

## First Record of Mugger Crocodile *Crocodylus Palustris* (Lesson, 1831) from River Kadavi at Sarud, Tal, Shahuwadi, Dist. Kolhapur, M.S., India

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**Abstract.** The paper is about the first record of crocodile *Crocodylus palustris* (Lesson, 1831) from river Kadavi at Sarud, Tal-Shahuwadi. Dist-Kolhapur, M. S., India. This is the first record of the order Crocodylia and genus *Crocodylus* for River Kadavi and western Maharashtra. In the month of February 2007, one crocodile was observed basking on left bank of river Kadavi near village Sarud of Kolhapur district. In May 2007, nesting of crocodile was also observed on the same place. We have used ground survey method to identify new potential habitat of the animal and to examine the distribution and presence of the species. Field observations indicated that the crocodile is present in river Kadavi-the tributary of river Warana which is the major tributary of river Krishna. River Krishna is a main river of Deccan plateau running from Sahyadri ranges of Maharashtra to Bay of Bengal in east direction. Besides, the presence of crocodile in river Kadavi their movements were observed in river Warana also. Still no any record is available, which confirms the presence of this crocodylian species in river Kadavi and Warana and based on this evidenced study, one more reptilian species – crocodile *Crocodylus palustris* can be added to the list of reptilian fauna of these rivers as well as that of Kolhapur district. This new record of crocodile's presence in the river Kadavi and Warana requires further investigations.

**Keywords:** Crocodile *Crocodylus palustris*, New record, Basking behaviour, River Kadavi, River Warana.

### 1. Introduction

Crocodiles as known to human being are the largest reptiles present on the earth. They are known since remote past. The Indian mythology represents crocodiles as a ride of Maa Ganga (the Ganga river goddess). Also it is said that the god of rain – varuna rides on monster of makara. Till then world represents only 22 species of Crocodiles, out of which only 3 are found in India. These are – the Gharial- *Gavialis gangeticus*, the mugger- *Crocodylus palustris* and the salt-water crocodile- *Crocodylus porosus*.

Out of these three species of crocodiles from India, the most common and widely found is the crocodile *Crocodylus palustris*. This is the broad-snouted mugger crocodile which inhabits all kinds of fresh water habitats such as rivers, lakes, reservoirs, hill streams and village ponds. It is categorized under vulnerable category in 'IUCN Red List of Threatened Species' and protected under schedule I of Wildlife Protection Act 1972 (WTI, 2003; Da Silva and Lenin, 2010). It is observed only in Indian sub-continent. Available historical records suggest that in Bangladesh, the wild population of crocodile was extinct and only two wild crocodiles were known to live in community ponds (except in zoos); similarly in Bhutan, crocodiles are considered to have become extinct in the 1960s and in Myanmar last record of the species was observed in 1867 to 1868 (Da Silva and Lenin, 2010). Increase in population and intensification of agricultural practices,

construction of dams and diversion of water channels for irrigation purpose are considered to be major reasons for shrinkage of the population of marsh crocodiles in Pakistan however, presence of this species is limited to certain area of Sindh and coastal areas of Baluchistan (Javed and Rehman, 2004). In India, crocodiles are reported from over ten states and the wild population is tentatively estimated as 2500 to 3500 non-hatchlings (Whitaker and Andrews 2003). In Uttarakhand state, this highly threatened wild species is known to be found in Corbett Tiger Reserve (Ram-Ganga River and Sonanadi reservoir) and in Baan-Ganga wetland (Laxar area, district-Haridwar) adjoining to river Ganges. It is also observed in Rajaji National Park in river Ganges near Haridwar city (Joshi et. al. 2011).

Present paper deals with the study of first record of *Crocodylus palustris* in the river Kadavi at Sarud, Tal, Shahuwadi, Dist. Kolhapur, MS, India. So far no one has reported the presence of Crocodiles from Warana tributaries. This is the first attempt, which has been taken towards the exploration and conservation of Crocodiles in Warana tributaries.

## 2. Study Area

River Kadavi is a major tributary of river Warana. It begins its course in the Sahyadri ranges ( $17^{\circ} 1' 40''$  North Latitude &  $73^{\circ} 50' 10''$  East Longitude) at the border of Kolhapur and Sangli district, on the west side of village Kokrud ( $16^{\circ} 59' 51''$  North Latitude &  $73^{\circ} 58' 53''$  East Longitude), Tal-Shirala, Dist.-Sangli. A small dam is constructed at Parleninai ( $17^{\circ} 0' 15''$  North Latitude &  $73^{\circ} 52' 14''$  East Longitude) on this river. River Kadavi runs north to South direction through Sahyadri ranges towards Malkapur. Further it takes eastward turn near Malkapur ( $16^{\circ} 55' 12''$  North Latitude &  $73^{\circ} 55' 55''$  East Longitude) of Kolhapur district and merges in river Warana near village Thergaon ( $16^{\circ} 54' 24''$  North Latitude &  $74^{\circ} 4' 47''$  East Longitude). Total length of river Kadavi is about 46 km. The village Sarud ( $16^{\circ} 54' 38''$  North Latitude &  $74^{\circ} 2' 41''$  East Longitude) is on the left bank of river Kadavi. Present habitat of crocodile observed at Sarud is at  $16^{\circ} 54' 9''$  North Latitude &  $74^{\circ} 2' 7''$  East Longitude.

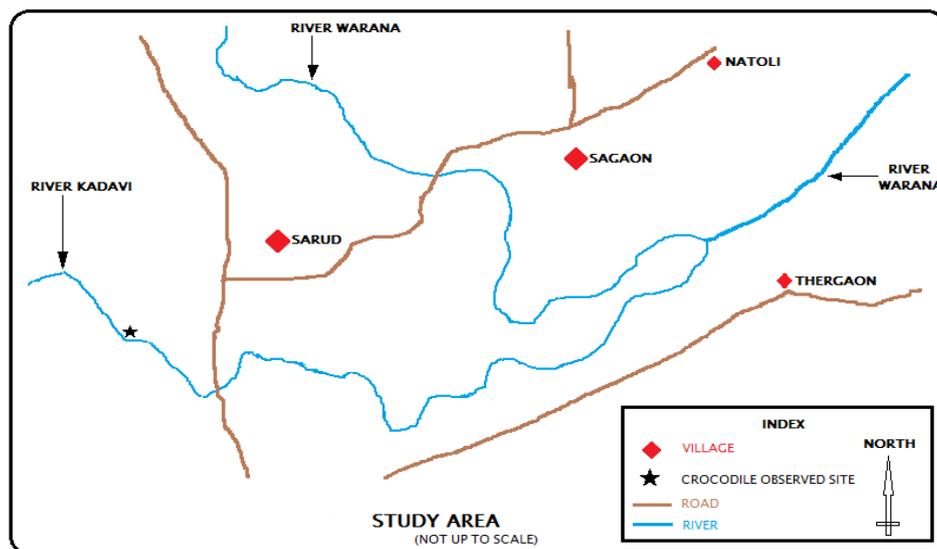


Fig. 1: Map of study area.

## 3. Methods

When Crocodile was observed in river Kadavi for the first time in February 2007 we tried to identify the habitat, basking behaviour as well as nesting behaviour of crocodile from the same place. Frequent visits were carried out at the site to find out crocodiles' presence in other adjoining areas. In-depth observations of the site and adjoining area were conducted two times daily between 08.00 am, to 12.00 pm. & 03.00 pm. to 07.00 pm. in the month of May. The data collected was a part of the animal monitoring activities and the daily record based on direct sighting of animals and indirect evidences like footprints and body impression signs. The local evidences like slide, ventral scale mark and footprints were noted and photographed. Communication with native people was made to know the basking site of crocodile. The persons inhabiting

nearby the site were interviewed and their observations and opinions were noted. Present study was carried out during February 2007 to May 2007.

#### 4. Results and Discussion

In the month of February 2007, Mr. Ramji Yadav and other farmers from Sarud observed one crocodile lying on the bank of river Kadavi. Third author of this paper got this information and he visited the site and observed local evidences like footprints and body impression signs (ventral scales mark) of crocodile. Later on we visited the site frequently and confirmed the presence of crocodile.



Fig. 2: Body impressions sign of Crocodile

During our further study, we came across an adult crocodile (nearly 7 to 7.5 feet in length), who was in the surface bask phase in a water of river Kadavi ( $16^{\circ} 54' 9''$  North Latitude &  $74^{\circ} 2' 7''$  East Longitude) near village Sarud. We observed the specimen for about 03 hours (08.30 am to 11.30 am) and noted its activity (minor movements, use of water, impact of its presence on birds and the behavioural responses). When we started a search operation to cross-check crocodiles' presence in other parts, surprisingly, we encountered an empty nest on the left bank of river which is about 10 feet away from the water line. We confirmed the nest of crocodile by observing the marks of claws of crocodile in the nest. It was 1.5 feet deep. It was present some 20 m far from the spot, where we sighted the adult specimen first.



Fig. 3: Surface bask of Crocodile at site



Fig. 4: Second author (R. H. Atigre) confirms the presence of Empty nest of Crocodile



Fig. 5: marks of claws of crocodile in the Empty nest.

During our whole study, sporadic sightings of crocodile on bare soil, sandy river bed as well as on water surface in the pre-bask phase, basking phase and surface bask phase were observed. Basking behaviour was classified as: Surface bask, when the crocodile observed was on the surface of the water without any movement. Prebask, when half to two-thirds of the body was still in water and, Basking, when the crocodile was completely on land, exposing the entire body (Venugopal and Devi Prasad 2003).

Basking is a phenomenon observed in some poikilothermic animals who could not maintain the body temperature constant. The body temperature of these animals changes as per the change in temperature of surrounding environment. Such animals need to regulate body temperature. When body temperature decreases, these animals absorb heat from surrounding environment. This phenomenon is called as basking. Temperature regulation is a dynamic process that involves behavioural and physiological adjustments in order to maintain body temperature within a range. Heliothermy (basking in the sun) and thigmothermy (absorbing heat from a warm surface) (Huey, 1982) are the two processes that the crocodiles use to maintain the body temperature. This causes the rise in body temperature which is obtained from external heat sources (Pough, 1983). The ectothermy is advantageous to regulate body temperature on a daily and/or seasonal basis with less energetic costs (Lang, 1987). Fluctuating environmental conditions that differ from thermal preferences of reptiles increase the time required to thermoregulate (Venugopal and Devi Prasad 2003). The consequences of devoting time to thermoregulation have broad behavioural and ecological significance. The time spent in thermoregulation can sometimes reduce the time available for other important activities (Huey, 1982). Climatic conditions, social interactions, circadian rhythms and reproductive state influence thermal behaviour (Lang, 1987). The land–water movement of crocodiles is triggered by a light-cued circadian rhythm and the amphibious life of crocodiles has been suggested to serve as a thermoregulatory function (Lang, 1976; 1987). During the course of this investigation, it was revealed that animal's sense was quite sharp although we were observing them from a safe distance and without disturbing them, sometimes they sensed our presence and reacted provisionally and returned back inside the water. The crocodile's sense of sight, hearing and smell are well developed and the animal remains very alert while basking on land (Daniel, 2002).

## 5. Conclusion

Present study projects that the crocodile *Crocodylus palustris* inhabiting the new habitat of river Kadavi near village Sarud. Even though, its occurrence was noted by us in 2007 it may be present since monsoon of 2005 when all the rivers of western Maharashtra were on the huge flood level. Due to heavy rains in 2005, all the rivers flowed on dangerous zone and thus, the administration declares 'high alert' during this said period. As there are no records of presence of crocodile *Crocodylus palustris* from river Kadavi, they might have migrated from river Krishna—the main river of western Maharashtra during this flood. We observed the crocodile in naturally made reservoirs of river Kadavi and for the maximum time they were found in basking phase. Currently, there is no collation of field data to suggest whether the overall wild crocodile *Crocodylus palustris* population is increasing or decreasing in this river and its adjoining habitats and ranges. Not a

single documentation is available, which confirms the presence of crocodile in river Kadavi as well as river Warana. Based on the evidence from this study, one more reptilian species, the Crocodile *Crocodylus palustris* (Lesson, 1831) can be added to the list of reptilian fauna of the river Kadavi. Additional detailed studies are urgently required, which may be helpful in strengthening knowledge about the presence and distribution of mugger crocodiles in river Kadavi.

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