



Tens of millions of vultures used to be present across the Indian sub-continent. The vast flocks present were due to the very large numbers of livestock reared across South Asia. Government statistics indicate that livestock numbers in India exceeded 400 million since the 1980s and reached more than 500 million in 2005. In India and Nepal, cows have a sacred status for Hindus and are not eaten. As a consequence, livestock carcasses became available for vultures in Asia and became the principal food source for the resident species. Vultures were so abundant that the Parsi religion in India and Buddhist communities on the Tibetan plateau utilised these birds for sky burials in order to cleanly and efficiently dispose of human bodies.

Vulture declines in India were first quantified at Keoladeo National Park, Rajasthan, by Dr Vibhu Prakash, Principal Scientist of the Bombay Natural History Society (BNHS). Between 1985-1986 and 1996-1997 the population of oriental white-backed vulture declined by an estimated 97% at Keoladeo, and in 2003 this colony was extinct. These declines were coupled with high mortality of all age classes widely recorded. Following the initial survey, in 2000 BNHS teams undertook over 11,000 km of road-based surveys, repeating 6,000 km of road-transects previously surveyed for raptors in the early 1990s, and confirmed that declines of >92% had occurred in all regions across northern India (Prakash *et al* 2003). Repeat surveys by the BNHS, covering the same route and methodology, were undertaken in 2001, 2003 and 2007 in order to monitor trends in numbers.

The survey in 2007 indicated that numbers of oriental white-backed vultures had declined by a staggering 99.9% over the preceding 15 years (Prakash *et al* 2007). Long-billed and slender-billed vultures decreased by 97% over the same period. Surveys across Nepal and Pakistan indicate vultures have declined at similar rates across the whole of south Asia, and within Pakistan both resident species (white-backed and long-billed) are on the edge of extinction.

The continuing rates of population decline were also of great concern, with white-backed vultures in India declining at an average rate of 48% a year for the period from 2001 to 2007 (to 11,000 birds in India). Long-billed (45,000) and slender-billed (1,000) vultures were estimated to be declining at around 22% a year. Populations of red-headed vultures and Egyptian vultures are also declining, at 41% and 35% a year in India (Cuthbert *et al* 2006).



Research biologists from the Bombay Natural History Society (BNHS), Bird Conservation Nepal (BCN) and the Ornithological Society of Pakistan (OSP) were joined by international partners from the RSPB (UK), Zoological Society of London (UK) and The Peregrine Fund (USA). Because of the rapidity of the decline, simple population modelling established that they had to be caused by a major reduction in adult survival, as reduced breeding success could not account for declines of nearly 50% a year. Through collecting carcasses of dead and dying vultures researchers quickly established that dead birds were often characterised by the presence of extensive visceral gout, and of 284 post-mortems carried out in Pakistan, India and Nepal gout was found in 84% of birds (Oaks *et al* 2004; Shultz *et al* 2004). Visceral gout is caused by a build up of uric acid, which at very high levels crystallises in the body coating all internal organs in a white 'paste'. Uric acid is the white substance found in the guano of all birds, and the characteristic presence of visceral gout in vultures suggested the cause of death was likely to be related to kidney failure. Some birds appeared sick and lethargic for a protracted period before death, with a characteristic drooping head.

For several years, researchers battled to understand what might be the cause of the deaths. Dead birds were tested for pesticides, herbicides, toxic heavy metals and other environmental pollutants. While trace levels of some of these compounds were detected, in the majority they were at insufficient levels to cause physiological damage and there was no link between these compounds and the gout found in most dead birds. Because of the geographic range and speed of the declines one initial strong hypothesis was that a novel infectious disease agent was responsible for mortalities.

The diclofenac breakthrough was made in 2003 by researchers working for the Ornithological Society of Pakistan and The Peregrine Fund, led by Professor Lindsay Oaks from Washington State University, USA. Lindsay recognised that the class of painkiller known as Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) had been linked to kidney failures and cases of visceral gout when some of these drugs were given to birds. Visiting pharmaceutical shops in Pakistan, the team found that a new NSAID, diclofenac, had recently come on sale and was commonly available. Investigating the carcasses revealed that every bird that had visceral gout also had traces of diclofenac, whereas those carcasses with no gout had no diclofenac. The team then gave diclofenac to vultures, either by injecting birds or by feeding flesh from buffalo and goats injected with diclofenac, and birds that received a high dose of diclofenac died within days of treatment, with extensive visceral gout. In 2004 the results of this work were published in the journal *Nature* (Oaks *et al* 2004). Extensive research established the same correlation between gout and diclofenac in birds from India and Nepal (Shultz *et al* 2004), modelled the amount of diclofenac required in the environment to cause the observed decline rates (Green *et al* 2004), measured the prevalence of diclofenac in cattle carcasses available for vultures (10% of carcasses, Taggart *et al* 2007), and modelled the prevalence of diclofenac and determined that diclofenac alone was responsible for the vulture population crash (Green *et al* 2007).

Other hypotheses put forward for the vulture declines include; reduced food availability, increased numbers of dogs, and habitat destruction.

## ADVOCACY



The overall aim is to remove diclofenac and other untested veterinary drugs from veterinary use and the environment.

### **Immediate goals:**

1. Ensuring injectable human diclofenac is only marketed in vials (ampoules) of 3ml or smaller
2. Veterinary painkillers that have not been safety-tested for vultures are not licensed or used in veterinary practice across Asia (eg ketoprofen, nimesulide)

In India, the vulture advocacy programme was initiated in 2004 within the Bombay Natural History Society (BNHS) with Royal Society for the Protection of Birds (RSPB) support. Ms Janki Teli is the vulture advocacy officer, building on groundwork by Dr Nita Shah.



The unprecedented scale and speed of vulture population declines has left all three resident *Gyps* vulture species Critically Endangered. In order to ensure survival it is necessary to bring them into captivity for breeding. Removing diclofenac from the environment will allow the eventual recovery of vulture populations but this process, in practice, may take several years so it is essential to protect vultures in an environment where they will not be exposed to the drug. Successful conservation breeding will enable vulture numbers to increase, eventually allowing for the release back into the wild once their food source in Asia is free of diclofenac. The success of the Eurasian Griffon vulture conservation breeding and release programme in Europe and the programme that saved the Californian Condor from extinction demonstrate that this approach will work. Without vulture conservation breeding centres, it is a very real possibility that resident *Gyps* vultures will become extinct across South Asia.

Dr Vibhu Prakash, Principal Scientist, Bombay Natural History Society (BNHS), heads the vulture breeding programme in India and manages a large number of staff and complex range of activities varying from overseeing the construction of aviaries and facilities, organising the capture of vultures for the centres, to managing the feeding requirements and health of birds within the three centres. The involvement of BNHS in the capture and breeding of vultures in India continues to expand and the programme now holds over 200 vultures in captivity at three centres in the states of Haryana, West Bengal and Assam. With funding from the Ministry of Environment and Forests (MoEF), India, the Indian Central Zoo Authority (CZA) has plans to establish a further five centres in India. The BNHS vulture conservation breeding programme is fully recognised by the CZA and Dr Vibhu Prakash is now advising the CZA on their breeding programmes. The World Association of Zoos and Aquarists (WAZA)

has formally recognised the vulture conservation breeding programmes in India and Nepal. Crucial support and land for the breeding centres has come from state Forestry Departments within India. Governing councils have been formally established to oversee the running of the centres in India ie in Haryana, West Bengal and Assam.

Funding for the breeding programme in India was initially from the UK government's Darwin Initiative, with most support now coming from the RSPB and other donors. Technical support on the design of the conservation breeding programme, the management of birds and breeding at the centres is supplied by Jemima Parry-Jones from the International Centre for Birds of Prey (ICBP) in Gloucestershire. The important veterinary guidance is provided by Dr Nic Masters, Chief Veterinary Officer, Zoological Society of London (ZSL). Further technical support to the breeding programme activities and the capture of birds for the centres is provided by the RSPB and ZSL.

### **VULTURE SAFE ZONE**



In Nepal, initial efforts at one breeding colony close to Chitwan National Park has led to local increases in numbers of nesting birds in the three years that the project has been running, with numbers of nesting pairs increasing from 17 to 45 pairs.

This conservation effort first focuses on removing all available stocks of veterinary diclofenac from the areas surrounding the breeding colony (up to a distance of >50 km) and replacing this with the vulture safe drug meloxicam. At the site close to Chitwan over US \$2,000 of

meloxicam has been swapped to replace diclofenac. Ridding the environment of diclofenac is the key conservation action that will save Asia's vultures: both the advocacy programme and conservation efforts around colonies are aiming to achieve this same *in-situ* conservation.

The diclofenac/meloxicam swapping work is followed up with an extensive education and awareness programme on the value of vultures for the local community in regards to their ability to clean up carcasses and therefore help reduce the risk of disease and increasing numbers of feral dogs. Workshops are held with farmers, vets and pharmacists to make sure they know of the problems with diclofenac use. Interest from national and international tourists to visit and watch vultures also provides a further economic incentive for local communities to protect their vultures and ensure diclofenac is not used in the surrounding district, and viewing hides are being set up at some sites.

### **The “Jatayu Restaurant”**

The final element of the programme is to attract vultures in to the safe area and to retain vultures already there through the provision of regular and safe food supply in the form of a “Jatayu Restaurant”. Safe food has been provided by establishing a cow shelter in the villages surrounding the vulture colonies. These farms buy old cattle at the end of their working lives that are otherwise destined to be sold to cattle traders (for use as meat) or else abandoned by their owners in forest land or outside villages. In Nepal, old cattle can be purchased for around US \$2 and many animals are given to the project, as it saves local people from feeding or abandoning an animal that is otherwise a burden.

The cattle are housed in purpose built cowsheds and herded to fields on community owned land in the village where they can graze. No cattle are killed and a project veterinarian ensures their welfare with regular checks and if necessary medical treatment with the notable exception of never using diclofenac. The animals die a natural death from old age and carcasses are then skinned (providing an important income to the project to pay the cattle herder and purchase more old animals) and the safe drug-free carcass is then placed out for vultures to feed upon. Flocks of over 150 vultures are now regularly seen at three *in-situ* conservation sites in Nepal.

The following websites and articles have published stories about the *in-situ* conservation work in Nepal: BBC News South Asia, BirdLife International news, Reuters press news, New Scientist Environment Support for this project in Nepal has come from the United Nations Development Programme, the UK Government Darwin Initiative and the Royal Society for the Protection of Birds Other funding contributors include Critical Ecosystem Partnership Fund (CEPF), WWF Nepal Programme, Conservation Leadership Programme (CLP), Rufford Small Grants, International Trust for Nature Conservation (ITNC).

In addition, the local community has received funding from the UNDP-GEF Small Grants programme to help establish a vulture watching hide, and education and community centre to further promote vulture conservation. Increasing numbers of tourists are now visiting the site, providing further incentive to protect these vultures.



The development and successful trial of vulture safe zones in Nepal has been duplicated in India with work lead by BNHS and funded by the UK Government's Darwin Initiative focusing on protecting vultures in Gujarat State, in the west of India. Due to the presence of a large number of conservation organisations in Gujarat, an active network of BNHS volunteers, and the continued presence of vultures, this work was started in 2006 in order to try to retain the small populations of vultures within the State. Continued monitoring indicates that vultures are still declining in many areas, but some safer areas are to be found, particularly in and around Ahmedabad, Surat and Bhavnagar.

Gujarat is particularly important for vultures due to the presence of many cow and animal shelters (also known as Panjarapoles) that are run in the State. These sites take in many injured and abandoned cattle, particularly in times of drought, and can hold up to 10,000 cattle and buffalo. Traditionally any animals that died were placed out for vultures to feed on, and the very large numbers of livestock held meant that they were important feeding sites. These animal charities are dedicated to helping all animals, including vultures, and so they have been quick to stop the use of diclofenac due to the toxic effects of the drug on vultures. Instead, these charities are now only using meloxicam, the only NSAID that we know is of low toxicity to vultures and other scavenging birds.

The work within Gujarat has focused on the Panjarapoles, but has also set out to work with pharmacies, veterinarians and farmers to ensure that the message about diclofenac is understood. Along with detailed monitoring of remaining vulture numbers and tackling other issues that are harmful to vultures (including entanglement with kite strings during the large kite festivals in the State) work in Gujarat is taking the necessary steps to speed up the removal of diclofenac. Hopefully, the animal charities will remain important sites for vulture

conservation throughout Gujarat and help numbers to recover in the future once diclofenac and other toxic drugs are eliminated from the system.