



CONSERVATION IN ACTION

The Ganga Aqualife Rescue and Rehabilitation Centre, Narora, India: A Chelonian Field Station on the Ganges

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Photographs by the WII-NMCG Component IV Team.

The Ganga, one of Asia’s seven greatest rivers (Sinha 2015) and the most sacred river in India, springs from the Himalayas in Uttarakhand and flows more than 2,000 km through Uttar Pradesh, Bihar, and Jharkhand to Ganga Sagar in West Bengal. The river’s aquatic ecosystems are inhabited by some critically endangered species, such as the Ganges River Dolphin (*Platanista gangetica*), the Eurasian Otter (*Lutra lutra*), Gharial (*Gavialis gangeticus*), Mugger Crocodile (*Crocodylus palustris*), and a number of species of

turtles. Anthropogenic activities, such as the extraction of natural resources and pollution, pose serious threats to the biodiversity and the viability of the Ganga (Sinha 2015).

To conserve the Ganga and its fauna, the science-based Biodiversity Conservation and Ganga Rejuvenation Project was initiated by the Ministry of Jal Shakti (Government of India) in association with the Wildlife Institute of India (WII), Dehradun (Ministry of Environment and Forest). Part of the mandate of this project is the rescue and rehabilitation



Fig. 1. Signboard outside the Ganga Aqualife Rescue and Rehabilitation Centre (GARRC) at Narora, Bulandshahr District, Uttar Pradesh, India. Inset: Map of India showing the location of the GARRC.

of the river's turtles, which face threats that include entanglement in nets, exploitation for meat or the international trade in live animals (Choudhury and Bhupathy 1993), and confiscation by various government officials throughout the Ganges system. To address that mandate, the Ganga Aqualife Rescue and Rehabilitation Center (GARRC) was established at Narora, Bulandshahar District, Uttar Pradesh (28.203039°N, 78.380551°E), where the WII could make use of an existing turtle head-starting and rearing facility.

The GARRC (Fig. 1) is on the campus of the Narora Atomic Power Station Township on the banks of the middle portion of the Ganga (Hussain and Badola 2017), where the stretch from Brijghat to Narora has been declared a Ramsar site (Murthy et al. 2013). The facility has two enclosures. Enclosure 1 (Fig. 2A), which has been partitioned with wire mesh into four sections to allow four different species to co-exist safely, has a central island of sand for basking. Enclosure 2, which is not partitioned, is comparatively small but has a pool surrounded by sand for basking.

The enclosures at GARRC currently house a total of 20 turtles of six species: eight Three-striped Roof Turtles (*Batagur dhongoka*), seven Spotted Pond Turtles (*Geoclemys hamiltonii*), two Indian Flap-shelled Turtles (*Lissemys punctata*), one Indian Roofed Turtle (*Pangshura tecta*), one Brown Roofed Turtle (*Pangshura smithii*), and one Crowned River Turtle (*Hardella thurjii*).

The facility follows a management protocol that addresses hygiene, feeding, sanitation, and environmental enrichment. Hygienic procedure and sanitation protects reptiles from infectious diseases and zoonoses (Donoley et al. 2018). Entry into enclosures is restricted, and anyone who enters must pass through a disinfectant footbath of dilute potassium permanganate at the entrance to inactivate bacteria, viruses, and protozoans (EPA 1999). Protective gear is worn for all animal handling and food preparation. Since water can easily become contaminated by dissolved pollutants, nitrogenous waste, or leftover food, the water must be cleaned and kept free from pathogens and algal growth (Donoley et al. 2017). Aquatic



Fig. 2. Enclosure 1 (A) at the GARRC has been partitioned into four sections to allow four different species to co-exist safely; the filtration unit (B), and a pool undergoing a complete water change (C).



Fig. 3. Species-specific fresh food for turtles at the GARRC includes mixed vegetables (A), fishes of various sizes (B), shrimp (C), and chicken intestines (D).



Fig. 4. Enclosures are covered with transparent plastic sheets during the winter months.

macrophytes are used to filter the water along with a cleaning and water flow system that uses a three-chambered unit containing layers of coarse sand, fine sand, and charcoal (Fig. 2B). The latter is powered by an electric pump that performs systemic filtration and aeration and recycles water on a daily basis. This not only saves water but also removes dissolved pollutants, odor, and color through oxidation (Siabi 2008) before the water is reused. Enclosures are cleaned daily and leftover food is collected, 30% of water is changed every third day, and pools (including walls) are completely cleaned and water changed twice a month (Fig. 2C).

Turtles at the facility are provided with species-specific food for animals that are herbivorous, carnivorous, or omniv-



Fig. 5. Hydrophytes provide refuges for aquatic turtles (A), Spotted Pond Turtles (*Geoclemys hamiltonii*) basking on a log positioned for that purpose (B), and an artificial terrestrial refuge (C).



Fig. 6. Staff of the GARRC conduct rescue operations for multiple species, here an Indian Flap-shelled Turtle (*Lissemys punctata*).

orous (Fig. 3); the diversity offered is designed to reflect food available in nature. As appropriate, turtles receive vegetables, such as, leafy greens (spinach, amaranth), beans, carrots, cucumbers, tomatoes, pumpkins, and fruits like apple and watermelon. Carnivores and omnivores receive various Gangetic river fishes (depending on availability) like Gangetic Aillia (*Ailia coila*), Morari (*Cabdio morar*), Swamp Barb (*Puntius chola*), Elongated Glassy Perchlet (*Chanda Nama*), Indian Glass Barb (*Chela Laubuca*), Clown Catfish (*Gagata cenia*), and Pool Barb (*Puntius sophore*) (Sarkar et al. 2012), along with shrimp and chicken intestines.

The GARRC is situated in Uttar Pradesh, where temperatures in the humid subtropical climate range from highs of 48 °C to winter lows of 2 °C. The GARRC has been successfully managing seasonal temperature fluctuations using, for the most part, natural resources that facilitate thermoregulation by the turtles. Air and water temperature and humidity levels are monitored and recorded throughout the year. During winter cold waves, enclosures are covered with multiple layers of transparent plastic sheets (Fig. 4) to counter low temperatures by allowing sunlight to enter by day and retaining heat during the night. Natural plants and artificial basking sites and refugia (Fig. 5) allow turtles to seek shelter

and thermoregulate as needed (Talukdar et al 2019). Ganges River sand in and around the pools plus floating and hanging logs are used by turtles for basking. Aquatic macrophytes, like Water Hyacinth (*Eichhornia crassipes*), Water Cabbage (*Pistia stratiotes*), and Duckweed (*Lemna minor*), serve as refuges. Plants around the pools mimic the natural vegetation and, along with rice hay in artificial shaded refuges, provide shelter.

Rescue operations (Fig. 6) are conducted by trained personnel who respond rapidly to calls from the forest department. Each rescued animal receives an on-site health examination. If healthy, it is released immediately. If not fit for release, it is taken to the facility, quarantined, measured, monitored under the supervision of a veterinary officer, and treated as needed (Fig. 7). When deemed safe, it is placed in the pool best suited for its species for further recovery. When determined to be fit, it is released into appropriate natural habitat by the rescue team and forest department (Fig. 8) at a site pre-selected by the project survey team.

Turtles are important components of the Ganga ecosystem; however, they face many anthropogenic threats. Thus, the GARRC plays a major role as a rehabilitation facility in support of chelonian conservation along the Ganga (Fig. 9).



Fig. 7. Staff of the GARRC take detailed morphometric measurements of all rescued animals (A) and provide necessary veterinary care (B).



Fig. 8. Staff of the GAARC releasing turtles at carefully selected sites in natural habitats.



Fig. 9. An operational pool at the Ganga Aqua-life Rescue and Rehabilitation Centre (GARRC).

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