REPTILES & AMPHIBIANS

CONSERVATION IN ACTION

Turtle Rescue Centre, Bhagalpur (Bihar), India

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Photographs by Akshay Bajaj and Aditya Raj.

Originating from the Gangotri Glacier in the Himalayas, the main channel of the Ganga River flows about 2,550 km (Sarkar et al. 2012), housing a diversity of life forms from phytoplankton to higher aquatic vertebrates (Tare et al. 2013), which collectively provide complete ecosystem services including a self-waste processing system that produces high water quality and productivity (Sinha 2015). Over time, the increase in anthropogenic pressure has severely impacted this freshwater system. Hydroelectric projects, construction of barrages and dams, industrial effluent discharge, sewage, and unlimited biological resource extraction (water extraction, sand mining, and species exploitation) have tremendously altered the structural morphology and flow regime of the river and also significantly and negatively affected interlinked species habitat (WII-GACMC 2017). These factors have resulted in the isolation and fragmentation of populations of many species. Much of the illegal pet trade from various parts of the country is smuggled through Kolkata with Bihar serving as one of the primary sources of illegally collected turtles; this has resulted in an increase in the confiscation of live turtles (Chaudhary and Bhupathy 1993). In response to negative reports of smuggling in the print media and due to significant efforts by various agencies to monitor and control this illegal trade, a dedicated facility for chelonian rescue and rehabilitation was established in Bhagalpur District (Bihar) along the right bank (downstream) of the Ganga (Fig. 1). The facility is within the Vikramshila Gangetic Dolphin Sanctuary (ENVIS 2020), which provides protection for many threatened species, including the Smooth-coated Otter (*Lutrogale perspicil-*

Fig. 1. Location of the Turtle Rescue Centre, Bhagalpur District, Bihar, India.

Fig. 2. One of four pools for turtles (left) and the tortoise exhibit with provisions for shade (right).

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late), Gangetic Dolphin (*Planista gangetica*), turtles, Gharial (*Gavialis gangeticus*), and 198 species of birds (Chaudhary et al. 2006; Dey et al. 2014; Sinha 2015). The mission of the facility is to rehabilitate animals in distress (rescued or confiscated) and release them into their natural habitat. The establishment of the facility is a joint effort of the Environment, Forest, and Climate Change Department of Bihar and the Wildlife Institute of India, Dehradun (NMCG Project). The centre is located within the campus of the Forest Department of Sunderban (25.261987°N, 87.011124°E) and is the first turtle and tortoise rescue and rehabilitation facility in the state of Bihar.

The Centre provides appropriate facilities with four pools for turtles and an exhibit for tortoises (Fig. 2). It currently houses nine Brown Roofed Turtles (*Pangshura smithii*) and five Indian Flap-shelled Turtles (*Lissemys punctata*). Since live animals in captivity must adapt themselves mentally as well as physiologically to constrained circumstances, management can be challenging and protocols must address sanitation, nutrition, and environmental enrichment. Effective sanitation prevents the spread of diseases and zoonoses (Kishinovsky et al. 2018). All leftover food is removed daily to prevent buildup of wastes. A bio-secure environment within and around the facility includes restricted entry with potassium permanganate footbaths that disable bacterial and viral pathogens (changed on alternate days; EPA 1999) and daily cleaning (Fig. 3) to enable cleanliness and positive aesthetics. Handling chelonians also entails a potential risk of exposure to common zoonoses such as *Salmonellosis*, *Campylobacter*, *Yersinia*, and *Mycobacterium* (McArthur 2004). Personal protective gear (disposable masks, gloves) is used by the staff during the daily work routine that ends with handwashing once the work is completed.

Fig. 3. Efforts to minimize the risk of infection include a footbath at the entrance of the Turtle Rescue Centre (left) and daily cleaning (right).

McArthur et al. (2004) noted that chelonians show four patterns of excretion (i.e., uricotelism, ureo-uricotelism, ureotelism, and amino-ureotelism) depending on the actual habitat of the species. Consequently, having good water quality (free from nitrogenous waste, dissolved pollutants, decaying leftover food) is essential. To address this, the facility is equipped with a filtration unit (Fig. 4) powered by an electric pump (0.5 hp). The unit has a three-stage filtration and oxygenation system that works on the principle of mechanical (stage one), biological (stage two), and chemical (stage three) filtration before circulating back to the pool. The filter media used in stage one are foam and sponges; stage two uses bio-balls and ceramic (oyster shell) rings, whereas activated char-

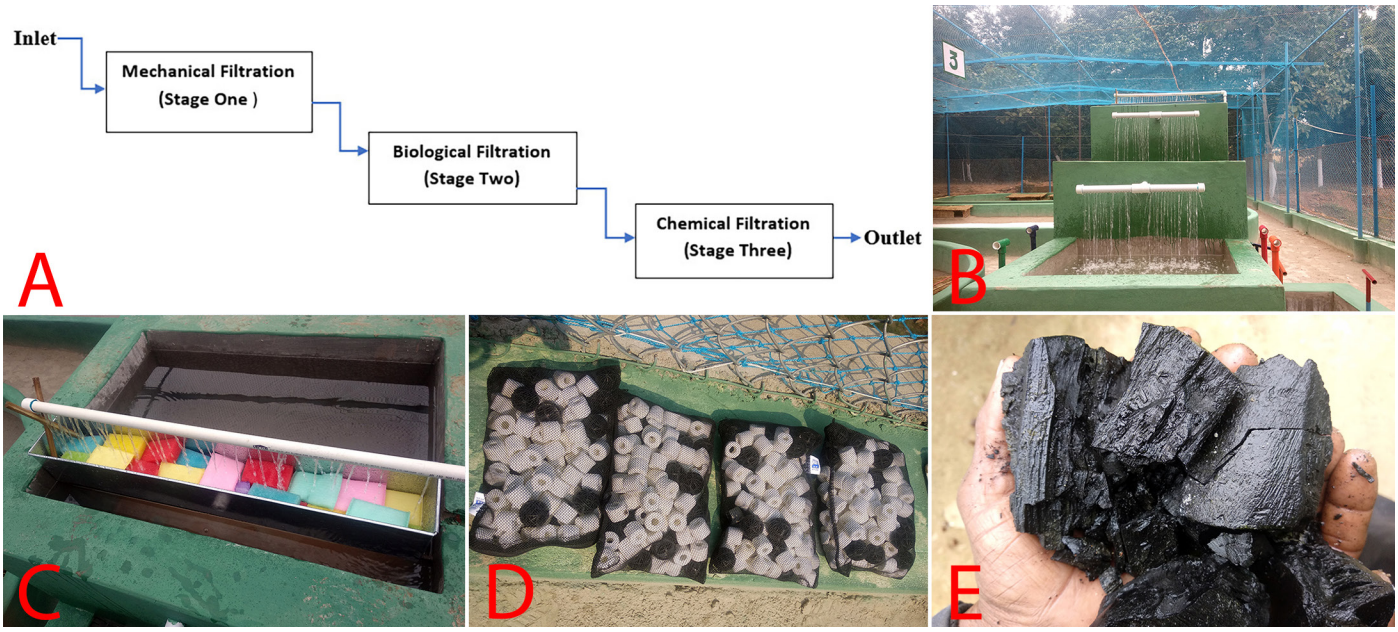

Fig. 4. The water filtration unit at the Turtle Rescue Centre. A schematic illustration showing the three-step sequence used (A); the filter at the facility (B); and filter media used in each respective step: Foam and sponges (C), ceramic rings and bio-balls (D), and activated charcoal (E).

coal is used in stage three. Mechanical filter media restrict passage of large particles; biological media (bio-balls and ceramic rings) eliminate excessive ammonia and nitrites by increasing surface area to house bacteria and by ammonification and nitrification (ceramic rings); chemical media use the principle of adsorption. Additionally, one-third of the water from each pool is replaced by freshwater every third day and pools are completely drained and cleaned once each month.

The rescued and confiscated turtles include herbivores, carnivores, and omnivores, necessitating a wide range of species- and age-specific food items (Fig. 5). These included locally sourced fresh seasonal vegetables and fruit (pumpkin, tomato, beetroot, spinach, amaranth, carrot, cucumber, beans, apple, and watermelon) and fish (live and dead), shrimp, and boiled egg albumin.

Fig. 5. Food for turtles at the Turtle Rescue Centre include locally available vegetables (left) and fish (right).

Fig. 6. Seasonally available aquatic macrophytes provide natural refuges in an enriched pool (top) and a floating platform serves as a basking site (bottom).

Winter in Bhagalpur District begins in December, with maximum and minimum mean temperatures of 24 °C and 10 °C, respectively; however, temperatures may be as low as 2–3 °C during cold waves (IMD 2011). The pools also are enclosed by thick white transparent plastic sheets for protection during cold waves and water and ambient air temperatures are monitored continuously. Also, because ectotherms such as chelonians must thermoregulate (Meek and Avery 1988), all pools are surrounded by ample basking space in the form of Ganga River sand.

Environmental enrichment is important for the maintenance of quality care for animals in captivity as it stimulates their psychological and physiological well-being (Swaisgood and Shephardson 2005). All attempts are made to reflect the range of daily activities that would occur in natural environments. Native Ganga River sand is used as a substrate for basking, multiple terrestrial refuges made of naturally available material are provided in each pool and exhibit, and floating platforms made of bamboo and hay serve as basking platforms within the pools (Fig. 6). Seasonally available aquatic macrophytes (e.g., *Lemna minor* [Duckweed], *Eichhornia crassipes* [Water Hyacinth], and *Pistia stratiotes* [Water Cabbage]; Fig. 6) provide natural refuges.

The facility has a team trained to respond to rescue calls around the clock. Rescued animals undergo health assessments by a veterinarian, who checks for injury level (external injuries: not found/minor/major), discharges (ocular/nasal), dehydration, and state (active/inactive). Healthy active animals are released in suitable habitat. The remaining animals are brought into the Centre and quarantined before being transferred to the main pools with other animals of the same species. Most of the live animals acquired via confiscations are sick or injured and in urgent need of intensive intervention by veterinarians.

Fig. 7. Leftover food is weighed daily to monitor the diet (quantity and preferences) of each species (left), and basic morphological measurements (carapace length and width, plastron length, and body mass) are used to monitor growth, here of a Brown Roofed Turtle (*Pangshura smithii*) (center) and an Indian Flap-shelled Turtle (*Lissemys punctata*) (right).

Fig. 8. An awareness program for school children (left) and bird-watching with a local Nature Club and Ganga Praharis (right) along the river.

Leftover food is collected and measured daily to help the project team monitor diet (quantity and preferences) of each species and growth is monitored using basic morphological measurements (carapace length and width, plastron length, and body mass) (Fig. 7). Individuals that recover undergo a final health assessment and, if found to be fit, are released into appropriate habitat.

People in the communities along the river have a deep spiritual connection with the Ganga. They also are actively engaged in the extraction of biological resources from the river. Frequent outreach programs (Fig. 8) are conducted to create awareness of biodiversity conservation by emphasizing the ecological role and importance of each species. These programs are targeted at a broad audience (all ages and levels of education) and make use of all available media to disseminate information.

Chelonians are indispensable components of freshwater (and other) ecosystems but their survival is now challenged by substantial anthropogenic disturbances. The Bhagalpur rescue and rehabilitation facility provides animal welfare, supports law enforcement, and helps raise awareness, ultimately contributing to the conservation of biodiversity.

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