GHARIAL CONSERVATION IN NEPAL: FIRST RESULTS OF A POPULATION REINFORCEMENT PROGRAM IN THE NARAYANI RIVER, ROYAL CHITWAN NATIONAL PARK

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Abstract

Two species of the family Crocodylidae are found in Nepal: The marsh Mugger, *Crocodylus palustris*, and the freshwater Gharial, *Gavialis gangeticus*. The gharial has a long and extremely slender-snout. The adult male gharial with a skull length exceeding 60cm develops a large cartilaginous protuberance on the end of its snout which is resembles to a clay pot called ghara in Northern India. Thus, among all the crocodilian species, the gharial is the only one who exhibits sexual dimorphism (Maskey and Schleich, 2002). It is listed as endangered in National Parks and Wildlife Conservation Act 1973 of Nepal and on Appendix I of CITES. Gharials are specialised fish-eaters. At present, the population are distributed in isolated remnant areas in the Karnali, Babai, Narayani and Sapta Kosi river systems of Nepal. All habitat areas are located inside or adjacent to protected areas. The population of Gharial in the Sapta Kosi River is very low numbering about 10. According to an estimate by Department of National Parks and Wildlife Conservation the gharial numbers in wild (about 80-120) and captivity (about 200).
Since 1981, the "Gharial Conservation Project" was initiated in Royal Chitwan National Park, Kasara to ensure the long term crocodile conservation in Nepal. Till now more than 500 gharials have been released in Karnali, Babai, Narayani and Koshi rivers to sustain their population in its former habitats. In order to achieve efficient management and long term survival of this endangered species, a solid knowledge on the biological and ecological requirements is needed. For the long term conservation of this species, a monitoring program has been designed in collaboration with the Ferme aux Crocodiles, Pierrelatté (France), the CEPA (Conservation des Espèces et des Populations Animales) and Department of National Parks and Wildlife Conservation, Nepal. To achieve this objective we released ten new gharials in Chitwan with radio-telemetry since March 2002.

Keywords: Gharial, *Gavialis gangeticus*, threats, monitoring, restocking

Introduction

Nepal is more often mentioned for its famous snowy summits, rather than its sub-tropical plains called the Terai. Nevertheless, half of the population of the country lives today on this narrow earth band fertilised since millenniums by waters descending from the Himalayas that runs for more than 800 kilometres between the Indo-Nepal border and the mountains. Today some parts of these areas are protected as the National Parks and Wildlife Reserves. Royal Chitwan National Park (RCNP) is one of them, which was identified as the priority area in the Terai for conservation of important faunal elements, particularly One-horned rhinoceros (*Rhinoceros unicornis*), Royal Bengal Tiger (*Panthera tigris*) Asian Elephant (*Elephas maximus*) and Gharial (*Gavialis gangeticus*).

Species studied

The subfamily Gavialinae is represented by a single species, the Gharial. The adult male gharial developed a large protuberance of connective tissues on the end of its snout which is resembled to a clay pot, locally known as ghara in Northern India. Thus, the name of this species derived from the presence of ghara. The large protuberance on the end of the male's snout is generally considered to be sexual characteristics of very large animals, although it is not obviously present in all males. Its function is apparently a visual sex indicator, a sound resonator, or as a special structure for bubbling and spouting during sexual behaviours (Martin and Bellair, 1977).
Beside the saltwater crocodile, it is considered as one of the largest living crocodilians (adults up to 6-7m) in the world. Of all living crocodilians, this species is the most closely bound to its aquatic environment because its legs are weak and not well-suited to walk on land. It only hauls itself out of the water on exposed sand banks to bask, to build its nest, and to lay its eggs. On the other hand, its broad oar-like tail helps propel this species in the water, making it highly mobile in an aquatic environment. It is typically a resident of deep, fast flowing rivers, preferring areas where the water current is low (Whitaker and Basu, 1983).
The gharial appears to be primarily a fish-eating species, but some time a large adult individuals were observed eating wild ducks in the Narayani River. Gharials are predictably synchronised nesters in Nepal. All clutches were deposited between March and April. Female gharial lays 10 – 60 eggs in the Narayani River (Maskey, 1989).

Threats

Reasons for the decline of the gharials are largely attributable to the construction of dams for hydroelectric power and irrigation. These dams create abnormally high water during the monsoon which floods practically all nests near the dams. The use of large seines and gill nets in the major rivers of Nepal not only have reduced the fish population, (gharial's major food) but also caused direct mortality to gharial because of entangle in their expensive nets. The third measure cause of population decline is the poaching of gharial eggs by the local communities for its medicinal and food values.

Conservation program

The gharial is one of the most endangered among all crocodilians (Table 1). However, unlike the other seven most endangered crocodilians, gharial conservation programs are now in place over much of its range. The species was literally brought back from the brink of extinction by restocking programs initiated in India (1975) and in Nepal (1978). Gharial eggs were collected from wild nests for captive raising and released them back into the main rivers of India and Nepal. In India, over 3,000 juveniles have been released at 12 sites mainly in the Gangese drainage (Chambal, Ramganga, Girwa and Sharada rivers). The follow-up surveys of released gharials indicates overall increase in the total wild population which has levelled off since 1990 as the number of available sites have become filled. Current wild population is estimated to be more than 1,500 individuals of which about 1,000 are found in the Chambal River with around 64 nest a year at 15 different sites (Rao and Singh 1994).
In Nepal, gharials are restricted to remnant populations in the Karnali, Babai and Narayani rivers (all tributaries of the Ganges). Despite, the captive rearing program which has released more than 500 juvenile gharials since 1978 in the different rivers, the present population estimated about 100 wild individuals (Maskey and Percival 1994).
Our team, supported by La Ferme aux crocodiles of Pierrelatte (France) in collaboration with the Conservation des Espèces et des Populations Animales (C.E.P.A.) and the Department of National Parks and Wildlife Conservation (DNPWC), tried to investigate the reasons of the disappearance of the last gharials (*Gavialis gangeticus*).

During the monsoon season (between June and September), the flooding of the rivers and the continuous rains render monitoring impossible. During winter, the level and the temperature of water

facilitate the observation of the crocodiles on the sand bank because of their basking behaviour. In the month of November 2001, we counted only around fifty individuals, solitary or in small groups disseminated along the river, revealing the poor health of the wild population.

Since 1981, approximately 140 young animals originating from the Gharial Conservation Project were released in Narayani and Rapti rivers. In the past, the released gharials were monitored over a short period during the research work carried out by one of the author (T. M. Maskey). No systematic monitoring was carried out after that. After our first expedition in the Narayani River, we envisaged to monitor the released gharials with telemetry to collect the systematic data on the movement of released gharials in the Narayani River.

Monitoring of Released gharials

In March 2002, after three months of our first expedition in the Narayani River, we selected 10 young gharials (2 males and 8 females) from the Gharial Conservation Program, Kasara and were measured, marked with notches and were implanted with INDEXEL® radio-transmitters furnished by MÉRIAL (Table 2). They were also equipped with electronic chips using an individual frequency. All young gharials were first placed into an acclimatisation enclosure prepared near Almatari in the Narayani River. One week later, the marked gharials were released into the Narayani River.

We started our monitoring after lift off of temporary acclimatisation enclosure in the Narayani River. During first month of monitoring, we found three individuals remained at proximity of the acclimatisation enclosure site. The six other gharials went rapidly in different direction, up and down the river. Four individuals seemed to let them be transported by the river current and went further down stream in the direction of Tribenighat. By the end of March, the gharials moved more than 25 kilometres downstream from the release site (Figure 1).

Since we are not able to stay for longer period in Nepal, we trained rangers from the Royal Chitwan National Park and several guides from the Tiger Tops Jungle Lodge to keep on the monitoring of released gharials. Our objective was to keep on locating each animal at least once a week. We plan to return twice a year (before and after the monsoon) during the two years equivalent of the life of the radio transmitters.

During the short period monitoring of released gharials in Narayani River, we observed most of them moving downstream of the river and finally move to the river in India. Since the populations share its habitat between Nepal and India, it is necessary to strengthen the bilateral coordination between India and Nepal for long term survival of gharial in the Narayani and Gandak river of Nepal and India. A joint survey (especially for Nepalese released gharials, which can cross the frontier), is recommended to study the trends of the gharial population in the transborder area of the Narayani River. This will help to design a long term conservation and management strategy of gharial in the Transborder area.

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CITES	Appendix 1
IUCN Red List (1996)	Endangered
Principal threats	Habitat destruction Limited distribution

Table 1: Gharial status

Notch number	Sex	Weight (in kg)	Length (in cm)	Age (in years)
1	female	22	208	9
2	male	22,5	210	9
3	male	20,5	201	9
4	female	19	204	9
5	female	10	156	7
6	female	23,5	208	9
7	female	15,5	181	9
8	female	18	185	9
9	female	14,1	172	9
10	female	11	163	7

Table 2: Release gharials characteristics

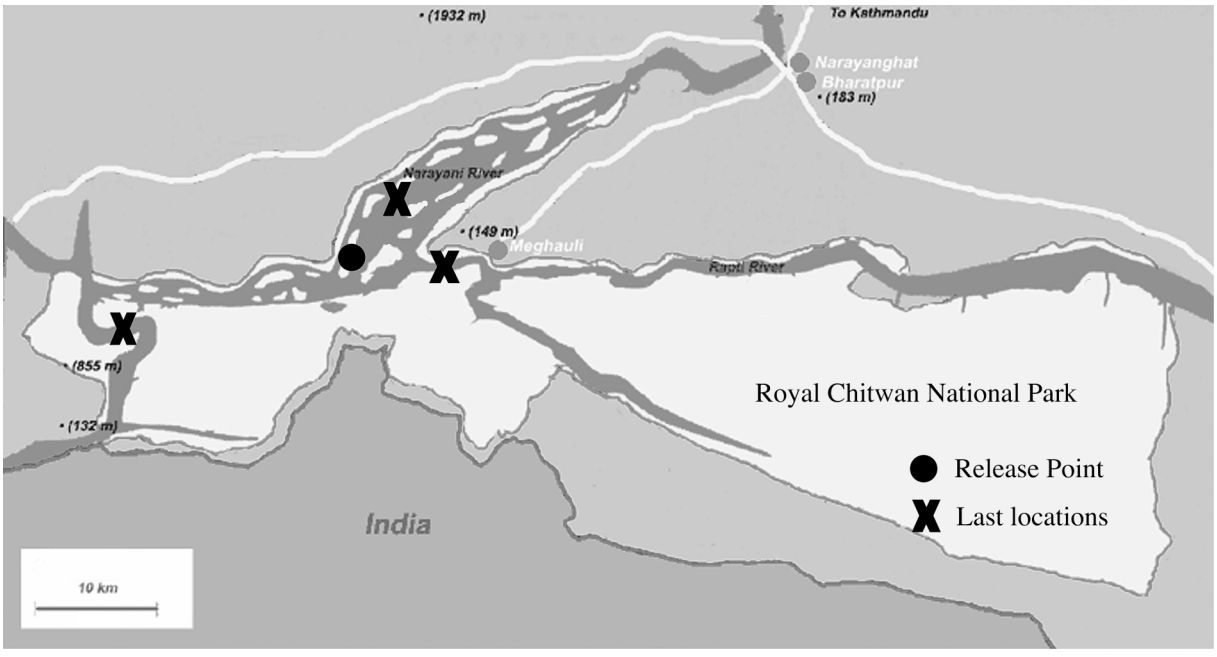

Figure 1: Map of the release site with the extreme gharial locations one month after.