

## GYPVS VULTURE RESTORATION PROJECT – ROLE OF CAPTIVE BREEDING IN ENDANGERED SPECIES MANAGEMENT

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### ABSTRACT

The population of the *Gyps* vultures has declined in South Asian region to 80- 95% in recent years. The primary cause of this rapid decline is attributed to the widespread use of a NSAID, Diclofenac in the livestock, however, other causes of vulture decline are habitat destruction, pesticides poisoning etc. In order to restore the population of *Gyps* vultures conservation centres have been established in South Asia. The primary aim of these centres is to hold safely a population of the species affected. Once the environment is safe for vultures, they can help in reintroductions or supplementations to the wild. In Pakistan such a centre has been established at Changa Manga for *Gyps bengalensis*. This centre is managed by WWF – Pakistan in partnership with the Punjab Wildlife and Parks Department, whilst technical and financial support of The Hawk Conservancy Trust, UK and keystone funding comes from the Environment Agency Abu Dhabi, UAE. The Birds of Prey have many success stories of population restoration through captive breeding and reintroduction, some examples are California Condor *Gymnogyps californianus*, Mauritius Kestrel *Falco punctatus*, Peregrine Falcon *Falco peregrinus* and Griffon vulture *Gyps fulvus*. Techniques such as double clutching and hacking have been successful in increasing the breeding rate and improving reintroduction success. In Changa Manga a large communal aviary holds fifteen *Gyps bengalensis*. Sex determination has been done genetically and birds have been inserted microchipped and ringed for individual recognition. Within the aviary, potential breeding birds have access to artificial nest sites (shallow woven baskets, wooden baskets) and nests retrieved from the wild. A roosting/nesting ledge has also been developed for potential breeding pairs. Ungulates are kept alive for at least five days before they are slaughtered to be fed to the birds, this is done to ensure that had there been any Diclofenac injected is excreted out the system. Furthermore, breeding facility for rabbits has been developed and goats are also bred at the facility to maintain a variety in the diet and sustainability. The aviary at the Conservation Centre at Changa Manga has a capacity of approximately 30 vultures and four separate breeding aviaries have been developed already. These are arranged so that all the pairs are able to see each other that would help in synchronising breeding. The project faces the challenges of implementation of Diclofenac ban in veterinary practice, increase awareness to stop the use of human formulations in the veterinary practice and to increase the founder population of *G. bengalensis* in the conservation centre. Successful captive breeding and release programme has been internationally agreed as the most appropriate conservation intervention of the conservation of Asian *Gyps* vultures.

**Keywords:** *Gyps* vultures, Diclofenac, holding facilities, captive management.

### INTRODUCTION

There are a total of nine species of vultures found in South Asia. Four of the *Gyps* vulture species are only found in Asia. These are Oriental White-backed Vulture *G. bengalensis*, Long-billed Vulture *G. indicus*, Slender-billed Vulture *G. tenuirostris* and Himalayan Griffon Vulture *G. himalayensis*. Eurasian Griffon Vulture *Gyps fulvus* breeds in Eurasia but migrates to Africa and South Asia. The geographic range of these vultures overlap (Pain *et al.*, 2003).

The Oriental White-backed Vulture *G. bengalensis* was once described as the commonest species of vulture found in the Indian sub-continent (Gilbert *et al.*, 2002). It was quoted as the most widely distributed species in Pakistan (Roberts 1991), occurring in provinces of Punjab, Sindh and the broader valleys of

NWFP and, even nested in the old trees of the Jinnah Garden in the centre of Lahore city, Pakistan (pers. obs.). The *Gyps* species in Africa and Asia prefer trees to cliffs and travel less far in search for food (Newton 1979). *G. bengalensis* showed preference for cultivated lands with scattered trees and high human population, particularly attracted to towns and cities where slaughter houses could provide opportunities for obtaining food (Roberts 1991).

The Oriental White-backed vulture usually lays one egg (Roberts 1991, Grossman and Hamlet 1964; Newton 1979) and has been reported to replace a lost mate within five days, however the sexes remained unidentified. Robert (1991) has reported 5-6 nests and Ferguson-Lees and Christie (2001) reported up to 15 nests of *G. bengalensis* in close proximity in the same tree.

Throughout South Asia *Gyps* vultures have shown declines, *G. bengalensis* disappeared from Burma and Southeast Asia by the 1970s, it became very rare in Malaysia, Laos, Cambodia and south Vietnam. However, the recent catastrophic decline began in about 1996 (Ferguson-Lees and Christie 2001). Parkash in 1999 reported a massive decline in India, Keoladeo National Park, Rajasthan (Gilbert *et al.*, 2002). The number of vultures in this park was reported to go down from 1,800 individuals to just 86. This alarming situation depicted a 96% decline in the population.

Studies conducted between 2000 and 2001 at two sites in the Punjab Province of Pakistan also showed high adult mortality rates 11.4% and 18.6%. The necropsy of dead vultures showed that 80% of adults, 63% of sub-adults, 19% of juveniles and 13% of nestlings had visceral gout (Gilbert *et al.*, 2002) and this finding was consistent with the earlier reports from India (The Peregrine Fund 2000). The trend of population decline was also obvious in other species of vultures; Long-billed Vulture *G. indicus* and Slender-billed Vulture *G. tenuirostris*. The status of these three *Gyps* species changed from 'vulnerable' to 'critically endangered' (Bird Life International 2004).

Studies across 16 sites in Pakistan between 2000 and 2003 correlated visceral gout and renal failure with the presence of the residues of drug 'Diclofenac' in kidneys of vultures. A study conducted in controlled conditions affirmed these data gathered from the field (Oaks *et al.*, 2004). A similar case has been reported to occur in the San Diego Zoo, where an African White-backed Vulture *Gyps africanus* died within days after it was injected with 'Ketoprofen', which is also a NSAID (Risebrough, in press). This suggests that the current Asian vulture population crisis can arise in other regions, such as in Africa if agricultural practices and livestock farming are enhanced. Diclofenac is a NSAID, which is commonly used in livestock in the Indian-subcontinent for the treatment of lameness, fever etc. It is cheap and widely available (Risebrough, in press) and is an active ingredient of seven drugs produced by local veterinary companies in Pakistan, moreover two are imported formulations. All these drugs were introduced during 1998 (Khan 2004). Declining population because of poisoning through the food chain has been observed in other species of vultures; the analysis of 600 carcasses of Cape Vultures *Gyps coprotheres* in South Africa, showed poisoning as the major factor to high mortality (The Peregrine Fund 1999). The population of California Condor *Gymnogyps californianus*, a New World Vulture, also suffered from poisoning attributed to lead present in bullets used for hunting game (Meretsky *et al.*, 2000). However, the declining number cannot only be attributed to Diclofenac, the decline reported in 1970s in Burma and Southeast Asia was due to other factors (Ferguson-Lees and Christie 2001). This highlights that a conservation

plan for these species should not ignore other threats faced by vulture populations in South Asian region.

**Background:** The South Asian countries have been really concerned about this rapid population decline and the involvement of international organisations has put immense pressure on the governments to urgently address this issue. A summit meeting entitled 'A new environmental threat posed by the drug 'Diclofenac' was arranged in Kathmundo, Nepal during February 2004. This summit brought together government representatives and experts from organisations such as The Peregrine Fund (TPF), Royal Society for Protection of Birds (RSPB), Ornithological Society of Pakistan (OSP), Zoological Society of London (ZSL), WWF – P, Bombay National History Society (BNHS) and Birds Conservation Nepal (BCN) and Government representatives. All parties agreed to a manifesto that suggests obtaining, holding and possibly breeding three *Gyps* species of vultures in captivity as a safety measure, until the threat of Diclofenac is removed from the environment.

An association between *ex-situ* and *in-situ* conservation has been proven to be very effective in species conservation. Various methods have been employed in support of re-establishment of wild populations of the raptors such as foster-parenting, double-clutching, provision of nests, hacking (Cade and Temple 1994; Primack 1993; Sherrod *et al.*, 1982) and food supplementation (Cade and Temple 1994; Meretsky *et al.*, 2000) with varying success (Cade and Temple 1994). There have been cases where a re-introduced population has suffered when birds started feeding outside the area of supplementary feeding, this has been seen in California Condor. A model showed that mortality rates of this species should be 25-50% lower than the existing mortality rates to sustain the population (Meretsky *et al.*, 2000). This shows that threats are not properly addressed or removed. Success or failure of each method depends on the species, accurate assessment of the factors that led to the initial decline in the species in question and effective mitigation of these factors.

#### **Overview of techniques used for raptors conservation:**

There are various techniques being used for the *ex-situ* breeding and reintroduction of birds of prey (raptors). See Table 1 for an overview. If vultures are brought into captivity the following techniques could be useful in reintroduction of vulture by amalgamation of *in-* and *ex-situ* conservation. Note that this table should be treated as an introduction to various techniques.

In 2004 WWF-Pakistan launched the Gyps Vulture Restoration Project in Pakistan. The immediate project objective is to conserve a viable population of *Gyps bengalensis* in a safe and secure environment. Once secured, the breeding potential of the captive population must be realised.

**Table 1 Techniques used for the conservation and release of Birds of Prey and New World Vultures**

No.	Method	Definition	Species	Reference
1.	Double-clutching	Raptors that generally lay a single egg and if it is removed a second is laid. Increases the number of eggs, helpful in quick recovery of the population	California Condor <i>Gymnogyps californianus</i> , Mauritius Kestrel <i>Falco punctatus</i> , Peregrine Falcon <i>Falco peregrinus</i> , Griffon vulture <i>Gyps fulvus</i>	Meretsky <i>et al.</i> , 2000 Sherrod <i>et al.</i> , 1982 French 1999
2.	Direct-Fostering	Newly hatched chicks are placed in the nests of the same species and reared by foster parents. Usually done in conjunction with double-clutching.	Peregrine Falcon <i>Falco peregrinus</i> , Mauritius Kestrel <i>Falco punctatus</i> Madagascar Fish Eagle <i>Haliaeetus vociferoides</i>	Sherrod <i>et al.</i> , 1982 Cade and Temple 1994 TPF, <a href="http://www.peregrinefund.org/release_tech.asp">http://www.peregrinefund.org/release_tech.asp</a>
3.	Cross-Fostering	Chicks of one bird are incubated and reared by another closely related bird species.	Peregrine Falcon <i>Falco peregrinus</i> chicks reared by Prairie Falcons <i>Falco mexicanus</i> (in some species it can lead to sexual imprinting and as adults such individuals fail to mate with their own species).	Sherrod <i>et al.</i> , 1982 Cade and Temple 1994
4.	Hatch and switch	Eggs are removed from the nests in the cliffs and dummy plastic eggs are placed in the nests, the eggs are incubated artificially and the hatchling are placed back in the nests	Bald Eagle <i>Haliaeetus leucocephalus</i>	Goddard 2004
5.	Hacking	Chick just before fledging is placed in a secured place such as a shed, barn. Food is given daily. The bird gradually becomes less dependent on provisioning and starts foraging independently.	Aplomado Falcon <i>Falco femoralis</i> , Harpy Eagles <i>Harpia harpyja</i> , Mauritius Kestrel <i>Falco punctatus</i>	Burnham <i>et al.</i> , 2002
6.	Cryo-preservation	Sperms are frozen and then used to fertilize eggs through artificial insemination. Extremely expensive and presently impractical procedure.	Bald Eagle <i>Haliaeetus leucocephalus</i>	BBC News 26 <sup>th</sup> May 2004 <a href="http://news.bbc.co.uk/1/hi/scotland/3749313.stm">http://news.bbc.co.uk/1/hi/scotland/3749313.stm</a>

#### The *Gyps* Vulture Restoration Project

Additional project objectives include continued monitoring of wild populations, lobbying for the complete removal of Diclofenac from the environment and to build staff capacity for the eventual release of captive-bred vultures.

Plans for Pakistan's first conservation breeding facility for vultures began in 2005. Government approval,

land allocation, facility design, fundraising and staff selection took place over the following 18 months.

The project, run by WWF-Pakistan, is a partnership between WWF-Pakistan, the Punjab Wildlife and Parks Department, the Environment Agency, Abu Dhabi and the Hawk Conservancy Trust. WWF - Pakistan is the project manager, whilst the Hawk

Conservancy Trust has provided technical and training support and has contributed towards facility running costs since July 2008. The Environment Agency Abu Dhabi provided keystone funding to set up the facility.

**Vulture Conservation Centre:** The Vulture Conservation Centre is located in a secluded area of Changa Manga forest, which is approximately 80km southwest of Lahore. There is currently one large holding aviary. It is 38m long and increases in width from 14m to 27.5m. Construction materials consist of 150mm steel pole supports and welded steel frames on a concrete base. The walls and roof are chain link.

Within the aviary, perch types consist of live trees in addition to a number of artificial perches. One end of the aviary contains a roosting/nesting ledge, which runs the width of the aviary. This also provides shade and shelter for the birds. Additional shade cloth on the aviary roof provides sun protection over a smaller area near the water pool.

Heat stress in the vultures is evident on hot days. Head drooping is frequent at these times, and the vultures will spend increased amounts of time bathing and drying. Apart from environmental considerations, there are other challenges specific to the management of captive raptors and these necessitate staff training. A key component of the project is the development of staff skills through training and capacity building. The field based Vulture Aviary Supervisor, Faisal Farid, attended a hands on training at the Hawk Conservancy Trust in UK.

Within the aviary, potential breeding birds have access to artificial nest sites (shallow woven baskets) and nests retrieved from the wild. The birds have been using these. The roosting/nesting ledge in the aviary is fitted with partitions to provide separate areas for potential breeding pairs.

There is a service building and storage facilities. The aviary has a capacity of approximately 30 vultures.

The birds are fed donkeys and horses and animals are bought and kept alive for a week before they are fed to the birds. This is done to ensure that if injected with any Diclofenac prior to acquisition is excreted out of the body. The bones are processed into small fragments to supply the birds with all essential nutrients. The visceral organs are also included in the diet. Regularly birds are also given whole carcass for behavioural enrichment. The food animals have a large area to roam around free and it is ensured that high welfare standards are maintained.

**Current population and future plans:** In March 2011, there were fifteen vultures in the facility. Five were collected as chicks from nests during the 2005/2006 breeding season, with one additional bird collected during the 2006/2007 season. The remaining five vultures are older, and are the remainder of the captive population used during Diclofenac toxicity testing work by the

Peregrine Fund (Oakes *et al.*, 2004). The rest have been collected from different scattered populations over the following years.

Future breeding potential with this small population is limited, as there are only three confirmed females in the group. The sex of the 2007 chick is currently unknown, but even if this bird is female, breeding potential is still low.

Clearly there is a need to increase the number of vultures at the facility. To this end, trapping of wild vultures is currently underway. Small populations and an abundance of food will undoubtedly make trapping attempts difficult; however the project aims to trap between 15 and 20 birds.

Second phase building comprising of four breeding aviaries is towards its finishing stages. Apart from providing additional accommodation, the breeding aviaries are an essential part of management. Although wild Oriental White-backed vultures breed in colonies, difficulties can arise when captive breeding pairs are in the same enclosure as non-breeding birds. The role of the large communal aviary is to provide a venue for breeding pairs to form. Once established, breeding pairs require separate enclosures to avoid disturbance from unpaired birds during the breeding season.

The Project site has a boundary wall where the food animals are free ranging, a facility for breeding guinea pigs and rabbits have been set up for supplementary feeding.

In the longer term, the construction of additional breeding aviaries is a primary goal. Only in this respect, is the time scale favourable. It is likely to be many years before the environment is safe for the release of vultures back to the wild. However, unless the facility can reach a production capacity of at least 10-15 chicks per year, there will be limited potential for any release programme in the future.

**Conclusions:** The WWF *Gyps* vulture restoration project in Pakistan is part of a regional effort for the conservation of south Asian *Gyps* vultures. The project benefits from a dedicated staff team, solid governmental and partner support and a series of clear targets. Further development and the expansion of facilities will occur over future years, as there is an urgent need to increase the capacity of the facility.

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