

## Population Estimation of Resident Vultures in Gujarat

*Statewide vulture population estimates in Gujarat have been conducted for the years 2005, 2007, 2010, 2012 and 2016 by Gujarat State Forest Department and GEER Foundation with the support of various NGOs, nature clubs, ornithologists and birdwatchers of the state. The entire state was surveyed simultaneously with uniform methodology during two days of May 2016. A total of 999 individuals of 4 species of vultures were estimated. Of the total 999 vultures, 843 (84.38%) individuals were Gyps vultures (including 458 White-rumped Vultures and 385 Long-billed Vultures). Over a period of a decade (2005-2016), population of Gyps vultures declined by 68.15% from 2,647 individuals to 843 individuals. The decadal (2005-2016) population change for Gyps vultures has indicated 78.55% decline for the White-rumped Vulture and 2.39% increase for the Long-billed Vulture. Populations of Red-headed Vulture and Egyptian Vulture were estimated in 2012 and 2016 which revealed 300% population rise (i.e. 8 to 24 individuals) for the Red-headed Vulture and 36% population rise (i.e. 97 to 132 individuals) for the Egyptian Vulture.*

**Key words:** Egyptian vulture, Gujarat state, Gyps vultures, Long-billed Vulture, Population estimation, Red-headed Vulture, White-rumped Vulture

### Introduction

A global alarm rang in 1990s regarding catastrophic decline in Gyps vulture population; especially that of White-rumped Vulture (WRV) *Gyps bengalensis*, Long-billed Vulture (LBV) *Gyps indicus*, and Slender-billed Vulture *Gyps tenuirostris* in India, Pakistan and Nepal (Prakash, 1999; Virani *et al.*, 2001; Prakash, *et al.* 2003). A sharp decline in number of vultures was recorded for the first time at Keoladeo National Park, India (Prakash, 1999). However, the exact cause of decline was not known at that time. Similar vulture population decline was recorded in Pakistan and post mortem examinations indicated the presence of uric acid deposition in kidneys of dead vultures that was caused by anti-inflammatory drug, 'Diclofenac' (Oaks *et al.*, 2004). It was soon realized that the problem of vulture population decline was very typical and required detailed studies, research and population monitoring. Gujarat was one of the pioneering states in India wherein statewide population estimation began to keep an eye on vulture population monitoring as a primary steps towards vulture conservation (Pandey and Jethva., 2005; Tatu *et al.*, 2012). Gujarat Forest Department and Gujarat Ecological Education and Research (GEER) Foundation have been the pioneering organizations in the state who initiated vulture population estimations in 2005 and repeated the estimations in 2007, 2010, 2012 and 2016. The GEER Foundation, with the support of Gujarat Forest Department and help of various NGOs, nature clubs, ornithologists, and birdwatchers, has been able to determine the trend and rate of population change of Gyps vultures [viz., White-rumped Vulture (*Gyps bengalensis*) and Long-billed Vulture (*Gyps indicus*)] over the period of a decade (2005-2016) and the trend and rate of population change of Red-headed Vulture (*Sarcogyps calvus*) and Egyptian Vulture (*Neophron percnopterus ginnianus*) between 2012 and 2016. This has been an important contribution to the vulture conservation

*Population estimation of four species of resident vultures of Gujarat was carried out from 2005 to 2016 which indicated some increase in Long-billed Vulture and Egyptian Vultures and decline of White-rumped Vulture*

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as both *Gyps* spp. and *Sarcogyps calvus* are globally Critically Endangered (CR) species and *Neophron percnopterus* is a globally Endangered (EN) species (IUCN, 2018).

### Study Area

The entire Gujarat State was covered under the estimation for four vulture species, viz., White-rumped Vulture (*Gyps bengalensis*), Long-billed Vulture (*Gyps indicus*), Egyptian Vulture (*Neophron percnopterus ginginianus*) and Red-headed Vulture (*Sarcogyps calvus*). All four species have feeding, roosting and nesting habitats in the state. Four major mountain ranges end in the state viz., Aravalli, Vindhyas, Satpudas and Western Ghats (Saiyadri) (Rodgers and Panwar, 1988). Apart from these, many hills and hill ranges occurs in the state, such as 1) hills of Mandav, Girnar, Shetranjay, Barda and Gir range in Saurashtra region, 2) Ratanmahals and Pavagadh hills in Central Gujarat, 3) Jessor and Arasur hills in North Gujarat, 4) Saputara and Parnera along with hillocks of Western Ghats (Saiyadri) in South Gujarat and 5) Northern, central and southern ranges with Kalodungar, Dhinodhar, Bhuijiyo etc. with many hills in Kachchh region.

Many parts of Saurashtra and Kachchh have *Vidis* (forest lands in Saurashtra with predominance of grass cover) and *Rakhals* (forest lands in Kachchh with/without domination of grass cover). Due to such grasslands the state has good practices of animal husbandry. All such conditions favour the occurrence of all vulture species in the state.

For the purpose of population estimation of vultures, administrative divisions (*i.e.* regions and districts) of the

state were considered. The state was categorized mainly into five regions viz., North Gujarat, Central Gujarat, South Gujarat, Kachchh and Saurashtra. **North Gujarat:** North Gujarat has arid to semi-arid climate, though largely it is semi-arid. A total of 7 districts in this region viz., Banaskantha, Sabarkantha, Patan, Mahesana, Aravalli, Gandhinagar and Mahisagar.

**Central Gujarat:** Central Gujarat is characterized by semi-arid climate and medium black soil. A total of 9 districts viz., Ahmedabad, Anand, Kheda, Dahod, Panchmahal, Vadodara and Chhota Udepur, Bharuch and Narmada have been included in Central Gujarat region.

**South Gujarat:** It includes Southern Hills of Dangs and Valsad as also plain terrain areas towards Surat, Navsari, etc. Southern Hills area is a small but largely a tribal belt. This area receives about 1800 mm of rainfall and the climate is semi-arid, dry sub humid. A total of 5 districts viz., Surat, Tapi, Navasari, the Dangs and Valsad are considered to be falling in this region.

**Saurashtra:** Saurashtra is a semi-arid region with long coast-line. The region is hilly in central Saurashtra and has dry-deciduous forests in and around Gir. The region has a total of 11 districts viz., Devbhumi-Dwarka, Porbandar, Jamnagar, Morbi, Rajkot, Surendranagar, Junagadh, Gir-Somnath, Amreli, Bhavnagar and Botad.

**Kachchh:** Kachchh region is characterized mainly by arid climate though some portions also have semi-arid climate. It is also one of the largest districts of India (45,652 km<sup>2</sup> area).

### Methodology

The population estimation was made through total head-count method during all the years (*i.e.* 2005, 2007, 2010, 2012 and 2016) of vulture estimation surveys in the state.

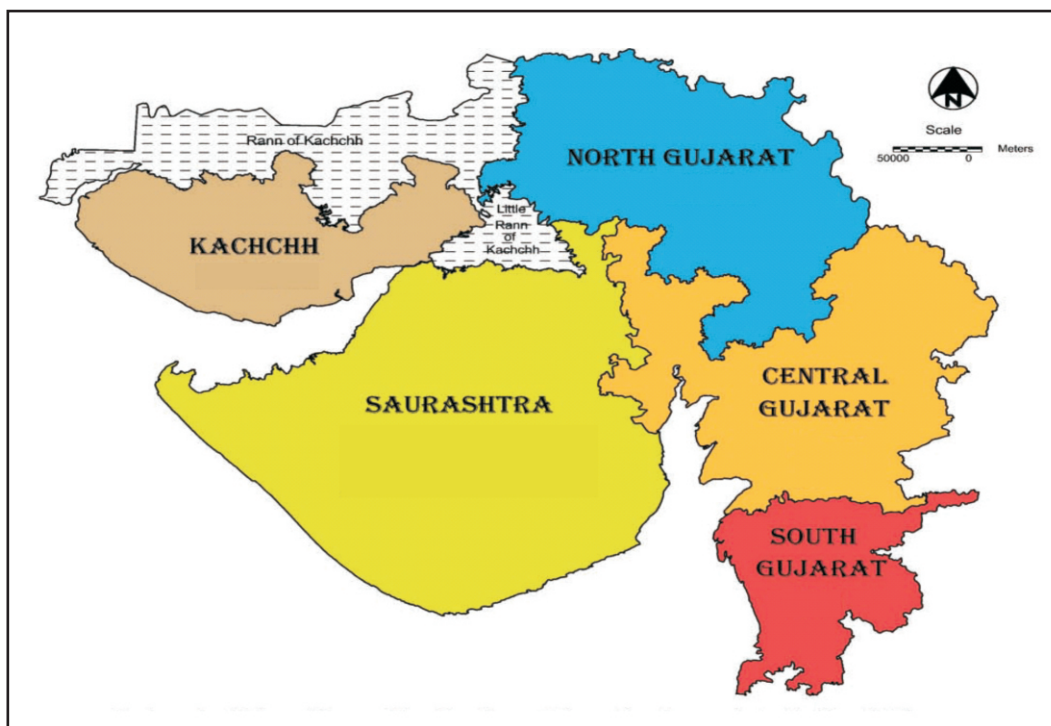


Fig. 1: Various regions of Gujarat State.

This method was used due to several favourable factors such as ease of identification of the species under investigation, gregarious way of life of the species and more or less same feeding and roosting sites used by vultures year after year. The vulture estimation surveys were conducted in summer season (mainly in last week of May). This is because out of total 7 vulture species known to occur in Gujarat, three species viz., Eurasian Griffon (*Gyps fulvus*), Himalayan Griffon (*Gyps himalayensis*) and Cinereous Vulture (*Aegypius monachus*) are winter visitors to the state. If the vulture population estimation surveys were conducted in winter, there were higher chances of identification mistakes by the survey participants due to presence of migratory vultures. Therefore, the estimation surveys were always planned for two consecutive days in summer. For the population estimation in such a widespread area, large network of NGOs, nature lovers, birdwatchers, the staff of Gujarat State Forest Department and GEER Foundation was employed. Pre-count activities included team building, area allotment, workshop, Satellite Communication (SATCOM) programme, data-sheet format, etc. Emphasis was laid on counting vultures at key habitats or sites like 'panjrapols' (i.e., permanent cattle shelters), well known roosting (including areas with palm trees), and feeding sites (including backyards and dumping areas of 'panjrapol'). The data was recorded in a prescribed data-sheet that asked for information/data on number of adults and immature individuals of each species; time and place of sighting (district, taluka, village/ town and locality), activity (feeding, flying, resting, roosting), habitat type, and other information such as health status of the vultures and disturbances at sites. The data gathered from the different regions were compiled and collated. All observations of vultures were plotted on a map.

## Results and Discussion

A total of 999 individuals of four species of vultures [including three Critically Endangered species (i.e., White-rumped Vulture, Long-billed Vulture and Red-headed Vulture) and one endangered species (i.e. Egyptian Vulture)] were recorded during May 2016 estimation. Of the total 999 vultures, 843 (84.38%) were *Gyps* vultures (including 458 White-rumped Vultures and 385 Long-billed Vultures) meaning thereby that *Gyps* vultures contributed a lion's share in the total vulture population of the State in May 2016. The two vulture species (i.e., Red-headed Vulture and Egyptian Vulture) had contributed 15.62% to total population (n=999) with 24 Red-headed Vultures and 132 Egyptian Vultures. The estimations of only two species of *Gyps* vultures viz., White-rumped Vulture and Long-billed Vulture have been done since 2005. Over this decade-long period, the population of *Gyps* has declined from 2,647 individuals to 843 individuals indicating population reduction by 68.15% (Pandey and Jethva, 2005; Pandey *et al.*, 2009; Kamboj *et al.*, 2016). The decline in population of *Gyps* vultures had been 45.9% between 2005 and 2007, 25.63% between 2007 and 2010, 11.9% between 2010 and 2012 and 10.1% between 2005 and 2007 (Fig. 2).

**White-rumped Vulture:** A total of 458 White-rumped Vultures (WRVs) contributing 45.8% to the total vulture population (n=999) were recorded in the state during the population estimation 2016 in Gujarat. Comparison of population of WRV with that of in the year 2012 (i.e. 577 WRVs), revealed that within 4 years (2012-2016), the population of WRV has declined by 20.62% at an annual rate of 5.61%. Earlier decline rates were higher than the most recent one, i.e., 27.2% between 2010 and 2012, 30.9% between 2007 and 2010 and 46.3% between 2005 and 2007 (Pandey and Jethva, 2005; Pandey *et al.* 2009). The decadal (2005-2016) population decline for WRVs

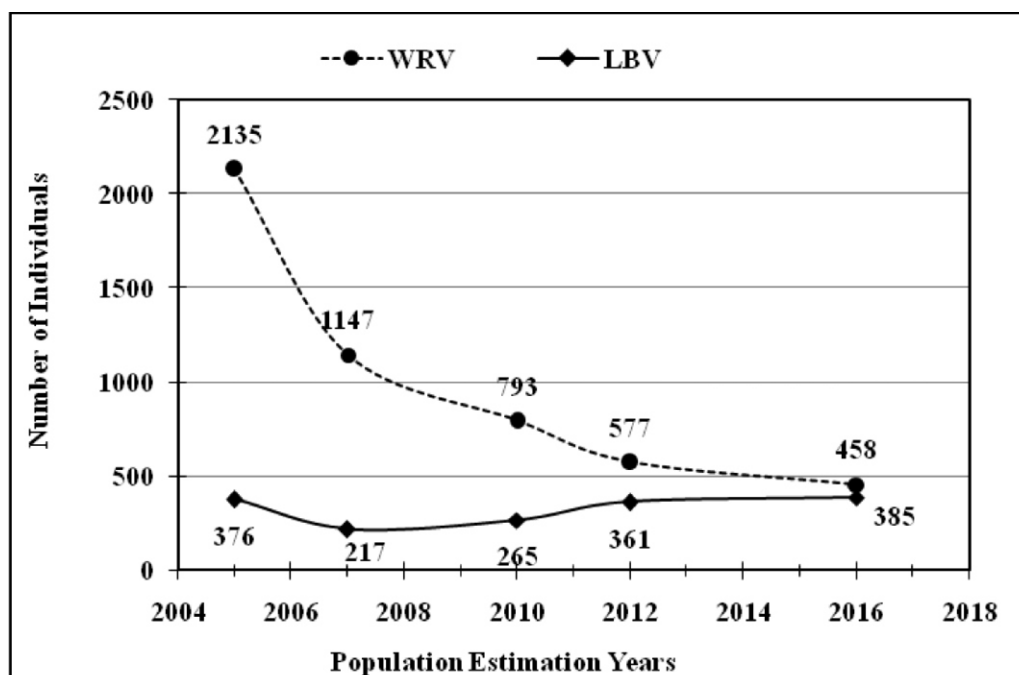


Fig. 2: Population trend of *Gyps* vultures (2005-2016).

was found to be as large as 78.55% with an annual population decline rate of 12.94% (Kamboj *et al.*, 2016) (Fig. 2).

**Long-billed Vulture:** A total of 385 Long-billed Vultures (LBVs), contributing 38.5% to the total vulture population (n=999) were recorded in Gujarat state during population estimation in May, 2016. Comparison of Long-billed Vulture population estimate of 2012 (n=361) with that of 2016 (n=385) showed a modest (*i.e.*, 6.65%) increase in vulture population with an annual increment of 1.62%. In fact, unlike White-rumped Vulture's population, the population of Long-billed Vulture has never declined drastically since the first state-wide vulture estimation in 2005 (n=376). On the contrary, comparing the latest population estimation (of 2016; n=385) with that of 2005, an increase by 2.39% had been recorded with an annual population rise of 0.21% (Kamboj *et al.*, 2016) (Fig. 2).

**Red-headed Vulture and Egyptian Vulture:** Red-headed Vulture (RHV) is globally a Critically Endangered (CR) species and Egyptian Vulture (EV) is an Endangered (EN) species as per IUCN criteria. Red-headed Vulture is known to be uncommon in the state having patchy distribution. The locations of survey had remained the same for all surveys (*i.e.* 2005, 2007, 2010, 2012 and 2016). However, during the vulture estimations of the years from 2005 to 2010, population estimation of Red-headed Vulture and Egyptian Vulture was not included. Therefore, a long-term population trend for these species could not be determined. However, population estimation of Red-headed Vulture and Egyptian Vulture was a part of vulture population estimation of years 2012 and 2016 (Kamboj *et al.*, 2016). In 2012 vulture estimation, a total of 8 Red-headed Vultures and 97 Egyptian Vultures were recorded whereas in 2016, a total of 24 Red-headed Vultures and 132 Egyptian Vultures were recorded (Kamboj *et al.*, 2016) (Fig. 3).

## Conclusion

Among the four resident vulture species covered under the population estimation, the steepest population decline in the Gujarat State has occurred for White-rumped Vultures whereas, the population of Long-billed Vulture is observed to be slightly increasing. Thus, the decline of State's vulture population is mainly due to decline in White-rumped Vulture population and not due to other species. White-rumped Vultures are relatively in critical situation as far as population profiles of the four vultures in the State. The decline in White-rumped Vulture was recorded to be 78.5% in last 10 years.

## Recommendations

By taking issues regarding conservation of vultures and population trend into the consideration various conservation measures are suggested. There is need to create and maintain new vulture feeding sites and facilities for water availability especially for White-rumped Vultures. Government of India and Government of Gujarat have taken measures to ban the use of the veterinary drug 'diclofenac' for treatment of livestock. Effective implementation of this ban should be closely monitored. In order to understand the trend of vulture population in the state, it is recommended that vulture population estimations should be conducted in the state at regular interval of 2 years. It is also recommended to survey nests and nestlings during nesting season at the interval of every 2 years. In connection to Vulture Action Plan (2006) by MoEF, a vulture care and breeding center at Sakkarbaug Zoo, Junagadh, Gujarat has been established. Ahmedabad too has such facilities. However, in view of the ongoing population decline, it is recommended that more such rescue and breeding centers may be set up. *Panjarapols* are important for vulture conservation as dumping sites of the *Panjarapols* become feeding site of vultures. If such sites can be made NSAID free and free of dog-menace, a majority of vulture population can be saved from the threat of NSAID.

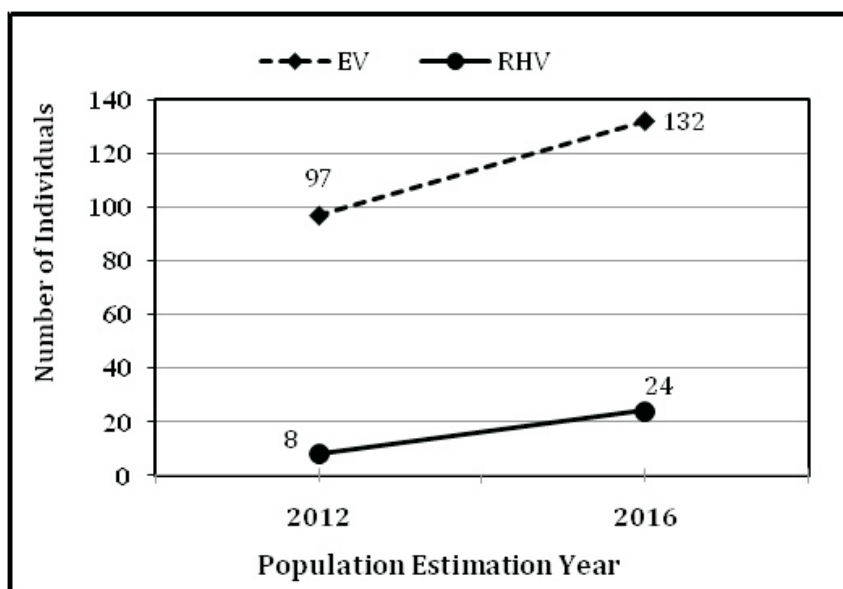


Fig. 3: Population change of RHV and EV between 2012 and 2016.



गुजरात में स्थानिक गिद्धों का आबादी आकलन  
संदीप बी. मुंजपारा, केतन टाटू एवं आर.डी. काम्बोज

सारांश

राज्य के विभिन्न गैर सरकारी संगठनों, नेचर क्लबों, पक्षिविज्ञानियों तथा पक्षी दर्शकों की सहायता से गुजरात राज्य वन विभाग एवं जीईईआर फाउन्डेशन द्वारा 2005, 2007, 2010, 2012 एवं 2016 में गुजरात में राज्यभर में गिद्ध आबादी का आकलन किया गया। मई, 2016 में दो दिन एकसमान क्रियाविधि के साथ सम्पूर्ण राज्य का साथ-साथ सर्वेक्षण किया गया। गिद्धों की 4 प्रजातियों के कुल 999 एकलों को आकलित किया गया। 999 गिद्धों में से 843 (84.38%) एकल जीप्स गिद्ध थे (458 व्हाइट-रम्ड गिद्ध और 385 लांग बिल्ड गिद्ध सहित): एक दशक की अवधि में (2005-2016) जीप्स गिद्ध की आबादी 2,647 एकलों से 843 एकल तक करीब 68.15% घटी। व्हाइट-रम्ड गिद्धों के लिए दशकीय (2005-2016) आबादी परिवर्तन 78.55% तक घटा जबकि लांग बिल्ड गिद्धों के लिए 2.39% तक की वृद्धि हुई। रैड-हैडेड गिद्धों और इजीप्शियन गिद्धों की आबादियां 2012 एवं 2016 में आकलित की गईं जिसने रैड-हैडेड गिद्धों के लिए 300% आबादी वृद्धि (यथा-8 से 24 एकल) और 36% आबादी वृद्धि (यथा-97 से 132 एकल) दर्शाई।

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