 79.25767 | 21.66291667 | Yes | Yes | |
| 5 | Dhoban | Dalbarjia panniculata | 79.25764 | 21.66252778 | Yes | Yes | |
| 6 | Dhoban | Dalbarjia panniculata | 79.2585 | 21.66227778 | Yes | | Yes |

**Vultures on leftover carcass**




**Other Scavengers on leftover carcass**




**Vultures at the restaurant with other birds and mammals. (Photographs are taken by the trap camera.)**

**Bengal Tiger captured in camera trap deployed on leftover kill**


**White-rumped Vulture on nest**

**Use of hide for vulture counting:**
Maximum of 60 vultures were counted on leftover kills at 'Juna boat camp' from the hide.

## Vulture species reported in study area

### Eurasian Griffon (*Gyps fulvus*)

Eurasian Griffon declined markedly throughout the 19th-20th centuries in much of Europe, North Africa and the Middle East, mainly due to direct persecution and "bycatch" from the poisoned carcasses set for livestock predators (del Hoyo *et al.* 1994, Snow and Perrins 1998, Ferguson-Lees and Christie 2001). In some areas a reduction in available food supplies, arising from changes in livestock management practices contributed to their decline.

### Indian Longbilled Vulture (*Gyps indicus*)

By mid-2000, *Gyps indicus* were being found dead and dying in Pakistan and throughout India, and major declines and local extirpations were being reported. The anti-inflammatory drug diclofenac, used to treat domestic livestock, has been identified as a cause of mortality from renal failure resulting in visceral gout in the vast majority of examined vultures (Oaks *et al.* 2004a, Shultz *et al.* 2004, Swan *et al.* 2005, Gilbert *et al.* 2006).

### White-rumped Vulture (*Gyps bengalensis*)

Since the mid-1990s, the White-rumped Vulture has suffered a catastrophic decline (over 99%) across the Indian Subcontinent (the majority of its historic range), first noticed in Keoladeo National Park, India (Prakash *et al.* 2003), but mirrored in Pakistan (Gilbert *et al.* 2006) and Nepal (Baral *et al.* 2005, Chaudhary *et al.* 2012), to the point that the species is highly threatened with extinction. Extensive research has identified the non-steroidal anti-inflammatory drug (NSAID), diclofenac, to be a cause of rapid population collapse (Green *et al.* 2004, Oaks *et al.* 2004a, Shultz *et al.* 2004). This drug, used to treat domestic livestock, is ingested by vultures feeding on their carcasses leading to renal failure and causing visceral gout (Oaks *et al.* 2004a, 2004b; Swan *et al.* 2005, Gilbert *et al.* 2006). Declines in India between 2000 and 2007 averaged 43.9% per year (Prakash *et al.* 2007)

### Egyptian Vulture (*Neophron percnopteus*)

This Egyptian Vulture faces a number of threats across its range. Disturbance, lead poisoning (from gun shot), direct poisoning, electrocution (by powerlines),

collisions with wind turbines, reduced food availability and habitat change are currently impacting upon European populations (Donázar et al. 2002; N. Petkov in litt. 2005; Kurtev et al. 2008; Angelov et al. in prep. 2011; Zuberogoitia et al. 2008; Carrete et al. 2009; Sara et al. 2009; Dzhamirzoev and Bukreev 2009). Illegal poisoning against carnivores seems to be the main threat operating on the breeding grounds in Spain (Hernandez and Margalida 2009) and the Balkans (I. Angelov in. litt. 2012). Declines in parts of Africa are likely to have been driven by loss of wild ungulate populations and, in some areas, overgrazing by livestock(Mundy et al. 1992). Within the European Union, regulations introduced in 2002, controlling the disposal of animal carcasses, greatly reduced food availability, notably through the closure of traditional "muladares" in Spain and Portugal (Donázar 2004; Lemus et al. 2008; J. C. Atienza in litt. 2007, Donázar et al. 2009.

**Red-headed Vulture (*Sarcogyps calvus*)**

The disappearance of Red-headed Vulture from Asia is linked to several factors: notably the demise of wild ungulates (Clements *et al.* 2013), the intensification of agriculture, increased sophistication of waste disposal techniques, direct persecution and disease. However, rapid declines since the turn of the 21st century are believed to have been driven by the diclofenac used to treat livestock, which has proven highly toxic to vultures, causing mortality from renal failure that results in visceral gout (Cuthbert et al. 2006)

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**REFERENCES**

- Ali, S. and S.D. Ripley. 1987. Compact Handbook of the Birds of India and Pakistan. 2nd Edition Oxford University Press.
- Ali, S. 1969. Birds of Kerala, Oxford University Press, Oxford.
- Baral, N. and G. Ramji. 2007. Population Status and Breeding Success of White-rumped Vulture Gyps bengalensis in Rampur, Syanja and Tanahu, Nepal. The Peregrine Fund, USA.
- Bird Life International. 2001. Threatened birds of Asia: the BirdLife International Red Data Book. Cambridge, UK: BirdLife International.
- Beaver, D. L., R. C. Osborn and T. W. Custer. 1980. Nest site and colony characteristic of wading birds

## ANNEXURE VIII :

**Vultures on leftover kills on various occasions**




in selected Atlantic coast colonies. Wilson Bulletin 92:200-220.

- Carrete M, Sa´nchez-Zapata J, Calvo JF, Lande R (2005) Demography and habitat availability in territorial occupancy of two competing species. Oikos 108:125–136

- Crocker-Bedford, D.C. 1990. Goshawk reproduction and forest management. Wildlife Society Bulletin 18: 262-269.

- Cuthbert, R., Green, R. E., Ranade, S., Saravanan, S., Pain, D. J., Prakash, V. And Cunningham, A. A. (2006) Rapid population declines of Egyptian vulture (Neo- phron percnopterus) and red-headed vulture (Sarcogyps calvus) in India. Anim.Conserv. 9: 349–354.

- Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon and Schuster, Inc., New York, NY.

- Ferguson-Lees, James & David A Christie, 2005. Vulture of the world, Princeton University press.

- Garcia R.C, Lopez, P.L, Lopez F.G, Jose M. A & Jose V (2005) Modelling nesting preferences of Eurasian griffon vulture *Gyps fulvus* in eastern Iberian peninsula. habitat *Ardeola* 52(2), 2005, 87-304.

- Grant, C.V., B.B. Steele and R.L. Bayn Jr. 1991. Raptor population dynamics in Utah.s Uinta Basin: the importance of food resource. Southwestern Naturalist 36(3): 265-280.

- Gilbert, M., Virani, M. Z., Watson, R. T., Oaks, J. L., Benson, P. C., Khan, A. A., Ahmed,. S., Chaudhry, J., Arshad, M., Vultures in Myanmar Mahmood, S. and Shah, Q. A. (2002) Breeding and mortality of Oriental White-backed Vulture *Gyps bengalensis* in Punjab Province, Pakistan.

- Gilbert, M.,Watson,R.T.,Ahmed,S.,Asim,M. and Johnson, J. A. (2007) Vulture restaurants and their role in reducing diclofenac exposure in Asian vultures. Bird Conserv. Int. 17: 63–77.

- Green, R. E., Newton, I., Shultz, S., Cunningham,A.A.,Gilbert, M.,Pain, D. J. and Prakash, V. (2004) Diclofenac poisoning as a cause of vulture population declines across the Indian subcontinent. J. Appl. Ecol. 41: 793–800.

- Grimmet Richad, Carol Inskipp &Tim Inskipp, 1999. Pocket Guide to India. Forktail, 8, 11-23.
- Kambale, A.A, 2010-2011. A Study on Breeding Behaviour of Oriental White-backed Vulture (*Gyps bengalensis*) in Anjarle & Deobag,Maharashtra.
- Katzner and J. Parry-Jones (eds.) Reports from the workshop on Indian Gyps vultures, 4th Eurasian congress on Vulture , Sevilla, Spain, September 2001.
- KruuK, H. 1967. Competition for food between vultures in East Africa. Ardea 55: 171 93.
- Kurupu, D.K. (2011) Studies on the status and distribution of Vulture in Wayanad district Kerla.
- Manuel Marin and John Schmitt (1996) A road survey of Vulture through western mexico. Otowgia neotropical 7: 173-17' 1996.
- Martin Gilbert, Richard T. Watson, Munir Z. Virani, J. Lindsay Oaks, Shakeel Ahmed, Muhammad Jamshed Iqbal,Chaudhry, Muhammad Arshad, Shahid Mahmood, Ahmad Ali and Aleem A. Khan,2006. Rapid population declines and mortality. Clusters in three Oriental whitebacked vulture *Gyps bengalensis* colonies in Pakistan due to diclofenac poisoning.
- MoEF. 2006. Action Plan for vulture conservation in India. Ministry of Environment and Forests, Government of India.
- Mundy P.J. 1985. The biology of vultures: a summary of the workshop proceedings ICBP Technical publication no. 5. 457-482.
- Naoroji, Rishad, 2006. Birds of prey of the Indian sub-continent. Om Books International.
- Newton I (1979) Population ecology of Vulture . T and AD Poyser, Berkhamsted
- Oaks, J. L., Gilbert, M., Virani, M. Z.,Watson, R. T., Meteyer, C. U., Rideout, B. A., Shivaprasad, H. L., Ahmed, S., Chaudhry, M. J. I., Arshad, M., Mahmood, S., Ali, A. and Khan, A. A. (2004) Diclofenac residues as the cause of vulture population decline in Pakistan. Nature 427: 630–633.
- Ontiveros D, Jesu C and Juan M . P (2008). Possible functions of alternative nests in Vulture : the case of Bonelli's Eagle. J Ornithol (2008) 149:253–259.
- Pande, S., P. Pandit, A. Ponkshe, R. Mone, S. Pawar & A.Mishra (2011). Behavioural and virological studies on a rescued OrientalWhite-backed Vulture *Gyps bengalensis* from western Maharashtra, India. *Journal of Threatened Taxa.* 3(1): 1490-1492.
- Pande, Satish., P. Mestri, P. Deshpande, A. Warange & A. Mahabal (2013). Promising trend of in situ breeding of Oriental White-rumped Vulture *Gyps bengalensis* in Raigad District, Maharashtra, India: conservation implications for re-introduction of ex situ populations. *Journal of Threatened Taxa* 5(7): 4106–4109; doi:
- Prakash, V. (1999) Status of vultures in Keo-ladeo National Park, Bharatpur, Rajasthan,with special reference to population crash in Gyps species. J. Bombay Nat. Hist. Soc. 96: 365–378.
- Prakash, V., Pain, D. J., Cunningham, A. A.,Donald, P. F., Prakash, N., Verma, A., Gargi,R.,Sivakumar,S. and Rahmani,A.R.(2003) Catastrophic collapse of Indian white-backed *Gyps bengalensis* and long-billed *Gyps indicus* vulture populations. Biol. Conserv. 109: 381–390.
- Thiollay, J.-M. (2000) Vultures in India. Vulture News 42: 36–38.
- Tingay R..E. (2010) Nesting ecology of the Grey-headed fish-eagle at prek toal, tonle sap lake, Cambodia. J. Raptor Res. 44(3):165–174.
- Umapathy,G., Hussain,S and Shivaji.S.(2009) Status and distribution of vultures in Andhra Pradesh, India. Forktail 25.
- Urios G. A, Martinez-Arabrain A (2005) The study of nest-site preferences in Eleonora's falcon Falco eleonorae through digital terrain models on a western Mediterranean island . J Ornithol (2006) 147: 13–23.
- Verdejo J and LÓPEZ-LÓPEZ P (2008) Long-term monitoring of a peregrine falcon population: size, breeding performance and nest-site characteristics. *Ardeola* 55(1), 2008, 87-96
- Virani, M., Gilbert, M., Watson, R., Oaks,L.,Benson,P., Kham,A.A., Baral,H.S and Giri,J.B.(2001) Asian vulture crisis project: field results from Pakistan and Nepal for the 2000–2001 field season. Pp. 7–9 in T.
- Zacharias, V.J. and A.J. Gaston, 1993. Birds of Wayanad, Southern India. Forktail, 8, 11-23.

# Monitoring of Vultures in Nasik Circle, Maharashtra during 2014-15

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## INTRODUCTION:

As compared to the overall scenario of India, in general and in Maharashtra in particular the *Gyps* vulture population is dwindling at an estimated rate of 97%. However, White-rumped (*Gyps benghalensis*), Long-billed (*Gyps indicus*) and Egyptian Vulture (*Neophron percnopterus*) are still surviving in the Nasik and Ahmednagar Districts of Maharashtra (Nasik Forest Circle). The vulture population monitoring, undertaking efforts for people's awareness and vulture conservation campaign have already been undertaken by the NCSN together with the forest department since 1998 and these efforts are obtaining adequate responses and it has helped to keep regular track of the vultures at different places in the district. The setting up a restaurant for vulture at Khoripada (Harsul) by the forest department together with the help of local JFM enthusiastic members have proved to be a good



**Nesting site located of White-rumped Vultures near Vani**

pilot project in this behalf. However in order to have more systematic, scientific, authentic documentation with facts and figures, together with required studies of vulture ecology, to monitor its movement, local migration, problem of its sustenance needs to have adequate in detailed studies for at least 1 year (including two breeding seasons). Similarly such field survey is needed initially for Ahmednagar District. The data will be recorded, analyzed and processed as per the prescribed procedure under the guidance of vulture monitoring cell of BNHS. It is also intended to know and understand the constraints of vulture survival and to suggest its long term conservation strategies. Similarly it is intended to create a network of field friends for vulture in the district to get day to day information. The geographical configuration of Nasik District is unique, as Sahyadri (Western ghat) hill ranges are spread from Kasara to Dang on western side, the vast plateau in the centre, the Satmala hill outspurs are along eastern side and Satpuda hill ranges along north. The continuous cliffs of rock hills like Konkada, patches of cliffs in Igatpuri/ Tirmbakeshwar and other rocky portion in Satmala are the ancient nesting places of vultures. Many hills in the districts are called "Gidh- Dongar" (vulture hills). There is a Vulture temple at Taked (near Igatpuri). So these mythological aspect needs to be explored. As regard Ahmednagar District the places on outskirts. The regular observations at the selected centers evenly distributed in the district to have its systematic data recording in the prescribed proforma, to have precise documentation and analysis of these data. We have veterinary doctors in the organization. Still much awakening needs to be done to have complete ban on Diclofenac. A research project for field survey, monitoring of existing population, ecological studies and suggesting strategies for the effective conservation measures was therefore undertaken.

**PERIOD OF RESEARCH:**

December 2014 to December 2015. Monitoring in Nasik District is ongoing.

**STUDY AREA:**

**Nasik District** ($19^0$-33| to $20^0$-53 N $73^0$-10| to $75^0$-06| E) was the main spread of the studies particularly known and new places of vulture occupancies will be included. In addition Ahmednagar District is also in the jurisdiction of Nasik Forest Circle which includes area of Ahmednagar Forest Division, Sangamner Forset Subdivision and Kalsubai and Harischandragad Wildlife Sanctuary.

**For Long billed Vulture:**

1. Anjaneri hills together with the spread of hill ranges-Pegalwadi, Brahmagiri, Harihar, Basgad and Utwad.
2. Aundpatta (Sinnar), Rajadhar- hill spread along - Satana road, forts of Salher and Mulher, Ahiwant, and hill ranges of Vani.
3. Chandreshwar and towards Ankai (Chandwad).

**For White-rumped Vulture:**

1. Kalmusthe, Dugarwadi, Thanapada, forts of Harihar, Basgad, and Utwad.
2. Harsul hill ranges,and places adjoining Khairepillai.
3. Forest area of Peth and Igatpuri.

**Ahmednagar District:**

So far reliable information is not available however the detailed searched survey were undertaken in Kalsubai, Harischandragad and Baleshwar hill ranges of Western Ghat. In addition to Garbhgiri hill ranges and Balagahat table land and outspurs were searched for vultures.

**MAIN OBJECTIVES:**

1. Documenting and monitoring nesting sites
2. Population estimation of vultures in area.
3. Post mortem of dead vultures.
4. Survey of cattle and animal carcasses and use by vultures as well as use of Diclofenac by veterinary practitioners.

**ADDITIONAL OBJECTIVES:**

1. To find out the places for additional vulture restaurants.
2. To understand the problems of villagers in disposal of dead cattle-carcesses, use of diclofenac and vet care available in the area.
3. To create network of "friend of vultures at field level".
4. To find out the constraints, problems, welfare needs and habitat improvement for vultures around the new places of vulture nesting.
5. To find out the effective strategies for conservation.
6. To use the available infrastructure of JFM committee, biodiversity study groups, local Panchayats, villagers and other NGO's for vulture conservation.

**METHODOLOGY:**

Field observations were undertaken periodically with the help of researchers, volunteers and field forest staff at selected places for whole day, and at night. Monthly meeting of all field groups were held to collate the data and to plan future strategies. Quarterly progress reports were submitted based on records, photographs and data analysis.

**RESULTS:**

**Past details of *Gyps* Vulture monitoring undertaken by the NCSN prior to the research project**

| Year | Zone | Place | Total Population | No. of Nests | No. of Chicks Flying successfully |
|---|---|---|---|---|---|
| 2006 | West Nashik | Anjaneri | 64 | 24 | 18 |
| | West Nashik | Brahmagiri | 12 | 4 | 3 |
| | West Nashik | Basgad | 6 | 2 | 2 |
| | East Nashik | Salher | 8 | 2 | NR |
| 2007 | West Nashik | Anjaneri | 60 | 26 | 23 |
| | West Nashik | Brahmagiri | 14 | 5 | 3 |
| | West Nashik | Basgad | 6 | 2 | 2 |
| | East Nashik | Salher | NR | NR | NR |
| 2008 | West Nashik | Anjaneri | 64 | 27 | 22 |
| | West Nashik | Brahmagiri | 12 | 05 | NR |
| | West Nashik | Basgad | 7 | 2 | 2 |
| | East Nashik | Salher | NR | NR | NR |
| 2009 | West Nashik | Anjaneri | 68 | 27 | 22 |
| | West Nashik | Brahmagiri | 14 | 06 | 06 |
| | West Nashik | Basgad | NR | NR | NR |
| | East Nashik | Salher | NR | NR | NR |
| 2010 | West Nashik | Anjaneri | 68 | 26 | 22 |
| | West Nashik | Brahmagiri | 14 | 03 | NR |
| | West Nashik | Basgad | NR | NR | NR |
| | East Nashik | Salher | NR | NR | NR |
| 2011 | West Nashik | Anjaneri | 68 | 24 | 20 |
| | West Nashik | Brahmagiri | 14 | 04 | NR |
| | West Nashik | Basgad | NR | NR | NR |
| | East Nashik | Salher | NR | NR | NR |

(NR-No records)

**Details of nesting sites of Long billed Vulture survey in the year 2014-15**

| Year | Zone | Place | Total Population | No. of Nests | No. of Chicks observed Flying successfully after nesting in the Month April 2015. |
|---|---|---|---|---|---|
| 2014-15 | West Nashik | Anjaneri Cliffs | 50 | 22 | 16 |
| | West Nashik | Bramhagiri | 48 | 20 | 18 |
| | West Nashik | Basgad | 14 | 6 | 4 |
| | West Nashik | Kavnai | 3 | 1 | 1 |
| | West Nashik | Harihar Gad | 3 | 1 | 1 |
| | East Nashik | Ramshej | 4 | 2 | 1 |
| | East Nashik | Ahiwantwadi | 8 | 3 | 2 |
| | East Nashik | Salher | 6 | 2 | 2 |
| | East Nashik | Rawlya Jawlya | 4 | 1 | 1 |

Extensive surveys were made in the Talukas of Peth, Dindori, Titmbakeshwar and Igatpuri ranges and we give below sightings of Long-billed vultures in the area; but found no nesting records.

**Major Sightings of Long billed Vultures recorded in the year 2014-15**

| Month | Place | Vultures Recorded | Vultures Activities |
|---|---|---|---|
| May 2014 | Harsul | 4 | Flying |
| June 2014 | Dugarwadi | 3 | Flying |
| July 2014 | Peth | 8 | Flying |
| August 2014 | Harsul | 42 | Feeding |
| September 2014 | Anjaneri | 54 | Soaring |
| October 2014 | Trimbakeshwar | 32 | Soaring |
| November2014 | Anjaneri | 40 | Perching on cliff |
| January2015 | Anjaneri | 32 | Perching on cliff |
| February 2015 | Vani | 4 | Flying |
| March 2015 | Ramshej | 6 | Flying |
| April 2015 | Borgad Conservation Reserve | 10 | Flying |
| May 2015 | Anjaneri | 30 | Soaring |
| June 2015 | Ramshej | 4 | Flying |

**Estimate of Long billed Vulture population, as on 31st may 2015**

| Adults | Chicks | Nests |
|---|---|---|
| 140 | 46 | 58 |

**Status of White-rumped Vulture in the Nashik District as on 2014-15**

NCSN members undertook a massive survey covering all parts of Nashik district to locate nest of White-rumped vultures as the last nest recorded were in the year 2010. The population of White-rumped vultures remains between 40-50 birds as recorded by us in various sightings mainly seen over carcasses. NCSN covered most of the forest area starting from Peth to Igatpuri a traverse over 200 kms but could not find any nest.

However, during the search for locating new nesting site NCSN together with forest department discovered 4 nests of White-rumped vultures 15 kms from Vani with chicks in them. This year and in the forthcoming year we will pay at most importance in trying to locate more nests of White-rumped vultures.

**Use of Diclofenac:**

1. Survey on the use of Diclofenac by veterinary doctors was carried out in the villages where the vultures were sighted.
2. It drew a blank as in most cases the villagers are using meloxicam and in many cases no drugs are used.
3. Qualified veterinary doctors have taken majors steps to stop the use of diclofenac but the possibility of unqualified veterinary practitioners using diclofenac exists.

**Major Sightings of White-rumped Vultures in the year 2014-15**

| Month | Place | Vultures Recorded | Vultures Activities |
|---|---|---|---|
| June 2014 | Harsul | 32 | Feeding |
| September 2014 | Gangapur Dam backwaters | 10 | Feeding |
| November 2014 | Kashyapi Dam Backwater | 12 | Feeding |
| December 2014 | Borgad Conservation Reserve | 2 | Flying |
| February 2015 | Vani | 6 | Flying |
| March2015 | Vaghera Ghat | 26 | Flying |
| April 2015 | Kharshet (Harsul) | 12 | Flying |

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**Nesting Rock wall of Long-billed Vultures at Anjaneri cliffs on Trimbak Road**

**Nests of Long-billed Vultures on Anjaneri cliff**

**The nests of the Long-billed vulture are made within huge holes in the cliffs and are surrounded with vulture droppings. 11 nests are seen in this picture.**

**A Pair of adult Long-billed vultures perching in nest**

**Juvenile Long-billed Vulture takes off from the nest**

**Nesting sites of Long-billed Vultures at Bramhagiri (total 20 nests recorded) on Paigalwadi Vaitarna Road**

**Cliffs of Basgad showing nesting sites of Long-billed Vulture on Trimbak Vaitarna Road (n= 6)**

**Long-billed Vultures feeding**

**Two juveniles were rescued and subsequently released; both chicks were just 6 months old**

**Flock of White-rumped Vultures feeding on a buffalo carcass**

**Adult and juvenile White-rumped Vulture**

**Adult White-rumped Vulture after feeding, note the gorged crop**

# Vulture restaurants as an effective management tool in vulture conservation program in Sironcha Forest division, Maharashtra, India.

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**Carcass on Machan**

## ABSTRACT

Vulture population in the Indian subcontinent has witnessed a drastic decline in the recent past. In an effort to arrest this declining trend, vulture conservation program was started in Sironcha forest division of Maharashtra state, India. The main component of the program was the establishment of vulture restaurants. The White-rumped (*Gyps bengalensis*) and Long-billed (*Gyps indicus*) vultures were observed to visit the restaurants. Vulture populations visiting the restaurants and feeding on the carcasses increased with progression of the program. It was observed that vultures started visiting the restaurant and the adjoining area even during the period when no feed was provided. In last seven months, vultures were observed almost every day in the adjoining area. During the beginning of the program, group size in restaurants and the adjoining area was small which increased in the later period and reached 80 in the month of September 2015. Besides, vultures also started making nests in the adjoining areas. Present work confirms that vulture restaurants can be used as a management tool for vulture conservation and they should be deployed on a larger scale with active cooperation of people and the support of government.

## KEY WORDS:

Vulture, restaurant, supplementary food, carcass.

## INTRODUCTION

Out of total 23 vulture species found across the world, India has 9 or 10 species in the wild (Prakash et al. 2003; MoEF 2006; Thakur et al. 2012). Among them, Gyps used to comprise around 99% of all vulture sightings in India (Houston 1983). Although once common, in the last two decades, our country has witnessed a sharp decline in vulture population which is widely known as the Asian vulture crisis (Prakash 1999, Gilbert et al. 2002, Prakash et al. 2003). The decline is astonishing 99.9% for oriental white-rumped (*Gyps bengalensis*) and 97% for Long-billed (*G. indicus*) and Slender-billed (*G. tenuirostris*) vultures (Prakash et al. 2007; Clements et al. 2013). Potential contributory factors for this fall in vulture population are changes in human consumption, processing of dead livestock, non-target

poisoning, avian malaria (Poharkar et al. 2009) and pesticide use (Ogada et al. 2012) and most importantly diclofenac (Mahapatro and Arunkumar 2014; BirdLife International 2015).

Provisioning of supplementary food at 'vulture restaurants' is a well established management tool in the conservation of vulture populations (Mundy et al. 1992). They may be constructed in areas with insufficient food (Wilbur et al. 1974, Meretsky & mannan 1999), in areas where nutrient availability is considered inadequate (Richardson et al. 1986), and in areas where carcasses are baited with poison to control carnivore populations (Wilbur et al. 1974; Terrasse 1985; Johnson et al. 1998; Susic & Pavokovic 2003). Recently, they are being used in areas where diclofenac use is a common practice in livestock management resulting into vulture decline.

The present work is an effort to assess the effectiveness of vulture restaurants as a management tool for conserving vulture population in Sironcha forest department of Maharashtra in view of vulture decline.

## MATERIAL AND METHOD

### PROGRAM AREA

The vulture restaurant program was started by constructing vulture restaurant in Challewada village ($19^0$ 15' 18", $80^0$ 11' 18") of Sironcha forest division which is situated in Gadchiroli district of Maharashtra state, India (Fig. 1). The site is bordered by Pranhita WLS (wild life sanctuary) on one side and Kolamarka conservation reserve on the other side. The climate is of tropical type with summer, winter and rainy seasons. However, climate remains hot and dry during the major part of the year. Most of the area is covered with forest which is broadly Southern Tropical dry deciduous forest (Champion & Seth 1968). Area is sparsely populated and is dominated by Gond, Madia and Pardhan tribes; Madia being one of the Primitive Tribal Groups (PTGs).

### CONSTRUCTING VULTURE RESTAURANT

Vulture restaurant was setup at a place traditionally used in the past as a 'Dhorphodi' site (A common place where villagers used to dump their dead livestock). It was constructed by enclosing an area of 30m×30m with chain link fencing provided with wooden poles. A raised wooden platform called as 'Machan' (3.2m×3.2m×1m) was erected in this area. For making provision of dead animal as food for vultures at these restaurants, villagers were assured Rs 250/- per dead animal so that vultures could get uncontaminated diclofenac free food. Being located in remote area with political unrest, data were collected on regular basis by the Gidhad Mitra (Friends of vulture), who are the trained local individuals engaged by forest department and entrusted with supporting vulture conservation effort through survey, monitoring and awareness creation. Data were collected during the period of October 2014 to September 2015.

## RESULTS AND DISCUSSION

During the entire period of the study, the carcasses were provided 29 times in vulture restaurants. They were attended by both White-rumped and Long billed vultures. Vulture feeding upon these carcasses increased with progression of the program (Fig. 2). Up to June 2015, the numberof vultures attending the carcass were 1 to 6. However, subsequently this number increased and reached 80 in September 2015 (Fig. 2). Besides, the number of the vultures in the adjoining area also increased even during the period when no feed was provided (Fig. 3). Furthermore, with progress of the program, number of days in a month on which vultures were sighted also increased (Fig. 4). From nine days in a month, vultures were observed almost every day in adjoining area in the last seven months (Fig. 4), and the total number of vultures sighted in a month also increased.

During the begining of the program, the group size both in the restaurant as well as in adjoining area was small which increased in later period and reached u pto 80 in the month of September (Table 1), presumably due to high number of cattle per individual. The area is tribal dominated and of people have reverence for cattle hence they are not sold to market or slaughter houses (Umapthy et al. 2009). It is known that the vultures utilize conspecifics as cues to food location for improving foraging success resulting in more number of individuals (Jackson et al. 2008; Moreno-Opo et al., 2010).

Vulture restaurant was seen to have an additional positive effect as indicated by breeding of *G. bengalensis* in the locality (Fig. 5). They have made three nests in the adjoining area after the program started. Interestingly, these nests are made on teak (*Tectona grandis*) rather than tamarind tree (*Tamarindus indica*), as reported in an adjoining area (Poharkar et al. 2009). It is a significant development because *ex-situ* population restoration program through conservation breeding centers is slow yielding, involving huge financial cost and demand high skill. Uncontaminated carcass were provided by the adjoining tribal population which don't use diclofenac and other types of the pharmaceuticals. The cattle usually feed on the fodder available in the forest and don't consume food contaminated with pesticides and fertilizers. The vulture restaurant program

are also effectively utilized to raise social awareness,. Besides, a villager who has a vulture restaurant on his land develops a sense of pride and ownership as was witnessed in the Challewada village.

However, vulture restaurants may decrease the foraging capacity of the long ranged vulture population (Cortés-Avizanda et al. 2010; Jackson et al. 2008). It has been suggested that numerous small restaurants supplied with low quantities of food should be put in a place to mimic the original condition of temporal and spatial unpredictability of carcasses and to maintain ecological relationships within the scavenger guild (Cortés-Avizanda et al. 2010).

Present work illustrates that vulture restaurants can be used as a management tool for vulture conservation on a wider scale with government support and active cooperation of people. However, there is a need to study the physical and ecological factors related to vulture restaurants and their acceptability. The research focus should be on vulture population, group dynamics and migratory pattern. Traditional "Dhorphodi" sites should be conserved. Besides, awareness program should be undertaken on a wider scale as success of this conservation initiative depends upon the extent of the community support.

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**REFERENCES**

- **BirdLife International (2015).** *Species factsheet: Gyps bengalensis.* http://www.birdlife.org on 08/03/2015.
- **Champion, H.G. & S.K. Seth (1968)**. *A Revised Survey of the Forest Types of India.* Government of India, New Delhi.
- **Clements, T., M. Gilbert, H.J. Rainey, R. Cuthbert, J.C. Eames, P. Bunnat, S. Teak, S. Chansocheat, & T. Setha (2013)**. Vultures in Cambodia: population, threats and conservation. *Bird Conservation International* 23(1): 7–24; http://dx.doi.org/10.1017/
- **Cortés-Avizanda, A., M. Carrete, J.A. Donázar (2010)**. Managing supplementary feeding for avian scavengers: Guidelines for optimal design using ecological criteria. *Biological Conservation* 143(7): 1707–1715; doi:10.1016/j.biocon.2010.04.016
- **Gilbert, M., Virani, M. Z., Watson, R. T., Oaks, J. L., Benson, P. C., Khan, A. A., Ahmed, S., Chaudhry, J., Arshad, M., Mahmood, S. and Shah, Q. A. (2002)** Breeding and mortality of Oriental Whitebacked Vulture *Gyps bengalensis* in Punjab Province, Pakistan. *Bird Conserv. Int.* 12: 311–326.
- **Houston, D.C.** (1983). The adaptive radiation of the griffon vultures. pp. 360–363. In: Wilbur, S.R., & J.A. Jackson (eds.) *Vulture Biology and Management.* University of California Press, Berkeley.
- **Jackson, A.L., G.D. Ruxton & D.C. Houston (2008)**. The effect of social facilitation on foraging success in vultures: a modelling study. *Biology Letters* 4(3): 3311-313; doi: 10.1098/rsbl.2008.0038
- **Jackson, A.L., Ruxton, G.D. & Houston, D.C. (2008)** The effect of social facilitation on foraging success in vultures: a modelling study. *Biology Letters* 4: 311-313.
- **Johnson, D.N., K.N. Barnes & B. Taylor (1998)**. Important bird areas of Kwa ZuluNatal. pp. 141–196. In: Barnes, K. N. (ed.) *The important bird areas of Southern Africa.* BirdLife South Africa, Johannesburg.
- **Mahapatro, G.K. & K. Arunkumar (2014)**. The case for banning diclofenac and the vanishing vultures. Biodiversity 15(4): 265–268; http://dx.doi.10.1080/14888386. 2014.978374
- **Meretsky, V.J. & R.W. Mannan (1999)**. Supplemental feeding regimes for Egyptian vultures in the Negev Desert, Israel. *Journal of Wildlife Management* 63: 107–115; doi: 10.2307/3802491
- **MoEF (Ministry of Environment & Forests, Government of India) (2006)**. *Action plan for vulture conservation in India.* http://www.moef.nic.in/sites/default/files/vulture_plan
- **Mundy, P., D. Butchart, D., J.A. Ledger & S.E. Piper (1992)**. *The vultures of Africa.* Academic Press, London, 460pp (originally published by Acorn Books, Johannesburg, 1992).
- **Ogada, D.L., F. Keesing & M.Z. Virani (2012)**. Dropping dead: causes and consequences of vulture population declines worldwide. *Annals of the New York Academy of Sciences* 1249: 57-71; http://dx.doi.10.1111/j.1749-6632.2011.06293.x

- **Poharkar, A., P.A. Reddy, V.A. Gadge, S. Kolte, N. Nurkure & S. Shivaji (2009)**. Is malaria the cause for decline of the Indian White-backed Vulture (*Gyps bengalensis*)? *Current Science* 96(4): 553-558.

- **Prakash, V. (1999)** Status of vultures in Keoladeo National Park, Bharatpur, Rajasthan with special reference to population crash in Gyps species. *J. Bombay Nat. Hist. Soc.* 96: 365–378

- **Prakash, V., D.J. Pain, A.A. Cunningham, P.F. Donald, N. Prakasha, A. Verma, R. Gargi, S. Sivakumar, A.R. Rahmani (2003)**. Catastrophic collapse of Indian white-backed *Gyps bengalensis* and long-billed *Gyps indicus* vulture populations. *Biological Conservation* 109: 381–390; doi:10.1016/S0006-3207(02)00164-7

- **Prakash, V., R.E. Green, N. Prakash & R. Cuthbert (2007)**. Recent changes in population of resident Gyps vulture in India. *Journal of the Bombay Nature History Society* 104: 129–135.

- **Richardson, P.R.K., P.J. Mundy, & I. Plug** (1986) Bone crushing carnivores and their significance to osteodystrophy in Griffon Vulture chicks. *Journal of Zoology* 210: 23–43.

- **Moreno-Opo R., Margalida A., Arredondo A., Guil F., Martı´n M., Higuero R., Soria C. & Guzman J. (2010)** Factors influencing the presence of the cinereous vulture *Aegypius monachus* at carcasses: food preferences and implications for the management of supplementary feeding sites. *Wildl. Biol.* 16: 25-34 (2010). S0959270912000093

- **Susic, G. & G. Pavokovic (2003)**. Poisoning and unexplained high Griffon Vulture *Gyps fulvus* mortality in Croatia. *Vulture News* 48: 58–59.

- **Thakur, M.L., R.C. Kataria & K. Chauhan (2012)**. Population decline of Vultures and their conservation: Scenario in India and Himachal Pradesh. *International Journal of Science and Nature* 3(2): 241-250.

- **Umapathy, G., S. Hussain & S. Shivaji (2009)**. Status and distribution on vultures in Andhra Pradesh, India. *Forktail* 25: 163-165.

- **Wilbur, S.R., W.D. Carrier & J.C. Borneman (1974)**. Supplemental feeding program for California Condors. *Journal of Wildlife Management* 38: 343–346.


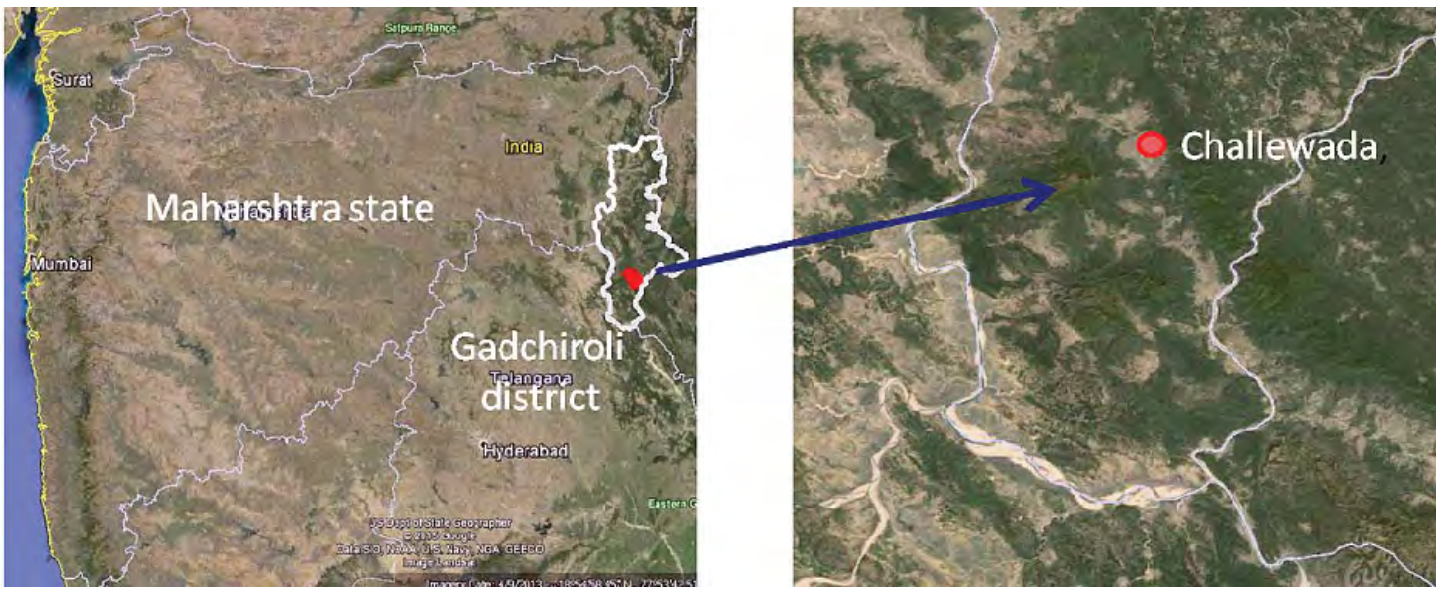


**Fig.1.** Location of the vulture conservation programme area in Sironcha Forest division of Gadchiroli district, Maharashtra state of India.

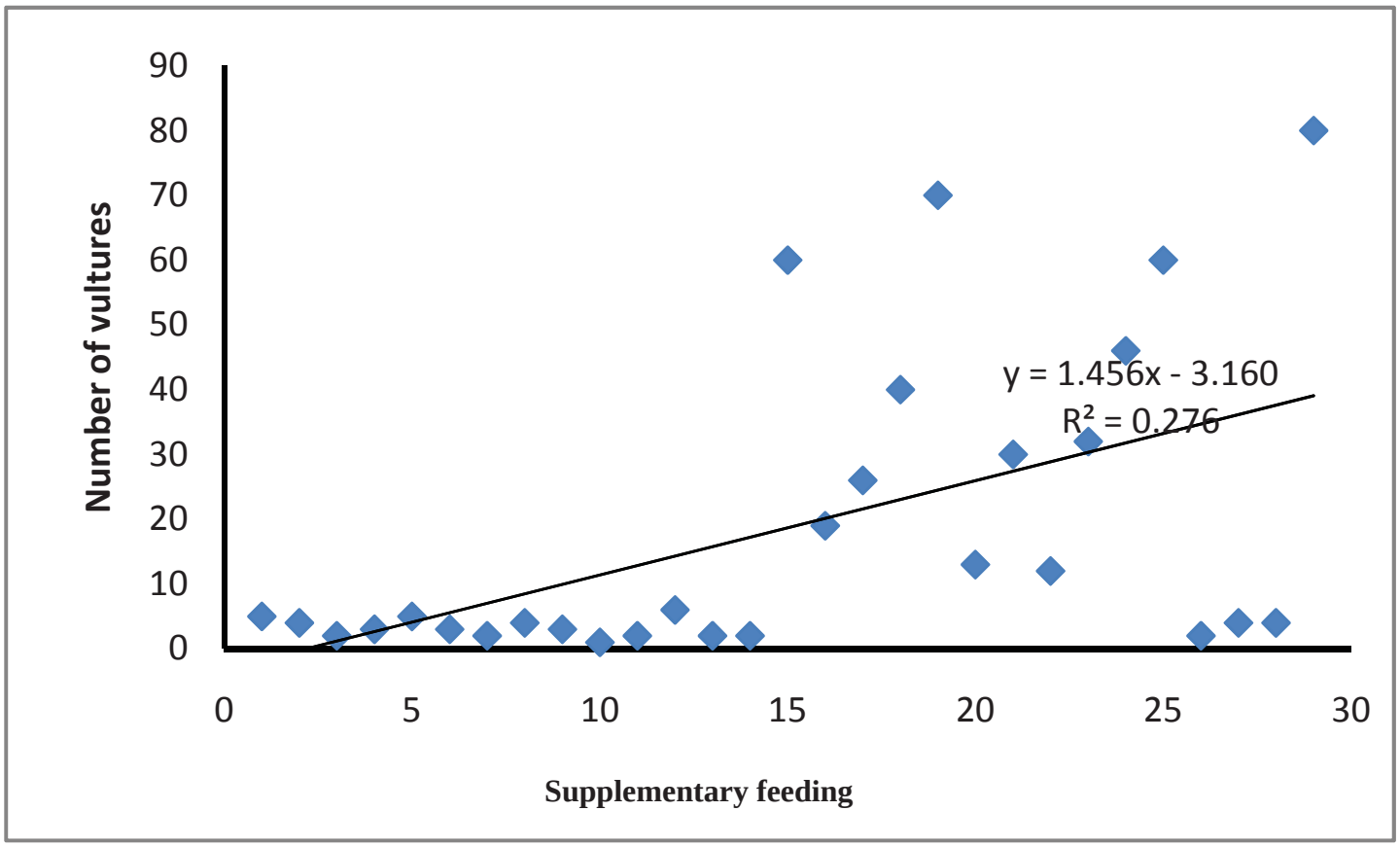


**Fig. 2.** Relationship between the progression of supplementary feeding program (supplementary food given on 29 occasions) and vulture group size attending vulture restaurant during Oct 2014 to Sept 2015.

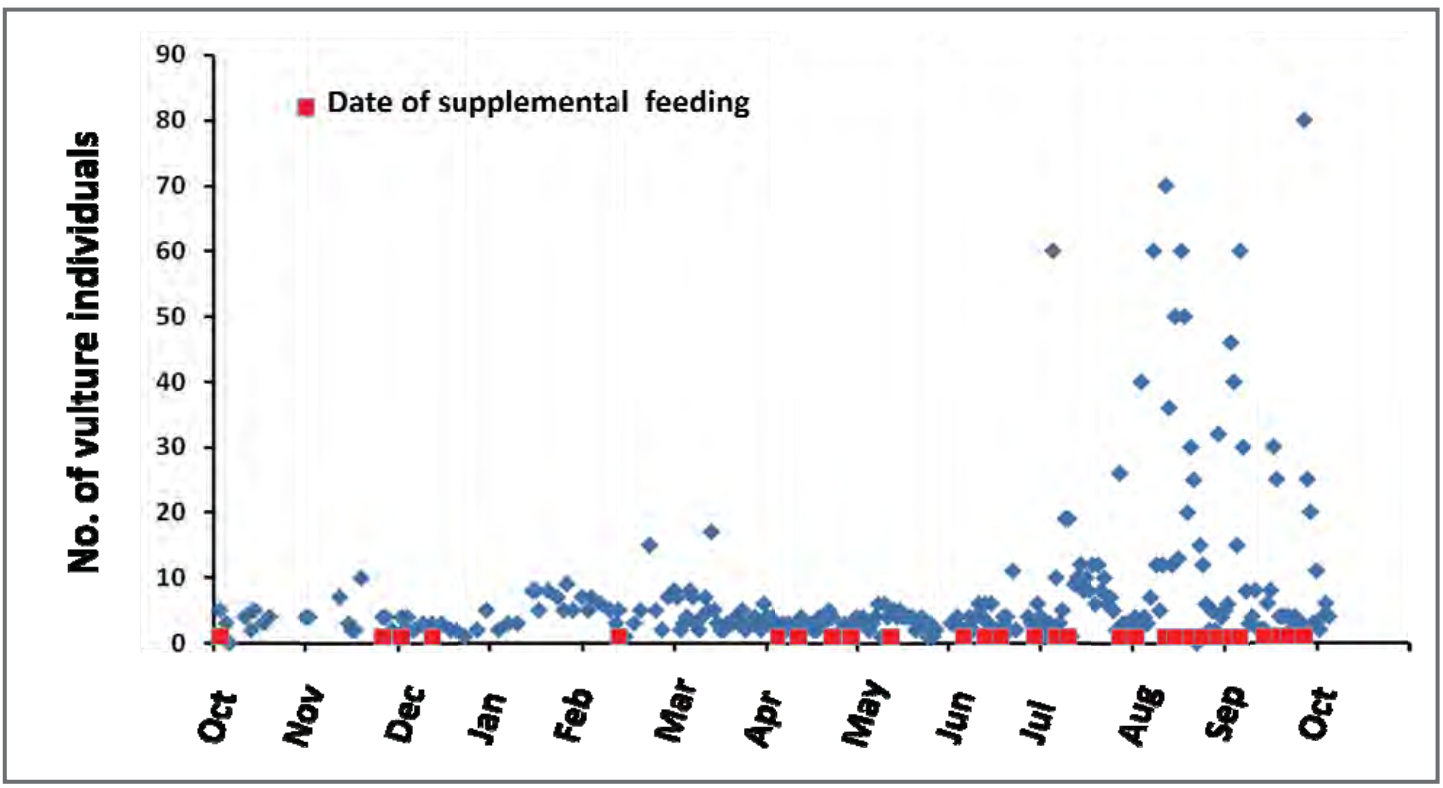


**Figure 3.** Total number of vultures observed on daily basis in vulture restaurants and adjoining area during October 2014 to Sept 2015. Date of supplemental feeding is given in red rectangular box.

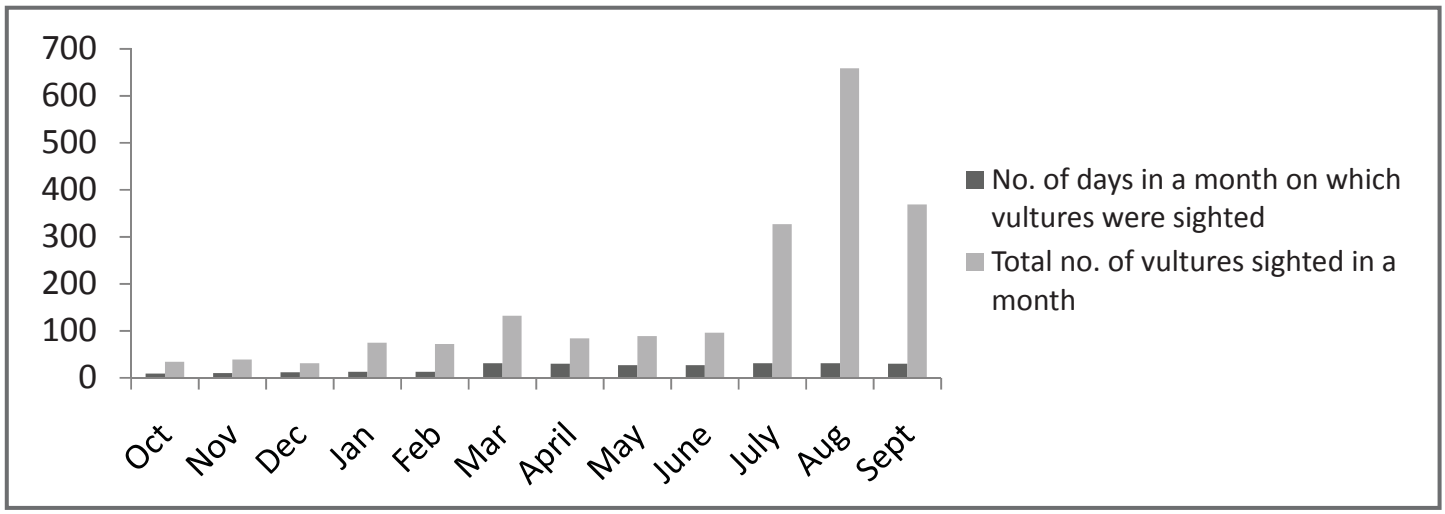


**Fig. 4.** With the progression of the program starting from October 2014 to September 2015 there was a shift in the consistency of vulture sighting.

**Fig. 5.** White-rumped vulture nest on a teak tree *(Tectona grandis)* near vulture restaurant after the begining of the vulture restaurant program.

**Table 1.** Group size of White-rumped vultures visiting the vulture restaurant during October 2014 to September 2015

| Months | Vulture restaurant | | Adjoining area | | Average population size |
|---|---|---|---|---|---|
| | Smallest group size | Largest group size | Smallest group size | Largest group size | |
| Oct | - | 5 | 2 | 5 | 3.7 |
| Nov | - | 4 | 2 | 10 | 3.9 |
| Dec | 2 | 3 | 1 | 4 | 2.58 |
| Jan | - | - | 2 | 9 | 5.8 |
| Feb | - | 5 | 1 | 15 | 5.5 |
| Mar | - | - | 2 | 17 | 4.25 |
| April | 2 | 4 | 1 | 5 | 2.8 |
| May | - | 1 | 1 | 6 | 3.29 |
| June | 2 | 6 | 1 | 11 | 3.5 |
| July | 19 | 60 | 1 | 40 | 10.54 |
| Aug | 2 | 60 | 12 | 70 | 21.25 |
| Sept | 2 | 80 | 1 | 30 | 12.3 |

# Vulture Restaurant - A Blessing for Nature's Scavenger's: A Success Story

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## INTRODUCTION:

There are 16 species of vulture throughout the world. Vultures are of great significance as scavengers. It is known that the strong gastric juices of vultures allow them to safely digest putrid carcasses infected with Botulinum toxin, hog cholera and Anthrax. These birds play an important ecological role through the rapid consumption of animal carcasses and thereby maintain ecological equilibrium. Vultures devour cattle carcasses and act as a clean and swift disposal mechanisms, consuming infected and decayed. Due to the decline in the vulture populations, they have now been replaced by dogs and rats who are the known carriers for diseases like rabies and plague.

Vultures in India have declined drammatically since 1990's. The *Gyps* population of vultures has witnessed declines of more than 90% in the past two decades. Three vulture species- the Oriental White-rumped vulture (*Gyps bengalensis*), the Long-billed vulture (*Gyps indicus*) and the Slender-billed vulture (*Gyps tenuirostris*) have been





classified as Critically Endangered by IUCN. Rapid and extensive decline of vulture in Indian sub continent have been attributed to the toxic effect of the anti-inflammatory diclofenac, a drug used in the treatment of livestock, to which vultures may be exposed while feeding on carcasses of diclofenac treated animals.

About 30-35 years ago, Gadchiroli district had good population of vultures. The Oriental White-rumped vulture (*Gyps bengalensis*) and the Long-billed vulture (*Gyps indicus*) are still found in Gadchiroli forest division. But multiple anthropogenic disturbances leading to destruction of suitable roosting and nesting trees, use of diclofenac, selling of old livestock directly to slaughter house, excessive use of insecticides and other disturbances have cumulatively had a marked negative impact on vultures and their survival leading to rapid decline in their population.

**CONSERVATION EFFORTS:**

With the winged scavengers hanging on the brink of extinction, innovative measures are being undertaken by Gadchiroli forest division to save the vultures. These measures can be summarized as follows:

**1) Establishment of 'Vulture Restaurants':**

In a bid to conserve the fast dwindling vulture population, Gadchiroli forest division has established 'Vulture Restaurants'. A vulture restaurant is a place where fresh and poison free meat and / or carcasses of domestic livestock are put out for vultures and where they can easily land and take off without interference. These restaurants are located out of sight of roads or human traffic with a regular supply of safe food by collecting dead animals from local people so that they can feed without any disturbances.

**Presently there are three 'Vulture Restaurants' in Gadchiroli forest division.**

1) Marakbodi, Gadchiroli Range
2) Madetukum, Gadchiroli Range and
3) Nimgaon.
4) In addition to these places, *Machans* are constructed near Yeoli and Navegaon, Kunghada Range to provide safe food and to protect the dead carcass from stray dogs.

**2) Public awareness program regarding 'Vulture Restaurants':**

The general public is ignorant of the ecological importance of vultures. Conservation efforts cannot be successful without the active involvement of local communities. In order to have general awareness about importance of vultures and assuring regular supply of dead livestock at vulture restaurants, information boards displaying information about the ecological importance of vultures, need for their conservation and the contact phone numbers of concerned forest staff have been displayed in villages. Educational rallies of school children have been organized on various occasions such as International Vulture Day, Vulture Week, Wildlife Week, etc.

**3) Supply of dead livestock at 'Vulture Restaurant':**

From the point of view of farmers, a vulture




restaurant is a cost effective way of disposing off waste product or carcasses. Economic incentives could be one of the means to attract local communities to this endeavor. People inform the forest department in case of the death of an animal in their village and the forest department after testing the dead animal pays monetary benefits to the owner of the animal and informer. The involvement of local communities in such *in-situ* conservation is having dual benefits to vultures and the society. There is a three-pronged approach wherein the forest department, NGO's and local people came together for conservation of vultures.

**4) Controlling and recording of information:**

The Range Forest Officer is responsible for controlling and recording the information regarding vulture restaurants. The concerned Forest Guard / Round Officer keep daily the record of supply of number of dead animals at Vulture Restaurant. The information about the expenditure incurred and number of vultures sighted there is sent to the Range Office. A weekly progressive report is being submitted by the Range Office to the Division Office.

**5) Other activities initiated in Gadchiroli Forest Division:**

a) Creating awareness about the importance of vultures and their conservation among local people.
b) Safeguarding of vulture nesting colonies and prohibition on felling tall nesting trees.
c) Economic incentive to people who conserve roosting trees in their own land.
d) Constant monitoring of vulture nests and providing adequate protection to the roost trees.
e) Apart from this, whenever a vulture nest is found, conservation measures like providing safe food near nesting trees, constant protection from all sorts of disturbances, etc., are put in place without delay.
f) Organizing school trips to the vulture restaurant.
g) Celebrating international vulture day: 7 September, and Vulture Week : 1 September to 7 September.





**Feathered friends:** Constant protection to vultures and their habitats is part of the conservation.

| Sr. no. | Period | No. of carcasses supplied | | | | No. of vultures observed |
|---|---|---|---|---|---|---|
| | | Marakbodi restaurant | Madetukum restaurant | Navegaon restaurant | Yeoli restaurant | |
| 1 | Feb. 2012 | 01 | 00 | 00 | 00 | Up to 100 to 140 vultures observed during 2014 to2015. |
| 2 | March 2012 | 01 | 01 | 02 | 02 | |
| 3 | April 2012 | 00 | 00 | 01 | 00 | |
| 4 | May 2012 | 02 | 00 | 00 | 00 | |
| 5 | June 2012 | 01 | 03 | 00 | 03 | |
| 6 | July 2012 | 02 | 01 | 01 | 00 | |
| 7 | August 2012 | 00 | 01 | 24 | 00 | |
| 8 | Sept. 2012 | 00 | 00 | 02 | 00 | |
| 9 | Nove. 2012 | 00 | 00 | 01 | 00 | |
| 10 | March 2013 | 00 | 00 | 01 | 00 | |
| 11 | April 2013 | 00 | 00 | 01 | 00 | |

**Positive impacts of Vulture Restaurants:**

Establishment of 'Vulture Restaurants' in the Gadchiroli Forest Division have shown many positive impacts. These can be elaborated as follows:

1. For farmers, vulture restaurant have proved a cost effective way of getting rid of carcasses rather than burying them or incinerating them. It has prevented the spread of foul smell in the surrounding air.
2. Farmers are getting paid for disposing their dead animals.
3. Awareness programs arranged under 'Vulture Restaurant' scheme, helped the people to remove misconceptions about vultures and underlined the importance of these winged scavengers in their minds.
4. Vulture restaurant has proved important tool for school children to study the behavior and habitat of vultures and learn about them.
5. The foremost impact of vulture restaurant is that, after this initiative, the frequency of vulture sighting has increased in and around Gadchiroli city. A vulture nest was found near the Yeoli village and a group of 25-30 vultures is regularly visiting the villages near Gadchiroli.

**Future Work:**

1. Our future work involves identification and conservation of available nesting locations of vultures around Gadchiroli and Dhanora.
2. Protection of roosting trees by involving local people.
3. Increasing the number of 'Vulture Restaurants' to provide the regular supply of safe food for vultures.
4. The 'Vulture Restaurants' have thus proved a blessing to Nature's scavengers.

# The Status of *Gyps* Vultures at Phansad WLS and Tansa WLS, Thane, Maharashtra

**Satish Pande[^], Anwar Ahmad[*]; Saroj Gavas[**] and [#]Saipun Shaikh**

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**Citation:** Satish Pande, Anwar Ahmad; Saroj Gavas and Saipun Shaikh (2015). The Status of *Gyps* Vultures at Phansad WLS and Tansa WLS, Maharashtra. *Ela Journal of Forestry and Wildlife* 4(3):78-79.

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**Referee:** Mafiul Hussain.

**OBJECTIVES:**

Survey of the present status of vulture populations in the study area.

Document the vulture conservation measures at these sites.

**STUDY SITES:**

- Phansad WLS, District Alibag
- Tansa WLS, District Thane.
- Cliff sites of the Mahuli Fort near Shahapur

**STUDY VISITS:**

Five visits were made to Phansad WLS and two visits were made to Tansa WLS between April and July 2015.



**Camera trap photograph showing two White-rumped Vultures at a restaurant in Phansad WLS**

**OBSERVATIONS:**

- At Phansad WLS no active nesting was recorded till July 2015. However, at Phansad WLS, the traditional nesting site was used as a roost site by atleast one pair of White-rumped Vulture *Gyps bengalensis*. Four old nests were also seen in a partially broken condition.
- At Tansa WLS, vultures were not sighted during the visits. There was no breeding on the traditional nesting sites on the mountain cliffs of Karavali, Navara, Navari or Karoli.
- Cliffs near the Shahapur town were presently not occupied by vultures and there was no evidence of nesting. Vultures were not sighted in the region.

**VULTURE RESTAURANT AT PHANSAD WLS:**

In later part of April 2015, one carcase was delivered at the vulture restaurant. *More than a dozen vultures had visited the carcase.*

Second carcase was delivered in the first week week of June 2015. On 5th June 2015 we observed a single White-rumped Vulutre flying over the carcse at noon. It did not land.

Two camera traps was deployed near the carcase. *The images from camera trap showed that two vultures had visited the carcase from 830 AM till 10 30 AM.* The carcse was largely consumed by seven Wild Boars *Sus scrofa*. These included four young two subadults and two adults of *Sus scrofa,* including one large female.

**RESULTS:**

The conclusions from the above observations are mentioned below:

**1)** The vulture restaurant at Phansad WLS are regularly visited and utilized by vultures. This justifies delivering carcases at the the restaurants regularly throughout the year.

**2)** The traditional nest sites at Phansad WLS are also visited by the vultures and these sites should be meticulously protected for the future. These sites, even if not occupied at present, will no doubt serve to cater to the populations of vultures in the future, if the conservation measures become successful and the populations start increasing.

**3)** Repeated monitoring of the study areas should be continued in the coming years..

**4)** The ACF, Tansa WLS, Shahapur has identified a vulture restaurant site to the west of Mahuli Fort in the rigion where vulture activity was previously recorded. Efforts are on way to mobilize the support of local NGO or other facilitators for carcass provisioning at the restaurant.

**ACKNOWLEDGEMENT:**

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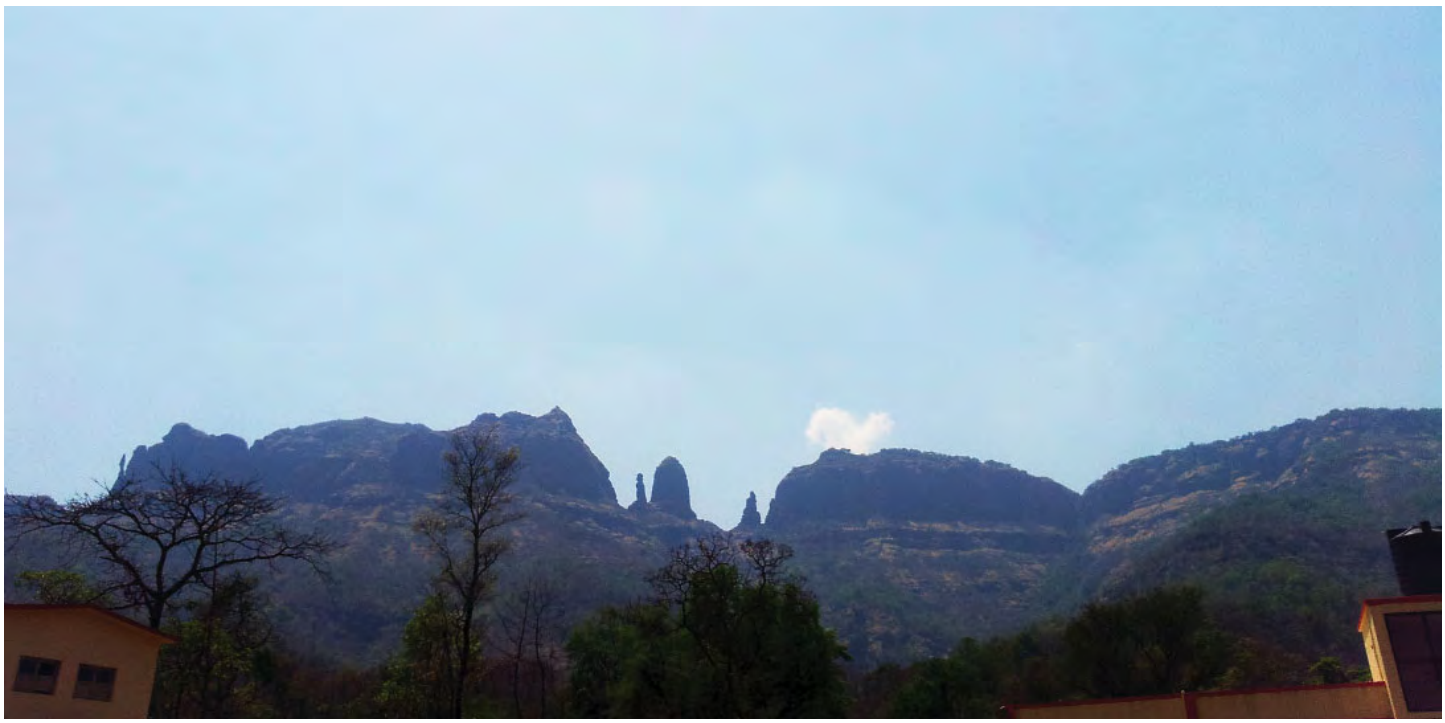



**Known vulture breeding site of Mahuli Fort, near Shahapur, Thane. No recent breeding records.**

# Vulture Conservation Program at Ratnagiri Forest Division (Chiplun)

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**Referee:** Nitin Kakodkar.

## INTRODUCTION

Ratnagiri district is in the Western part of the Maharashtra State having Western Ghat ranges as its eastern border and the Arabian Sea as the western border. The forest area of the district is 0.85% of the geographical area of the district, however 52% land of the district is under tree cover. Vultures were abundantly found in the district prior to 1990-1992 and vultures feeding on the carcasses of dead animal were a common site. After 1992 the vulture population of the district has drastically decreased. This may be due to the various causes such as the destruction of the nests on coconut trees where the vultures bed traditionally and the use of diclofenac used as pain killer for sick cattle and other reasons.

The Forest Department, Ratnagiri Forest Division and the local NGO Sahyadri Nisarg Mitra, Chiplun are working for the conservation of vultures since 2002 by conducting vulture surveys in the district. Through these surveys 2 nests with 4 vultures were located at village Anjarle in Dapoli Taluka. The vulture conservation work was in the district was continued through 2005-06. The forest department with the support of the local NGO is actively involved in the vulture restaurant program at three localities in the district.

## OBJECTIVES OF THE PROGRAM

1. To identify potential sites for vulture nesting and their feeding grounds.
2. To create awareness amongst the local people for vulture conservation.
3. To create awareness among veterinary doctors for use of alternate medicines to diclofenac.
4. To create vulture restaurants at potential vulture feeding grounds and to make available adequate feed to the vultures.
5. To provide protection to the vulture habitats.
6. To study behavioral patterns of vultures.
7. Monitoring of vulture habitats and their population.

## IMPLEMENTATION OF PROGRAM

Vulture conservation program is being implemented in Ratnagiri district since 2005-06. Two species of vultures are found in the district. Nests of White-

rumped vultures (*Gyps bengalensis*) were found at village Anjarle in Dapoli Taluka. Presently nests are not seen in these areas, however the vulture population is growing in nearby Shrivardhan areas of Alibag district. These vultures use the areas of Mandangad and Dapoli Tahsil in Ratnagiri district as their feeding ground. Long billed vultures (*Gyps indicus*) are found in village Vihali in Khed Tahsil. Their nests are located in the cliffs of Sahyadri at Vihali. About 9 nests are seen in this area and the vulture population is estimated to be around 40. Presently vulture restaurants are formed at 3 locations in the district as follows-

**Sukondi, Taluka Dapoli:**

A vulture restaurant was started at village Anjarle taluka Dapoli in 2007. However, it was later shifted to the adjacent village Sukondi in 2011. Chain link fencing with a gate was provided to this area of 10m x10m and carcasses of domestic cattle are transported to this enclosure as and when available. The chain link fencing provides protection to the vultures from stray dogs.

**Kalkawane, Taluka Mandangad:**

Vulture restaurant was started in 2015 by providing fencing to 10m x 10m area and feed is provided in this enclosure.

**Vihali, Taluka Khed:**

Vulture restaurant was started in 2015 by providing fencing to 10m x 10m area and feed is provided in this enclosure. Workshop of local people veterinary doctors, veterinary medicinal shop owners, local police officers, community representatives, students and forest staff were organized to create awareness.

**RESULTS**

- The population of White-rumped vulturea is increasing in Shrivardhan area near vulture restaurant sites at Sukondi and Kalkawane (also Per. Com. Vijay Suryawanshi, DCF, Roha).
- The population of Long billed vultures is increasing at Vihali.

**Future Plan**

Efforts will be taken in the future to increase participation of local people and students in the program. Possibilities of using these sites for eco tourism shall be explored and new potential sites will be identified for creation of vulture restaurants and habitat improvement.

**Vulture restuarant with vultures at Mauje Sukondi, Ratnagiri. Fencing prevents entry of dogs.**

**Vulture restuarant at Mauje Kalkavane, Ratnagiri.**

**Vultures perching on a tree near the restaurant.**

# Rescued Cinereous Vulture *Aegypius monachus* in Dhakna Wildlife Range

**Mufaddal A Shakir, Gaurav Kadu, Alkesh Thakre and Nandkishor Dudhe and Sadanand S. Pachange**

**Citation:** Mufaddal A Shakir, Gaurav Kadu, Alkesh Thakre and Nandkishor Dudhe and Sadanand S. Pachange (2015). Rescued Cinereous Vulture *Aegypius monachus* in Dhakna Wildlife Range. *Ela Journal of Forestry and Wildlife* 4(3):82.

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**Referee:** Uttam Sawant.

**HISTORY:**

On the 10 February 2012 at 8 :30 AM , one Cinereous Vulture *Aegypius monachus* was found in Suklihenda valley jurisdiction site in Dhakna wildlife range under Melghat Tiger Reserve, (compartment number – 860) Dist. Amravati. It was seen on the ground either due to illness or hunger. We rescued it and picked it up to save it from possible predators like wild dogs or leopard. We carried it to the Range head quarter at Dhakna. It was identified by Dr. Jayant Wadatkar and photographed by Gaurav Kadu, Alkesh Thakre and Nandkishor Dudhe. It was kept safely for observation and treated by Dr. Swapnil Sonone of YNCO. After treatment and feeding it began to recover and its health improved and it was able to fly. On the morning of 19 February while feeding, the vulture flew away.

**Morphometry:**

- Length: 90 cm.
- Weight: 12 - 14 kg.
- Wing chord: 230 cm .
- Bill: 12.5 cm .

# *Vulture – the Mahagrudhra*

**Suruchi Pande***
*Ethno-Ornithologist and Sanskrit scholar

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**Referee:** Mafiul Hussain.

In the *Valmiki Ramayana* (*Aranyakanda* and *Kishkindhakanda*), *Grudhra* (vulture) has played an important role in the form of *Jatayu* and *Sampati* who helped Lord Rama in his mission of searching for the exiled and abducted queen *Seeta*. *Jatayu* is called *Mahagrudhra* (a huge vulture). The word *Jatayu* comes from the word '*jatala*' meaning an Indian fig tree and '*jatila*' meaning one wearing matted or twisted hair. The word is applicable to the bearded vulture. *Sampati* is the brother of *Jatayu*. '*Sampata*' means the flight of an arrow. The name *Sampati* may suggest the unique flight of the vulture.

In the Buddhist literature the *Grudhra* is referred in the Jataka Tales (no. 164, 399, 427) stories told for the preaching of the *dharma*. In the '*Gijjha Jataka*' ( no. 164) the *Bodhisattva* is born as the vulture. It is also said that the fifth Dalai Lama, Drupthob tashi, a Khampa yogi was said to have the ability to transform himself into a white vulture. In the Parsi culture dead bodies are left in the Tower of Silence to be offered to the giant birds – vultures.

One wonders, that in spite of these glorifying examples in the culture, what could be the reasons that caused the negative perceptions about vultures. Let us begin by analyzing the root verb. '*Grudh*' means to endeavor to gain, to desire, to be greedy, to strive after greedily, to deceive or to cheat. The bird is called *Grudhra* because it eats carrion, which is foul smelling and unpleasant.

***Some Synonyms in Sanskrit for the vulture***:

- *Dakshayya* = One who is alert.
- *Dooradrug* / *Doora darshana* = One who can see at a long distance.
- *Sudarshana* = One that looks good or one who has good eye-sight.
- *Vajra tunda* = One who has a strong (hard) beak.
- *Khagendra* = Chief of the birds.

***Some interesting ancient references to the vulture in Sanskrit literature***:

References to the vulture are found from the *Rigvedic* times. The *Rigveda* contains references to the vulture (1.118.4; 7.104.22). The Rigveda takes note of the sharp vision of the vulture (10.123.8). The scavenging habit of the vulture is referred in the *Atharvaveda* (11.2.2; 11.9.9), *Yajurveda – Maitrayani Samhita* (4.9.19) and in



**White-rumped Vulture on a tree**

the *Taittiriya Aranyaka* (4.29). The *Krishna Yajurveda* refers to the vulture with a white belly (5.520.1).

The *Valmiki Ramayana* speaks of the great capacity of the vulture to see at a distance of more than one hundred *yojana*s. (VR IV.58.30a) One *yojana* is a measure of distance equal to eight or nine miles. Vultures are respectfully described as

***"Mahaakaayam Grudhram Bheema Parakramam|"***
**"the huge-bodied vultures having a great strength"**
- (*Valmiki Ramayana*; *Aranya kanda*; 14.1)!

Some references to the vultures and their scavenging habits which are usually quoted in negative manner could also be found. Works like *Nagananda* (4.18), *Urubhanga* (1.5), *Nirukta* (2.6), *Markandeya Purana* (8.12) refer to their habit of feeding on carcasses.

In the *Vaimanika Shastra* (1.1), the flight and speed of the vulture is admired and it is is said to be an ideal model for the concept of '*vimana*' (airplane).

Sometimes vulture is depicted as the carrier vehicle of Shani – one of the Navagrahs i.e. one of the nine celestial planets in Hindu astrology.



**Long-billed Vultures on a ledge**

**REFERENCE:**

The information in this short article is based on "*Some reflections on birds in Sanskrit Literature*". PhD thesis by Dr. Suruchi Pande; April 2007.


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