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STUDY OF SCAVENGER BIRDS IN SOME REGION OF BUNDELKHAND TO ASSESS THE PROMISING BREEDING SITES FOR THEIR BREEDING CONSERVATION

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ABSTRACT

Due to the fact that they consume carrion, vultures serve an important ecological purpose in addition to being very reliable indicators of the ecosystem's overall health. They are the only group of vertebrates that have been documented as being obligate scavengers. There are nine distinct species of old world vultures found in India. The Red-headed Vulture (RHV) is a species of vulture found in the United States that reaches a height of 2,000 meters throughout the nation. The inquiry was conducted in Madhya Pradesh, popularly known as Bundelkhand, and Uttar Pradesh, two states in India. The research zone was partitioned into grids with random location selection, each grid consisting of 15 square kilometers by 15 square kilometers. Within each of the selected grids, transects with a length of ten kilometers were successfully completed. In light of this, the quantities of vultures that were recorded over the years 2021 through 2023 were 46, 54, and 74, respectively. The population of RHV showed a continuous growth during the duration of the study that was observed, which indicates that the species is moving in a positive direction. In addition to the hurdles that are faced by other species of vultures, RHV is also face with considerable obstacles. Some examples of biotic and abiotic threats include habitat loss, predation, hunting, and disturbance; scarcity of food and water; changes in agricultural practices and land use; poisoning; and death from traffic accidents at feeding locations. The population trend is showing signs that are positive; but, in order to preserve the species, it will be required to simply maintain constant monitoring and put conservation measures into effect.

Keywords: Vultures, Bundelkhand, Biotic and abiotic threats, environmental.

INTRODUCTION:

When it comes to the ecosystem, the scavenging activity of vultures is of enormous significance. The removal of dead animals and birds is a significant contribution that they provide to our ecosystems, despite the fact that they may give the impression of being unfriendly. Our environment is protected against a number of diseases that can be spread by microbes that thrive on dead organic materials. They offer this protection to our surrounds. It is the only group of vertebrate obligate scavengers that has been documented. Individuals that are considered to be obligatory scavengers are those who obtain all of their sustenance from

carrion. The physiological mechanism that enables vultures to rest in their roost reduces their high metabolic rate, an adaptation that has evolved over many generations. Since vultures make up the bulk of the food chain, eliminating one of their predators could upset the delicate balance of other scavenging species, which could increase the number of dead animals lying around and put people at risk of contracting diseases.

Fig. 1: Red-headed Vulture in flight

[8] Vultures have a slow reproduction rate compared to other birds]. During each breeding season, it lays a single egg, and it achieves maturity between the ages of four and five years old. As a result of their striking similarity in appearance, it can be difficult to differentiate between male and female vultures based on their morphological characteristics. It is true that vultures are monogamous, which means that they form a close commitment with their partners through courtship and sexual reproduction that continues throughout their entire lives. The Bundelkhand region, which is comprised of 14 districts in both Uttar Pradesh and Madhya Pradesh, is included in the scope of the scientific investigation. There are abundant amounts of Haldu, Semal, Tamarindus, Mahuua, Sheesam, Sal, Salai, and Tendu in the distinctive dry deciduous forest that is found in the breeding region. Additionally, these trees are utilized as roosting areas, in addition to being utilized for the construction of nests. In the present moment, this county is struggling with the problem of extensive ecological damage brought on by deforestation and drought, which has led to a decrease in the amount of land that is being produced. Since 2016, this region has been experiencing extreme drought, which has had a negative influence on the growth and regeneration of the vegetation. This has been the case since 2016. The reproductive success of vultures may also be affected as a result of this. This particular species of colonial vulture, known as Gyps indicus, is known to nest predominantly on cliffs, monuments, and ruins. On the other hand, colonies have been observed to nest in trees in areas that do not contain any exposed cliffs [11]. The presence of both cliffs and long trees is taken into consideration while choosing breeding grounds for the tree species. When it comes to breeding sites, they make sure that they are always situated in close proximity to a plentiful supply of water supplies. After each meal, they take a bath in order to remove blood smudge from their bills and other areas of their bodies, as well as to protect themselves from a variety of microbiological ailments.

It is the Chambal Jamni and Betwa rivers that are responsible for providing this region with its water supply. Vultures are winged creatures that are shy, and as a result, they employ a strategic approach to avoid human disturbances, the presence of predators, fluctuations in temperature, and the presence of predators at the areas where they mate. The vast majority of Gyps indicus

nests may be found in monumental constructions in Orchha. Notable among these buildings are the Laxmi Temple, Jahagir Mahal, Raja Ram Mandir, Chaturbhuj Temple, and Badi Chhattris. These nests offer protection from rain and strong winds, which could harm their young. The nests are constructed in well-protected locations, far from human reach, atop monuments and trees that have been hand-picked after much deliberation. Nests in the air are constructed in close proximity to bodies of water.

The Gyps species is now listed as Critically Endangered on the International Union for Conservation of Nature (IUCN) Red List due to the devastating impact of diclofenac poisoning, which has reduced the population by 90-98%. The existing breeding grounds in the Bundelkhand region are being threatened by the loss of their habitat, as well as by anthropogenic activities that disturb the food chain. These activities include unorthodox fireworks, festivals, the filming of movies in historical locations, light and sound programs, and unregulated tourism. This research was conducted with the intention of determining the most suitable nesting areas and habitats for Gyps vultures in the state of Bundelkhand.

According to Ali and Ripley (1987), India is home to nine distinct species of old world vultures. Among these, you can find the following vultures: the redheaded (Sarcogyps calvus), the cinereous (Aegypius monachus), the griffon (Gyps fulvus), the himalayan (Gyps himalayensis), the long-billed (Gyps indicus), the slender-billed (Gyps tenurostris), the white-rumped (Gyps bengalensis), the bearded (Gypaetus barbatus), and the Egyptian (Neophron percnopterus) vultures [1][2][9]. Considering that vultures are birds of prey that are capable of scavenging, they have unique capabilities that allow them to keep their habitat clean and efficiently prevent the spread of contagious diseases.

The current condition of a species of Asian vultures that is largely unknown was the subject of this study, which aimed to determine its current state. RHVs, which are also known as reproductive headwaters, require rapid conservation. The information that is gathered from this study will be used as a basis for the continuation of the species' conservation and monitoring efforts.

REVIEW OF LITERATURE:

Dr Adesh Kumar (2017), Individual bird survival depends on breeding habitat. In colony, Gyps vultures breed. Slow breeders, they mature at five years and lay one egg per year. Finding suitable sites for Gyps vulture nesting in the Indian states of Uttar Pradesh and Madhya Pradesh, which are part of Bundelkhand, was the goal of this research. Nesting trees, cliffs, and monuments support a diverse range of vulture species and contribute to high numbers. The research period spanned from 2015 to 2016. There were 30 breeding places in Bundelkhand, as shown in the study. There are a total of eight breeding sites in Shivpuri, seven in Panna Tiger Reserve, five in Tikamgarh, one in Lalitpur, six in Madhav National Park, one in Karaira Sanctuary, and two in Jhansi.[4]

Kaushalendra Kumar Jha (2020), Due of their ecological role and recent population collapse, Indian vultures are increasingly examined. Central India is a vulture stronghold, but little investigations have been done. The present study investigated the frequency, distribution,

roosting habits, and nesting practices of vultures in this area, as well as their variation in landcover. Investigations made use of both total counts and questionnaire surveys. Vultures roost and lay their eggs in large trees or on cliffs in wide areas that have not been affected by agricultural expansion, according to the theory. The only exception to this is the Egyptian vulture. During both the summer and winter counts, vultures with long bills, whiterumped beaks, red heads, and cinereous patterns were noted. On average, there were 7,028 of them, with 3,351 Long-billed vultures and 39 Cinereous vultures. Thematic maps displayed the distributions of agroclimates and ecozones. The presence of vultures was unaffected by human disturbance; only orography and forest structure were. Vulture protection, food monitoring, and human-induced disturbances are all dealt with by policies that are critical, educated, and adaptable. Based on these results, vulture conservation efforts in Central India and elsewhere can be better monitored and managed.[5]

Sonika Kushwaha(2018) Birds are essential to life on Earth. Humans' limitless appetites and thoughtlessness have caused endless animal suffering. Vulture populations have declined recently. This 2014–2017 study examined the ongoing impact of human activity on Bundelkhand's vulture population. Field visits and questionnaires were conducted for the study. A narrow and closed questionnaire and an expansive and open one were both developed. Volcanoes are under attack from a number of directions, including the animal diclofenac ban of 2006 and the human single-unit dose pack announcement in 2015. Some of the main issues include villagers cutting down big trees that vultures use as nests, the decline of the local skill of de-skinning cattle, the improper disposal of these animals (such as burying them or throwing them in water), the lack of action to control the feral dog population, the needless lighting of monuments where vultures nest, the unauthorized use of drones at these sites, and the misuse of permission to shoot schedules in monuments during breeding. The rocky cliff vulture population is also threatened by mining. Human activities are causing ongoing vulture population decline. The responsible departments should act immediately and coordinate to stop the vulture population decline.[6]

OBJECTIVE:

1. To research on scavenger birds in particular regions of Bundelkhand
2. To examine the potential breeding locations in order to preserve their breeding in Bundelkhand.

METHODS:

Study Area:

Two Indian states, Uttar Pradesh (U.P.) and Madhya Pradesh (M.P.), which are generally referred to as Bundelkhand (Fig. 2), were the locations where the investigation was carried out. Although it was once known as the Chedi Kingdom (Bundeli), the geographical region of central India that is now known as Bundelkhand got its name from the Bundela Rajputs. This was the case until the 16th century, when the Chandel Rajputs and the Bundela Rajputs took control of the region. Specifically, it is located between the coordinates 23°35′-26′ North and 78°-82′ East. It has around 70,000 square kilometers in total area. Thirteen different districts'

administrative boundaries are traversed by the route. For instance, in the Indian state of Uttar Pradesh you'll find the districts of Jhansi, Jalaun, Lalitpur, Hamirpur, Mahoba, Banda, and Chitrakoot. Alternatively, Datia, Tikamgarh, Chhatarpur, Damoh, Panna, and Sagar are the districts that make up Madhya Pradesh. The Yamuna, Ken, Betwa, and Dhasan are the four main rivers that flow through this region.

Fig. 2: Map of Study Area: Bundelkhand

Within the scope of the research, a grid with dimensions of 15 square kilometers by 15 square kilometers was formed, and ArcGIS software was utilized to generate random points (Fig. 3). In order to conduct the survey, grids with points selected at random were selected. In the event that species were found in the grid, nearby grids were also investigated to determine whether or not they included any species. All of the locations that displayed the presence of the species were investigated, and a variety of factors, including GPS coordinates, timing, temperature, and so on, received documentation. In addition, cooperation was sought from local people as well as forest personnel in order to acquire first-hand accounts of any visual observations of the species.

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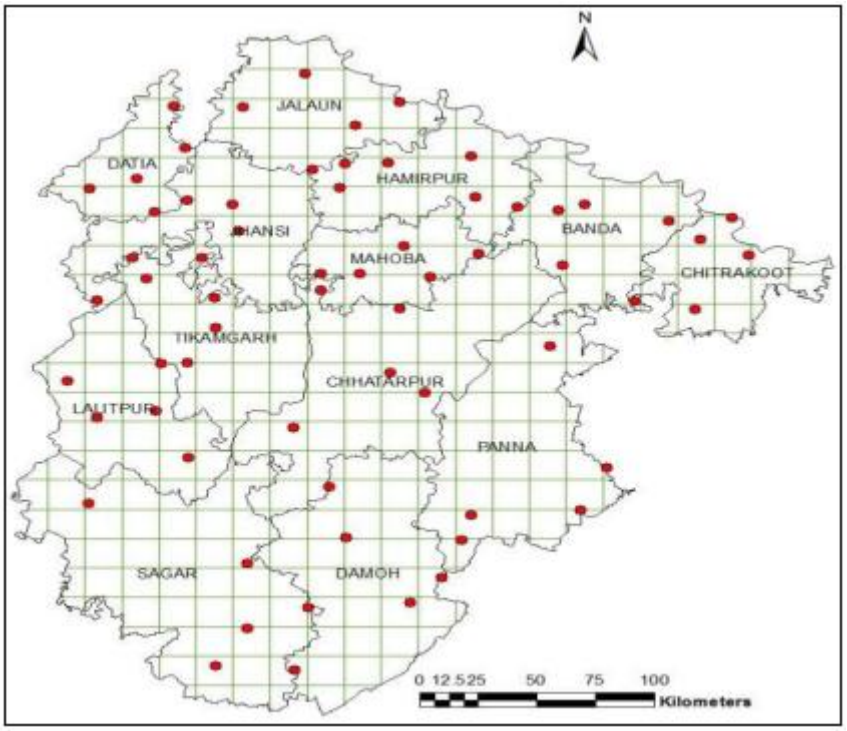

Fig. 3: The research region is depicted on the map using randomly generated points generated using 15*15 sq km grids.

Using the information that was available in the area as well as the prior knowledge that the research team possessed, exhaustive observations were carried out on the potential nesting habitat for vultures. In order to discover nesting vultures, a comprehensive search was carried out, during which prospective nesting trees and cliffs in geographically exposed areas were meticulously investigated. When we saw a nest, we used binoculars to look closely and figure out what kind of bird it was, how many of them there were, and whether they were nesting, roosting, or perching. We also made care to maintain a safe distance from the nesting area. For the purpose of locating breeding, roosting, and feeding locations, certain grids were crossed in transects that were 10 kilometers long. When it was practical to do so, transects were typically carried out by automobile, with careful consideration given to the topography and the conditions that prevailed at the time.

RESULT:

Vultures are found in a diverse range of environments, including deserts, semi-desert regions, open spaces, plains, woods, mountains, hills, and human towns, with the majority of their habitats being the historic architectural structures of human settlements. On the basis of the surveys that were conducted between the years 2021 and 2023, the findings have been produced. A total of 46, 54, and 74 RHV cases were reported throughout the course of these three years, with an average of 58 cases. There were 19.57%, 24.07%, and 27.03% of these individuals who were under the age of 18 in their respective years. Over the course of the entire research period, only eight out of thirteen districts (three in Uttar Pradesh and five in Madhya

Pradesh) reported having a Viability (RHV) that was considered to be Relatively High. In the year 2017, Damoh had the largest number of RHV sightings, exactly twenty (17 adults and three juveniles). On the other hand, Tikamgarh had only four sightings, three of which were witnessed by adults and one by a juvenile.

Table 1: RHV's situation in 2021

Division	Adult	Juvenile
Chhatarpur	6	1
Damoh	17	3
Sagar	11	4
Tikamgarh	3	1
Total	**37**	**9**

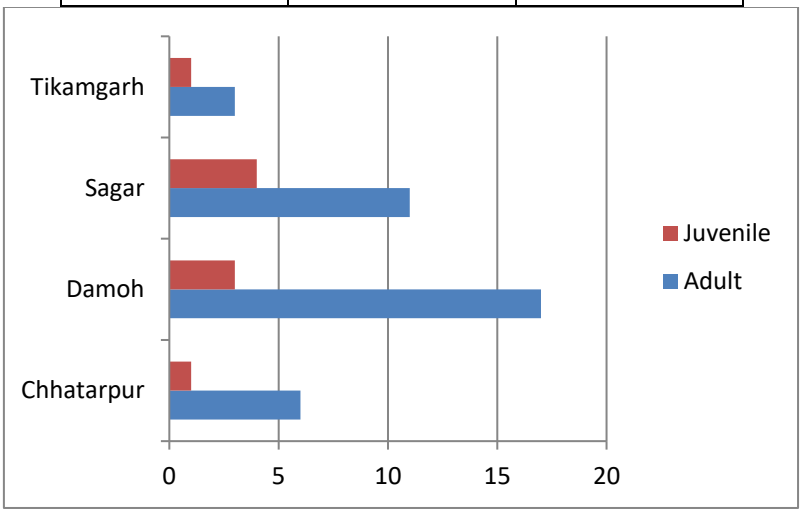

Fig. 4: Bar Chart displaying RHV Status in 2021

In the year 2022, the RHV population in Panna and Sagar reaches its highest point of 17 individuals, with 12 adults and 5 juveniles in each case, and 13 adults and 4 juveniles together in Sagar. In each of the districts of Chhatarpur and Tikamgarh, there have been at least three cases of the Red Heinous Virus (RHV), with three adults and no children being recognized as suspected of having the virus.

Table 2: RHV's situation in 2022

Division	Adult	Juvenile
Chhatarpur	3	0
Damoh	12	2
Panna	12	5
Sagar	13	4
Tikamgarh	1	2
Total	**41**	**13**

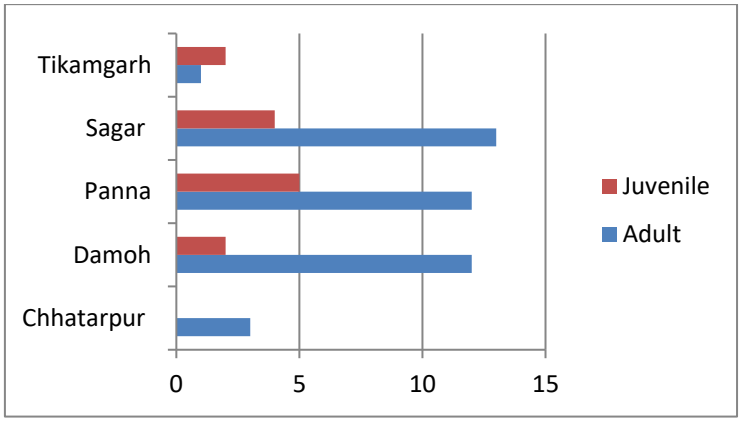

Fig. 5: Bar Chart displaying RHV Status in 2022

In the year 2023, the county of Panna, which encompasses Panna National Park, was the location where the greatest number of documented sightings took place. In particular, there were 28 RHV that were seen, with 21 adults and 7 juveniles. The largest number of RHV was found in Jhansi, where there was just one adult (Table 3; Fig. 6). The RHV population has been observed to be increasing throughout the course of the research period, which is a tendency that is encouraging for both the species and the conservationists who are working to preserve it.

Table 3: RHV's situation in 2023

Division	Adult	Juvenile
Chhatarpur	4	3
Chitrakoot	5	0
Damoh	12	2
Jhansi	1	0
Lalitpur	1	2
Panna	21	7
Sagar	10	6
Total	**54**	**20**

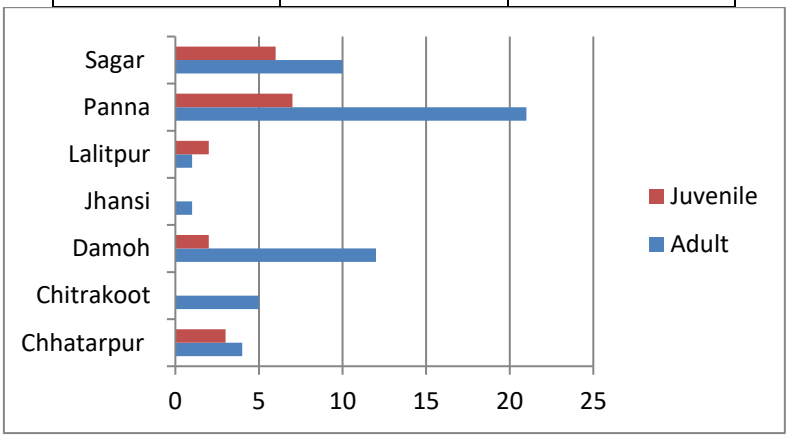

Fig. 6: Bar Chart displaying RHV Status in 2021

An ideal nesting environment for vultures can be found in the Bundelkhand region, which is rich in the diversity of vulture species. A total of thirty breeding sites have been identified as existing in the Bundelkhand region, according to the findings of the investigation. The biggest number of breeding sites is found in Shivpuri, which has eight, followed by Panna Tiger Reserve, which has seven, Madhav National Park, which has six, Tikamgarh, which has five, Jhansi, which has two, Lalitpur, which has one, and Karaira, which has one.

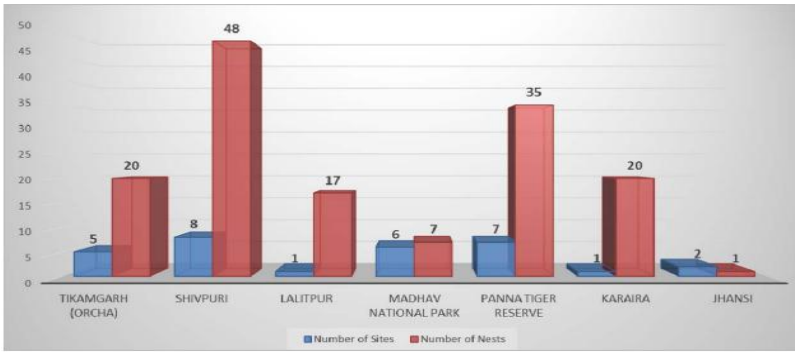

Fig 7: Count of nests and locations in the Bundelkhand region for each research area

DISCUSSION:

A large portion of the vulture population in the Indian subcontinent, especially Gyps vultures, disappeared in the 1990s [15, 16, 20].The RHV is quieter and more solitary than the other vulture species in the study region; it only nests in couples when it's time to lay eggs. When it comes to the examination of the RHV in Bundelkhand, this work is both innovative and groundbreaking. The status result appears to be optimistic due to the observed stability in the population, which is in comparison to other studies that were conducted on RHV in various regions of the country. Only eight districts—Chitrakoot, Chhatarpur, Jhansi, Lalitpur, Sagar, Damoh, Tikamgarh, and Panna—were reported to have a population of RHV between 2021 and 2023. These districts are listed in the order of their respective populations. The presence of RHV was continuously low and there was very little evidence of its presence. In addition to displaying a territorial tendency, they do not create colonies with either their own species or with other species of vultures. The increase in RHV population has been somewhat less severe than the fall in the three native Gyps vulture populations in South Asia.

The number of people in India who were infected with RHV showed a continuous annual drop of 41% in 1999 and 44% throughout the years 2000 and 2003 [7]. The result of this was that they were placed in the category of species that are in a state of severe endangered status [2].In the current research, the population measure suggests an upward trend, which is in contrast to the assumption made in earlier studies by Prakash et al. (2003) and Gilbert et al. (2006) that there is a trend toward a diminishing population. The positive tendencies that are observed in this study are a direct result of the meticulous effort and studies that have been carried out by people who are concerned about the environment and academics.

The survey also included the examination of nests as an additional component. An active nest is characterized by the depositing of eggs, as stated by Postupalsky (1974). On the other hand, an occupied nest is characterized by the absence of eggs but the occurrence of actions related

to the construction of the nest. Most RHV populations and nests were found in and around protected areas in the area, according to our survey. The province of Bundelkhand is home to three major natural preserves: Panna National Park, Orchha Wildlife Sanctuary, and Ken Gharial Wildlife Sanctuary. Within the context of their nesting and roosting behavior, vultures often select trees that are tall and have thin branches. An improved perspective of the surrounding area, as well as a favorable position for taking off, are all benefits that these trees offer in addition to providing protection against potential predators. Furthermore, this event was responsible for the induction of temperature inversion, which allowed nightly perches to have a microclimate that was beneficial to their survival [26]. The current analysis did not provide any evidence to support the hypothesis that particular species of vultures have a preference for roosting on dead trees [27].

In the same way as other species of vultures are, RHV is also facing serious conservation challenges. It is the drug diclofenac, which is routinely provided to cattle in many different locations of the country, that poses the greatest threat to the RHV population. The elevated mortality rate in vultures was mostly caused by this and was the key factor contributing to the problem. In the absence of any treatment, diclofenac has the potential to persist within the inanimate remains of cattle. Vultures are responsible for the biomagnification of the medicinal chemical that occurs when they devour them. Ultimately, renal failure is the end result of this biomagnification event, which ultimately leads to mortality as a consequence of renal impairment [13].Despite the fact that Nepal, Pakistan, and India have all passed laws prohibiting the production of veterinary Diclofenac since 2006, there is still continued illegal production and distribution of the drug in the market.

CONCLUSION:

Owing to the fact that they are avian predators that are able to actively hunt for prey, vultures play an essential role in the ecological dynamics. Furthermore, in order for them to survive, a wholesome environment is required. Although they are dependent on humans for their survival in the ecosystem, vultures do not rely on humans. As an additional measure, they engage in activities that include scavenging in order to maintain a clean and healthy environment. In light of this, it is imperative that efforts be directed toward the preservation of vultures in their native habitat. At particular times of the year, such as this one, a number of different kinds of birds achieve their full maturity. Vultures achieve their full development at the age of five, and throughout each breeding cycle, they lay a single egg during their reproductive cycle. The provision of adequate and uncontaminated water, food, and good roosting, nesting, and soaring areas are the primary considerations that go into their habitat selection.

This region is characterized by a low level of anthropogenic activities. At the moment, the majority of the blame for the fall in the vulture population can be placed on the increasing number of anthropogenic activities. These activities include wood cutting, browsing, lopping, grazing, fishing, mining, and the presence of highways. This reduction of breeding and roosting sites is caused by activities such as cutting down trees and lopping, which are examples of activities. The destruction of vulture habitat and the resultant impact on vulture survival in this

region have both been identified as being caused by human intervention or interaction, which has been cited as a contributing factor. As a result, it is essential to protect vultures in the natural habitat in which they were born and to educate farmers about the value of vultures in the process of developing novel in-situ breeding techniques.

Vultures are the principal consumers, and the removal of a substantial scavenger from the environment may cause a disruption in the equilibrium between populations of other species that scavenge, as well as contribute to an increase in the number of decaying carcasses, which in turn prompts the emergence of infectious diseases. In order to ensure the safety of vulture breeding colonies, it is essential to designate breeding grounds that are situated in places that are well away from human disturbances and then transform these areas into protected zones. There is a significant amount of potential for the Bundelkhand region to serve as a nesting ground for vultures. This location has been transformed into a paradise for vultures as a result of both excellent management and conservation efforts. The favorable conditions of food supply and nesting sites have contributed to this transformation.

In order to develop a fundamental dataset that includes landscape, breeding characteristics, pathological, genetic, molecular, and microbiological characteristics of vultures, it is advised that additional empirical research be conducted. It is important that each vulture colony designate volunteers who are ready to keep an eye on the place and swiftly inform the forest office as well as any organizations or non-governmental organizations (NGOs) that are active in that region of any potential dangers that may be discovered. As a result, we are able to investigate the cause of death as well as any other possible threat.

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