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POPULATION ASSESSMENT, THREATS AND CONSERVATION MEASURES OF MARSH CROCODILE AT DASHT RIVER, GWADAR

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ABSTRACT: Dasht River is the largest seasonal river in District Gwadar and Turbat which is fed by Nehang and Kech Rivers. The river and its tributaries are good habitat of Marsh crocodile (*Crocodylus palustris*). Population census of the species revealed that there is a sharp decline in their numbers and are some serious threat to crocodile at Dasht like predation of their eggs by feral dogs, shooting by local people, habitat destruction like construction of dams and agricultural activities, illegal smugglings of crocodile juveniles and frequent tropical cyclones/high floods in the area. There was an alarming decline in the populations during a period of 10 years. There were 99 crocs of the species in 2007-8 having 63 adults, 18 sub adults and 18 juveniles which reduced to only 25 crocs having 23 adults and only 2 juveniles in 2017-18.

The decline of adult population and absence of offsprings indicates that the reproduction is not taking place, which is a highly unhealthy and dangerous situation. The habitat degradation needs to be controlled. The current conservation program like might the species which is classified as endangered must be considered for a status of critically endangered species.

KEYWORDS: Population assessment, Marsh crocodile, Dasht River, Gwadar.

INTRODUCTION

Globally, there are 23 species of crocodylians (Eaton, 2010) and Mugger or Marsh crocodile (*Crocodylus palustris*) is the only species still surviving in Pakistan (Ahmad, 1986; Ghalib *et al.*, 1981; Javed *et al.*, 2005; Da Silva & Lenin, 2010; Khan and Mirza 1976). Marsh crocodiles are widely distributed, though in significantly reduced numbers from Iran, Dasht in the extreme west of Pakistan to Assam in north eastern India, Bangladesh and also in Sri Lanka. Mugger is distributed in Balochistan in Hub, Hingol and Dasht Rivers (Minton, 1966; Javed *et al.*, 2005).

Mugger is usually 4-5 meters long and mostly found in fresh water but also can survive in salt water lagoons and estuaries (Whitaker & Andrews, 2003).

The species is regarded as endangered, exterminated in most of its range, rare in Iran and vulnerable in Pakistan (Javed & Rehman, 2004). It is listed in IUCN Red Data Book as an endangered species and is also included in Appendix 1 of CITES (Convention on International Trade in Endangered Species). Present paper describes the distribution of mugger in Dasht River of Balochistan.

Marsh Crocodiles have also been reported from various location in Pakistan, e.g. Nara desert wetland complex, (Rais, 2017), Chotiari wetland complex (Chang *et al.*, 2015) and Manghopir near Karachi (Latif, 2015).



Fig. 1. A view of Dasht river in 2007.

MATERIALS AND METHOD

Dasht River is the largest seasonal river in District Gwadar and Turbat. The river is fed by Nihing and Kech Rivers. Kech River has its catchment area in Balochistan, whereas the Nihing River brings torrential water from Iran. At the point of their confluence they merge into Dasht River which debouches into Arabian Sea near Jiwani. Dasht River is a non-perennial river depending on rain flows (annual average rainfall: 110 cm) from catchment areas spread over 21,000 km². During dry seasons, the river is transformed into ponds/impoundments of varying sizes and the crocodile population is scattered in these ponds. Mirani Dam is constructed on Dasht River at 7 km downstream of the point of confluence of Nihing and Kech Rivers. Because of the Dam the freshwater flow is almost continuous in outflow channels where the small and large ponds also receive continuous freshwater flows throughout the year. The freshwater fishes introduced in Mirani Dam (aquaculture initiatives introduced by the provincial fisheries department in the reservoir) has also helped the crocodile population as the fish quite often flow downstream with the flow of water in the dam. The vegetation of the area comprises of *Tamarix* spp., *Indigofera oblongifolia*, *Sesbania sesban*, *Saccharum* spp., *Typha* spp., *Cynodon dactylon* and *Acacia senegal*.

Methodology:

Direct sightings of crocodiles were recorded early in the morning and late in the evening. Population was classified by age (adults, sub adults and juveniles) and group size. Footprints were considered a positive sign of their occurrence. Local community members who are well versed with the crocodile population along Dasht River were associated with the study; interviewed to record their impressions. The information provided by the women who wash clothes and utensils along the banks of ponds was of special significance. A format was developed to record the data and observations.

Table 1. Ponds where the crocodiles were present.

Pond No.	Location of the Pond	Pond No.	Location of the Pond
	District		District
1	<i>Bedane kash</i> (Gwadar)	12	<i>Buzwar-e-Dap</i> (Gwadar)
2	<i>Kulmeer Sunt</i> (Gwadar)	13	<i>Laggoki Kashag</i> (Gwadar)
3	<i>Rah-e-Bat</i> (Gwadar)	14	<i>Aap Ger1</i> (Gwadar)
4	<i>Bug-e-Bat</i> (Gwadar)	15	<i>Aap Ger2</i> (Gwadar)
5	<i>Lodig Aap</i> (Gwadar)	16	<i>Luggoki kashag</i> (Gwadar)
6	<i>Kunrik-e-Gowarm</i> (Gwadar)	17	<i>Ramain Dal</i> (Gwadar)
7	<i>Ragathani Bat</i> (Gwadar)	18	<i>Chati Dap</i> (Gwadar)
8	<i>Shenikani Dramg</i> (Gwadar)	19	<i>Her Bar</i> (Gwadar)
9	<i>Bengo kaler</i> (Gwadar)	20	<i>Gando-e-Gurm</i> (Gwadar)
10	<i>Mazar-e-Gwarm</i> (Gwadar)	21	<i>Tangani Aap</i> (Gwadar)
11	<i>Naburran Kashag</i> (Gwadar)		

Most of crocodile were recorded in resting position along the banks of the ponds and few were found in waters.

Twenty one ponds as per Table 1. in Dasht river bed (Fig. 1) were surveyed on daily basis during the period from November 18, 2007 to January 15, 2008. After ten year November 2017 to January 2018 the survey was repeated. Figure 2 shows the map of the area of Dasht River where the survey was done.

Threats to the crocodile population were also determined by recording direct evidence and through interviews.



Fig. 2. Satellite image of the study area showing pond locations in Dasht (Courtesy: Google Earth).

RESULTS AND DISCUSSION

The Marsh crocodile population in River Dasht was counted to be 99 in 2007-8 including adults, sub adults and juveniles at 21 ponds starting from the lower region of Dasht River from Gabd (Gwadar district) to Lodi Aab (Kech District). These populations live in small ponds (less than 200m length) or medium sized ponds (more than 200m length) in the bed of Dasht River that may be permanent or seasonal retaining water. The details of total population can be seen in Fig. 3. The size of adult population at each pond can be seen in the Figure 4. Sub adult crocs were not found in the later survey of 2017 (Fig. 5).

Only 2 juveniles were observed in the 2017 survey whereas in the 2007 there were 18 juveniles (Fig. 6)

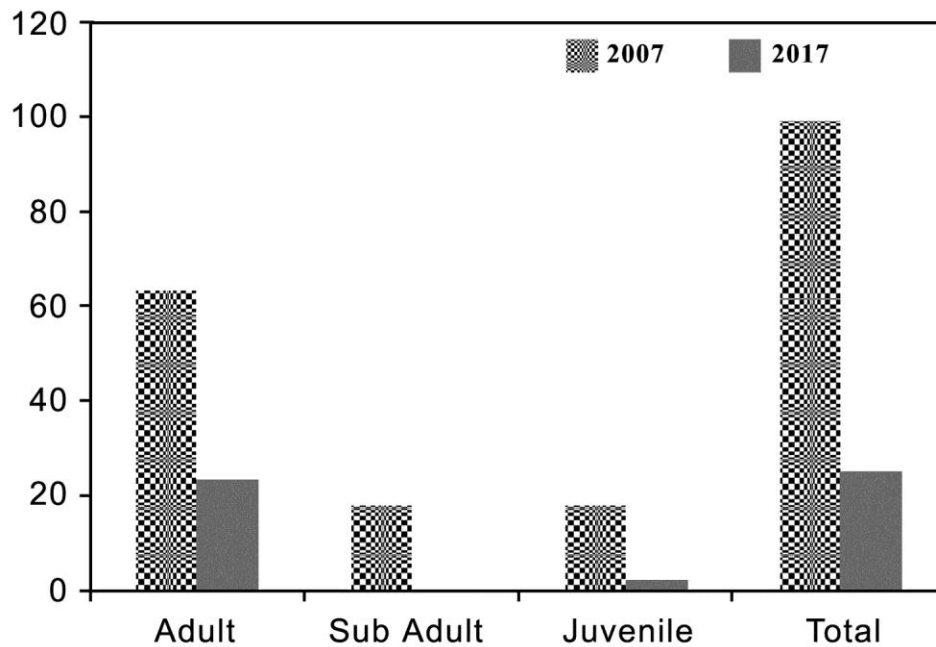


Fig. 3. Comparison between two surveys of 2007 and 2017.

The results in Fig. 3. show that the population of crocodile is in decline, due to shortage of water, hunting and habitat destruction.

Ahmad (1985) reported seeing 11 crocodile in Dasht River in February 1983 (Nihang Kaur, Kech kaur and Mirani Dam). Javed *et al.* (2005) reported the presence of four crocodile, one seen and the footprints of three recorded, near a mining village 95 km north of Jiwani during the period December 20, 2001 to January 1, 2002.

It has been reported that a number of impoundments have been dried up during the long drought of four to five years between 1999 and 2004 which is believed to a major decline in the population of muggers in these rivers (according to Javed *et al.*,2005)

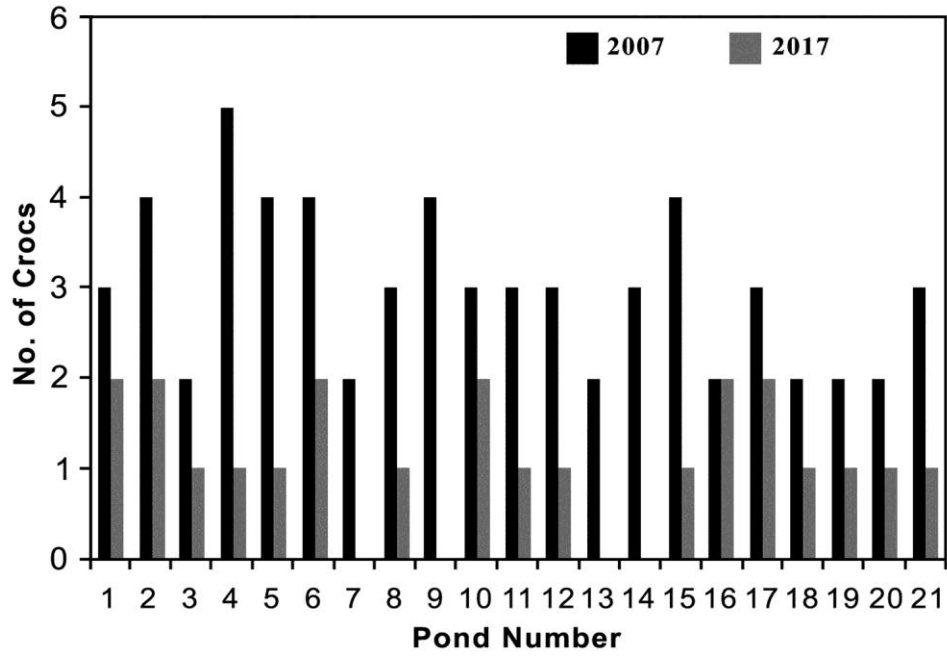


Fig. 4. Presence of adult crocs in different ponds during the two surveys.

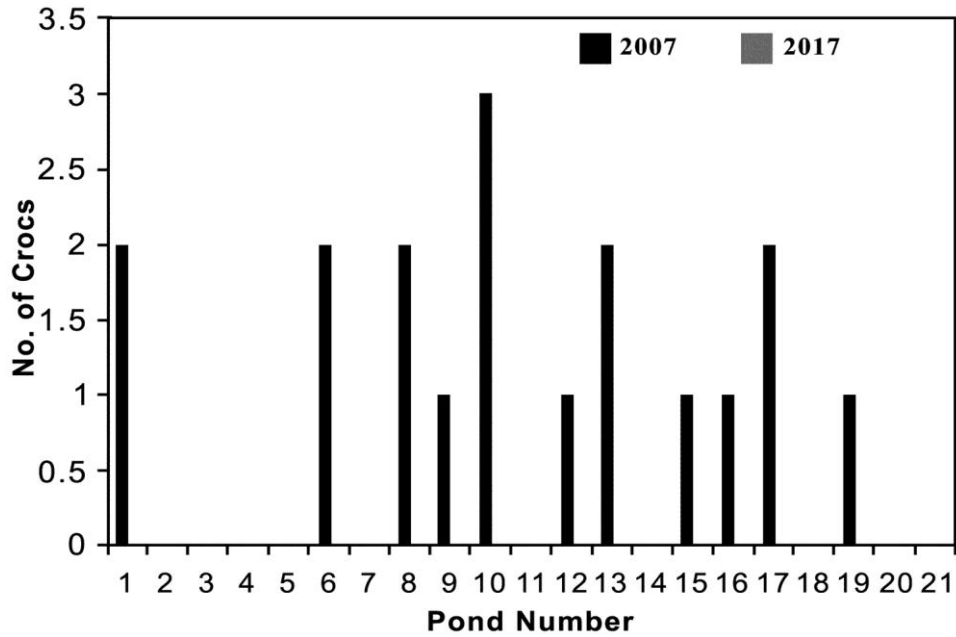


Fig. 5. Presence of sub adult crocs in different ponds.

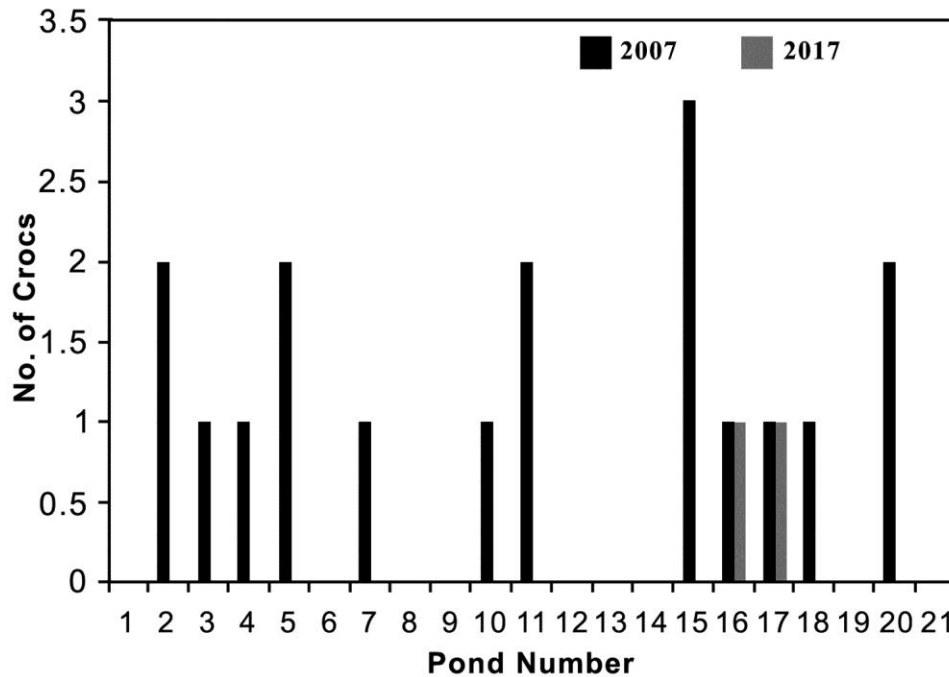


Fig. 6. Presence of Juveniles in different ponds.

The current study shown the considerable decrease in population of Marsh crocodile in the areas due to influx of Mirani dam downstream water which continuous flowing and bringing enough freshwater with food materials. The second reason would be good safe and healthy environment and change in mind set of local people regarding the importance of Marsh crocodile in river ecosystem. Pakistan wetlands programme also helped local resident to build some good demonstration models and social mobilization in areas which can be adapted to other areas for the conservation of crocodile.

Chang *et al.* (2015) reported the population of Marsh crocodile in Chotiari wetland complex Sanghar, Sindh under threat due to multiple reasons. Similarly Latif (2015) also mentioned a declining status of the species.

Still the Marsh crocodile population is threatened mainly because of habitat alteration and human intervention. Considering vulnerability of the Marsh crocodile in Balochistan, there is a need to develop a management plan with the help of local community for the protection of the species. There is also a need to regular monitor the population of Marsh crocodile at Dasht Rivers of Balochistan. With effective and sustainable management, the population of muggers can be protected.

The main cause to decrease march crocodile due to construction of Mirani dam at Turbut which controlled downstream water in Dashat river. Unsustainable use of river water as flood irrigation and pumping of water for irrigation system. Prolong draught in Balochistan particularly Makran region since one decade climate change impact on river and coastal waters.



Fig. 7. Crocodiles are in unhealthy condition in the embankment areas of Dasht River due to drying out of the small water ponds.

Threats to the population:

- The degradation of habitat due to long droughts has results in lack of fresh water availability in dasht river and its tributaries has threatened the survival of crocodiles (Fig. 7).
- The reduction in natural food forces the crocodiles in Dasht to prey upon domestic livestock. As a result they come into direct competition with the people hence they are killed by the communities; two such cases were reported during the study period, one at Dasht and the second in Jiwani where the communities killed the wild crocs. Such killing is just to offset the threat to livestock and not for any commercial gains (the carcasses were left to decay in the open).
- The juveniles have also been reported to be smuggled to Iran for sale (Mobaraki, personal communication).
- Habitat alteration for agricultural purposes is another threat to crocodile populations.
- Local women wash their clothes and utensils at the banks of the rivers, which adds detergents and other pollutants that degrades the natural quality of water.

Conservation measures:

Conservation of Crocodiles in Dasht River depends on the interest and involvement of local communities. Dasht was one of the sites included in the Pakistan Wetlands Programme (PWP) initiated by Ministry of Environment and WWF the involvement of local community for the conservation of Crocodiles. The conservation initiatives were started with the support of local communities for protecting the ecosystem and the marsh crocodile. The project at this site was ended in 2008.

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