

Original Research Article

<https://doi.org/10.20546/ijcmas.2018.710.379>

## Effect of Seasons on Census Mugger Crocodiles (*Crocodylus palustris*) Kept at Crocodile Conservation Park, Kotmi-Sonar (Chhattisgarh)

B. Mishra<sup>1</sup>, S. Roy<sup>1</sup>, M. Roy<sup>2\*</sup> and J. Singh<sup>1</sup>

<sup>1</sup>Wild Life Health and Forensic Centre, Chhattisgarh Kamdhenu Vishwavidyalay, Durg, 491001 (Chhattisgarh), India

<sup>2</sup>Department of Veterinary Physiology and Biochemistry, College of Veterinary Science & A.H., Anjora, Durg (Chhattisgarh), India

\*Corresponding author

### ABSTRACT

#### Keywords

*Crocodylus palustris*,  
Survey, Abundance,  
Season, Basking

#### Article Info

Accepted:  
24 September 2018  
Available Online:  
10 October 2018

The Mugger Crocodile (*Crocodylus palustris*) is one of the widely distributed crocodilian species in the world. The mugger, the most adapting species is found across various types of habitats ranging from rivers to large lakes, small puddles to village tanks and road side ditches. Mugger Crocodile is a threatened species in India and is legally protected as Schedule I species under the Indian Wildlife (Protection) Act 1972. Crocodile Conservation Park, Kotmi-Sonar, Chhattisgarh was created in 2006 to support the large breeding population of mugger crocodiles. The choice of survey method depends on management objectives i.e. conservation, harvesting and control of crocodile population. Thus knowing the abundance and density of crocodile population in this monotypic habitat

### Introduction

The Mugger Crocodile (*Crocodylus palustris*) is one of the widely distributed crocodilian species in the world. They are the widespread occupants of South-East Asia. The mugger, the most adapting species is found across various types of habitats ranging from rivers to large lakes, small puddles to village tanks and road side ditches. Mugger Crocodile is a threatened species in India and is legally protected as Schedule I species under the Indian Wildlife (Protection) Act 1972. Due to many *ex situ* programs, such as “Indian Crocodile Conservation Project”, the once threatened crocodilians are now placed on a

good path of recovery. Muggers are carnivorous, ecto heterothermic, seasonal breeder, gonochoric, diocious, hole-nesting and oviparous species (Jacobson, 1999). Muggers (*C. palustris*), gharials (*G. gangeticus*) and salt-water crocodiles (*C. porosus*) occur sympatrically in some northern Indian and Nepalian rivers (Groombridge, 1994).

As a part of risk mitigation and management to reduce human-crocodile conflict (HCC), Crocodile Conservation Park was created by Chhattisgarh Government in 2006 to support the large breeding population of mugger crocodiles. The choice of survey method

depends on management objectives i.e. conservation, harvesting and control of crocodile population (Caughley, 1977).

## Materials and Methods

The present study was conducted in Kotmi Sonar, an ancient village of District Janjgir - Champa (Chhattisgarh) India. It lies at 220, 01'; 44.8' north latitude and 820, 21', 13.1' east longitude (Bharos and Kanoje, 2007). It is situated in Mumbai Howrah railway line between Bilaspur and Champa junctions of Chhattisgarh, India.

The survey of *Crocodylus palustris* population at Crocodile Conservation Park, Kotmi Sonar was carried out by total count method as per the method suggested by Bayliss (1987).

Crocodiles basking on land were counted intensively during a calm sunny day time between 07:00 to 11:00 hrs with the aid of 10X50 power field binocular. However, spotlight count surveys was done during no-moon night hours (21:00 to 02:00 hrs) with the aid of 30 Watt LED handheld searchlight taking the advantage of the bright red reflection of the crocodilian eye which occurs when a light is shone into it during night.

A total of two surveys were conducted over a period of 01 year between August, 2016 to July, 2017 and the average of the total count was taken to get the relative density index of crocodile population in Crocodile Park spread over an area of 85 acres.

## Results and Discussion

The relative density index during summer day time was 169 (20%) and night time was 246 (28%) while that of winter day time was 290 (33%) and night time was 167 (19%). More individuals were spotted basking during late morning hours of winter month (290) and least

during cold winter nights (167). Maximum numbers of crocodiles were found to be basking during winter season (228) than summer season (206). Figure and table showing the relative density index of *Crocodylus palustris* spotted during different seasons is given below.

Young crocodiles were found to be basking on the water surface, juvenile and sub-adult in diminutive contact with water. Their mouth was oriented towards the water line, while adult and big sized crocodiles were basked away and oriented parallel to the water line.

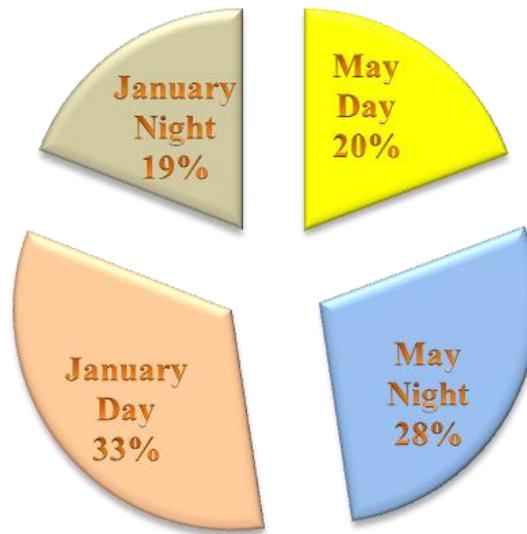
The basking pattern (shuttling sun, shade and water) of mugger mainly depends on ambient environmental temperature. The terrain of Kotmi-Sonar has got a plain rocky terrain with gentle slope and is situated in 620 m above mean sea level.

In summer, temperature goes up about 42°C while it goes down near about 10°C in winter. The average annual rainfall is 1300 mm and the area experiences a tropical hot and humid type of climate (Rai and Raj, 2015).

They tend to bask in same basking spots. The dominant one attained their preferred a basking site by chasing the subordinates into water. Mouth gaping was seen in most of mugger population basking when on land or partly submerged. Gapping (exposing the moist buccal membranes to evaporation, a cooling mechanism) seems to be more prevalent after a long period of basking (Downs *et al.*, 2008).

Our findings are well supported by the findings of Grigg *et al.*, (1998) who have reported similar kind of observation in population study of *Crocodylus porosus* exposing themselves to sun diurnally and staying in water nocturnally during winter season.

**Fig.1** Showing the relative density index of *Crocodylus palustris* spotted during different seasons



**Table.1** Showing the relative density index of *Crocodylus palustris* Spotted during different seasons

SEASON	TIME	COUNT
SUMMER	Day	169
	Night	246
WINTER	Day	290
	Night	167

Basking is a seasonal phenomenon of reptiles. Although, our team was observing the basking muggers from a safe distance without disturbing them but still then some individuals reacted provisionally and returned back inside the water as their sense was quite sharp.

This is in concordance with the results of a study carried out on the basking behaviour of a wild population of marsh crocodiles (09.00 am to 04.00 pm) in Baghdarra lake, Rajasthan (India) during the winter season (Joshi *et al.*, 2011). The exact figure cannot be estimated in our study due to wary nature of these reptiles. Mugger crocodiles (*Crocodylus palustris*), also use burrows as refugia during periods of extreme temperature

(Ross *et al.*, 1989). Some individuals might be hidden in creeks or in vegetation cover or might be under deep water. Least some of these crocodiles were apparently kept in the water by social pressure. Our findings only provide the abundance of mugger population in the park and further specialized methods are needed to know the accurate population status.

**Acknowledgement**

The authors thank the authorities of Chhattisgarh Forest Department and staffs of Crocodile Conservation Park Kotmi-Sonar (Chhattisgarh) for continuous support and kind cooperation in carrying this research work.

## References

- Bayliss, P. 1987. Survey methods and monitoring within crocodile management programmes. In: Webb, Manolis and Whitehead. *Wildlife Management: Crocodiles and Alligators*. Surrey Beatty and Sons. Sydney. pp. 157–75.
- Downs, C.T, Greaver, C., Taylor, R. 2008. Body temperature and basking behaviour of Nile crocodiles (*Crocodylus niloticus*) during winter. *J. Thermal Bio*, 33:185–192.
- Grigg, G.C., Seebacher, F., Beard L.A. and Morris, D. 1998. Thermal relations of large crocodiles, *Crocodylus porosus*, free-ranging in a naturalistic situation. *Proc. Biological Sciences*. 265:1793–1799.
- Groombridge, B. 1994. IUCN Red List of Threatened Animals. IUCN - The WCU. Gland, Switzerland. pp 1:286.
- Jacobson, C. 1999. Reintroduction of the Mugger Crocodile, *Crocodylus palustris*, in India, Restoration and Reclamation Review. *Student on-line Journal*, 4(3):1-7.
- Joshi, R., Singh, R. and Negi, M.S. 2011. First record of mugger crocodile *Crocodylus palustris* from the Rajaji National Park, North India, *International Journal of Biodiversity and Conservation*. 3(9):444-450.
- Rai, R.K. and Raj, B.S. 2015. Conservation of *Crocodylus palustris* in Kotmi Sonar of Janjgir-Chamapa (C.G.) India. *IOSR J. Env. Sci. Toxicol. Food Technol.*, 1(3): 24-29.
- Ross, J.P. (1998). *Crocodiles: status survey and conservation action plan*, 2<sup>nd</sup> edn.
- Whitaker, R. and Whitaker, Z. 1989. Ecology of the mugger crocodile. In: *Crocodiles: Their Ecology, Management and Conservation*. A Special Publication of the CSG. IUCN, Gland, Switzerland. pp 276-297.

### How to cite this article:

Mishra, B., S. Roy, M. Roy and Singh, J. 2018. Effect of Seasons on Census Mugger Crocodiles (*Crocodylus palustris*) Kept at Crocodile Conservation Park, Kotmi-Sonar (Chhattisgarh). *Int.J.Curr.Microbiol.App.Sci*. 7(10): 3278-3281.  
doi: <https://doi.org/10.20546/ijcmas.2018.710.379>