

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

Project Progress Report

BIHAR

JANUARY - DECEMBER 2023

नमो
गंगे



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

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Content



01

**ECOLOGICAL
SURVEY**



06

**GENETIC
ASSESSMENT**



07

**ECO-TOXICOLOGICAL
ASSESSMENT**



08

**COMMUNITY
CONSERVATION
INITIATIVES**



13

**MISSION LIFESTYLE
FOR ENVIRONMENT
(LiFE) CAMPAIGN**

1. ECOLOGICAL SURVEY

Effective conservation of aquatic ecosystems at a riverscape level demands meticulous planning grounded in a robust ecological understanding, aligned with socio-economic goals, and fortified by substantial socio-political support. The primary goal of this project is to augment conservation efforts in specified locations along the main stem of the Ganga River and expand these activities to the basin level. In pursuit of this objective, the lead teams from the Wildlife Institute of India, which include officials from the state Forest Department and the scientific team from the Ganga Aqualife Conservation Monitoring Centre, are actively engaged in activities such as training, ecological surveys, and initiatives to enhance the livelihoods and skills of local communities. These endeavours aim to contribute to biodiversity conservation and the maintenance of ecosystem services, with the overarching aim of achieving a cleaner Ganga. Following which major tributaries and sub-tributaries of Ganga falling in the state of Bihar were surveyed between January 2023 and November 2023.



1.1. Ganga River

From February to March 2023, an in-depth biodiversity survey was conducted along the Ganga River, covering a total stretch of 430 km between Buxar and Manihari in Bihar. The survey documented 810 Gangetic dolphin, 59 species of water and water-associated birds, along with 33 species of grassland and terrestrial birds. Additionally, the survey yielded documentation of 45 species of fish fauna in the river.

1.2. Ghaghra River

During March-April 2023, an extensive biodiversity survey was conducted along the Ghaghra River to evaluate riparian biodiversity. Additionally, a visual survey was undertaken via boat between Guthani and Revelganj at the Ganga confluence, covering a span of 100 kilometers. The survey documented a total of 188 Gangetic Dolphins and 2029 water birds representing 35 different species.



1.3. Gandak River

An intensive biodiversity survey was carried out during the month of March, 2023 in the Gandak River from Valmikinagar to Sonapur. A boat-based visual survey was performed covering a distance of 290 km. A total of 159 visual sightings of Gangetic Dolphins were recorded, along with 108 sightings of Gharials, 17 sightings of Mugger, 651 sightings of Freshwater Turtles of which 633 individuals were *Pangshura* sp., and 18 individuals were *Nilssonina gangetica* and 45 species of water and water-associated bird fauna was documented.

1.4. Bagmati River

In February 2022, a prompt biodiversity assessment of the Bagmati River was initiated. The survey spanned from Jagmohra to the Bagmati-Kosi confluence, covering a linear distance of 100 kilometers. This ecological assessment documented 68 visual sightings of Gangetic dolphins, 39 species of water birds, and two individuals of gharials. Notably, the survey marked the first recorded occurrence of the Grey Plover in the Ganga basin.

1.5. Population status of Gangetic dolphin

The Gangetic dolphin is a top predator which influences the food chain structure, thereby plays a critical role in maintaining the vital ecological processes of the river ecosystems and serve as a potential indicator for monitoring status of river health. Historically, the species was commonly distributed in major river systems between longitudes 77°E and 89°E in India, Nepal and Bangladesh, now restricted to disjunct stretches of the Ganga-Brahmaputra-Barak River system in India from the estuarine deltas upstream till Himalayan foothills Karnali, Sapta Koshi and Narayani River systems in Nepal and Meghna, Karnaphuli, Sangu rivers systems in Bangladesh. The Gangetic dolphin owing to these threats experienced a ~30% decline in population and a range reduction between the late 19th and early 21st century. Surveys were conducted in rivers having presence of Gangetic dolphin and population was estimated using N-mixture model (Das et al., 2022) (Table 1)

Table 1: Gangetic dolphin population in the Bihar State

State	River	Population	Minimum	Maximum	Stretch
Bihar	Ganga	548	375	756	Sitabdiara-Manihari
	Gandak	143	83	222	Mangalpur-Baghachaur khas and Amwakhas to Ganga confluence
	Kosi	311	209	434	Piprahi to Kursela
	Bagmati	120	81	168	Jagmohra- Kosi confluence
	Mahananda	156	103	220	Damdama-Kumedpur bridge
		1278	851	1800	
Uttar Pradesh-Bihar	Ganga	262	233	286	Buxar-Sitabdiara
	Ghaghra	188	143	236	Guthani-Revalganj
	Gandak	26	11	46	Valmikinagar-Badahari-Mangalpur & Amwakhas to Baghachaur khas
		476	387	568	
Bihar-Jharkhand	Ganga	53	34	76	Manihari-Gadai
Bihar-West Bengal	Mahananda	39	27	54	Kumedpur bridge-Parbhaluka
		92	61	130	



1.6 Nesting survey

The river islands were searched for nesting occurrence of the island nesting birds, during June 2023. In the Ganga River, of the total 20 island searched, nesting events of Little tern, Small pratincole and Black-winged stilt were observed on the four islands. While in the Gandak River, 15 river islands were searched in a survey covering a distance of 260 km from Paniahawa to Sonepur (Gandak-Ganga confluence). However, no direct sighting of eggs or nests of any waterbirds was observed in this stretch of the river as most of the river islands were submerged due to irregular water discharge from the Valmikinagar barrage. Twenty-one fledglings of Small pratincole was recorded from a single island.

1.7 Amphibian survey

Eight sampling sites were surveyed between Sitabdiara to Farakka along the Ganga River, adopting on foot visual encounter survey. Three amphibian species representing two families (Bufonidae, Dicroglossidae) was recorded. We recorded 133 individuals of Skittering frog (*Euphlyctis cyanophlyctis*), followed by an Indian bull frog (*Hoplobatrachus tigerinus*) (13 individuals) and one Common Asian toad (*Duttaphrynus melanostictus*) in this stretch of the river.

From the Gandak River, Indian bull frog (*Hoplobatrachus tigerinus*) and Skittering frog (*Euphlyctis cyanophlyctis*) representing family Dicroglossidae were documented. Skittering frog was

most abundant (105 individuals) than the Indian bull frog (8 individuals) in the surveyed stretch.

1.8. Conservation Priority Stretches (CPS)

In light of the increasing demand for river resources and the growing threats to freshwater ecosystems, it is crucial to prioritize the conservation Priority Stretches (CPS). This is essential to prevent habitat degradation and species loss. Managing interventions in these extensive river stretches is complicated due to the intricate relationship between societal dependence and human impacts on riverine ecosystems.

We employed a flagship-cum-indicator species-based approach to identify conservation priority stretches. This approach primarily involves species of conservation significance and considers ecological integrity criteria. Within the rivers displaying suitable habitats, the Ganga River exhibited the most extensive contiguous and highly suitable river segment, followed by the confluence areas of the Ganga River with its tributaries (Table 2 and Fig. 1). The identified river stretches with high biodiversity value present an opportunity for targeted conservation efforts, offering solutions to preserve optimal sections of rivers for sustained ecosystem services. This framework can serve as a model for biodiversity conservation while simultaneously meeting societal needs, ensuring the connection between natural resources and human ecological requirements is maintained.

Table 2: Conservation Priority Stretches in the state of Bihar

State	River	CPS-1 Length (km)	Districts in Bihar
Bihar	Ganga	160	Buxar, Saran, Patna, and Bhagalpur
	Son	5	Bhojpur and Patna
	Gandak	5	Saran and Vaishali
	Kosi	70	Saharasa, Samastipur and Khagaria
	Bagmati	50	Samastipur and Khagaria
	Total	290	

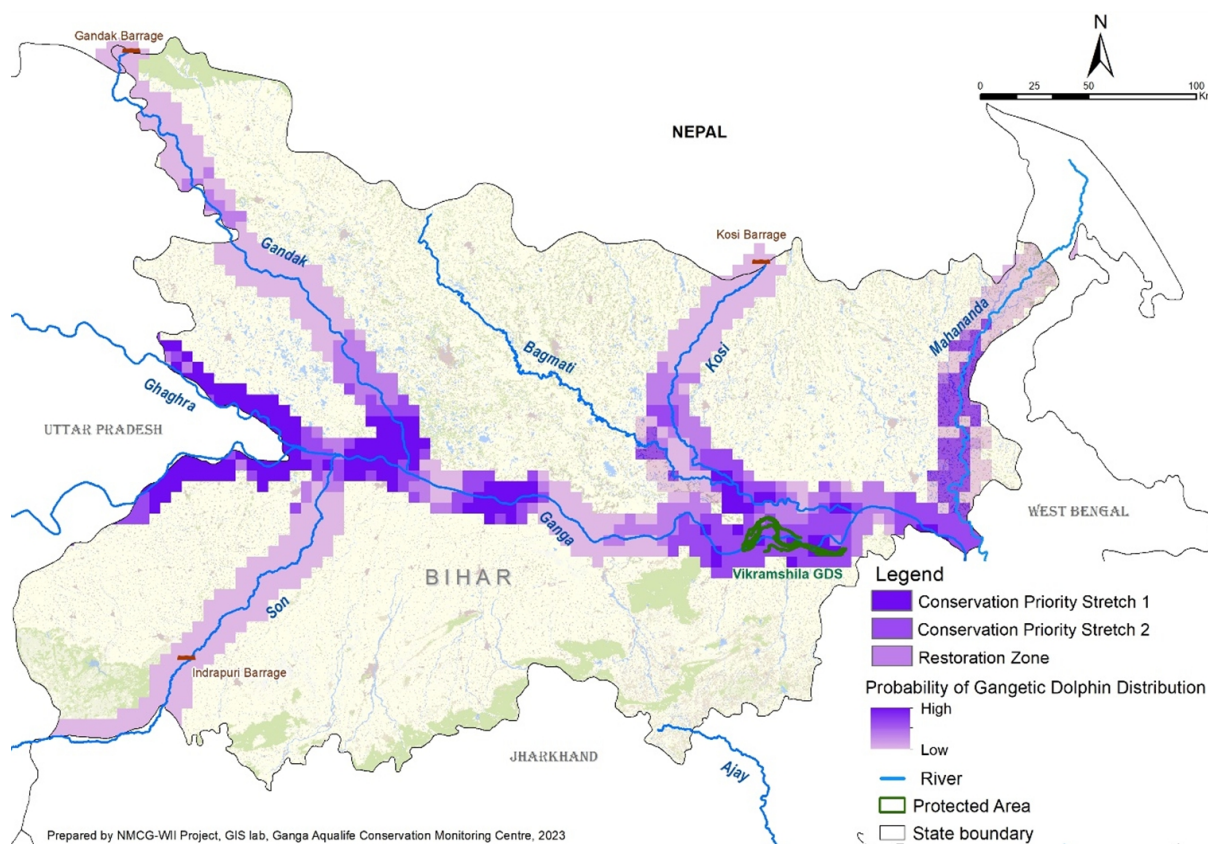


Figure 1: Conservation Priority Stretches in Bihar

1.9 Vegetation survey

About 50 km of the Son river in Bihar was surveyed for aquatic plants during January 2023. From 59 sampling points, about 300 species were recorded. The Asteraceae, Fabaceae, Poaceae and Acanthaceae were the dominant families. Most of the species were herbs, followed by shrubs, trees and grasses (Figure 2). More than 50% of the species were riparian, 25% were marshy and only 19.9% were aquatic (Figure 3). Medicinal plants such as *Ehretia aspera*, *Cyperus rotundus*, *Centella asiatica*, *Murraya koenigii* were documented along the Son River. Four weed species were also documented from the surveyed length of the Son River (*Xanthium strumarium*, *Argemone mexicana*, *Mecardonia procumbens* and *Wedelia chinensis*).

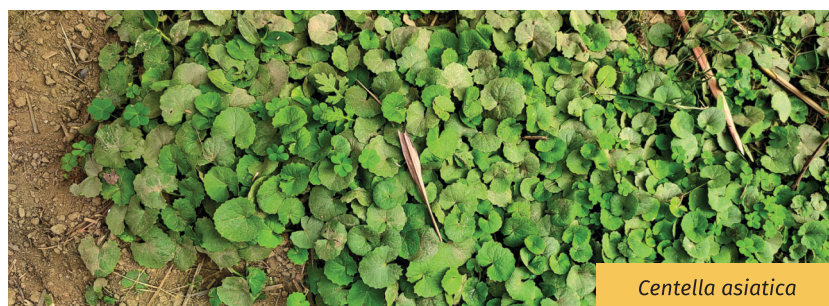


Figure 2:
Habit of the
plant species
documented
along the
Son River

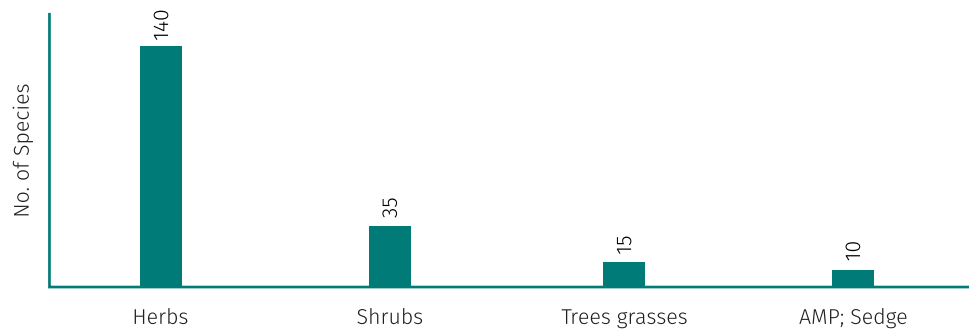
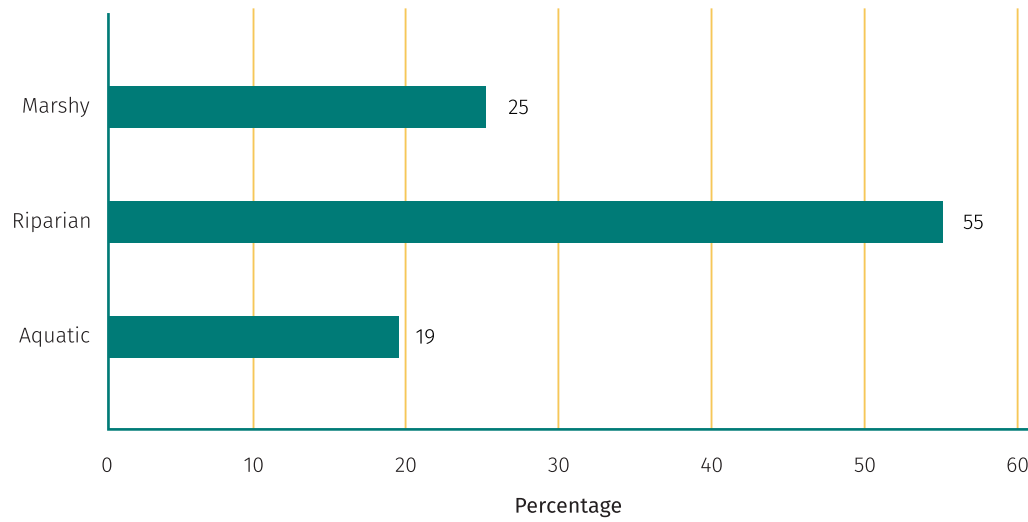


Figure 3:
Habitat of the
plant species
documented
along the
Son River



2. GENETIC ASSESSMENT

Understanding of the genetic diversity, gene flow patterns, and the necessity for long-term monitoring of threatened aquatic fauna is crucial for informing effective conservation and management strategies. In alignment with the project's objectives, we systematically collected biological samples from strategically chosen sampling sites in Kosi, Gandak and Ganga rivers for the genetic assessment. This initiative serves as a crucial step toward establishing a robust foundation for the conservation and sustainable management of native species, contributing to the overall preservation of aquatic ecosystems in the region.

In the Kosi River, 115 biological samples were collected from upper, middle, and lower stretches covering six sites revealed 47 fish species. Meanwhile, in the Gandak River, 143 samples from five sites included 24 fish species and five turtle samples. Additionally, 22 samples were included from the Ganga River represent 8 selected fish species. An integrated approach was adopted to determine the diversity of fish fauna from the studied rivers. Genetic barcoding using targeted gene of all identified species was performed to established species specific genetic signature. In addition, detail genetic analysis of few selected species was focused for enabling a comparative analysis of genetic variations with the other river data. The generated genetic data provides insights into their genetic makeup and diversity. Furthermore, comparative analysis of genetic variations, revealing high genetic diversity in the studied river species with significant gene flow. The resulting information will be utilized to assess the genetic structure and spatial connectivity of aquatic biodiversity and highlights ecological implications.



3.

ECO-TOXICOLOGICAL ASSESSMENT

During the period between January 2023 and November 2023 ecotoxicological surveys were conducted in the Ganga, Ghaghra, Kosi, Gandak and Son rivers.



The purpose of this survey was to conduct water quality monitoring and gather abiotic and biotic samples from the Ganga (N=12), Kosi (N = 5), Ghaghra (N=9), Gandak (N=8), and Sone (N=3). A total of 210 samples of surface water, sediment, fish, and macro invertebrates were collected during the survey, and the samples are currently undergoing processing and analysis. The resulting information will be utilized to assess the risk of Contaminants of Emerging Concerns (CECs), such as pharmaceuticals, personal care products, heavy metals, and Persistent Organic Pollutants to the biodiversity and ecology of the concerned rivers. Biotic samples collected from various trophic levels will be used to study the bio accumulation and species-specific distribution of CECs, along with the bio magnification potential in the freshwater food web.

Eco-toxicological survey was conducted at Vikramshila Dolphin Sanctuary. The collected samples (N=110) included surface water, sediment, aquatic insects, and prey species of the Gangetic dolphin, forming part of the non-invasive monitoring strategy and bio magnification potential assessment of CECs in the freshwater food web.

4. COMMUNITY CONSERVATION INITIATIVES

In Phase-I, a cadre comprising 389 individuals (comprising 60 females and 329 males) of Ganga Praharis established in Bihar state has seamlessly transitioned into Phase-II. Additionally, an augment of 423 Ganga Praharis (comprising 155 females and 268 males) has been integrated into the cadres till November 2023, emanating from various regions within the Ganga River and its tributaries, including Ghaghra, Gandak, Kosi, Son, Mahananda and three sub-tributaries (Burhi Gandak, Chandan and Kiul). These dedicated Ganga Praharis are strategically distributed across 20 districts of Bihar. Notably, an additional 43 Ganga Praharis (comprising 22 females and 21 males) have been inducted to the cadre from January to November 2023.

A cumulative total of 306 activities, encompassing awareness programs, cleanliness drives, plantation initiatives, sensitisation workshops, consultative meetings, livelihood training sessions, cultural activities, and ecological surveys were diligently carried out across 29 districts of Bihar across the Ganga River basin by the Wildlife Institute of India (WII). Approximately 6,243 participants, predominantly comprised of different stakeholder categories, including local community representatives, Ganga Praharis, Forest department officials, district administration officials, NGOs and other line agencies, participated in these events.



Awareness Programmes

Table 2: Activities conducted in Bihar

Type of Activities	No. of Activities	Participants
Awareness programme	53	2405
Cleanliness drives	3	83
Consultative meetings	121	794
Days celebration	2	61
Livelihood activities	44	1012
Livelihood training	11	385
Orientation programme	4	41
Plantation drive	1	40
Socio-economic survey	40	241
Others	27	1181
Total	306	6243



Consultative Meeting



Awareness Programmes



Socio-economic survey conducted by Ganga Praharis



Consultative Meeting

Thirteen distinct training programs were launched in Bihar, each functioning as a specialised platform for skill development. Across these training sessions conducted at diverse locations, a cumulative total of 362 Ganga Praharis underwent comprehensive training in a range of fields, including Bamboo

Products making, Organic Soap making and sewing and stitching. Furthermore, Ganga Prahari's active participation in Jalaj initiatives played a pivotal role in establishing additional opportunities geared towards cultivating self-sufficiency and independence, aligning with the Arth Ganga initiative.

Table 3: Skill development trainings

Type of Trainings	No. of Trainings	Nos. of Persons trained
Bamboo Products Training	1	13
Herbal Soap Making	2	62
Sewing & Stitching	10	287
Total	13	362



Herbal Soap making training



Herbal Soap making training

From January to November 2023, Ganga Praharis, who underwent training, conducted a total of 114 activities, with 47 categorised as input activities and 67 as output activities. These activities encompassed

initiatives such as awareness and cleanliness drives, tree plantation, livelihood development, assistance in ecological monitoring and ecological surveys, and microplan data collection, rescue, and rehabilitation.

Table 4: Activities initiated by Ganga Praharis

Type of Activities	Input		Output	
	No. of Activities	Participants	No. of Activities	Participants
Awareness activity	27	1164	38	2399
Cleanliness drive	7	185	4	159
Consultative meetings	2	4	-	-
Days celebration	2	80	1	15
Dolphin day celebration	1	16	2	52
Ecological monitoring & survey	1	10	11	86
Participation in activities organized by other organizations	-	-	4	246
Plantation programme	5	52	2	36
Rescue & rehabilitation	1	6	2	15
Others	1	21	3	756
Total	47	1538	67	3764



Sewing and Stitching Training



Sewing and Stitching Training



Cleanliness Drive



Wetland Day Celebration



LIFE Exhibition organised by Ganga Praharis

5.

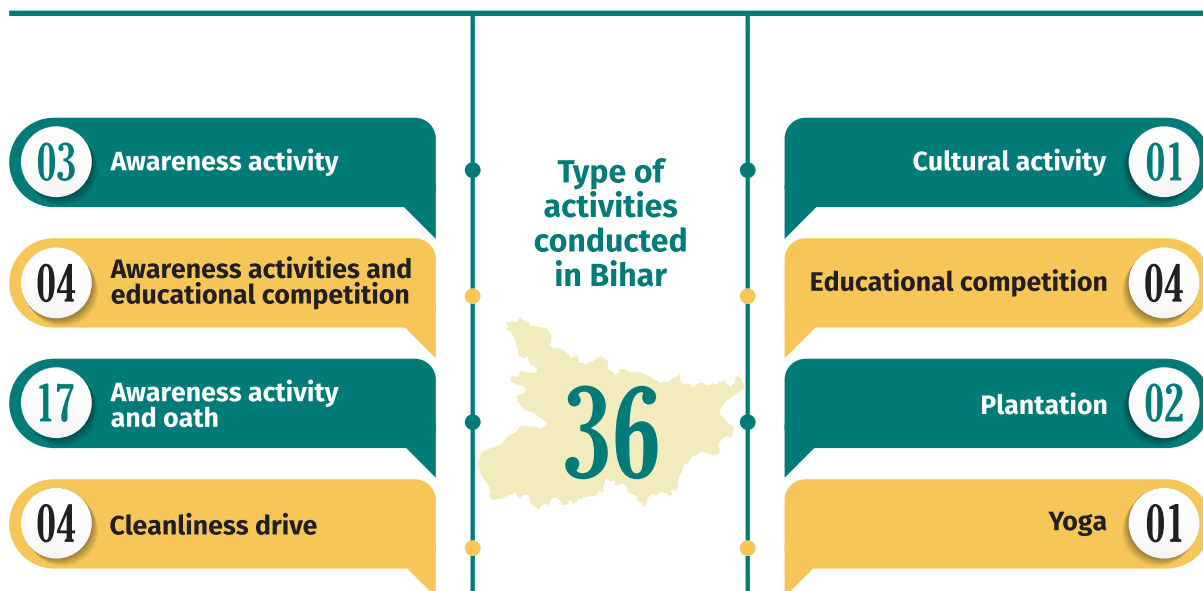
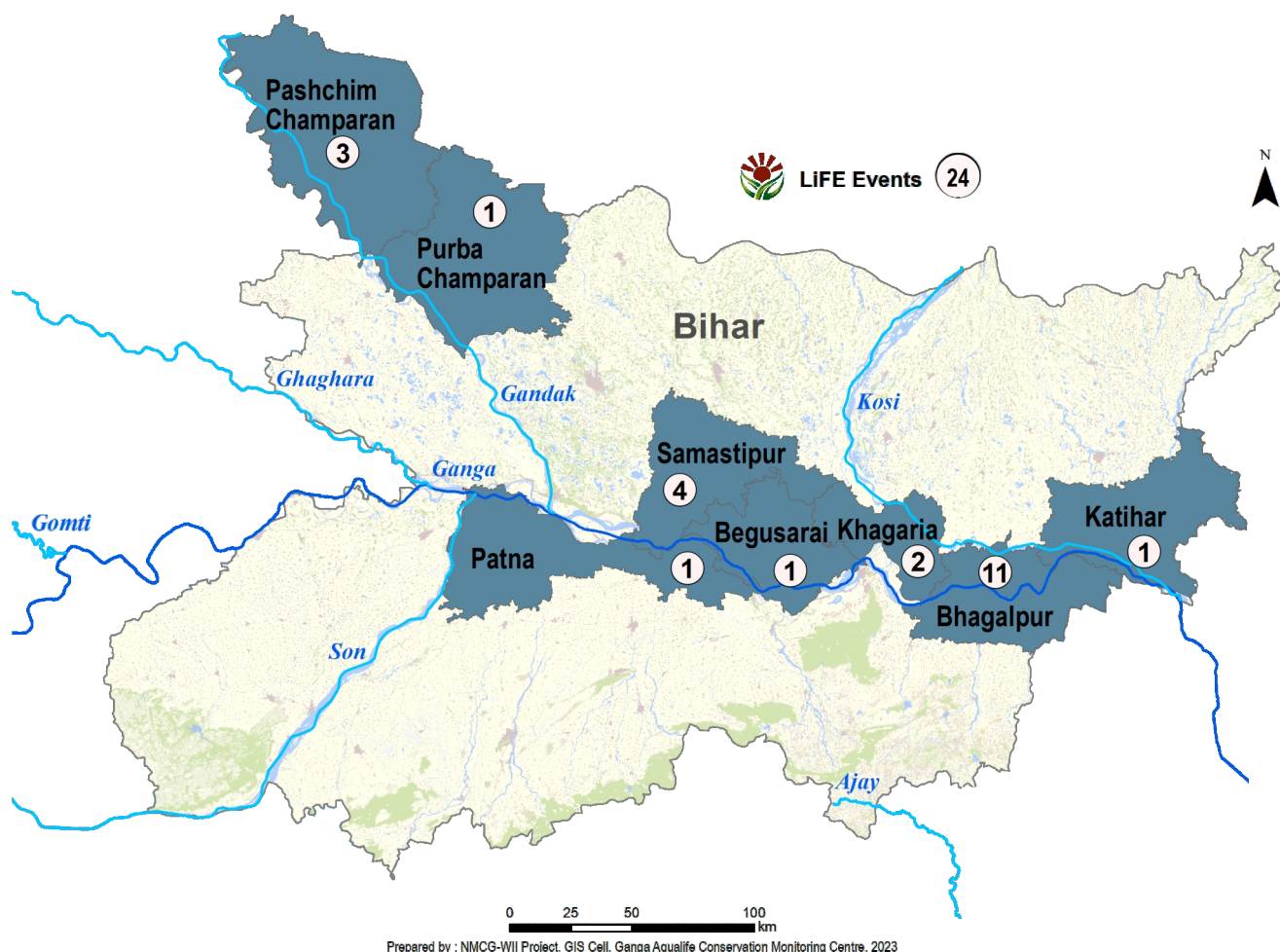
MISSION LIFESTYLE FOR ENVIRONMENT (LiFE) CAMPAIGN

A series of events were conducted in eight districts of Bihar, namely Bhagalpur, Samastipur, Purba Champaran, Khagaria, Patna, Purba Champaran, Begusarai, and Katihar, in which about 1,298 people participated and sensitised about the Mission LiFE campaign, its objectives and theme and the Ganga River conservation value. A wide range of stakeholders, including youths, local communities, tourists, students, teachers, local administrations, and the MLAs, were engaged in these programmes through awareness activities, educational competitions, youga and cleanliness drives.



Educational competitions, such as drawing, painting, elocution, slogans, and quizzes, were organised to actively involve school students and youth. Yoga sessions were organised to promote a healthy lifestyle among the participants. An exhibition was organised at Simaria Ghat in Begusarai to sensitise tourists and local communities and promote the utilisation of eco-friendly products crafted by local

communities and Ganga Praharis. Additionally, participants spearheaded cleanliness drives to amplify the message of refraining from using plastic and striving for a cleaner environment. Participants also pledged to adopt healthy and eco-friendly lifestyles and contribute to conserving biodiversity and the environment.



692 Bhagalpur

214 Samastipur

144 Paschim Champaran

100 Khagaria

People's
participation
in the
Districts of
Bihar

1298

Patna 46

Purba Champaran 44

Begusarai 38

Katihar 20



IN NEWS

अंतरराष्ट्रीय योग दिवस की पूर्व संध्या पर योगाभ्यास

सन्मार्ग/नवगछिया। भारतीय वन्यजीव संस्थान देहरादून के तत्वावधान में इस्माइलपुर गंगा घाट पर गंगा प्रहरी राहुल कुमार राज के नेतृत्व में अंतरराष्ट्रीय योग दिवस की पूर्व संध्या पर विभिन्न जगहों पर योगाभ्यास कार्यक्रम आयोजित किया गया। इस बाबत राहुल कुमार राज ने बताया कि नियमित योग करने वाले



व्यक्तियों के लिए योगाभ्यास एक बहुत ही अच्छा अभ्यास है। यह स्वस्थ जीवनशैली तथा बेहतर जीवन जीने में हमारी काफी सहायता करता है। वहीं उन्होंने कहा कि योग वह क्रिया है, जिसके अन्तर्गत शरीर के विभिन्न भागों को एक साथ लाकर शरीर, मस्तिष्क और आत्मा को संतुलित करने का कार्य करता है। यह तनाव कम करने में मदद करता है। तनाव का होना इन दिनों एक आम बात है, जिससे शरीर और मन पर विनाशकारी प्रभाव पड़ता है। तनाव के कारण लोगों को सोते समय दर्द, गर्दन का दर्द, पीठ दर्द, सिरदर्द, तेजी से दिल का धड़कना, हथेलियों में पसीने आना, असंतोष, क्रोध, अनिद्रा और ध्यान केंद्रित करने में असमर्थता जैसी गंभीर समस्याएं पैदा होती हैं। समय गुजरने के साथ इन प्रकार की समस्याओं का इलाज करने में योग वास्तव में प्रभावी है। यह एक व्यक्ति को ध्यान और साँस लेने के व्यायाम से तनाव कम करने में मदद करता है और एक व्यक्ति के मानसिक कल्याण में सुधार करता है। नियमित अभ्यास मानसिक स्पष्टता और शांति बनाता है। इससे मन को आराम मिलता है। मौके पर वार्ड सदस्य पंकज कुमार यादव, डुबेश रॉय, मिथिलेश कुमार मिट्टू, छोटू कुमार, संदीप कुमार, दीपक कुमार और राज कुमार सहित दर्जनों युवा मौजूद थे।

दैनिक भास्कर

भागलपुर 22-03-2023

पेंटिंग प्रतियोगिता में 55 बच्चे हुए शामिल

भास्कर न्यूज़ | नवगछिया

पर्यावरण जागरूकता अभियान के तहत नवगछिया में पेंटिंग प्रतियोगिता हुई। इसमें 55 बच्चों ने भाग लिया। भारतीय वन्य जीव संस्थान के गंगा प्रहरी राहुल कुमार राज ने बताया कि प्रतियोगिता का मुख्य उद्देश्य सभी प्रकार के वनों के महत्व के बारे में जागरूकता बढ़ाना है। पेड़ों के महत्व के बारे में लोगों को जागरूक कर वर्तमान और आने वाली पीढ़ियों के लाभ के साथ समुदायों के बीच मूल्यों के महत्व और पृथ्वी पर जीवन चक्र को संतुलित करने के लिए आयोजन किया गया। कार्यक्रम में जोनी कुमारी की अगुवाई में पेंटिंग प्रतियोगिता हुई। इसमें दीपक कुमार, राजकुमार चंदन कुमार, सिपक कुमार, रंजन कुमार, मनोष कुमार सहित 55 प्रतिभागियों ने हिस्सा लिया।

4

दैनिक जागरण

भागलपुर, 18 जून, 2023

www

मगरमच्छ के जबड़े से बचने के लिए अंगूठे से दबाएं उसकी आंख को : राहुल

संसू नवगछिया : भारतीय वन्य जीव संस्थान के तत्वावधान में इस्माइलपुर प्रखंड में गंगा प्रहरी राहुल कुमार राज के नेतृत्व में विश्व मगरमच्छ दिवस मनाया गया। राहुल कुमार राज ने बताया कि हिंदू धर्मग्रंथों में देवी गंगा का वाहन मगरमच्छ है, जो जलीय प्राणियों में सर्वाधिक शक्तिशाली और परम वेगवान माना गया है। मगरमच्छ एक प्रतीक है, जो बताता है हमें जल में रहने वाले हर जीव की रक्षा करनी चाहिए।



समारोह पूर्वक मनाया गया विश्व मगरमच्छ दिवस

सन्मार्ग/नवगछिया। भारतीय वन्य जीव संस्थान के तत्वावधान में इस्माइलपुर प्रखंड में गंगा प्रहरी राहुल कुमार राज के नेतृत्व में विश्व मगरमच्छ दिवस देवी गंगा का वाहन मगरमच्छ है, जो जलीय प्राणियों में सर्वाधिक शक्तिशाली और परम वेगवान माना गया है। मगरमच्छ एक प्रतीक है, जो बताता है हमें जल में रहने वाले हर प्राणी की रक्षा करनी चाहिए। उसकी अनुपस्थिति में पारिस्थितिक तंत्र बिगड़ जाएगा। कार्यक्रम में सुबोध कुमार, दिलकुश कुमार, गौतम कुमार, जोनी कुमारी, दीपक कुमार और राजकुमार सहित दर्जनों युवा मौजूद थे।

इस्माइलपुर में योगाभ्यास कार्यक्रम आयोजित

नवगछिया : भारतीय वन्यजीव संस्थान देहरादून के तत्वावधान में इस्माइलपुर प्रखंड में गंगा प्रहरी राहुल कुमार राज के नेतृत्व में अंतरराष्ट्रीय योग दिवस की पूर्व संध्या पर इस्माइलपुर घाट सहित विभिन्न जगहों पर योगाभ्यास कार्यक्रम का आयोजन किया गया। कार्यक्रम में पंकज कुमार यादव, डुबेश रॉय, मिथिलेश कुमार मिट्टू आदि थे। (संसू)



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