



# Funding proposal for gharial (*Gavialis gangeticus*) conservation in Nepal

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# Gharial (*Gavialis gangeticus*)

The gharial is a highly specialised, monotypic crocodylian endemic to the Indian subcontinent. Historically, the species occurred across the Indus, Ganges, Brahmaputra, Mahanadi and Irrawaddy drainages. However, they are now restricted to a few, scattered locations in India and Nepal, largely within the Gangetic Basin. The most important surviving populations are within four tributaries of the Ganges River: The Girwa, Son, and Chambal Rivers, in India, and the Rapti-Narayani River, in Nepal (Garial Conservation Trust (GCT), no date). Gharials are the most aquatic of all the crocodylians and are poorly designed for terrestrial life.

This species is of conservation concern and is listed as Critically Endangered on the IUCN Red List (IUCN, 2012). In recent years there have been mass mortalities of gharial in river systems. These mortalities are still being investigated, but initial findings suggest pollutants could be affecting food sources.

A long standing threat to this species is habitat loss, overfishing, sand mining, poaching and pollution. A problem in India has also been a lack of suitable release sites for any re-introduction programs. Gharial are specialist feeders, preying exclusively on fish and they play an important part in ecology of the river systems they inhabit (Britton, 2002).

Sandy banks are vital for gharial nesting and basking. The destruction of these banks and bars by sand-mining, erosion, and changing river levels poses a serious threat to the species. However, gharials have used artificially created sand-banks in captivity for successful nesting and basking for many years and so some habitat managers have tried creating sand bars and banks in the wild, in areas where natural sites have been eroded or destroyed. These efforts have been successful, with gharials using these areas to bask and nest, indicating new possibilities for reclaiming degraded habitats (GCT, no date).



# ZSL Nepal

ZSL has a strong representation with conservation initiatives in Nepal, and is currently developing a conservation project with gharials. In 2014, I visited Nepal to meet with key organisations involved with gharial work. This was to identify conservation and research needs for this species.

There are both *in situ* and *ex situ* components to this project, which overlap and complement each other. This project will involve a cross-ZSL collaborative effort, incorporating living collections, conservation programs and Institute of Zoology.

All current conservation and research efforts for this species are in India. The IUCN action plan is out of date and is entirely focussed on work in India.

[http://www.iucncsg.org/365\\_docs/attachments/protarea/23\\_G-6764939a.pdf](http://www.iucncsg.org/365_docs/attachments/protarea/23_G-6764939a.pdf)

Historically, Nepal's efforts to conserve this species have not been incorporated into the wider conservation strategy for the species .

Vital research is required to further our understanding of *G. gangeticus* and their habitat, from which a much needed conservation strategy can be formulated for this Critically Endangered crocodylian, which teeters on the brink of extinction (Stevenson, 2015).



The Gharial breeding centre, in Chitwan National Park, was established in 1978 with the help and support of the Smithsonian Institute and Frankfurt Zoological Society. There are currently 600 gharial held at the facility, including two breeding groups, with each group comprising of 1 male to 6 females. This number also includes around 20 animals that have visual disfigurements. Other animals held at the facility include mugger crocodiles (*Crocodylus paulistris*) and elongated tortoises (*Indotestudo elongata*), the latter of which are bred for release.

Historically the gharial breeding groups have produced approximately 300 eggs per year, of which 100-200 go on to hatch between May and July (Khadka, 2014). Eggs are left with the females and juveniles are removed once hatched. Nest temperatures are 27°C and, as a result, the majority of the animals hatched are female. The hatchlings often get a fungal infection on and in the mouth, which is treated by brushing it off using a toothbrush. Due to a high mortality level a study was carried out by Ghairhe, a veterinary student, in 2007. This revealed that there were a number of fungi present, as well as parasitic agents and bacteria, all of which contributed to juvenile deaths.

Dead fish bought from the local community are the staple diet offered to these animals. There is a pool situated behind the centre where fish are kept and bred to supplement fish supplies. This pond also has another purpose; all waste water from the gharial ponds is discarded into here. This is an issue as parasitic agents are introduced back in to the gharial centre.

100 animals per year are released in to the wild (Babai river), at five years. These animals measure between 1.5 – 2m (Khadka, 2014). There seems to be very little in place in terms of pre – release screening and assessments, with animals being offered one live fish feed before the release. Animals are notch marked for identification before release and a couple of individuals are cattle tagged. These markers appear to be the only way animals can be identified during survey work / post release monitoring. Animals are placed in a soft release pen for 24 hours prior to release (Kadariya, 2014).

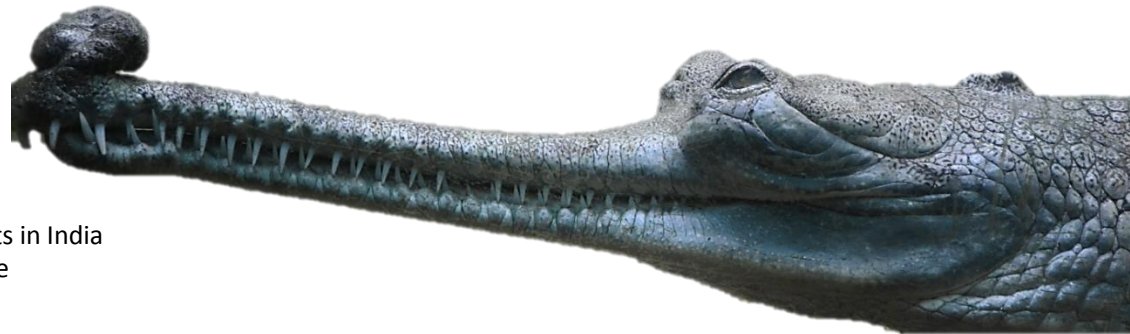
In the past two years, only five gharial have been hatched out at this breeding centre. Since 2010, the numbers of animals produced there have gradually dwindled; females continue to produce eggs, but all are infertile. In light of this information, ZSL proposes to deliver a much needed husbandry workshop to the Chitwan gharial breeding centre staff and other key organisations (Department of National Parks & Wildlife Conservation (DNPWC) and National Trust for Nature Conservation (NTNC) ). During this time, ZSL also hopes to facilitate a meeting, bringing key people involved with gharial conservation efforts in India to Nepal. This meeting will work towards a more united and organised strategy for gharial work. Hosting this significant meeting in Nepal will bring Nepal to the forefront of gharial work.

The main aim of the husbandry workshop is to make recommendations and help improve captive management of the breeding groups and also the animals for release. The following topics will be covered:

- Reptile husbandry, including health monitoring practises and operating procedures
- Egg incubation
- Record keeping
- Reptile health and disease
- Disease risk assessment for releasing animals
- Aquaculture – to expand existing capacity

Opportunity will also be taken to carry out other activities::

- Presentations from guest speakers on existing gharial projects in India
- Discuss and help implement infrastructure improvements like enclosure design and filtration of enclosures
- Construction of incubators
- A visit to survey sites to develop monitoring techniques and move forward with *in situ* components
- Micro chip all gharials and create a database for record keeping





The workshop, meeting and support provided by ZSL is starting point in refining the selection process for animals released, the release strategy and post release monitoring protocols. The workshop is the first step in developing a wider conservation strategy for this species. An *in situ* component has also been identified and is in the planning stages (details available on request).

### **Funding request**

The request for half the funding is for computer equipment. The computer will be used to create a database record system for the animals at the centre. A record system is imperative in a modern animal collection, as a full profile of an animal's history can be documented. As previously mentioned all the animals at the centre will be microchipped and given individual identifications. This will be the starting point of the database. Key information will be stored on this record system including; parentage, age, sex, management notes including environmental data, behaviour notes including breeding, full medical history including treatments, morphometric data and much more.

The record system will complement every aspect of this release program from an animal hatching to the point its released and even the potential to continue data input post release. A computerised record system and will compliment a more rigid health monitoring schedule. As part of the workshop, record keeping is one of the topics that will be covered. This element of the workshop will focus on the importance of recording a variety of data and also how to actually use the database to make entries.

The other half of the money will go towards trying to improve the breeding conditions for the adult gharials, ultimately increasing the production of fertile eggs. Improving the quality and quantity of prey fish species that is being produced, in the ponds at the centre, would be one factor that would promote the breeding condition of the animals. This can be achieved by installing a reed bed to improve the water quality of the fish ponds. By doing this it would filter waste water from the gharial centre and potential improve breeding conditions for the fish. In addition to this the filtered water would also potentially reduce the parasite level circulating at this collection. On installing the reed bed, expertise from ZSL will advise centre staff on aquaculture will an aim to maximise prey production. Long term health screening protocols , on the gharials, will monitor parasites and levels, which can be compared to the study conducted by Ghairhe in 2007.

Cost estimations:

|   |      |
|---|------|
| Computer + monitor                              | £500 |
| Improving infrastructure at the breeding centre | £500 |



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