

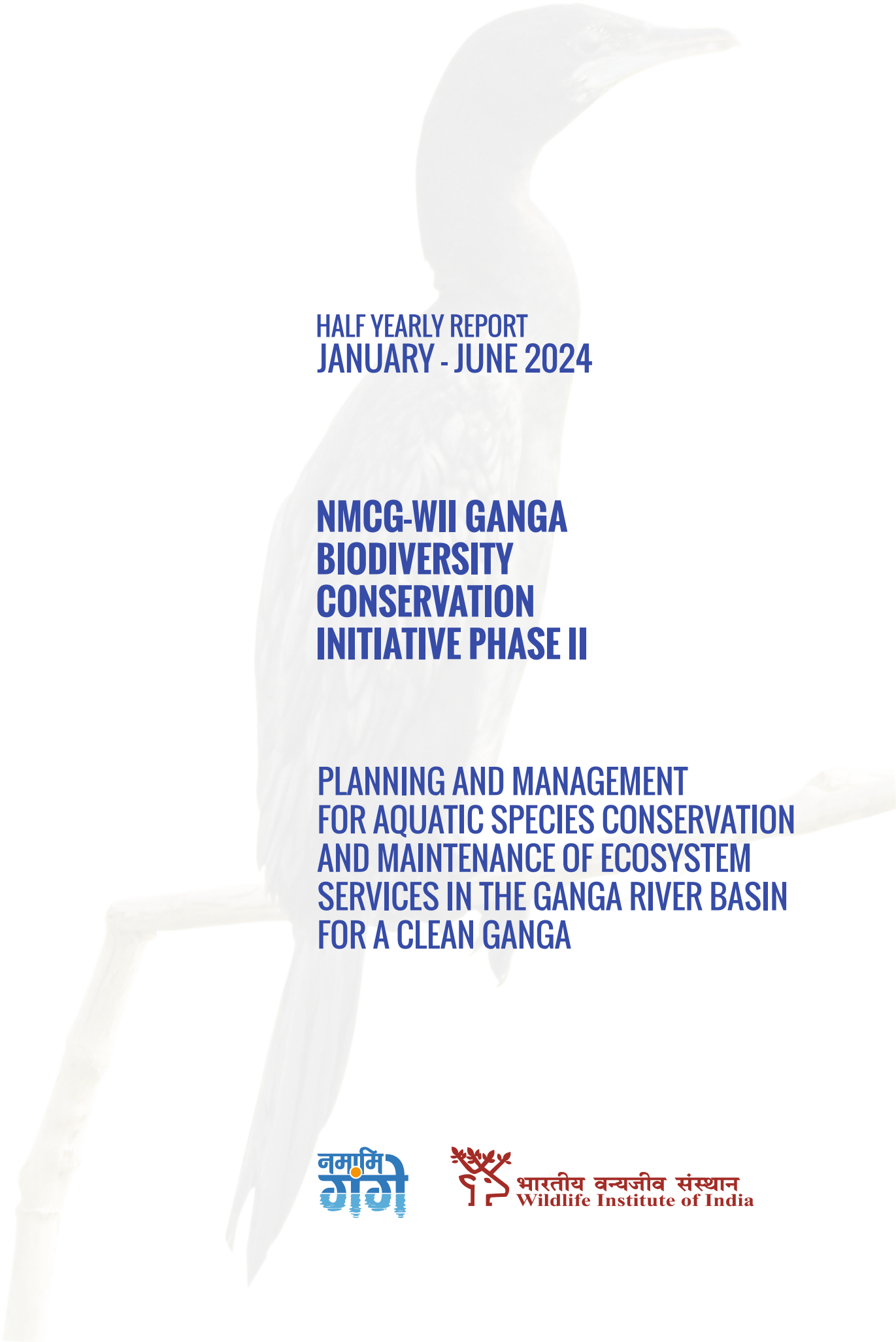
HALF YEARLY REPORT
JANUARY - JUNE 2024

**NMCG-WII GANGA
BIODIVERSITY
CONSERVATION
INITIATIVE PHASE II**

**PLANNING AND MANAGEMENT
FOR AQUATIC SPECIES CONSERVATION
AND MAINTENANCE OF ECOSYSTEM
SERVICES IN THE GANGA RIVER BASIN
FOR A CLEAN GANGA**



भारतीय वन्यजीव संस्थान
Wildlife Institute of India



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OF ECOSYSTEM SERVICES IN THE GANGA RIVER
BASIN FOR A CLEAN GANGA**

Progress Report

January – June 2024

Project Investigators

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COMPONENT - 1

SCIENCE-BASED AQUATIC SPECIES CONSERVATION AND MAINTENANCE OF ECOSYSTEM SERVICES IN THE GANGA RIVER BASIN

1

ECOLOGICAL ASESMENT

Waterbird diversity and conservation challenges in Ganga River Basin wetlands

Bihar

Wetlands namely Mokama Taal, Jakhar Jheel and Naubhatta East Pul were surveyed from 20th to 23rd February, 2024 during post monsoon season. A total of 84 species belonging to 17 orders and 37 families were recorded from the three surveyed wetlands. Of the recorded species, one is listed as Vulnerable (common pochard), and two are Near Threatened (ferruginous duck, lesser adjutant) as per the IUCN Red List. A total 52 water and water-associated bird species were recorded in Mokama Tal, 49 species in Jakhar Jheel and 39 species in Naubhatta East Pul. Several challenges were identified in aforementioned

wetlands, including agriculture on the exposed shore, pollution, unregulated fishing practice and the invasion of *Eichhornia crassipes* (water hyacinth).

Jharkhand

Udhwa Wetland, Bramhajamalpur, Konar Dam, and Patratu Dam were surveyed wetlands during the post-monsoon season between 1st and 3rd March, 2024 in the state of Jharkhand. Among these wetlands, only Udhwa Wetland is designated as wildlife sanctuary and an Important Bird Area (IBA), while rest are non-protected areas. Altogether, 69 avifaunal species belonging to 30 families, were recorded. Of these, 51 were water and water-associated and 18 were terrestrial birds. Of recorded species, woolly-necked stork, greater adjutant, lesser adjutant, oriental darter and black-headed ibis are listed as Near Threatened species on the IUCN Red List. Site



Asan Conservation Reserve and Asan Barrage

wise, a total 45 species of water and water-associated birds were recorded from Udhwa Dam, 47 from Bramhajamalpur, 9 from Konar and 7 from Patratu Dam. Pollution, agriculture, unregulated fishing practices, tourism, extraction of water from the wetland for agricultural purposes, and the invasion of *Eichhornia crassipes* were identified as major threats to waterbirds and their habitats.

Uttarakhand

The Asan Conservation Reserve, Banganga Wetland and Jhilmil Jeel Conservation Reserve were selected for the assessment of wetlands in Uttarakhand. The assessment was carried out during the winter season from 8th February to 17th February, 2024. Altogether, 8936 individuals of 52 water and water associated species were recorded in three wetlands of



Woolly-necked stork in Jhilmil Jheel Conservation Reserve

Uttarakhand. Of which, 8612 individuals (mean 2870.67 ± 476.13 SD) of 48 waterbird species belonging to 14 families and 10 orders were recorded in Asan Conservation Reserve. One species each of Endangered (steppe eagle), Vulnerable (common pochard) and Near Threatened (river lapwing) was recorded during the survey. Average water temperature of the wetland was recorded as $17.40^\circ\text{C} \pm 1.73$ (SD) and mean air temperature was recorded as $18.29^\circ\text{C} \pm 2.56$ (14-21). The average pH value of water was 7.77 ± 0.67 and salinity values varied between 0.01 to 0.2 (0.12 ± 0.09) ppt. A total 272 individuals of 10 waterbird species were recorded belonging to seven families and six orders. Only one Near Threatened species, woolly-necked stork was recorded during survey. Apart, red-wattled lapwing, little egret, cattle egret, white-breasted kingfisher are the Least Concern species found in the wetland during the assessment. The average water temperature of the wetland was recorded as $23^\circ\text{C} \pm 4.24$ (SD) and air temperature was $23.75^\circ\text{C} \pm 2.19$ and salinity was 0.4 ppt. A total 52 individuals of 12 waterbird species were recorded in the Banganga River wetland belonging to four orders and five families. It included one vulnerable and one Near Threatened waterbird species that listed on the IUCN Red List. In Asan, agriculture was prominent in only one sampling point, while Banganga stream has almost dried up. There was no fishing activity in the Asan wetland and water level usually regulated by the irrigation department through barrage. Half of

the sampling points has presence of small and large power lines crossing wetland at multiple locations.

Uttar Pradesh

Three wetlands were surveyed during the post-monsoon season of 2024. The Haiderpur wetland was surveyed for four days-post winter survey from 15th to 18th March 2024. A total of 94 species of avifauna belonging to 16 orders and 39 families were observed during this survey mostly from order Passeriformes (21 species) followed by Charadriiformes (15 species) and Anseriformes (14 species). Out of 94 species, four were listed as Vulnerable and seven as Near Threatened on the IUCN Red List. The average TDS value of the wetland was 83 ± 38.33 (SD), pH value was 6.79 ± 0.91 , conductivity value was 139.29 ± 64.41 (mcS cm⁻¹) and salinity value was 0.09 ppt ± 0.04 . The average air temperature was 28.14 °C ± 3.31 and water temperature was 24.03 °C ± 1.83 . Intensive fishing, grazing, use of chemical fertilizers, tourism and fluctuating water table were identified as some of the threats to waterbirds and their habitats. Multiple bird survey was conducted in Bakhira Bird Sanctuary (RAMSAR Site), also known as Sarus Crane Bird Sanctuary from December to February, 2024. The wetland spans in an area of 2,894 hectares and located in Sant Kabir Nagar district of Uttar Pradesh. A total of 90 species of birds from 37 families were recorded using point count and boat survey methods

Over growth of floating invasive macrophytes and ongoing succession leading to growth of grassland, Udhwa wetland



Bar-headed geese

to count birds. Of these, 77% were residents, 22% were winter migrants, and 1% were passage migrants. In Bakhira, painted stork and black-headed ibis were identified as Near-threatened, while lesser adjutant and sarus crane were classified as Vulnerable, hunting, invasive species like water hyacinth, encroachment, and grass cutting are some of the disturbances to waterbirds and their habitats in the Bakhira wetland. Painted stork, and black-headed ibis, the Near Threatened species, and lesser adjutant and sarus crane, Vulnerable species were recorded from Bakhira. The Gorakhpur Zoo wetland is located in Gorakhpur district and it was surveyed from December to February 2024. Altogether, 85 species of birds from 39 families were documented, with 74% being residents, 22% winter migrants, and 4% local migrants. Only one Near-threatened species recorded was the ferruginous duck.

West Bengal

Altogether, six wetlands (East Kolkata Wetland, Nangla Lake, Purbasthali Wetland, Dongaria Wetland, Ahiran Lake, and Sheel Lake) were surveyed from 21st February to 1st March, 2024 in West Bengal. During this survey, a total 866 individuals of 34 avifaunal species were recorded from the all surveyed wetlands with only one Near Threatened species (black-headed ibis). Ardeidae (6 species) was the most dominant family, followed by Anatidae (3 species) and Rallidae (3 species). Purbasthali wetland had 21 water and water-associated species, while 15 species in Sheel Lake, 10 species in Dongara, seven in Ahiran and 6 each were recorded in East Kolkata wetland and Nangla lake. East Kolkata Wetlands comprise a cluster of highly fragmented wetlands, which are leading to greater pollution levels, threatening the wetlands. Agriculture, fish cultivation, livestock grazing, noise pollution, invasion of *Eichhornia crassipes*, was found to be quite prominent in the most of surveyed wetlands.



Water parameter collection, Ghaghra River

Breeding hotspots: Monitoring of nesting birds in Ganga River Basin

Ghaghra River (Uttar Pradesh & Bihar)

Nesting events of resident breeding birds was evaluated in the Ghaghra River between 27 April - 8 May 2024. A boat-based visual survey was also conducted between Girijapuri barrage and Revelganj at the Ganga confluence, covering a distance of 615 km. A total of 55 river islands were surveyed, and nesting occurrences were observed and recorded from 37 islands. A total of 543 nests belonging to 9 bird species such as black-winged stilt, greater painted-snipe, Indian skimmer, Indian thick-knee, little ringed plover, little tern, red-wattled lapwing, river lapwing, and small pratincole were recorded. Out of the total nests observed, 59 nests of Indian skimmers on seven islands were documented in the Ghaghra River. Among these islands, we discovered the presence of Indian skimmers on 15 islands. Furthermore, we documented 36 nests and 123 unhatched eggs of the Indian skimmer in the Ghaghra River. Disturbance factors such as the presence of free-ranging dogs, raptors, crows, cattle, riverbed agriculture, mining, and other human-induced activities were also recorded.

Lower Yamuna River (Uttar Pradesh)

During the recent survey of island nesting birds carried out from May, 16th to 22nd, 2024 832 events were recorded for eight breeding species between

Pachnada and Prayagraj along the Yamuna River. A total of 41, nesting islands were identified and actively used by nesting birds. The nesting events of eight breeding species were recorded in the Yamuna River islands namely black-winged stilt, greater painted-snipe, Indian skimmer, little tern, red-wattled lapwing, river lapwing, small pratincole, and white-browed wagtail. A total of 843 nesting events, 2139 unhatched eggs, 66 hatchlings and 315 fledglings of different species were recorded during this survey. Among these islands, maximum nesting events were recorded for little tern (n=548) followed by black-winged stilt (159) and small pratincole (99). The presence of Indian skimmer reconfirmed from the previously identified island at Mau where two nests, eight unhatched eggs, and 31 fledglings were recorded with mean clutch size of four during second pre-monsoon survey. The mixed clutches of two species were encountered on four occasions, likely indicating incidents of brood parasitism. These mixed clutches contained unhatched eggs and hatchlings of the little tern found in the nests of black-winged stilts. An unusual collection of unhatched eggs, trampling of fledglings by livestock, sand mining and mortality of adults and fledglings of small pratincole and green sandpiper owing to high concentration of toxic chemicals in water were some recorded threats associated to nesting waterbirds in the Yamuna River.

Bakhira Wildlife Sanctuary (Uttar Pradesh)

The nesting bird survey at Bakhira Wetland was conducted from May - June 2024, primarily using boat-based visual method. A total of 35 bird species



Black-bellied tern

were recorded during the survey, including the breeding plumage of great egret, intermediate egret, little egret, cattle egret, and Indian pond heron. We found two fledglings of grey-headed swampphen, one fledgling each of red-wattled lapwing, and pheasant-tailed jacana, as well as one juvenile and nine sub-adults of sarus crane and painted stork, respectively. There was a noticeable high dependency of villagers on the wetland for collecting lotus flowers (*Nelumbo nucifera*) to sell in the market. Other anthropogenic pressures included cattle grazing and bathing, extraction of *Urochloa muricata*, burning of agriculture land and fishing along the wetland.

Gandak River (Bihar)

The survey was conducted in the Gandak River from 3rd to 8th May 2024. A total 3 nesting events and 3 nests of small pratincole with 3 unhatched eggs and 1 hatchling and the clutch size varied between 1 and 2 Riverbed and river island agriculture are highly prevalent in the Gandak River. The river islands are extensively used for the cultivation of cucurbit crops. Heavy Machines like JCB excavators frequently employed to plough the soil/sand for cultivation. The presence of the free-ranging dogs was also recorded during the survey.

Lower Ganga River (Bihar, Jharkhand and West Bengal)

The survey was carried out in the lower stretch of the Ganga River (Sitab Diyara, Bihar -Farakka, West Bengal) from 9th to 19th May 2024. A total of 242 nests were observed for 5 river island nesting bird species (black-winged stilt, little tern, red-wattled lapwing, river lapwing and small pratincole). A total of 243 nesting events, 479 unhatched eggs, 50 hatchlings and 6 fledglings were recorded from this stretch. Small pratincole had the highest number of nests (153 nests) with 282 unhatched eggs, 28 hatchlings and 6 fledglings, followed by little tern (80 nests) with 170 unhatched eggs, 22 hatchlings, river lapwing had 4 nests with 11 unhatched eggs, black-winged stilt had 3 nests with 12 unhatched eggs and red-wattled lapwing (2 nests) with 4 unhatched eggs. In the case of clutch size, the black-winged stilt had a consistent clutch size of 4 eggs per nest. The little tern and river lapwing both exhibited a clutch size range of 1 to 4 eggs per nest. The red-wattled lapwing had a slightly smaller clutch size range, with 1 to 3 eggs per nest. Meanwhile, the small pratincole showed the greatest variation in clutch size (1-5 eggs per nest). In this stretch of the Ganga River, high intensity of fishing activities was observed, numerous islands were utilised for the cultivation of crops encroaching potential nesting habitats. Additionally, the frequent presence of livestock and free-ranging dogs in this region contributed to disturbances. None of the nesting bird species was found in the state of West Bengal.



Mixed clutch and evidence of brood parasitism of little tern on black-winged stilt clutch (Yamuna River)

Fish diversity based on the ecological survey

A post-monsoon ecological survey was conducted in the Ramganga River from the origin of Dudhatoli to the Kannauj, Ganga confluence, the complete course of the river. A total of 65 species belonging to 9 orders, 21 families, and 47 genera were recorded during the study period. The study found that Cyprinidae was the most abundant order, followed by Danionidae and then Bagridae. Among the 65 species recorded, 60 were native, and 5 exotic species, namely *Cyprinus carpio*, *Hypothalmichthys molitrix*, *Hypothalmichthys nobilis*, *Clarias gariepinus*, and *Ctenopharyngodon idella*. Of the recorded species, a significant proportion were ornamental fishes, and a considerable number were edible fishes.

The post-monsoon survey of the Sharda River was conducted from Tanakpur to Ratanganj, covering the entire river course. A total of 17 fish species belonging to 14 orders, 10 families, and 17 genera were recorded. The study found that Order Notopteridae, Cyprinidae and Bagridae were the most abundant family, with 2 species each. No exotics were recorded during the survey.

The post-monsoon survey of the Kosi River was conducted in May 2024. The survey was conducted from Piparahi to Majhaul Ganga confluence. A total of 83 species belonging to 11 orders, 28 families, and 57 genera were recorded from the Kosi River during the survey, of which 80 were native and 3 were exotic. The study found that Cyprinidae was the most abundant Order with 21 species, followed by Danionidae with 13 species and Sisoridae with 10 species. A total of 3 exotic species were also recorded: *Ctenopharyngodon idella*, *Cyprinus carpio* and *Clarias gariepinus*.



Measuring the flow rate of river



Bagarius bagarius entangled in fishing net in the Ganga River

The Gomti River was surveyed from Gomat Taal to Kaithi (Varanasi) in January 2024. A total of 65 individuals and 41 fish species belonging to 10 orders, 16 families, and 32 genera were recorded from the Gomti River during the study period. The most abundant order was Cyprinidae, and the least abundant order was Cichlidae and Belonidae. The Kaithi site exhibited the highest species number (13). The exotic fish *Cyprinus carpio* and *Oreochromis niloticus* specimens were collected from the Jalalpur and Kaithi sites.

A pre-monsoon survey of the Ganga River was conducted from Mukhaba to Diamond harbour in the month of March to April 2024. A total of 121 fish species belonging to 88 genera, 34 families and 11 orders were recorded across the complete river course of the Ganga River. Among the 121 fish species, 116 were native and 5 exotic fish species, namely *Cyprinus carpio*, *Cyprinus carpio specularis*, *Ctenopharyngodon idella*, *Hypothalmichthys molitrix*, and *Hypothalmichthys nobilis*. During the study, Cyprinidae was found to be the most abundant, followed by Sisoridae and Bagridae.

Riverine vegetation survey

From January to April 2024, vegetation survey carried out along Gomti, Ghaghra, Song, Chandrabhaga, Ajay, Rupnarayan and Damodar rivers. In month of May, vegetation sampling was done in Haiderpur wetland, Uttar Pradesh.

During the post-monsoon survey we recorded 369 species along the Ghaghra River. 408 species along Gomti River, 392 species along the Ajay River. During the survey of Damodar River, 409 species recorded under 285 genera, 84 families and 31 orders. Poaceae was found to be the most dominant family with 59 species followed by Asteraceae, Fabaceae, Cyperaceae, Amaranthaceae, Acanthaceae and Moraceae, Convolvulaceae, Linderniaceae and Euphorbiaceae.

During the survey of Rupnarayan River, 401 taxa (Angiospermic) recorded with 282 genera, 85 families and 31 orders. Poaceae was found to be the most dominant family with 53 species.



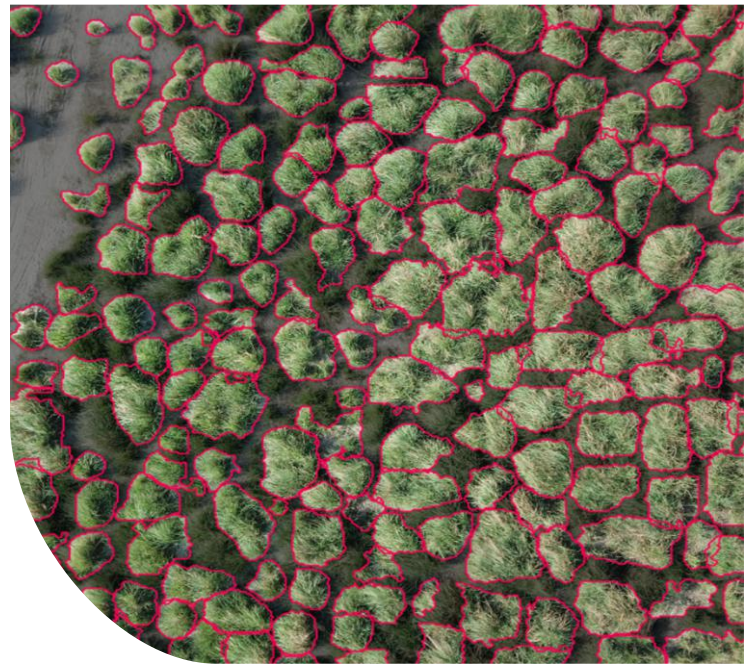
River bank dominated by *Phragmites*, *Eicchornia* and *Pistia*

Cyperus imbricatus



Advancements in monitoring grassland: The role of UAVs and AI in grassland species detection

Grassland species are key components of wetland ecosystem, serving as indicators of ecosystem health and biodiversity, and are valuable for conservation and ecological research. Effective monitoring in extensive areas like Hastinapur Wildlife Sanctuary and Haiderpur wetland is essential, but traditional methods face challenges due to dense vegetation. These areas hosts various grassland species such as *Phragmites*, *Saccharum*, *Bolboschoenus maritimus*, *Schoenoplectiella mucronata*, *Pistia*, *Typha*, *Eichhornia*, *Fimbristylis*, *Cynodon*, *Eleocharis*, *Polypogon*, and *Sagittaria*. Unmanned Aerial Vehicles (UAVs) with advanced optical sensors and deep learning algorithms were used to monitor these grassland species. UAVs surveyed the wetland from 8 strategic points, collecting over 2,200 images from 25 flights covering 6,908 hectares, ensuring comprehensive coverage based on topography and vegetation patterns.



High-resolution processed image displaying a grassland area dominated by *Saccharum* species



Aerial image displaying a grassland area of Haiderpur wetland

Status of waterbirds in the Ganga River Basin states of India: A review

A dearth of information on the comprehensive status of waterbirds was realized thus existing peer-reviewed studies were compiled from the 11 states of the Ganga River Basin- Uttarakhand, Himachal Pradesh, Uttar Pradesh, Bihar, Delhi, Haryana, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand and West Bengal. Following PRISMA based review protocol, various databases were searched and scrutinized using different keywords between years 1861-2023. Out of 3157 peer-reviewed studies obtained from the different sources, only 17% were selected for the review covering topics like status, diversity, composition, behaviour that were mostly (57%) conducted by universities and colleges. Maximum peer reviewed studies were carried out in the state of Uttar Pradesh (135), followed by Bihar (80) and Rajasthan (67). Till year 2023, 550 peer reviewed studies have been conducted in the different types of wetlands in the basin. In quality assessment, 26% peer reviewed studies were indexed with SCI or SCOPUS and the rest were either indexed with NAAS or non-indexed journals.

A total 234 waterbirds species from 32 families and 15 orders were recorded from different wetlands of the basin including 51 threatened or near threatened species on the IUCN Red List. Of these, 44% were identified as winter migrants and 16% resident to India. Most of the published studies occurred in the rural and urban wetlands of Uttar Pradesh and Bihar rather than riverine habitats. The major emphasis of these studies was on the diversity and composition of waterbirds followed by behavioural studies. The

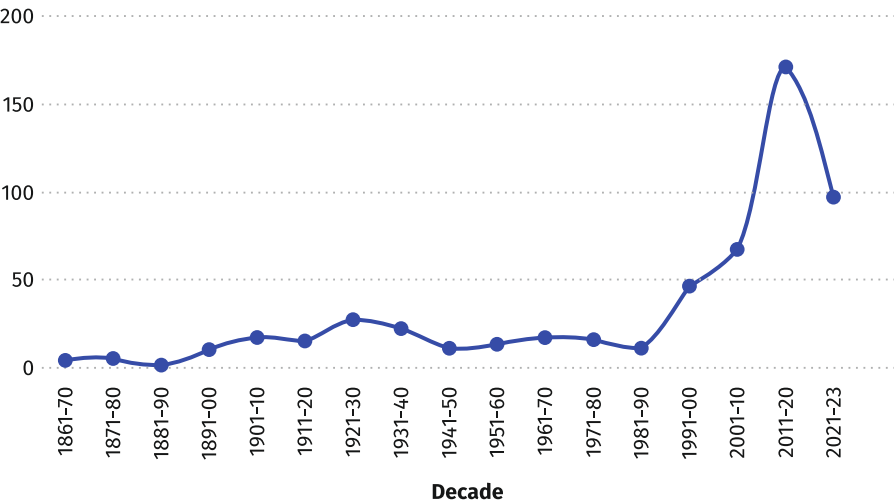
number of waterbird species crossed the mark of 100 in most of the basin states, highest species were recorded in Uttar Pradesh (179), followed by Delhi (178) and Bihar (164). Point count and line transect were two key methods used for the assessment of waterbirds however, most of the studies lagged abundance/density estimations and seasonal information.

More collaborative scientifically robust studies are required to enhance quality and reliability of the data, and long term monitoring and micro level studies are recommended to cope up with site-specific threats and management challenges. Review underlines need for more access and waiver to developing countries like India for open access journals, which will ensure timely and quality publications. Focus on the socio-ecological; river ecosystem, migration pattern, threatened species and ecosystem service aspects will contribute more in the long term conservation of waterbirds and wetlands in the Ganga River Basin of India.



No. of Studies

Knob-billed duck



Decadal trend of published studies on waterbirds between 1861 and 2023 in the Ganga River Basin (n=550)

2

GENETIC ASESMENT

Genetic diversity and population dynamics of *Batagur baska* and *Wallago attu*

To fulfill the conservation genetics objectives of our project, we collected non-invasive biological samples of *Batagur baska* (n = 40) from the Sajnakheli breeding centre. Both mitochondrial and nuclear genes (microsatellite markers) were successfully utilized to assess genetic diversity and historical demographic changes in this Critically Endangered species. Additionally, we sequenced and characterized the first time complete mitogenome of *Batagur baska* and compared it with other *Batagur* species to gain insights into phylogenetic relationships within Testudines and adaptive evolution in protein coding gene.

Additionally, we analyzed novel data including more samples of *Wallago attu* in the Ganga River basin, from rivers Gandak and Kosi. The study highlights recent population expansion in *Wallago attu* and significantly enhances our understanding of the genetic diversity and spatial connectivity of this species in the Ganga River basin, providing a vital foundation for developing informed conservation strategies.

Furthermore, genetic analyses of the genera *Pangshura* and *Spereta* are in their final stages. These findings offer valuable insights for scientific management strategies focused on the conservation and restoration of aquatic species.



Non-invasive sampling, Sundarban

3

RESCUE AND REHABILITATION



First-aid given to rescued *Nilssonian gangetica*

Renovation activities

The Sarnath Rescue and Rehabilitation center, housing three enclosures, a hatchery, and a medical care room, underwent significant upgrades. Enclosures I and III were repaired, with Enclosure II renovated for additional turtle housing. Enrichment included adding sand, wooden logs, rubber mats, bamboo thatches, bushy plants, and water hyacinth to improve the turtles' environment. A field laboratory was also established, equipped with new microscopy and lab supplies for better health assessment and research.

The Barhi turtle Rescue and Rehabilitation center, with three enclosures, a hatchery, and a medical care room, underwent renovations to enhance turtle living conditions and facilitate their rehabilitation. All

enclosures received new iron wire mesh, Enclosure II's walls were repaired and painted, distorted tiles were reinstalled, and a new banner was added. Enrichment included adding wooden logs and baskets for basking and hiding, and installing green nets for shade and temperature control.

Daily management and maintenance

At Sarnath rescue and rehabilitation center, daily activities are meticulously planned to ensure the turtles' welfare. These include regular pond cleaning, involving water changes, algae removal, and sweeping, as well as feeding the turtles at a specific time under veterinary guidance. Proper enclosure enrichment methods are also implemented. Morphometric assessments are conducted monthly

on *Batagur kachuga*, *Batagur dhongoka* (for 2020 and 2023), and *Nilssonina hurum* (2023). From the 1st to the 5th, each turtle undergoes algae removal and thorough cleaning, followed by measurements of carapace length and width, plastron length, weight, and a photograph on graph paper. This approach helps monitor and maintain their health.

At the Barhi Rescue and Rehabilitation Centre, rigorous practices ensure an enriched habitat and clean environment for turtles. Daily routines include providing a proper diet, cleaning ponds, removing leftover food, and changing 20% of the pond water to maintain water quality. The ponds are also cleaned every 10 days. Monthly morphometric assessments for *Batagur kachuga* and *Batagur dhongoka*, conducted from the 1st to the 5th, involve algae removal, thorough cleaning, and detailed measurements, including carapace and plastron dimensions, head width, body weight, and a photograph on graph paper. Feeding charts tailored to the turtles' species, life stage, and season are updated post-winter, incorporating seasonal vegetables, fruits, commercial turtle feed, and dry super worms for in-house turtles, and increased chicken meat for rescued *Lissemys punctata*.

Health care and management of the turtles

To ensure the well-being of rescued and captive turtles, the staff at Sarnath centre conduct daily health monitoring. During winter, hatchlings and rescued turtles suffering from hypovitaminosis and conjunctivitis received treatment. Additionally,

veterinary doctors managed a *Nilssonina gangetica* with prolapse. Biological samples, including nails, tissue, oral swabs, carapace swabs, and cloacal swabs, were collected for further analysis, and blood samples from rescued *Lissemys punctata* were taken for serum biochemistry. Sanitation and hygiene practices were enhanced by using disinfectants to clean the ponds and establishing a quarantine area for newly rescued turtles. These efforts collectively enhance the well-being of the resident turtle.

To ensure the well-being of rescued and captive turtles, the staff at Barhi centre conduct daily health monitoring. Furthermore, a Necropsy examination of a dead hatchling of a three-striped roofed turtle (*Batagur dhongoka*) was carried out. The cause of death was likely due to pyloric obstruction by a foreign body, resulting in partial blockage and impairment of gastric emptying. Chronic irritation and inflammation, along with noticeable thickening of the stomach wall, particularly in the vicinity of the obstructed pylorus, may have contributed to the fatal outcome. Additionally, the presence of petechial haemorrhages on the liver and gastric mucosa suggests vascular compromise associated with the obstruction. The perforation and subsequent bile leakage into the abdominal cavity, leading to peritonitis, may have further exacerbated the condition.

Temperature maintenance (wintering)

To manage temperature extremes, we insulated enclosures with transparent plastic sheets and



Morphometry measurement of *Batagur dhongoka*

installed heating lights to maintain 29-30°C in winter. In summer, bamboo thatch, aquatic plants, and green netting provided shade and reduced heat, while water was changed and filtered twice daily to cool it down.

Rescue and rehabilitation of turtles at Sarnath turtle rescue and rehabilitation centre

During the rescue operations, the Railway Police Force (RPF) and Forest Department successfully rescued 3 individuals of *Nilssonia gangetica* on April 1, 2024, from Mughalsarai railway station. These rescued turtles were expertly cared for at our turtle rescue and rehabilitation centre, receiving necessary attention such as first aid treatment, feeding, and rehydration.

Dolphin rescue at Lakhimpur Kheri

As a first responder, the NMCG WII rescue team arrived at Sharda Barrage near Lakhimpur Kheri, Uttar Pradesh to address the stranded dolphins in the irrigation canal. At least 11 Gangetic dolphins were stranded in the shallow water. Our team

reached the site and monitored the dolphins. The dolphins were stuck in two places, and our team also spotted two calves. Due to the prompt action of our team, the water level increased, and the dolphins started moving out of the canal.

Release of turtles

On April 2, 2024, a release operation took place at the Turtle Wildlife Sanctuary in Ramnagar, UP, with the Ramnagar Forest Department and the Wildlife Institute of India (WII) Rescue and Rehabilitation team. The event began with a briefing on turtle conservation and release procedures. Before the release, turtles underwent health assessments and necessary treatments. The selected release site was chosen for its suitable habitat, water quality, and food availability. Turtles were transported safely and observed post-release to ensure successful adaptation, with ongoing monitoring to evaluate their survival.

A total of 380 turtles, including 276 *Batagur dhongoka* (hatched at the centre), 101 *Lissemys punctata*, and 3 *Nilssonia gangetica*, were successfully released. The release aimed to restore these endangered turtles to their natural habitat and contribute to their conservation and population recovery.



Release of turtles in the Turtle Sanctuary , Uttar Pradesh

Stock updation

The Sarnath Turtle Rescue and Rehabilitation Centre in Varanasi houses a total of 612 turtles, including 434 *Batagur dhongoka*, 122 *Batagur kachuga*, and 56 *Nilssonia gangetica*. Meanwhile, the Barhi Turtle Rescue and Rehabilitation Centre in Bhind hosts 153 turtles, comprising 98 *Batagur dhongoka*, 45 *Batagur kachuga*, and 10 rescued *Lissemys punctata*.

Capacity building for stakeholders

A total of 327 participants attended the workshops conducted at the Sarnath turtle rescue and rehabilitation centre, including ninth-grade students from Mahabodhi Inter College, students from DIET College, forest officials, school students, Ganga Praharis, and trainee Forest Rangers from Odisha Forest Rangers' College. They were taught about turtle biology, species identification, proper handling techniques, husbandry practices, and the importance of turtle conservation.

A total of 158 participants attended the workshops at Barhi turtle rescue and rehabilitation centre, including school students, forest officials, and local villagers. They were educated about reptiles, aquatic macrofauna, turtle conservation, and the significance of these species in our environment.



Feeding of the hatchlings



Enrichments for the hatchlings

4

ECO-TOXICOLOGICAL ASSESSMENT

Evaluating pollutants and risks to biodiversity

Conducted field surveys between April and June 2024 to investigate the pollution dynamics of emerging and legacy pollutants; while assessing the risks they pose to the biodiversity of the Ganga River Basin.

A total of 133 sampling sites across the Ganga (43), Yamuna (23), Gomti (14), Ghaghra (10), Gandak (5), Kosi (5), Sone (9), Chambal (11), and Ramganga (13) were surveyed. Surface water and sediment were collected for ecotoxicological assessment, with water quality parameters quantified on-site. The analysis and quantification of target analytes are currently in progress.

Additionally, two scientific publications on the dietary exposure risk of emerging and legacy contaminants to the Gangetic Dolphin have been published in peer-reviewed journals. These studies are the first to quantify the dietary exposure risk of contaminants for the Gangetic Dolphin, marking a pioneering effort for any riverine cetacean species.



Eco-toxicological sampling in the Ganga River, Kanpur

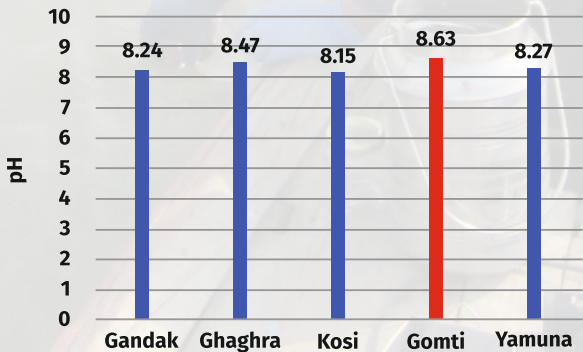
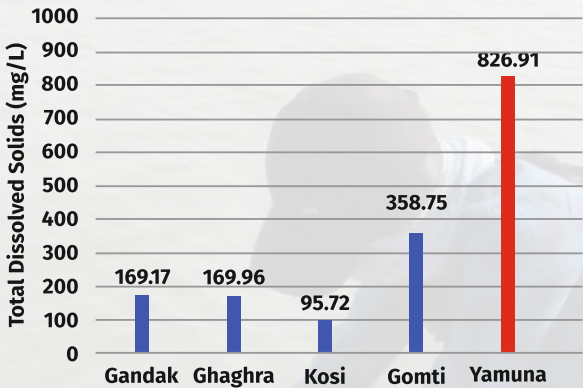
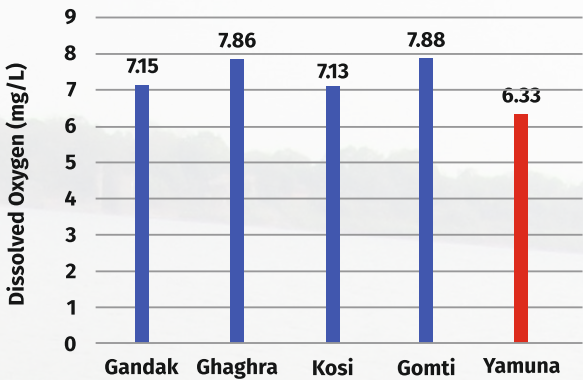


Figure 1: Water quality assessment of selected rivers of GRB.
*Red bar indicates the values exceeding the threshold range

COMPONENT - 2

CAPACITY BUILDING OF THE FOREST DEPARTMENT AND OTHER STAKEHOLDERS IN MANAGING AQUATIC AND WETLAND RESOURCES

1

SPEARHEAD TRAININGS

Two national-level trainings were conducted under the Spearhead Training initiative to enhance capacity in biodiversity conservation and sustainable practices. The training, conducted from March 5 to 7, 2024 with 47 participants, aimed at improving the competencies of university lecturers in aquatic ecosystem management. The second training, held from June 11 to 13, 2024 with 39 participants, focused on the Fisheries Department, aimed at integration of biodiversity protection with sustainable fisheries practices. Both trainings were crucial in developing competence among experts dedicated to the protection and restoration of the Ganga River Basin.



Hands-on training on bird monitoring



2

TRAINING WITH OTHER STAKEHOLDERS



Training of zoo staff, Nainital

Three trainings were organised and conducted both on-site and off-site. This encompassed collaborative workshops with Quantum University and targeted training for zookeepers at Nainital Zoo. These trainings were held between May and June 2024, with a total of 190 participants. These initiatives sought to improve conservation knowledge and practical skills for managing river biodiversity and wildlife, thereby significantly advancing capacity of stakeholders in the Ganga River Basin.

3

BAL GANGA PRAHARI CORNERS (GANGA AQUALIFE KNOWLEDGE CENTRE)

During the six-month period, three Bal Ganga Prahari Corners were established at Govt Girls Sr. Sec School, Kota, Rajasthan, Birla Vidya Niketan, Delhi, and GIC Patel Nagar, Dehradun. Notably, the corner at Birla Vidya Niketan was inaugurated on Otter Day, adding a special emphasis on otter conservation as part of the school's river conservation awareness efforts.

Date of inauguration	Name of school
15 th January	Govt Girls Sr. Sec. School, Kota, Rajasthan
2 nd April	GIC, Patel Nagar, Dehradun, Uttarakhand
29 th May	Birla Vidya Niketan, Delhi



4

BAL GANGA PRAHARI PROGRAMME



Through the Bal Ganga Prahari Program, several students were educated on the significance of river conservation and biodiversity. Between January and June 2024, 19 workshop were conducted in 5 states in which 2,394 students were sensitized. Students were instructed about the ecological importance of the Ganga River through several interactive sessions and activities, building a sense of responsibility for its preservation. These efforts aim to create a new generation of young conservationists dedicated to protecting the Ganga and its ecosystems.



Bal Ganga Prahari programme

COMPONENT - 3

DEVELOP COMMUNITY BASED AQUATIC SPECIES CONSERVATION AND OUTREACH PROGRAMMES FOR THE GANGA RIVER BASIN

1

ECOLOGICAL ASESMENT

Expanding the network of Ganga Prahari

The Ganga Prahari cadre has increased to 5,432 individuals in the Ganga River Basin, of which 3,516 are female. Capacity development workshops were conducted for the Ganga Prahari from 19 significant tributaries, sub-tributaries and newly identified Ganga Prahari from the Ganga mainstem. A total of 340 newly identified Ganga Prahari were inducted between January to June 2024, from various region within the Ganga River Basin and its tributaries, including sub-tributaries such as Dwarkeshwar, Noon, Rapti, Rispana and Subarnrekha.



Ganga Prahari conducting cleanliness drive

River wise Ganga Prahari distribution

Rivers	Female	Male	Total
Ajay	83	27	110
Noon	2		2
Bhagirathi	1	4	5
Chambal		1	1
Damodar	1	1	2
Dwarkeswar	1		1
Gandak	43	1	44
Ganga	58	14	72
Ghaghara	1	2	3
Hooghly	8	14	22
Kangasabati		2	2
Kiul		1	1
Kosi	27		27
Rapti		3	3
Rispana	3		3
Subarnarekha	23	2	25
Yamuna	8	9	17
Total	259	81	340



Single-use plastic waste received at segregation unit SDC, Dehradun

Engaging communities across the Ganga River Basin

A cumulative 765 activities, encompassing awareness programs, cleanliness drives, consultative meetings, plantation initiatives, livelihood training and activities, millet training and workshops, sensitization workshops, rescue and rehabilitation, focus group discussion, Ganga Prahari conclave, ecological surveys and socio-economic surveys were carried out across Ganga River Basin. More than 18,000 participants comprised of different categories, including local community, Ganga Praharis, Forest department officials, district administration officials and other line agencies, participated in these events.

Activities conducted from January to June 2024

Type of activities	No. of activities	No. of participants
Awareness programme (awareness programme, river walk, exhibition, exposure visit)	138	5612
Cleanliness drives	23	458
Consultative meetings	312	3048
Ecological survey (bird count)	1	9
Focus group discussion	14	281
Ganga Prahari conclave	1	380
Livelihood activities	110	2663
Livelihood training	32	1053
Millet training	2	55
Millet workshop	2	133
Plantation drives	2	106
Rescue & rehabilitation	1	5
Sensitisation and training workshops	29	853
Socio-economic survey	21	248
Special occasions and days celebrations	70	3399
Others	7	162
Total	765	18465

Empowering guardians of the Ganga

Under skill development activities 32 training sessions were conducted at various locations in the Ganga River Basin. A cumulative total of 1053 Ganag Praharis underwent comprehensive training in various fields, including Basket weaving, Bird watching, Candle, Dhoop and Incense Stick making, Herbal soap making, Millet Value addition, Organic color making and Sewing and Stitching.



Livelihood training	No. of training	No. of GPs trained
Basket weaving	1	27
Bird watching	1	17
Candle, dhoop and incense stick making	7	268
Herbal soap making	2	65
Millet value addition	3	160
Organic Colour and Incense Stick making	2	41
Sewing & Stitching	16	475
Total	32	1053



Fruit processing and value addition training at Uttarkashi

Collaborative efforts

From January to June 2024, Ganag Praharis, who underwent training, conducted a total 182 activities, with 149 categorized as input activities and 33 as

output activities. These activities encompassed initiatives such as awareness and cleanliness drives, consultative meetings, ecological monitoring, special days related to wildlife and environment, rescue and rehabilitation.

Activities by Ganga Praharis

Activities	Input		Output	
	No. of activities	Total participants	No. of activities	Total participants
Awareness activity	66	1863	8	119
Cleanliness drive	47	299	4	57
Consultative meetings	3	23		
Ecological monitoring	3	22	4	43
International yoga day celebration	2	101		
Monitoring of livelihood centre	2	70		
Participation in activities organized by other organizations			4	512
Participation in Republic day event	1	501		
Republic day celebration	1	40	1	32
Rescue & rehabilitation	5	21	9	34
World Earth day celebration	8	87	2	15
World turtle day celebration	2	42		
World wetland day celebration	3	135		
World wildlife day celebration	6	95	1	13
Total	149	3299	33	825

Microplanning initiatives

A total of three village level microplans have been prepared in Uttar Pradesh (Village Sonbarsha in District Chandauli and Village Nuwwawal in District Gorakhpur) and Himachal Pradesh (Village Rampur Ghat in District Sirmour).

Understanding community-river interactions

Participatory mapping of ecosystem services by local communities was carried out in eight districts of Bihar, three districts of Madhya Pradesh and four districts of Rajasthan. The pupose of this study is to assess the perceived dependency of local communities on the ecosystem services provided by rivers (such as the biotic and abiotic resources, cultural and religious services, dependence of agriculture, livestock and other village level economic constituents) and the change in the supply of these ecosystem services over the years and the consequent change in the livelihood.

Participatory mapping of ecosystem services

State	Districts	Rivers	No. of villages	No. of participants
Bihar	Begusarai, East Champaran, Jamui, Khagaria, Samastipur, Supaul, West Champaran, Vaishali	Ganga, Gandak, Kosi, Nagi, Budhi Gandak	15	197
Madhya Pradesh	Mandsaur, Sheopur, Morena	Chambal	4	62
Rajasthan	Kota, Chitthorgarh, Sawai Madhopur, Dhaulpur	Chambal, Brahmani	4	56



Understanding community-river interaction with villagers residing along the Chambal river

Jalmala samvaad:
A journey of
awareness and
education

From January to June 2024 total 4 Jalmala Samvaad were established in Uttar Pradesh and Uttarakhand. Through the Jalmala Samvaad 9312 students and 521 teachers were sensitized.



Activities	Location	School	Jalmala samvaad	River	Total students sensitized	Total teachers sensitized
Jalmala & workshop	Rudraprayag	Atal Utkrist Govt. Intermediate College	1	Ganga	670	24
Jalmala & workshop	Devprayag	Central Sanskrit University	1	Ganga	5950	453
Workshop	Paudi Garhwal	GIC Khirsu	0	Ganga	92	6
Jalmala & workshop	Narora	Irrigation IC	1	Ganga	1700	27
Workshop	Meerut	GIC Hastinapur	0	Ganga	150	3
Jalmala & workshop	Meerut	PKD IC, Hastinapur	1	Ganga	750	8
Total			4		9312	521



Awareness in action: Training and outreach

One teacher training workshop was carried out at D.I.E.T., Kanpur where 71 teachers were trained by team of Wildlife Institute of India. Also, outreach activities like community awareness and Nukkad natak were carried out at different locations along the Ganga River in the state of Uttarakhand and Uttar Pradesh. Through these activities, more than 2000 people were sensitized about the Ganga River and its species conservation.



Outreach activities carried out along the Ganga River

Activities	State	Locations	No. of Events	Type of participants	River	Total No. of participants
Community awareness	Uttarakhand	Rudraprayag and Devprayag	3	Tourist, pujaris, local communities and teachers	Ganga	157
Community awareness	Uttar Pradesh	Anubhuti Centre at Kanpur Zoo and Atal Ghat, Kanpur	3	Tourists	Ganga	260
Nukkad natak	Uttar Pradesh	Narora, Kashipur, Sambhal and Varanasi	4	Local communities	Ganga	1650
Total						2067

Education tour and celebration of Special days at Ganga Darpan Interpretation Center, Sarnath, Varanasi

Between January to June 2024, 407 participants including students, teachers and forest staff trainees from Odisha Forest Development Corporation were sensitized through educational tour at Ganga Darpan Interpretation Centre. At the centre, special days were celebrated in which more than 300 students, teachers, forest officials and rickshaw drivers participated.

Activity	Location	No. of events	Organization visiting	Participants	Total number
Educational Tour	Ganga Darpan Sarnath	4	D.I.E.T. Sarnath, Kasturba Vidyalaya, OFRC, Odhisa	Students & teachers, Forest staff trainees	407

Digital media - Blog articles

A total of 18 blog articles were published on the digital media platform between January 2024 and June 2024, attracting over 3,000 views and visitors during this period.



SPECIAL DAYS CELEBRATION

Under the Special Day Celebrations section, several significant environmental and cultural observances were noted, including World Wetland Day, National Youth Day, and Earth Day. The events featured interactive activities designed to enhance awareness of conservation issues, including many organisations highlighting the significance of maintaining natural resources and promoting for sustainable practices.

A total of 4,852 participants including students, teachers, Ganga Praharis and local community participated in the special day celebrations at the different locations of the Ganga River Basin states.

Day Celebrated	No. of participants
National youth day	247
Republic day	459
State bird festival 2024	355
World wetland day	511
World wildlife day	25
International women's day	104
International day of action for rivers	103
International children's book day	80
World Earth day	455
Endangered species day	75
International day of biological diversity	647
World turtle day	325
World otter day	35
World environment day	1037
International yoga day	275
World migratory bird day	119
Total	4852



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NOTE

NOTE



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

NMCG

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