

## FIRST RECORD OF MUGGER CROCODILE (*CROCODYLUS PALUSTRIS* LESSON, 1831) FROM HAJI SHAHR, DISTRICT KACHHI, BALOCHISTAN, PAKISTAN

Mehmood Khan\*, Sohaib Ahmed, Ahmad Zamir and Sajjad Saeed

Pakistan Forest Institute, Peshawar, Khyber Pakhtunkhwa, Pakistan

\*Corresponding author: khanmehmood384@gmail.com

### ABSTRACT

Marsh crocodile (*Crocodylus palustris* Lesson, 1831) is considered one of the oldest creatures on the planet. It is a critically endangered species of freshwater crocodile that was once abundant in the tropics. A high level of exploitation of this animal is in the leather industry. This study aims to develop a method to (a) estimate its current population in the study area, (b) identify habitat destruction, and (c) suggest conservation strategies and public awareness. A questionnaire was developed to estimate the population size of this species during summer in 2022 using a direct day and night count method. The study area is subject to frequent drought conditions, biotic stress as a result of sprawling urbanization, and frequent fishing practices by the local population. All these factors were found to have a negative impact on their population size.

**Keywords:** crocodile, census, population size, Kachhi, Balochistan.

### INTRODUCTION

*Crocodylus palustris* Lesson 1831 is a tropical species referred to with various names - Indian crocodile, Indus crocodile, Persian crocodile and Marsh crocodile (Da Silva and Lenin, 2010). It is found in all countries of the subcontinent such as Pakistan, Sri Lanka, India, Nepal and Bangladesh (Da Silva and Lenin, 2010; Choudhary *et al.*, 2018; Mobaraki *et al.*, 2015; Zafar and Malik, 2018). This species is medium-sized and mostly inhabits freshwater lakes, large-sized ponds, sloughs in rivers, swamps near streams, and even sometimes swampy areas (Da Silva and Lenin, 2010). Male alligators of the species can grow up to 16 feet in length. Females are smaller in size than male crocodiles (Whittaker, 1987 and Whittaker and Whittaker, 1984). Marsh crocodile is a natural predator with excellent skills in attacking its prey (Chang *et al.*, 2012). Like other crocodile species, they can hide themselves underwater and jump out and wait for prey to approach (Dinets, 2015). They feed on all types of chordates such as mammals, Aves, Pisces, and Reptiles (Bhatnagar and Mahur, 2010). They breed in winter. The female crocodile lays several eggs in a nest in the sand (Chang *et al.*, 2012).

They are famous for burrowing and burrowing bills play an important role in their survival in harsh environment (Lang, 1987). This study focuses on (a) estimating its current population in the study area, (b) identifying habitat destruction and (c) suggesting conservation strategies.

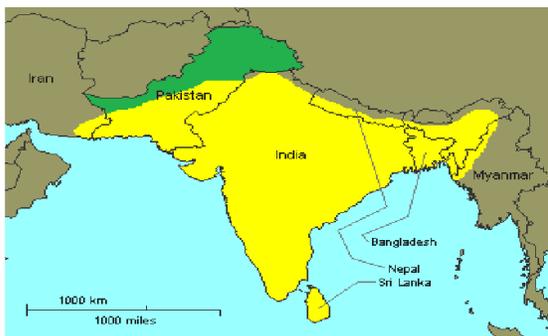


Fig. 1. Distribution of Marsh crocodile. Yellow colour indicates the presence of Marsh Crocodile



Fig. 2 Map of Kachhi District

### Study Area

Area where the study was conducted is Nari Gage, which is an aquatic freshwater canal that passing through Haji Shahr, which come under the jurisdiction of Tehsil Bhag district Kacchi, Balochistan. Bhag is a small village

type located within Kacchi district formally known as Bolan. The altitude or above sea level of Bhag is 90 meters (298 feet). The area and terrain of Bhag is considerably undulating and plain. Off-take of Kachhi Canal starts from Taunsa Barrage and then passes through district Muzaffargarh following Dera Ghazi Khan and Rajanpur districts of Punjab and then enters into Dera Bugti, followed by Kachhi, Jhal Magsi and Nasirabad districts of Balochistan and the coordinates/latitude and longitude are 29.6297° N, 67.9100° E (Fig.1, 2, 3).

The site of study was located at Latitude: 29° 02' 57.7588'' N and Longitude: 67° 48' 45.3968'' E in Nari gage near Tehsil Bhag District Kachhi.



Fig. 3. Aerial view of Kachhi Canal.

## MATERIALS AND METHODS

Three methods were used to assess the population and census of marsh crocodile (*Crocodylus palustris*) in the Haji Shahr, Nari Gage study area.

### Equipments

The Equipment used during surveys included

- A. Global Positioning System (Garmin)
- B. Study area map 1:50;000 with 0.5 minute interval
- C. Digital Single Lense Reflex Camera (Nikon D-850)
- D. Binocular (7×7)
- E. Sheet of survey i.e Questionnaire
- F. Pen, Scale, Pencil, clip-board with Nate book
- G. Vernier caliper for measurement of dung of animal
- H. First Aid Kit

### Methods used

These methods included the Questionnaire survey method, the direct method and the indirect method. The primary data/information regarding marsh crocodile was collected by preparing questionnaire and interview with local people. The direct sighting method of mugger in day light time ground counting is nice method in which least equipment is required, and day time is done by foot along study area (Magnusson, 1982).

The indirect sighting method and evidence of the presence mugger included the tracks of mugger, its dung, the trails, dens, the footprints and nesting/ burrowing etc. of the mugger in the study area (Magnusson, 1982).

## RESULTS

The followings are the results of interview with local peoples, direct and indirect method of survey in Bhag Nari gage area.

### Questionnaire:

Questionnaire survey was conducted with 187 local people/resident of Haji Shahr Bhag city. In the questionnaire local people were interviewed including Fishermen, general public nomads, tourist landlords, etc. in

the month of July 2022. Eighteen questionnaires reports (14% of people interviewed) that they have seen crocodile sometimes during excess water and fish availability in the canal.

#### Direct Method:

The population census and the distribution of marsh crocodile (*Crocodylus palustris*) is estimated by direct counting method or basking of sun counting method survey was carried out in the month of July, 2022 in the potential area by foot walking along the bank of the Nari gage canal in Haji Shahr during the day time 09 AM in the morning up to 1 .00 PM in the noon and then 08 PM to 10 PM at night. The survey revealed a number of destroyed nests of the Crocodile and 02 individual species found in direct sighting. The totally count report of the direct method is given in Table 1.

Table. 1 Areas surveyed in Bhag Nari.

S. No.	Name of Area	No. of Mugger	M	F	J	Nest	Sign
1.	Start of nari gage	-	-	-	-	Yes	Yes
2.	Upper village Side	-	-	-	-	Yes	Yes
3.	Lower village side	-	-	-	-	No	Yes
4.	Pir Muhammad village	-	-	-	-	No	Yes
5.	Middle of canal	2	1	1	-	No	Yes
6.	Bridge Side	-	-	-	-	No	No

Direct Count Method (M=Male, F=Female, J= Juvenile)

#### Indirect method:

In the indirect survey method we used to observe and find out the nest, dungs, and signs of the mugger to get information and data about the presence of the mugger and estimate/calculate the population of mugger. Several signs have been seen and observed shown in the Fig. 4 and 5.



Fig. 4. Fore-limb of Mugger pointing out by local resident Abdul Rehman



Fig. 5. Another abdomen walk of mugger near standing water in Kachhi canal.

#### DISCUSSION

Present studies indicated occurrence of *Crocodylus palustris* (Kachhi canal) in the Haji Shahr, Nari Gage study area. Studies on mugger were conducted in Pakistan, by Groom bridge (1982). There are round about total 1500

hundred freshwater crocodile population across the Pakistan either in wild or captive and the studies were conducted by experts of Zoological Survey of Pakistan, but no authentic data about the population of mugger related to Balochistan is available. The Crocodile Specialist Group (CSG) conducted studies on mugger in January, 2009 in different areas of Sindh and Balochistan (CSG March 2009, and Volume 28 Number 1). The surveys and studies stated that mugger has become extinct Punjab due to habitat destruction/degradation (Chaudhury, 1993; Khan, 1986). Where as in some areas of Balochistan such as Nari gage, Hub dam, Hub River, Fitiani, Hingol River, Dasht, Nahang kech/turbet and Kuch kuar countable numbers of muggers were seen. (Ahmed, 1986; Ghalib *et al.*, 1981; Khan and Mirza, 1989). However, in Sindh province only little countable numbers of muggers were seen in Nara canal district Khairpur, other areas include Deh Akro 2 in district Nawabshah, Chotiari reservoir in Sanghar, Jatoi Moro in Naushahro Ferooz where the animals are captive, in Haleji lake district Thatta both in captive and wild form, in Karachi Zoological Garden Mangho Pir, along with Shamzoo Park Karachi and Khar Centre Karachi in captive form (Ahmed, 1990; Javed and Rehman, 2004).

## REFERENCES

- Ahmad, A. (1990). Pakistan. *Crocodile Specialist Group Newsletter*, 9 (2): 15-16.
- Ahmed, A. (1986). The distribution and population of Crocodiles in the province of Sindh and Balochistan (Pakistan). *J. Bombay Nat. Soc.*, (83): 220-223.
- Bhatnagar, C. and M. Mahur (2010). Observations on feeding behavior of a wild population of Marsh Crocodile in Baghdarrah Lake, Udaipur, Rajasthan. *Reptile Rap.*, 10: 16-18.
- Chang, M. S., G. S. Gachal, A. H. Qadri and M. Y. Shaikh (2012). Bio-ecological status, management and conservation of marsh crocodiles (*Crocodylus palustris*) in Deh Akro 2, Sindh–Pakistan. *Sindh University Research Journal (Science Series)*, 44(2): 209-214.
- Chaudhry, A.A. (1993). Status of crocodiles in Pakistan. *Crocodile Specialist Group Newsletter*, 12(1): 19-20.
- Choudhary, S., B. C. Choudhury and G. V. Gopi (2018). Spatio- temporal partitioning between two sympatric crocodilians (*Gavialis gangeticus* and *Crocodylus palustris*) in Katarniaghat Wildlife Sanctuary, India. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 28(5): 1067-1076.
- Da Silva, A. and J. Lenin (2010). Mugger crocodile *Crocodylus palustris*. Crocodiles. Status survey and conservation action plan, 3.
- Dinets, V. (2015). Apparent coordination and collaboration in cooperatively hunting crocodilians. *Ethology, Ecology and Evolution*, 27(2): 244-250.
- Ghalib, S.A., H. Rahman, F. Iffat and S.A. Hasnain (1981). A checklist of the reptiles of Pakistan. *Rec. Zool. Surv. Pakistan*, (8): 37-59.
- Groom bridge, B. (1982). *The IUCN Amphibia-Reptilia Red Data Book*. IUCN: Gland.
- Javed, H. I. and H. Rehman, (2004). Status of marsh crocodile (*Crocodylus palustris*) in Sindh. *Rec. Zool. Surv. Pakistan*, (15): 22-30.
- Khan, M. A. R. (1986). Wildlife in Bangladesh Mangrove Ecosystem. *Journal of the Bombay Natural History Society*, 86 (1): 32–48.
- Khan, M.S. and M.R. Mirza (1989). An annotated checklist and key to the Reptiles of Pakistan. Part-I: Chelonia and Crocodilian. *Biologia*. (22): 211-221.
- Lang, J. W. (1987). Crocodilian behaviour: implications for management. In: *Wildlife Management: Crocodiles and Alligators*. G.J. W. Webb, S. C. Manolis and P.J. Whitehead (Eds.). Sydney: Surrey Beatty and Sons. pp. 273–294.
- Magnusson W.E., (1982). Techniques of surveying for crocodilians. In: *Crocodiles: Proceedings of the 5th Annual Working Meeting of the Crocodile Specialist Group of the Species Survival*. Commission of IUCN-The conservation union, Switzerland, pp: 389-403.
- Mobaraki, A., M.R. Silva and E. Abtin (2015). *Sustainable Management and conservation of the Mugger Crocodile (Crocodylus palustris) in Iran*. Baeza: International University of Andalusia, 1-2.
- Whitaker, R. and Z. Whitaker (1984). Reproductive biology of the Mugger (*Crocodylus palustris*). *Journal of the Bombay Natural History Society*, 81 (2): 297–317.
- Whitaker, R. (1987). The management of crocodilians in India. In: *Wildlife Management: Crocodiles and Alligators*. Webb, GJW.
- Zafar, M. and M. F. Malik (2018). A review on status and conservation of mugger crocodile. *Environment*, 19(20): 21.

(Accepted for publication October 2022)