advantages of a long-duration basking and it would have to keep moving between water and the basking site.

At the onset of winter, mugger crocodiles start digging tunnels or repair and use the tunnel of the previous year. They spend most of the winter in it until basking in sun appears beneficial. In places like Similipal, sighting of Mugger is rare until middle of February.

At Tikarpada gharial pools, during winter the roof used to be kept covered with transparent polythene-- that allows sunlight during the winter, and retains heat inside for the night, as the sides are covered with straw-polythene-straw boards.

Winter screen gharial pool, Tikarpada

Impact of Climate Change

Prolonged or a dry summer would destabilize the nest temperature and there will be skewed sex ratio in young crocodiles, as the sex of crocodiles is dependent on the temperature at which eggs are incubated in the nest. Incubation temperature below 30^0C produces more of females and above it more of males.

Crocodiles do not incubate their eggs. They leave it to the nest temperature that is largely stabilized by the nest-material, its humidity and ambient temperature. Increase in temperature and drying up of freshwater bodies will reduce breeding success. Higher nest temperature leading to desiccation of eggs will produce young with a large number of congenital deformities.

With respect to impact of climate change on crocodilian survival various aspects have not been quantified but the impacts can be summarized as logical conclusions from decades of studies and understanding of related ecology and behaviour of the crocodilians.

During summer when a marshy habitat dries up, Mugger crocodiles can walk on land for five to seven kilometers. With fast disappearance of marshes and small wetlands suitable for supporting Crocodiles, Muggers are getting confined to rivers and reservoirs. When they have to share the habitat with Gharial the latter is a loser, as evident in Satkosia Gorge of River Mahanadi in Odisha. The original Gharial Sanctuary appears like a Mugger Sanctuary.

It is argued in general that climate change may lead to change in salinity of oceans and the estuaries. This would affect the mangrove forests and associated biodiversity which support the Estuarine Crocodile for its nesting integrity of their wetland habitats have always been under various threats resulting from anthropogenic activities. Additional range of threats seems to be linked with imminent climatic changes. At present most of the probable impacts of climate change on flora and fauna appear hypothetical or fictional, and carry educational messages, but climate has a heavy impact on some group of animals like crocodilians.

Note on Environment Enrichment for Better Thermoregulation by Crocodiles in Captivity.

Lala A. K. Singh*

This short article is about environmental enrichments we have practiced in captivity so that crocodiles, particularly the hatchlings and small juveniles are able to better adjust to the changing temperature in their rearing pools. Deep water and access to basking are two prime clues for providing better scope for thermoregulation by crocs in captivity. But to prevent mortality due to cold nights certain enrichments are done in captivity.

The arrangements include:
(a) sun-shade mosaic effect by planting creepers and other small plants,
(b) artificial tunnel for mugger hatchlings;
(c) large palm-leaves left on ground so that the hatchling mugger congregate underneath;
(d) maintain full water in pools, etc.

In Tikarpada we used to cover up the entire roof and sides of the rearing pen with specially designed boards having a layer of polythene between straw bound on bamboo frames. These 'winter covers' are installed before sunset and taken out after about an hour of sunrise. These were natural and better ways for thermoregulation than providing electric heaters with reflectors to raise the ambient temperature.

Sometimes I had to shift a sick gharial or mugger hatchling to the warmer temperature in my bedroom at Tikarpada. For captive rearing a few crocs these were alright and the approaches can be improved in captivity under any other conditions. But drastic and large climatic changes in natural habitat towards hot or cold may create a challenge for crocodilians. The behavioural adaptations evolved over centuries or learnt through years may not be adequate to overcome the impact of greater disaster anticipated because of climate change.

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