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# WETLAND MONITORING AND MANAGEMENT

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## Giant Reed Infestation in Wetlands; Challenges and Opportunities

**Dr. Dipesh Kumar**

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### Abstract

Wetlands are considered the *kidneys of the Earth* and extend numerous ecological and economic services to humankind. Along with other anthropogenic threats, infestations of invasive flora and fauna have threatened the very existence of such delicate ecosystems. The Global Invasive Species Database has identified *A. donax* as one of the 100 worst invasive species of the present times. Like other invasive plants, there are only a few management options for *A. donax* infestations; however, the efficacy and techno-economic viability of the management options necessitate a careful examination of all alternative options. Some of the available and emerging valorization and management options are discussed in the article.

**Keywords:** Wetland, *A. donax*, Invasive Species, Valorization, Bioenergy, Biorefinery



Giant Reed Infestation in Kabartal, Begusarai, Bihar

## 1. Introduction

The ongoing climate catastrophe is one of the most pressing challenges of the 21<sup>st</sup> century. Besides altering the historical ranges of the climatic factors, climate change has had numerous indirect and ripple effects on several climatic variables. While techno-economically viable remedies for some of the direct/indirect impacts of the crises are yet to be developed, it is likely that many of the indirect effects are yet to be identified/unfold.

The edaphoclimatic conditions primarily dictate the geospatial distribution of flora and fauna. However, this delicate natural balance seems to have been disturbed by the prevailing crisis. This has led to heightened threats of extinction for some biological species that grow in very narrow ranges. Adding to the woes, the unplanned and unscientific (often accidental) introductions of flora and fauna from their natural ranges to other parts of the world seem to have severely impacted the local biodiversity in many biogeographical realms. Globalization and climate change have exacerbated the intensity of biological invasions. Invasive species can have a profound negative impact on biodiversity, ecosystem services and functioning, human health and well-being, and the economy. The impact of biological invasions on the economy is twofold: the economic damages attributed to the invasion of agricultural and other productive ecosystems and the associated costs incurred in the control and management of invasion. Diagne et al. (2021) estimate a minimum economic cost of US\$ 1.28 trillion from 1970-2017 and an annual mean cost of around US\$162.7 billion in 2017.

*A. donax* is a very tall (up to 6 m tall) and robust bamboo-like perennial grass with large clumps of thick culms. The leaves are about 5 cm wide and 30-61 cm long and are arranged prominently in two alternate ranks on the culms (similar to those of maize plants). The leaf's margins have high silicon deposits (an adaptation to keep grazing in check) and can easily cut careless hands. The flowering is usually in late summer, with 0.3-0.6 m long inflorescence conspicuously appearing above the foliage. The reproduction in *A. donax* is through rhizomes (asexual). After establishment, it forms large, continuous, clonal root masses that may sometimes cover several acres of land (Fig. 1). A hydrophyte, *A. donax*, grows best in well-drained and nitrogen-rich soils. It can be seen growing in areas where the water table is either at the ground level or very near to it. As a result, large establishments of *A. donax*

plantations are found in floodplains and wetlands, and it is capable of withstanding high disturbance dynamics typical of riparian systems. It can withstand salinity and flourishes in many soil types, including heavy clays and loose sands. Some common names of *A. donax* are Giant Cane, Elephant Grass, Arundo, Wild Cane, and Giant Reed. In Hindi, it is known as Narkat. It is native to Greater Middle East and is naturalized in various parts of the world, including tropics, sub-tropics and mild-temperate areas in both hemispheres.



**Fig. 1** *Arundo Donax*

*A. donax* plantations compete with local vegetation for nutrients, moisture, sunlight and space, and may eventually displace them. It can interfere with flood control measures taken along the riparian ecosystems. The biomass dries out in the summers and is highly flammable, which increases the likelihood and intensity of fire. Considering its hardy nature, *A. donax* can recover from fire 3-4 times faster than native flora while the latter perishes, further strengthening the establishment of an invasive regime. With its rapid growth rate, estimated 2-5 times faster than native competitors, and vegetative reproduction, it can quickly invade new areas and form pure stands. Once established, *A. donax* can outcompete and completely suppress native vegetation, reduce habitat for wildlife, and inflict drastic ecological change. Once established, *A. donax* can utterly outcompete and inhibit natural vegetation, diminish wildlife habitat, and cause profound ecological changes.

Due to its remarkable adaptability to diverse edaphoclimatic conditions, high growth rate, and ability to outcompete the local vegetation, *A. donax* has become a nuisance species. The Global Invasive Species Database has identified *A. donax* as one of the 100 worst invasive species of the present times. Like other invasive plants, there are only a few management options for *A. donax* infestations; however, the efficacy and techno-economic viability of the management options necessitate a careful examination of all alternative options. Some of the available and emerging valorization and management options are discussed below:

## 2. Management and Valorization Options

The preceding discussions show that *A. donax* possesses all the traits necessary for growth and survival in various climatic conditions. It can easily outcompete the local vegetation in most places, especially areas where water availability is not an issue. The valorization of Giant Reed biomass in rural Indian settings is limited to the utility of immature green leaves as fodder and the stem as construction material in low-value applications.

As part of chemical treatment, herbicides such as glyphosate and fluazifop can be applied as a foliar spray or as a cut stump after flowering. However, in the case of wetlands, the use of chemical herbicides is not advisable as their impacts on other vegetation cannot be precluded. Hand pulling, burning and cutting are some of the physical treatments. Small infestations can be removed by hand pulling, but eliminating all rhizomes is essential to ensure a successful operation. Burning, as stated above, is not recommended. Cutting is also not recommended unless the rhizomes are dug up and removed. It has been reported that native species (flora and fauna) do not possess significant control potential for *A. donax*. Some insects (including corn borers, spider mites, aphids, leafhoppers etc.) are known to feed on the leaves of *A. donax*, but all of these are also known to affect various staple crops, including wheat and maize. In addition to these, several diseases have also been reported (including root rot, lesions, crown rust, stem speckle etc.), but these do not seem to have any adverse impact on the growth of *A. donax*. In many areas of California, Angora and Spanish goats have shown the potential to graze the infestations of *A. donax* (Global Invasive Species Database (2023)). Some other biological control agents with integrated management plans are being tested for efficacy.

In the absence of any established control mechanism, the most plausible option is the valorization of biomass for various value-added applications. The fast growth rate and adaptability to a wide range of ecological conditions make it an attractive source of biomass for industrial applications. The tolerance of *A. donax* to a wide variety and concentrations of contaminants also justifies its application in phytoremediation. More recently, there has been a growing technical understanding of biomass processing in a biorefinery regime, and a few practices have also taken shape on the ground. The idea of a biorefinery is akin to a petroleum refinery wherein multiple value-added products are derived from biomass by exploiting the diversity of molecular composition and alternative processing pathways. Some potential valorization options (Fig. 2) are discussed below.

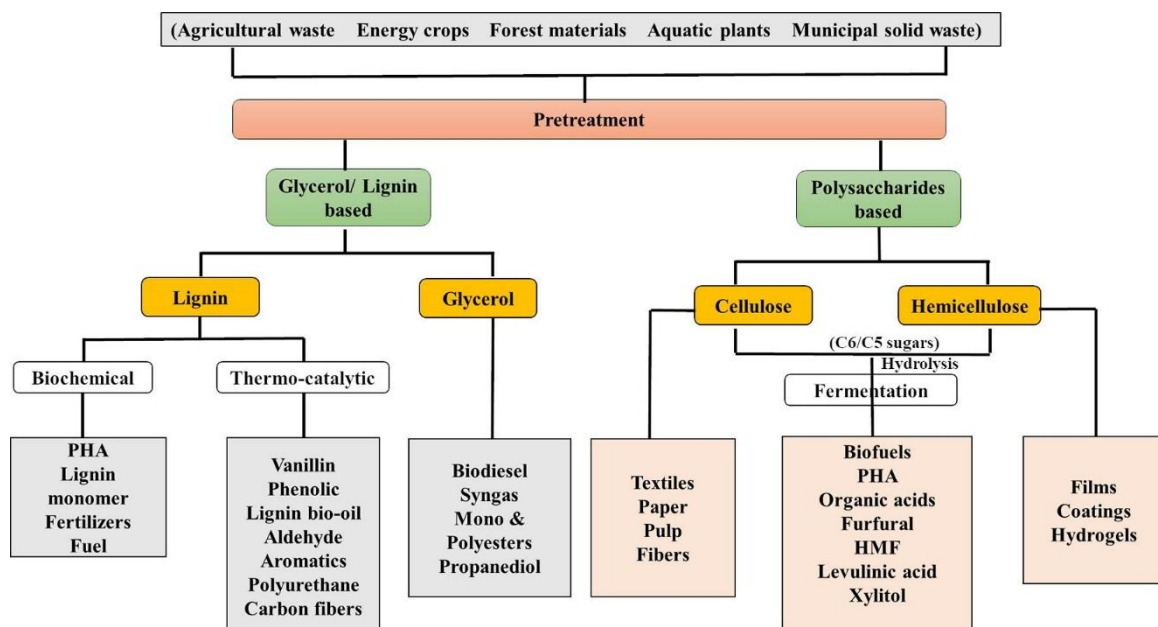


Fig. 2. A potential scheme for a biorefinery regime (Singh et al. 2022)

## 2.1. Bioenergy

Biomass-based energy currently provides for approximately 10% of the global primary energy supplies and can contribute up to 1/3<sup>rd</sup> of the supplies in future. India's Intended Nationally Determined Contributions submitted to UNFCCC identifies bioenergy as important in meeting our commitments. In addition, to supplying zero-carbon energy, bioenergy plantations also contribute to sequestering significant amounts of airborne carbon into terrestrial and aquatic biomass.



Some of the prominent advantages of bioenergy are energy security (local production opportunity), carbon neutrality (subject to the emissions associated with land use and land cover changes), and potential utility in a biorefinery regime. An ideal bioenergy crop should possess certain traits, including a high growth rate, high phenotypic plasticity, desirable biomolecular composition, and low demand for water, space, nutrients, and pesticides, among a few others. The relative suitability of different bioenergy crops can be gauged from proximate, ultimate and elemental analysis of samples.

Compared to traditional energy crops, *A. donax* produces more biomass per unit area. However, the yield depends on several factors, such as the age of the plants, agronomic practices, pedo-climatic conditions, and age. As a result, the literature survey suggests high variability in reported yield (Table 1). Yields as high as over 150 Mg ha<sup>-1</sup> have been reported for wild fields in tropical countries (Some parts of the USA and India). The data presented in table form is primarily derived from temperate and Mediterranean regions of the world.

Table 1. : The yield of *A. donax* biomass in different parts of the world

Country	Agronomy	Dry Biomass (Mg ha <sup>-1</sup> )	Reference
USA	Wild Population	171	Spencer et al. (2006)
USA	Wild Population	155	Giessow et al. (2011)
India	Wild Population	36-167	Sharma et al. (1998)
Australia	Crop on Saline Soil	29-45.2	Williams et al. (2008)
Greece	Crop	30-40	Papazoglou et al. (2007)
Spain	Crop (yield in 3 <sup>rd</sup> year)	45.9	Hidalgo and Fernandez (2000)
Greece	Crop	15.6	Soldatos et al. (2004)
Southern Italy	Wild Population	26-37	Cosentino et al. (2008)
Southern Italy	Crop (yield in 3 <sup>rd</sup> year)	38.8	Mantineo et al. (2009)
Southern Italy	Crop (yield in 4 <sup>th</sup> year)	34.9	Mantineo et al. (2009)

As reported, the higher heating value of Giant Reed ( $18.7 \pm 1.2$  MJ kg<sup>-1</sup>) is comparable to those of other herbaceous grasses, including switchgrass (19.1 MJ kg<sup>-1</sup>) and miscanthus (18.7 MJ kg<sup>-1</sup>), and woody plants such as poplar (19.5 MJ kg<sup>-1</sup>). Likewise, compared to the conventional bioenergy plants/crops, the areal productivity of the Giant Reed is also higher. This translates into a much higher

(45-70%) areal energy density ( $\text{MJ/ha}^{-1}$ ) in temperate areas. Clearly, owing to the substantially higher areal productivity, the potential of Giant Reed is tremendously high in the tropics. The results of proximate (moisture 8.2%, ash 5%, volatile matter 68.4% and fixed carbon content 18.4%) and ultimate analysis (Carbon 42.7%, Hydrogen 7.5%, Nitrogen 0.8%, Oxygen 48.7%, and Sulphur content 0.2%) are also encouraging and comparable to miscanthus (Jeguirim et al. 2010).

A survey of the literature indicates the potential utility of Giant reed in the production of different forms of biofuels (biogas *via* anaerobic digestion, second-generation bioethanol *via* fermentation, and syngas *via* pyrolysis/gasification) or as a fuel wood (in the form of pellets/briquettes *via* direct combustion). Co-firing of biomass in thermal power plants is also in practice and is gaining momentum.

## 2.2. Phytoremediation Potential of *A. donax*

*A. donax* has been used to phytoremediate soil contaminated by Mercury, Cadmium, Chromium, Arsenic, Lead, Nickel, Manganese, Zinc, and Iron (Corno et al. 2014). In addition, *A. donax* has also been used in the removal of heavy metals from urban wastewater (Mandi and Abissy 2000) and industrial effluents rich in synthetic dye (malachite green) (Zhang et al. 2008).

A vertical flow type constructed wetland planted with *A. donax* could remove the organic loading (applied at 80-120 g COD/ $\text{m}^2/\text{day}$ ) of crocodile farm wastewater by up to 68-77%. Likewise, at a total Kjeldahl nitrogen (TKN) loading of 30 mg/L, the corresponding uptake of TKN by biomass was 82-86% (Sudha and Vasudevan 2009).

The advantages of phytoremediation are low cost, simple operation and environment friendliness. However, the disposal of heavy metal-infested biomass can be troublesome. It is worth mentioning that heavy metals are indestructible and non-biodegradable, unlike organic pollutants. As a result, proper disposal and/or valorization strategy is indispensable. In cases where biomass infested with heavy metals is valorized for other value-added applications, the chances of heavy metal-infested biomass becoming a secondary source of pollution is very high.

### 2.3. Other Applications

The potential application of *A. donax* biomass as a natural food packaging material has also been shown. Crystalline and thermally-stable cellulosic fractions obtained from the *A. donax* biomass were homogeneously dispersed in water, and the packaging film was sufficiently transparent and exhibited superior mechanical and water barrier properties (Sanz M et al. 2018)

In another study, Rodriguez J et al. 2013 examined the physical and mechanical characteristics of different parts of the *A. donax* biomass to evaluate their utility as an alternative insulating fibreboard in the building sector. All the examined physical, mechanical and thermal properties of the fibreboard derived from *A. donax* biomass were comparable to other biomass-based fibreboards. However, the expansion of bioenergy plantations and their end use may directly or indirectly impact land-use land cover (LULC) and biodiversity, issues that must be appraised.

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**About Author:**

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## Seasonal and Temporal Changes in Lake Baraila; a Time Series Analysis

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### Abstract

Baraila wetland complex is an important wetland-based hydrological regime in the Vaishali district of Bihar. The wetland complex hosts a notified bird sanctuary and offers numerous ecosystem services of local and regional significance. The present investigation attempts to examine the pre and post-monsoonal changes in the wetland complex using satellite imagery for the period 1988-2022. Significant transitions in the areas under open water, marshes, agriculture and fellow land have been noticed. Significant changes in areas under different land use categories are apparent apart from seasonal changes. Along with the infestation of Giant Reed (*A. donax*), increasing land transitions towards agriculture and settlement highlight the plight of the wetland.

**Keywords:** Wetland, Geospatial Analysis, *A. donax*, Ecosystem Services

### 1. Introduction

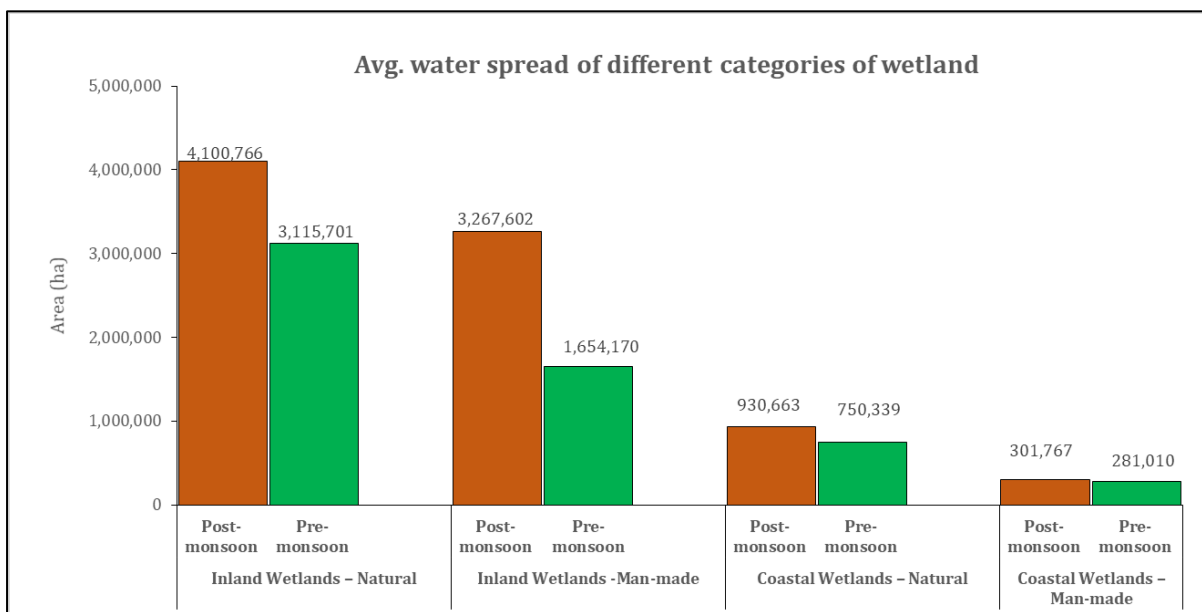
One of the most important natural resources on Earth is wetlands. Transitional between land and water, wetlands are one of the most prolific ecosystems on Earth and are labelled “kidneys of the Earth”. Wetland ecosystem biodiversity varies worldwide; it includes the variety of living creatures, the level of genetic variation, and the abundance of various habitats within a given ecosystem (Alam 2014). On February 1, 1982, India ratified the "Convention on Wetlands," also known as the "Ramsar Convention." Since then, it has designated 75 wetlands totalling a geographical spread of 13,26,677 hectares. India currently holds the top spot in South Asia and third place overall in Asia in terms of designated sites (<https://indianwetlands.in/>). With about 130 cm of rain falling annually, India supports a variety of distinctive wetland habitats, including high-altitude lakes in the Himalayas, wetlands in the flood plains of the main river systems, saline and temporary wetlands in dry and semi-arid regions, coastal wetlands such as lagoons, backwaters and estuaries; mangrove swamps; coral reefs and marine

wetlands etc. (Sarkar and Borah, 2017). The country has 19 types of wetlands. Gujarat has the maximum area, followed by Andhra Pradesh, Uttar Pradesh and West Bengal. (Arya, Joshi, Bachheti, and Deepti, 2020). The average spread of water in various categories of wetlands in India has been represented graphically in **Fig. 3**. The data has been acquired from the Wetlands of India Portal. Inland wetlands have traditionally been the backbone of agriculture practised in the Ganga-Brahmaputra floodplains. They not only act as major flood defence systems but are also used to meet domestic water supply demands. Primarily an agricultural economy, India's dependency on water resources is high. Monsoon floodwaters in the northern alluvial plains were diverted, making riverine agriculture possible. In contrast, the Deccan Plateau of peninsular India lacked many perennial rivers and relied on the tradition of building tanks to store rainfall. Reservoirs and embankments constructed post-independence continued to serve the purpose. The strategy of 'developing' water resources gave shape to man-made wetlands, reservoirs, and barrages that have gained significance due to increased control over water supplies (Kumar & Kaul, 2022). For instance, Udayamarthandapuram, a human-made wetland type, is one of the important Birds Sanctuaries in Tamil Nadu, stores floodwaters during monsoon overflows and maintains surface water flow during drier periods.

In Bihar, the total estimated area of wetlands is 403,209 ha (NWIA 2011), which is approximately 2.64% of the total wetland area of India. Wetlands in Bihar are locally called Chaur, Maun, Taal, Jheel, and Pats. The natural inland wetlands dominate the landscape in Bihar, comprising about 92% of the total estimated area of the wetlands of Bihar, while the artificial area accounts for 3.5%, and the small wetlands (area of 1–2.5ha) account for 4.5% (NWIA 2011). The major rivers contributing to different wetlands in Bihar are Ganga, Kosi, Gandak, Bagmati, Mahananda, and Kamla-Balan (Ghosh et al. 2004).

Periodic monitoring of wetlands through geospatial techniques offers tremendous benefits and has now become a routine exercise. However, despite geospatial mapping and monitoring overshadowing other monitoring tools, there are several important wetlands which have not received due attention. The eastern state of Bihar in India is endowed with a rich diversity of wetlands, and unfortunately, a majority of the published literature has only focused on Kabrtal wetland, which is the only Ramsar site

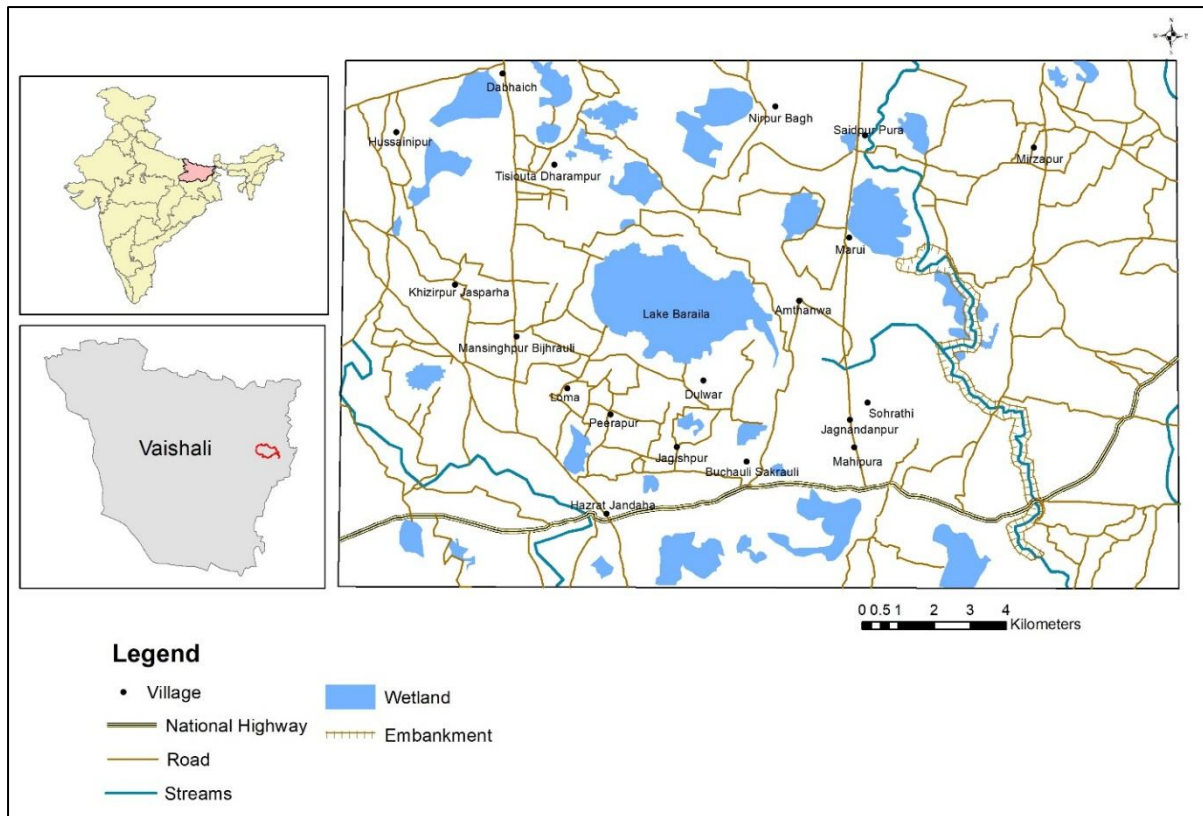
in Bihar. Baraila wetland is a seasonally flooded area located in the lower Gangetic plains of the Vaishali district, Bihar. Taking note of the rich diversity of the avian population, it has been designated as a bird sanctuary (Salim Ali Jubba Sahni Bird Sanctuary). The current study is an attempt to highlight the case of Baraila Wetland, which is also a potential Ramsar site in Vaishali, Bihar. The present investigation attempts to examine the seasonal and temporal change in Lake Baraila during the past 30 years.



**Fig. 3** Average Water Spread in different wetland categories of India (<https://indianwetlands.in/>)

## 2. Study Area

The Baraila wetland complex (**Fig. 4**) is a seasonally flooded area located in the lower Gangetic plains of the Vaishali district, Bihar. It has an aggregate area of 12.7 Km<sup>2</sup> located between 25°45'58 & 25°45'37 North latitude and between 85°31'48 & 85°34'50 East longitude. Also known as Tal Baraila, it forms a large ecologically diverse wetland complex which feeds more than 10 small wetlands (**Fig. 4**).



**Fig. 4-** Tal Baraila complex

### 3. Methodology

#### 3.1. Data Collection

**Table 2** gives a piece of comprehensive information on the imageries considered in the study. The relevant spatial data was collected for 1988- 2022. All the satellite images (Landsat 4-5 TM; 1988, 2009) (Landsat 8 OLI/ TIRS; 2022) were downloaded from the USGS earth explorer website.

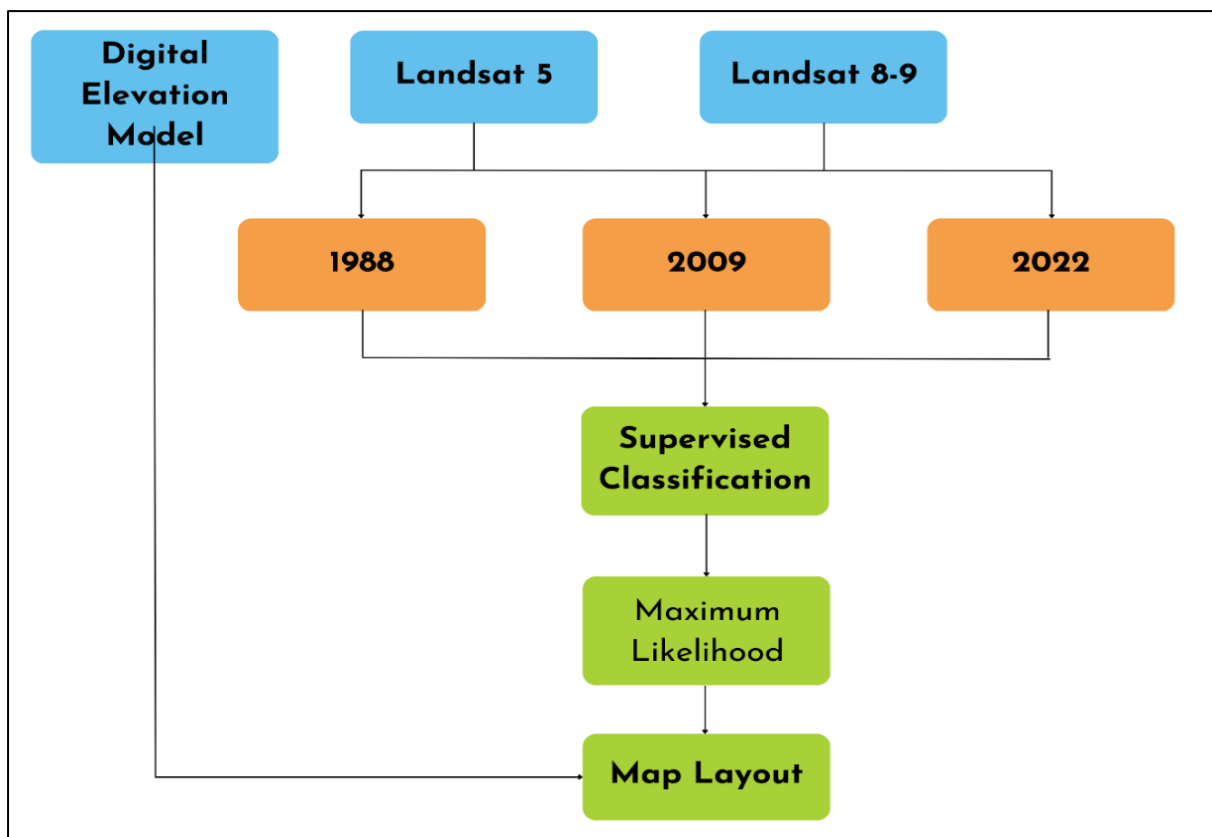
**Table 2-** The satellite data and sources remotely sensed images used

Lake	Satellite	Date of Acquisition		Source
		Pre-Monsoon	Post Monsoon	
Lake Baraila	Landsat 8-9 TM/C1/L-1	2022-02-28	2022-10-26	USGS Earth Explorer ( <a href="https://earthexplorer.usgs.gov/">https://earthexplorer.usgs.gov/</a> )
		2009-02-08	2009-10-22	
	Landsat 4-5 TM/C1/L-1	1988-01-30	1988-10-12	



### 3.2. Image Processing

To analyze the wetland, the initial method used for the project was to collect data from the USGS earth explorer to gain spatial information. To determine the fluctuation, data from 3 years, that is, 1988, 2009, and 2022, has been considered. For the land use land cover classification and map interpretation, the Landsat 4-5 and Landsat 8 satellite imagery have been used. The database creation was done with the help of GIS software ArcGIS 10.4. Digital Elevation Models (DEM) imagery has been used to study the catchment area delineation with an enhanced resolution from 30 m to 10 m using ASTER global DEM V3. **Fig. 5** presents a summarized flow chart for the method followed in the study. Supervised classification using Maximum Likelihood Algorithm (MLA) was employed to detect spatiotemporal changes in land use land cover (LULC). It gives an extensive classification of the LULC of the study area as (1) Open water, (2) Agricultural, (3) Vegetation, (4) Settlement, (5) Marshes, and (6) Current Fallow.



**Fig. 5-** Flow Chart showing the methodology adopted in the study

#### 4. Results and Discussion

Lake Baraila plays a significant ecological role through its hydrological, wetland and aquatic regimes. The seasonally flooded lake is considered an eco-sensitive zone as it acts as a shock absorber and functions as a transition zone from areas of high protection to areas of lesser protection. Due to its rich biodiversity, keeping the conservation aspects in mind, the Government of Bihar declared the lake a sanctuary in 1997. However, it was published in the Gazette of India as Salim Ali Jubba Sahni Bird Sanctuary in 2016. Baraila Jheel has a maximum length and width of 5.39 km and 3.6 km, respectively. The surrounding areas of the wetland elevate in a range of 42-48 m above mean sea level (AMSL), as evident from **Fig. 6**. The catchment slopes from northwest to southeast and the elevation of the river system ranges from 13-33 m (AMSL), gently sloping towards the south and southeast. Precipitation and nearby feeding channels play a critical role in structuring the rich aquatic diversity of the Jheel.

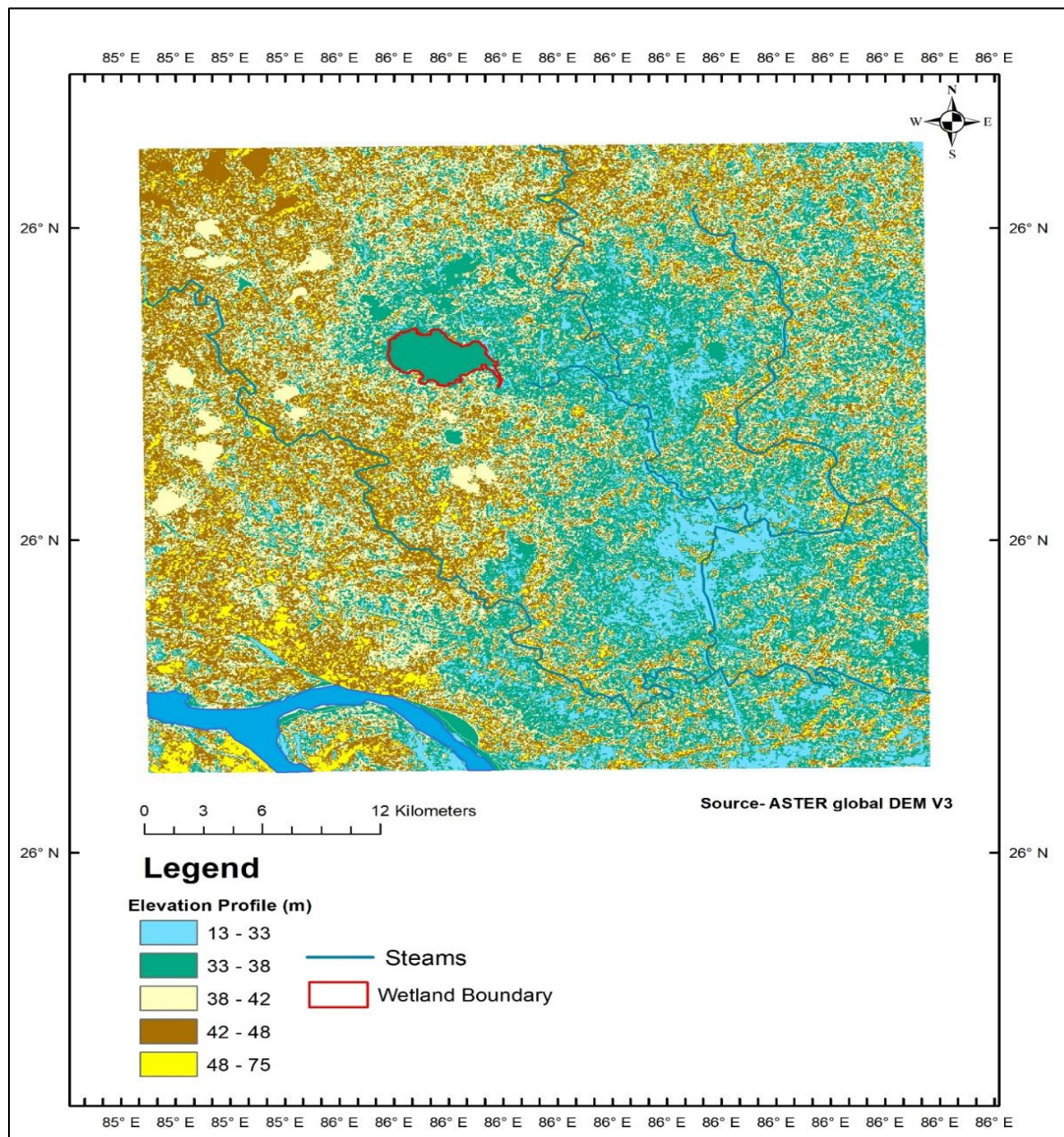
In Baraila, the water flows through various local channels, including the Noon River, and drains to the Burhi Gandak River. The Gandak Canal and the Baya River are other water sources in the sanctuary. This hydrological exchange makes Baraila wetland a seasonally flooded aquatic ecosystem. Under the dynamic land-use and land-cover (LULC) scenario, the wetland and its catchment have significant relation and inter-dependency on each other. In this study, images of the years 1988, 2009 and 2022 of the lake have been taken into consideration to examine temporal change in seasonal variation. Located in a rural setting, agricultural activities predominate in the area. During the pre-monsoon period, most dried regions of the wetland are converted to active farmland and may involve an intensive withdrawal of ground and surface water from the wetland regime. The pasturelands surrounding the wetland have seasonal significance, which also impacts the area of settlement. During the late monsoon season, when the water recedes (significant observation viewed in the year 2009), it led to an extension of agriculture within the wetland. There are substantial impacts on associated land use due to changing dynamics of the core area due to various anthropogenic actions. Livelihood activities in the area of influence, like agriculture and fisheries, have a major impact on Baraila Lake, which alters the wetland dynamics. For example, as per the study by Kumari et al. (2023), water quality parameters such as

chloride and fluoride levels exceed the standard limits prescribed. The overall deterioration of the water quality adversely affects the biodiversity within and across the wetland. An increase in settlement has been observed in the considerate time period. Settlements accumulation can be observed around the wetland during the pre-monsoon period, which signifies a direct dependence on the wetland in the dry season and can also be termed as the 'area of influence' since any land use change in that area has a direct impact on the wetland.

Additionally, during the post-monsoon season, there is a minor decrease in the number of settlements across the area. The probable reason could be the area being highly flood-prone. In 1988, the post-monsoonal period witnessed a decline in agricultural production. Rainfall has a direct impact on the wetland. The entire wetland becomes marshy, and aquatic grasses and other types of seasonal vegetation in the pre-monsoon season replace the wetland vegetation. After the advent of the monsoon at the end of June, the sanctuary receives water from the catchment area and gets inundated. A significant change in land use was observed in 2009. The year witnessed the onset of relatively scanty spells of monsoon and marked an increase in area under the agriculture and open water category. Also, huge fragments of the catchment turned into barren land, replacing agricultural fields as limited water availability exposed the silt/sand. Hence the seasonal changes had numerous direct and indirect impacts on the core and buffer areas. It also led to compromised ecosystem services and the benefits people receive from wetlands.

Tal Baraila is a nested socio-ecological functional system of Vaishali district of Bihar. The social construct of the ecological character of wetlands reflects its interlinkages with livelihood systems and thereby provides key insights into the ways ecological characters connect with livelihood capitals, institutions and, finally, human- well-being. The wetland supports the livelihood of hundreds of people every day. However, an increasing population and encroachment threaten degradation both directly and indirectly. In addition, the variations in climatic conditions, especially rainfall and temperature, which are crucial for maintaining water levels, are another vital factor for the degradation of wetlands. High diversity of invasive species of plants, such as Narkat grass or Giant reed (*Arundo donax*), was

observed within the eco-sensitive Zone of Baraila Lake. In addition to this, many brick manufacturing units, poultry farms, and cattle grazing pressure were witnessed.

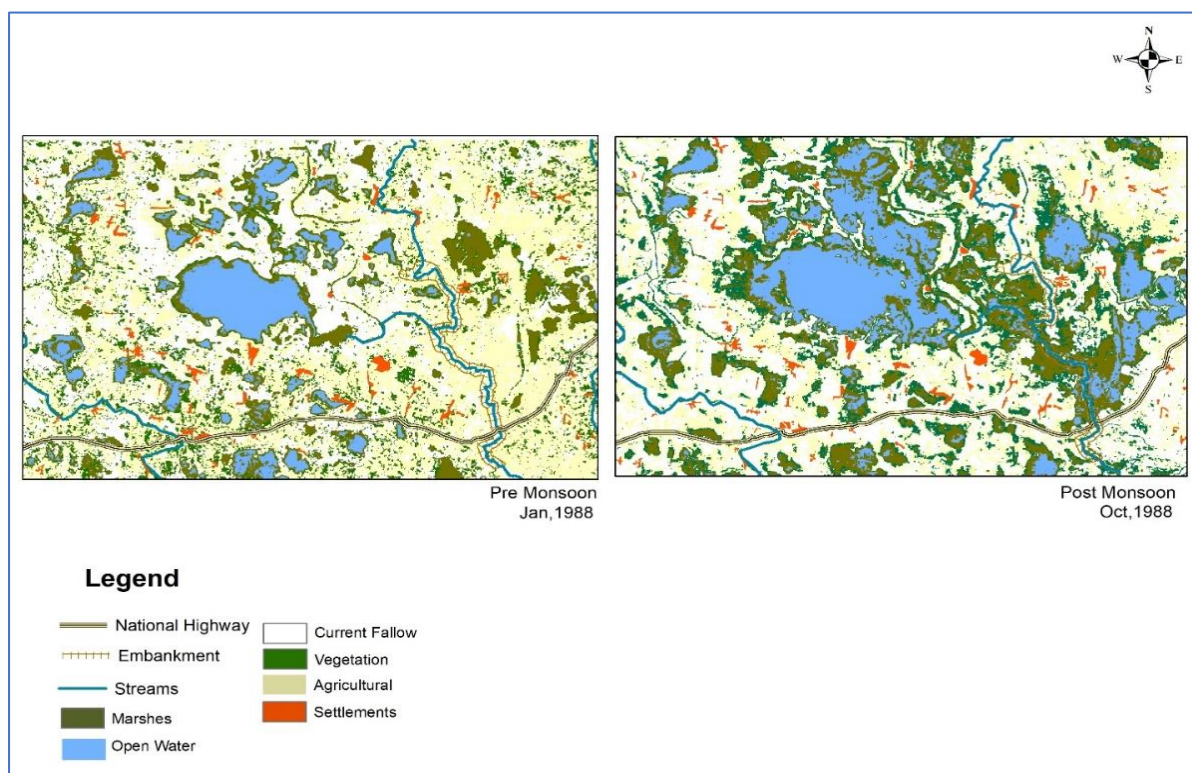


**Fig. 6.** Slope map of Baraila Wetland Complex and catchment area

During 1998, the post-monsoon period witnessed a significant decline (49%) in area under agriculture/fallow land and settlements (37%) (**Fig. 7**). During the same period, an increase in area under open water (24%) and marshes (23%) was noticed. As stated earlier, the monsoonal rainfall in 2009 (**Fig. 8**) was much lower than the average values, and consequently, the area under open water

and marshes were reduced drastically. Those dependent on fisheries and related activities had to switch to other livelihood opportunities. This also led to intensive agricultural practices in core and buffer areas of the wetland, and accordingly, the ecosystem services were compromised. The nesting and roosting sites of local and migratory birds were remarkably reduced. Fortunately, the regular to near regular onset of monsoon from 2015 onwards led to the restoration of many of the services of local and regional significance. The same was revealed during the analysis of imagery for 2022 (**Fig. 9**). A steep rise (135%) in areas classified under the open water category was evident during the post-monsoon period of 2022. A proportionate reduction in other land use land cover categories was obvious.

Nonetheless, the area under the open water category during the pre-monsoon decreased from 504 to 202 ha between 1988 and 2022. The corresponding decrease in the open water category during the post-monsoon period was limited to 150 ha. Infestation of Giant Reed is widespread in the area, and being an invasive weed, it can outcompete the local vegetation for space, nutrients and moisture. The first and foremost management actions should be based on the removal of strands of Giant reed.



**Fig. 7.** LULC map of pre and post-monsoon seasons of Baraila Wetland Complex in 1988

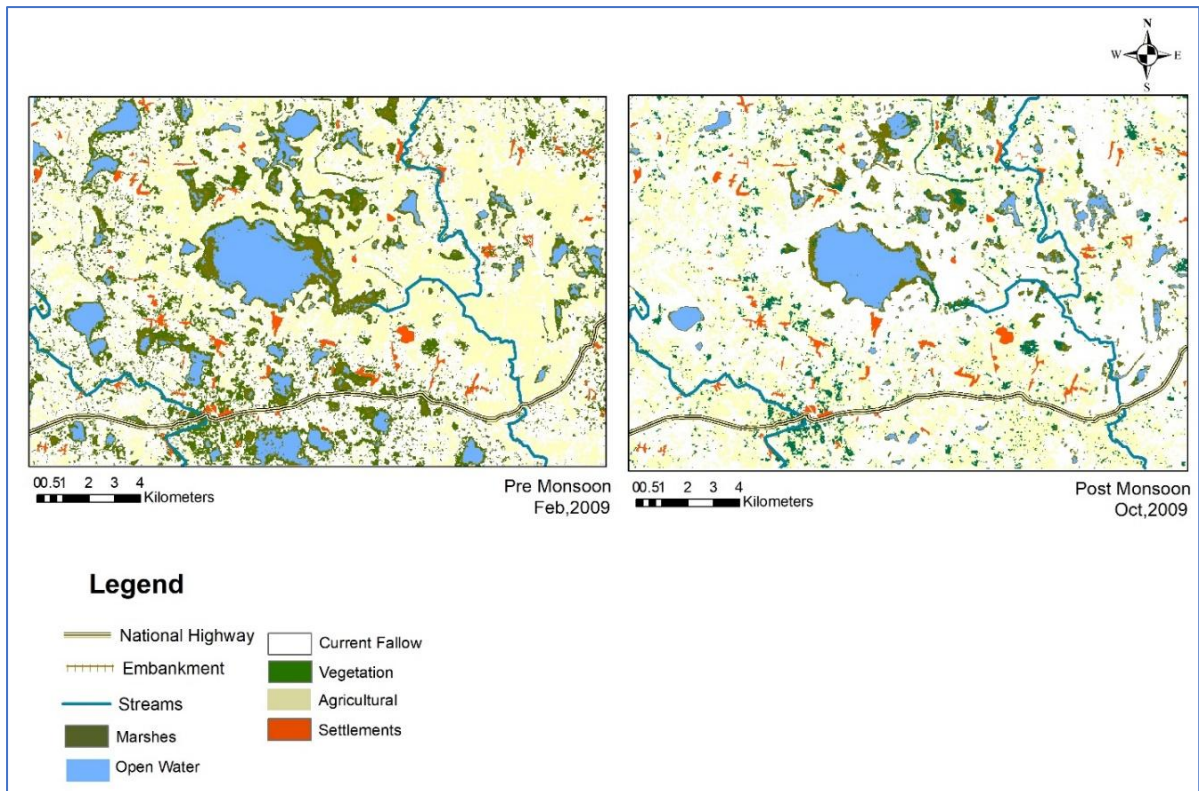


Fig. 8. LULC map of pre and post-monsoon seasons of Baraila Wetland Complex in 2009

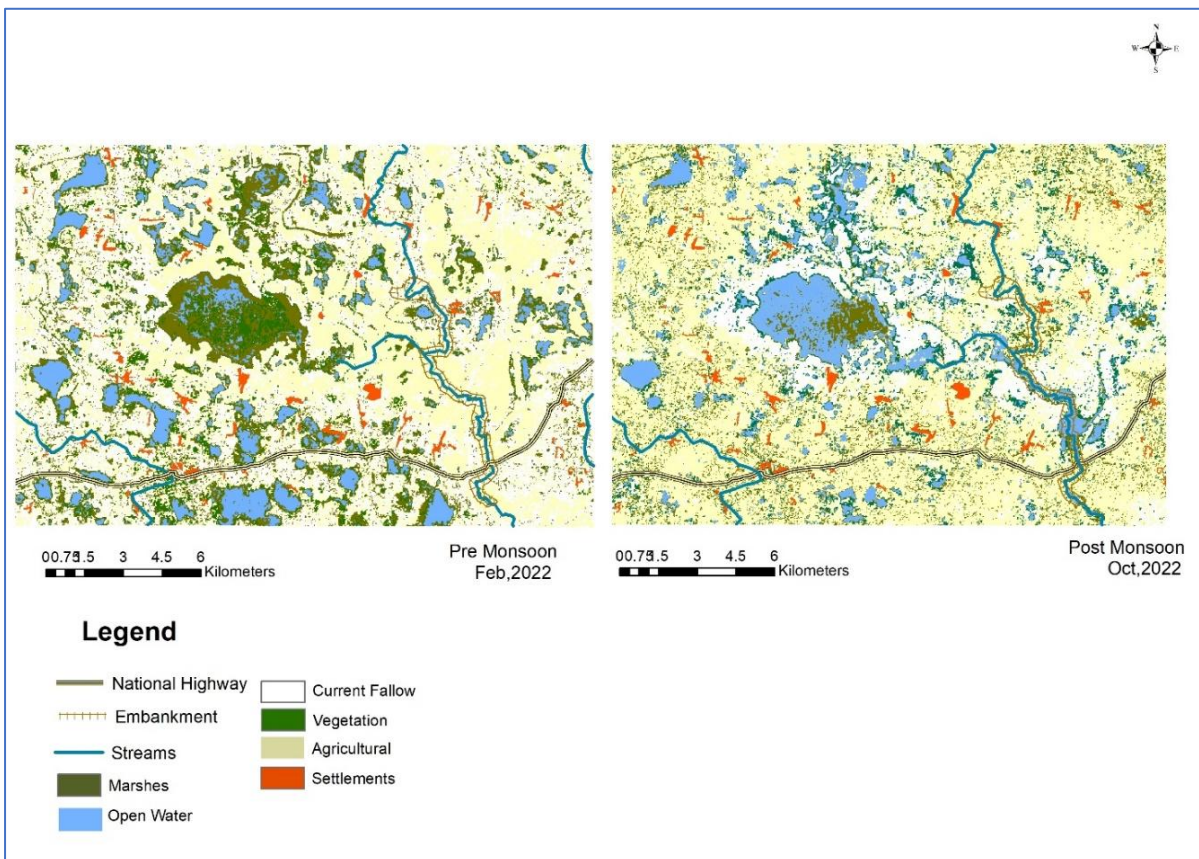


Fig. 9. LULC map of pre and post-monsoon seasons of Baraila Wetland Complex in 2022

## **Conclusion**

The study highlights the importance of geospatial monitoring and management tools in the case of wetlands. A significant transition towards other land use categories has been seen in the case of the Baraila wetland complex. Significant transitions among and between different land use and land cover classes were evident, and the season fluctuation is more pronounced than temporal variation across 1988-2022. Nonetheless, a reduction in the total area under water in pre and post-monsoon periods and a proportionate increase in areas under other land use categories has been recorded. Clearly, there is a rising pressure of encroachments (from agriculture and settlements). Perhaps the single largest challenge in the case of Baraila is the infestation of Giant reeds which not only drastically altered the chemistry and ecology of the wetland but also made the ground truthing and spatial mapping a challenging exercise.

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**About Author:**



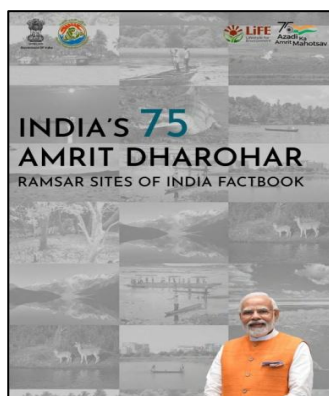
**Ms. Sarada Modak** is an Environmental Specialist with expertise in GIS. She is currently working as an IT-Officer at ADRI. Her area of interest includes climate change mitigation, water resource management, GIS, and Remote Sensing.



## In Spotlight

### Launching of ‘Save Wetlands Campaign’ as a “whole of society” approach for wetlands conservation

**February 4, 2023:** Shri Bhupender Yadav, Union Minister for Environment, Forest and Climate Change, launched the 'Save Wetlands Campaign'. This campaign is structured on a “whole of society” approach to wetland conservation, enabling affirmative actions for the preservation at all levels of society. Over the next year, this campaign will include sensitizing people to the value of wetlands, increasing the coverage of Wetland Mitras and building citizen partnerships for wetlands conservation.

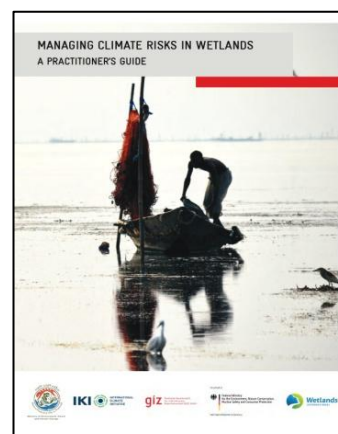


### Launching of ‘India’s Ramsar Sites Factbook’

**February 4, 2023:** 'India’s 75 Amrit Dharohar- India's Ramsar Sites Factbook' was launched by Union Minister for Environment, Forest and Climate Change under the ‘Save Wetlands Campaign’. This factbook is a one-stop resource of information on our 75 Ramsar Sites, including their values, threats they face and management arrangements.

### Launching of ‘Managing Climate Risks in Wetlands - A Practitioner's Guide’

**February 4, 2023:** ‘Managing Climate Risks in Wetlands – A Practitioner’s Guide’ was launched by Union Minister for Environment, Forest and Climate Change under the ‘Save Wetlands Campaign’. The Practitioner’s Guide on Climate Risk Assessment provides step-wise guidance on assessing the site-level climate risks and integrated adaptation and mitigation responses into the wetland management plan.



## Mission Sahbhagita to enable a society ownership approach for participatory conservation and wise use of Wetlands

**March 16, 2023:** The Ministry has launched Mission Sahbhagita, as an important step towards participatory conservation and wise use of wetlands to enable a society ownership approach with communities leading at the forefront. Ministry has also launched the “Wetlands of India Portal” (<https://indianwetlands.in/>), a publicly available information and knowledge platform, to facilitate knowledge sharing, information dissemination, host capacity building material, and provide a single-point access data repository with the features of a Management Information System (MIS) login for each state/UT for uploading of information from time to time.



## ‘National Plan for Conservation of Aquatic Ecosystems (NPCA) scheme implemented for conservation and management of wetlands

**March 27, 2023:** The Ministry is currently implementing a centrally sponsored scheme, “The National Plan for Conservation of Aquatic Ecosystems (NPCA),” for the conservation and management of identified wetlands in the country on cost sharing basis between Central Government and respective State Governments/ Union Territories. The scheme covers various



activities such as interception, diversion and treatment of wastewater, shoreline protection, lakefront development, in-situ cleaning, stormwater management, bioremediation, catchment area treatment, lake beautification, survey & demarcation, fisheries development, biodiversity conservation, education and awareness creation, community participation, etc.

## Launch of Meri LiFE App

**May 15, 2023:** To catalyze youth action for climate change as a build-up to June 5<sup>th</sup>, World Environment Day, MoEFCC launched a mobile application called “Meri LiFE” (My life). This app is inspired by LiFE, which promotes mindful and deliberate utilization instead of mindless and wasteful consumption.



# Knowledge Outcomes

## Brochures/ Infographics

### Lifestyle for Environment: Introduction

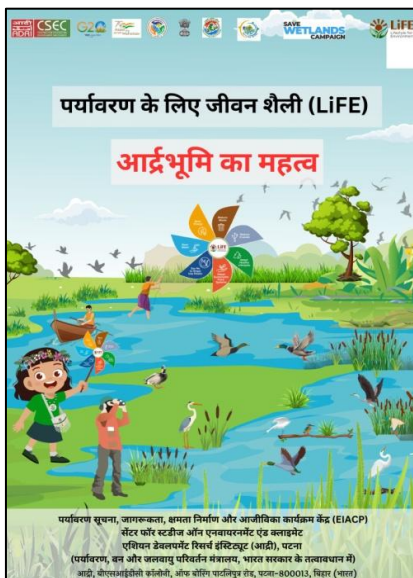


This brochure highlights the importance of Mission Life and its objective. Mission LiFE links the efforts of individuals towards collective action for the environment. The Mission has identified different actions for individuals and communities to take across seven themes, i.e. (1) *Save Energy*, (2) *Save Water*, (3) *Say No to Single-Use Plastic*, (4) *Reduce E-waste*, (5) *Adopt Sustainable Food Systems*, (6) *Reduce Waste*, and (7) *Adopt Healthy Lifestyles*.

Full pdf available at:

<https://www.adriindia.org/publications/brochures/51>

### Importance of wetland



This brochure highlights the importance of wetlands for lifestyle for the environment. Wetlands deliver essential services for humans, from providing and purifying our water supplies to protecting us from storms and floods, sustaining biodiversity and storing carbon. It also highlights the best practices to restore wetlands and the critical benefits of restored wetlands.

Full pdf available at:

<https://www.adriindia.org/publications/brochures/50>



### Wetlands of Bihar

This brochure highlights the significant wetlands of Bihar like Kabartaal, Lake Baraila, Mirzapur bahiyara, Sariyaman Siswa, Koliakalal, Salah Chaur etc. It contains information about wetland types, areas, fringe villages, village populations etc.

Full pdf available at:

<https://www.adriindia.org/publications/brochures/49>

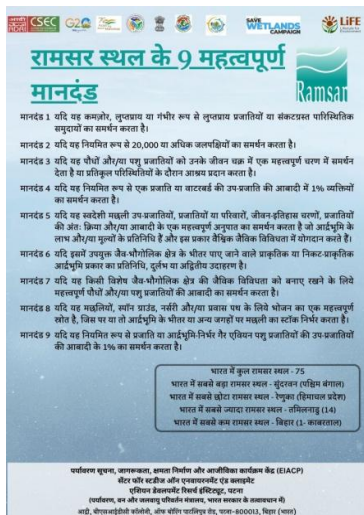


### Wetland: A Source of Sustainable Livelihood

Wetlands are essential for humans to live and prosper. More than one billion people depend on wetlands for meeting their daily needs. This infographic features some significant points on wetlands for sustainable livelihoods.

Full pdf available at:

<https://www.adriindia.org/publications/brochures/52>



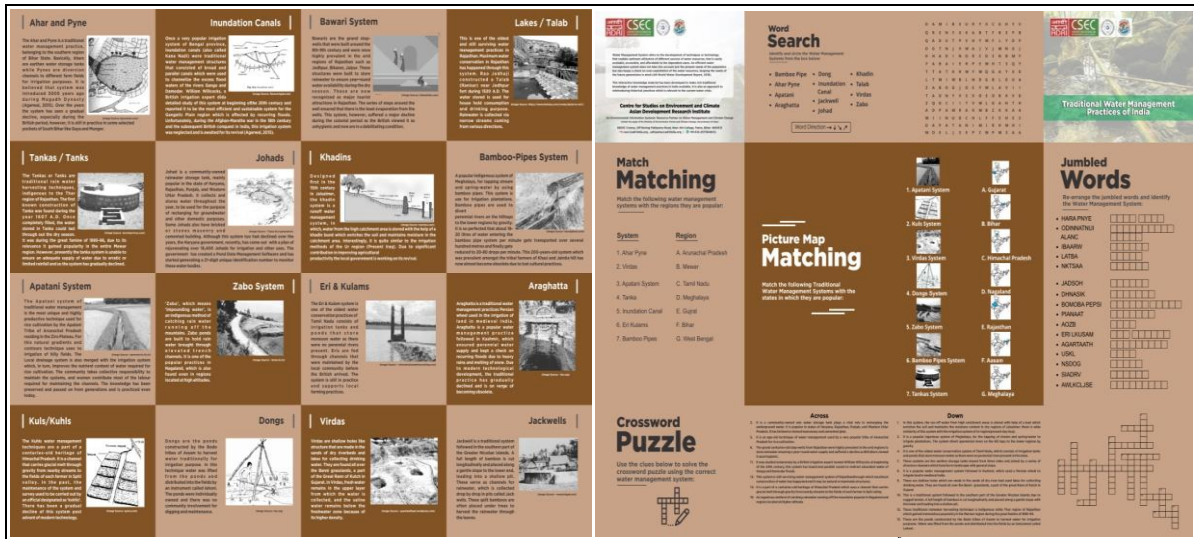
### Ramsar Sites: Criterias

This infographic features all nine criteria for identifying Wetlands of International Importance (Ramsar Sites).

Full pdf available at:

<https://www.adriindia.org/publications/brochures/47>

## Traditional Knowledge Kit on Water Management



The centre has designed an educational kit which explains various traditional water management practices of India. Besides information, the kit features different interactive games and puzzles related to water management in the country.

During the last three months, this kit has been disseminated among 1000+ students of various schools and colleges in the state.



### Mobile Based Applications/ Web-Interfaces

#### a) Know Your Wetlands

The interface provides extensive information on wetlands of national and international importance in India.

Link: <http://jalbodhi.com/wetlands.php>



#### b) Know Your Water Footprint

The interface allows the estimation of water footprint (in liters or cubic meters) and helps individuals choose ecofriendly products and services, and thereby contribute in natural resource management.

Link: <http://jalbodhi.com/>



#### c) Traditional Water Management

The interface facilitates exploration of different traditional methods of water conservation along with some interesting games and puzzles for improved learning.

Link: [http://jalbodhi.com/traditional\\_water\\_management\\_practices.html](http://jalbodhi.com/traditional_water_management_practices.html)

## Documentary

### Wetland and Lifestyle for Environment (LiFE): A case of Bihar



wetland bihar



Youtube link: <https://www.youtube.com/watch?v=SOBH3FwmW3w>

# EVENTS

## I. Awareness programme cum interactive session on Mission LiFE under the theme of Traditional Water Management Practices in India



**January 12, 2023.** To create

Awareness on Mission LiFE, CSEC-ADRI EIACP PC-RP, Patna conducted a lecture cum interactive session on Traditional Water Management Practices in India at Kilkari Bihar Bal Bhawan. A special educational kit has also been designed by the centre which explains various practices in the form of different games and puzzles. These Traditional Water management

Kits and LiFE posters on water conservation were distributed among the students and staff of Kilkari.

**Number of participants:** 100

## II. Exhibition at National Workshop on Mission Lifestyle for Environment (LiFE) at MoEFCC, New Delhi

**January 30, 2023:** CSEC-ADRI, Patna, participated in EIACP National Workshop on LiFE at the Ministry of Environment, Forest and Climate Change (MoEF&CC), Indira Paryavaran Bhawan, Jorbagh Road, New Delhi. The centre's main focus in the workshop was to highlight the importance and status of the wetlands of Bihar. The centre showcased many items related to wetlands, such as a Wetland Model showcasing the Ecosystem and LiFE around Wetland, Interactive interfaces, Documentary, Wetland based produce/goods made by community members, Infographics, Maps, newsletters, etc.



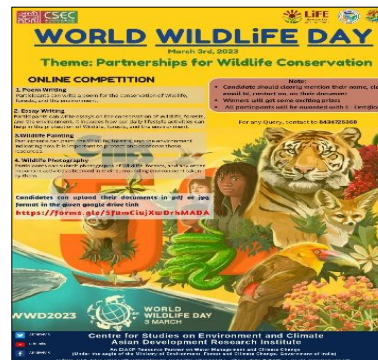
A large number of people interacted at the stall with their queries and questions on wetland produce and interfaces. The Games and interface based on Traditional Water Management Practices of India attracted a group of school kids. Senior Officials from the Ministry and scholars from the different EIACP centres inquired about the wetland status in Bihar.

Number of visitors at the stall: 200-250

### III. Online competition on World Wildlife Day

March 3, 2023. On "World Wildlife Day", CSEC-ADRI EIACP invited students to participate in an online competition to create awareness about wildlife, forest, and environmental protection and conservation through different creative activities like poem writing, essay writing, wildlife painting, and wildlife photography.

Number of participants: 40



### IV. Mission LiFE Exhibition at Banka, Bihar



March 10, 2023: CSEC-ADRI EIACP Patna has exhibited wetlands and sustainable livelihood items under mission LiFE organized by DoEFCC Banka and Bihar State Pollution Control Board. Hon'ble Governor of Bihar Shri Rajendra Vishwanath Arlekar, Hon'ble MoS Shri Ashwini Kumar Chaubey, along with other ministers, officials and experts, were present during the event and

took feedback on various aspects of mission LiFE on a local level.

Number of visitors at the stall: 500

### V. Webinar on Lifestyle for Environment

May 13, 2023: The CSEC-ADRI EIACP Patna organized a webinar on 'Lifestyle for Environment'. The discussion intended to engage students on Mission LiFE and its importance in India. Dr. Bhaskar Singh, Associate Professor, Central University of Jharkhand, gave the lecture.

Number of participants: 50

Join Our Upcoming Webinar on

Saturday, May 13<sup>th</sup> 2023  
11:00 AM-12:00 PM

To join the webinar, click [here](#) or Scan the code below






**Dr. Bhaskar Singh**  
Associate Professor, Dept. of Environmental Sciences  
Central University of Jharkhand











## VI. Youth Parliament on Lifestyle for Environment



**Patna, May 20.** A 'Youth Parliament on Lifestyle for Environment' was organized by the CSEC-ADRI EIACP, Patna. The event aimed to encourage youth participation in the climate change dialogue and promote grassroots action. Undergraduate and postgraduate level students from different colleges of Bihar were invited for the debated cum discussion

competition on various aspects of LiFE. *It was part of a collective effort by more than 60 EIACP hubs and resource partners across India under the aegis of the Ministry of Environment, Forests and Climate Change, Government of India.* Jury Members shortlisted 10 candidates who went on to compete at the national level. Students from Bihar Engineering University, Bihar Agriculture University, Nalanda University, Patna University, National Institute of Technology, and Patliputra University, participated in the competition.

**Number of participants: 50**

## VII. LiFE Art Competition



**June 3, 2023:** As part of the LiFE awareness campaign, CSEC-ADRI EIACP, in collaboration with Bhojpur Forest Division, Ara, organized a LiFE Art competition for the students of schools situated in proximity to Gokul Jalashay, Buxar. The competition involved three different engagements, including drawing, speech and seed-ball-making competitions for students

of varying age groups. The theme of all of these competitions was centred around wetlands.

**Number of participants: 300**

### VIII. Mission Lifestyle for Wetlands (Plantation cum Youth Conference at Gokul Jalashay)

**June 8, 2023:** The CSEC-EIACP PC-RP, Patna and Bhojpur Forest Division, Ara, jointly organized a Plantation cum Youth Conference at Dallapur Ghat, Brahampur, Buxar, Bihar. The Union Minister for State, Ministry of Environment, Forests and Climate Change Shri. Aswini Kumar Choubey graced the occasion as chief guest. The minister, EIACP members, school students, and localities, were engaged in plantation, seed ball making, and sightseeing around Gokul Jalashay (an ecologically significant wetland in Buxar, Bihar). A street play titled “Bolta Jalashay” was enacted to sensitize the crowd about the plight of water bodies.



**Number of participants:** 350

### VIII. Marathon for Lifestyle for Environment (LiFEathon)



**June 17, 2023:** The CSEC- ADRI EIACP Patna has organized “Marathon for Lifestyle for Environment (LiFEathon)” under the umbrella of “Save Wetland Campaign” at Kila Maidan, Buxar. People of 12 to 50 years of age group participated in 5km, 7 km, and 12 km segments.

**Number of participants:** 550

### IX. Mission LiFE Exhibition

**June 17, 2023:** The CSEC-ADRI EIACP, Patna, organized the “Mission LiFE Exhibition” under the umbrella of the “Save Wetland Campaign” at the town hall, Buxar. Six EICAP centres under seven LiFE themes participated in the exhibition and showcased the sustainable lifestyle and natural products, along with innovations in sustainable livelihood, in the exhibition. Besides EIACP centres, ZSI, the Department of Forest, Environment and Climate Change Bihar, JEEVIKA-BRLPS, BIS and Bihar State Pollution Control Board (BSPCB) showcased their products and innovation. Adding a vibrant touch to the event, a captivating Nukkad Natak titled “Bolta Jalashay” engaged the attention of the audience with a powerful performance, raising awareness about the significance of wetlands and the urgent need to protect and preserve them. The programme witnessed a special award ceremony for the sports achievers of Buxar.






**Number of participants:** 400-500

## Appendix I


### Online competition on World Wildlife Day

#### Winners

#### Painting

RANK 1	RANK 2	RANK 3
		
<p><b><i>Kunal Verma</i></b> Indian Institute of Tourism &amp; Travel Management, Gwalior</p>	<p><b><i>Aisha Panda</i></b> Buxi Jagabandhu English Medium School, Khordha, Odisha</p>	<p><b><i>R. Sayali Ashley</i></b> Montfort Matric Higher Secondary School, Chennai</p>

#### Photography

			
<p><b><i>Madagoni Venkatesham</i></b> Hyderabad</p>	<p><b><i>Chaiyanya M. Saxena</i></b> Maheshwari Public School, Jaipur</p>	<p><b><i>Rijo Baby</i></b> College of Applied Science, Kuttikkanam, Kerala</p>	<p><b><i>Vaishnavi M. Saxena</i></b> Maheshwari Public School, Jaipur</p>

Participants



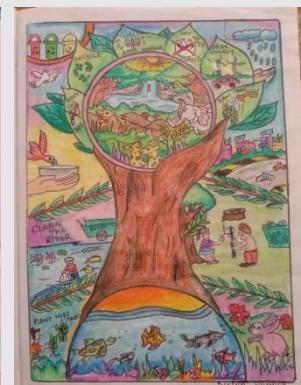
**Sajal Jain**  
Agra public school,  
Agra



**Samiksha Anand**  
Lohia Nagar Mount  
Carmel School, Patna



**Ananya Singh**  
Bloom Public School,  
New Delhi



**Diksha Pandey**  
KV Sector 5, Dwarka,  
New Delhi



**Manasvi Singh**  
Bloom Public School,  
New Delhi



**Anubhav Sigdel**  
Genius IB world school,  
Kathmandu, Nepal



**B. Divyadarshini**  
Chinmaya Vidyalaya,  
Chennai



**Ananya Rout**  
DAV Public School,  
Bhubaneswar , Odisha



**R. Amitha Shrer**  
Martin Homeopathy Medical  
College & Hospital, Coimbatore,



**Chaitanya M. Saxena**  
Maheshwari Public School,  
Jaipur



**R. Jay Harni**  
Amrita Vidyalayam Sr. Sec.  
School, K.K.Nagar, Chennai



**Nirvighna Peetha**  
Sivananda Rajaram Sr Sec  
School, Kattangalattur (TN)



**A.T.Sivasri**  
Chinmaya Vidyalaya,  
Nagapattinam

Appendix II

MEDIA COVERAGE

पटना, रविवार | 07  
21.05.2023

# पर्यावरण के लिए जीवन शैली पर युवा संसद का आयोजन

□ आद्री ने किया आयोजन, 10 उम्मीदवारों को पांच जून को मिलेगा पुरस्कार

संव्यवस्था, पटना

आद्री, सेंटर फॉर स्टडीज ऑन एनवायरनमेंट एंड क्लाइमेट द्वारा शनिवार को पर्यावरण के लिए जीवन शैली पर युवा संसद का आयोजन किया गया। इस कार्यक्रम का आयोजन जलवायु परिवर्तन संवाद में युवाओं की भागीदारी को प्रोत्साहित करने और जमीनी कार्रवाई के लिए किया गया। लाइफस्टाइल फॉर एनवायरनमेंट; पर्यावरण की विभिन्न पहलुओं पर वाद-विवाद सह चर्चा प्रतियोगिता के लिए विचार के विभिन्न कॉलेजों



से स्नातक और स्नातकोत्तर स्तर के नामांकित छात्रों को आमंत्रित किया गया। पर्यावरण वन और जलवायु परिवर्तन मंत्रालय के तत्वावधान में पूरे देश में 60 से अधिक पर्यावरण सुचना, जागरूकता, क्षमता निर्माण और आजीविका कार्यक्रम तथा संसाधन भागीदारों के सामूहिक प्रयास का हिस्सा है। ज्यरी सदस्यों में पटना विवि के प्रो

अतुल आदित्य पांडेय, पटना विवि की प्रो शाहला यास्मीन और जुलाजिकल सर्वे ऑफ इंडिया के डॉ गोपाल शर्मा और आद्री के विवेक तेजस्वी शामिल थे। इन्होंने 35 नामांकित उम्मीदवारों में से 10 उम्मीदवारों को चयनित किया। ये चयनित उम्मीदवार बिहार की तरफ से भारतीय स्तर की वाद-विवाद प्रतियोगिता में भाग लेंगे।

## पर्यावरण अनुकूल जीवनशैली को लेकर मैराथन दौड़ आज

बक्सर | केंद्रीय मंत्री अश्विनी चौबे ने कहा कि मिशन लाइफ संयुक्त राष्ट्र के सतत विकास लक्ष्यों को प्राप्त करने के लिए जलवायु परिवर्तन का मुकाबला करने और टिकाऊ जीवन को बढ़ावा देने के लिए प्रधानमंत्री नरेंद्र मोदी के मार्गदर्शन में भारत की वैश्विक पहल है। इसके प्रति जागरूकता के लिए बक्सर में मैराथन और जागरूकता प्रदर्शनी का आयोजन किया जा रहा है। उन्होंने कहा कि बक्सर स्थित किला मैदान से जीवनशैली मैराथन की शुरुआत सुबह 5 बजे होगी। केंद्रीय मंत्री चौबे लाइफ मैराथन को हरी झंडी दिखा शुभारंभ करेंगे। साथ ही टाउन हॉल में मिशन लाइफ पर्यावरण अनुकूल जीवनशैली अंतर्गत 'जीवनशैली प्रदर्शनी' का आयोजन किया गया है। इसमें बड़ी संख्या में स्कूली बच्चे शामिल हो रहे हैं।

# हिन्दुस्तान

## गोकुल जलाशय के किनारे पौधरोपण कर पेड़ लगाओ पेड़ बचाओ का नारा दिया गया गोकुल जलाशय के सौंदर्यीकरण के लिए 62 करोड़ की योजना तैयार

बोले अश्विनी चौबे

ब्रह्मपुर, मिना | गोकुल जलाशय के समुद्र तट पर केंद्रीय पर्यटन वन और जलवायु मंत्रालय की ओर से मुम्बई के विनायक पंचवर्षीय दिना के उपलक्ष में पौधरोपण का काम संपन्न हो चुका है। इस अवसर पर केंद्रीय पर्यटन वन और जलवायु मंत्रालय के सचिव अश्विनी चौबे ने बताया कि गोकुल जलाशय के किनारे पौधरोपण करने शुरू किए गए हैं। उन्होंने कहा कि गोकुल जलाशय को हर वर्ष बर्खास्त करने के लिए 62 करोड़ की योजना तैयार की गई है। यह पहल गोकुल जलाशय के किनारे पौधरोपण करने शुरू किए गए हैं। उन्होंने कहा कि गोकुल जलाशय को हर वर्ष बर्खास्त करने के लिए 62 करोड़ की योजना तैयार की गई है।



गोकुल जलाशय के किनारे पौधरोपण करने शुरू किए गए हैं। उन्होंने कहा कि गोकुल जलाशय को हर वर्ष बर्खास्त करने के लिए 62 करोड़ की योजना तैयार की गई है। यह पहल गोकुल जलाशय के किनारे पौधरोपण करने शुरू किए गए हैं। उन्होंने कहा कि गोकुल जलाशय को हर वर्ष बर्खास्त करने के लिए 62 करोड़ की योजना तैयार की गई है।

Hindi News / Local / Bihar / Buxar / Minister Visited Gokul Reservoir Regarding Environmental Protection And Tourism

### मुआयना: पर्यावरण संरक्षण व पर्यटन को ले मंत्री ने गोकुल जलाशय का किया भ्रमण

ब्रह्मपुर 3 महीने पहले




<https://dainik-b.in/KrPGASCytAb>

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HOME CENTRAL STATE PSU APPOINTMENTS INTERNATIONAL CLASSIFIEDS

**Ashwini Kumar Choubey calls for saving Wetlands and adopting LIFE**

June 11, 2023



In continuation to the World Environment Day (WED) celebrations, the EIACP Division, MoEF&CC, Government of India, through its Program Centre at ADRI, Patna, organised a 'Save Wetlands Campaign' on 8<sup>th</sup> June, 2023 at Gokul Jalashay, Buxar, Bihar to sensitise local youths about Mission LIFE and for saving wetlands. Minister of State, Ministry of Environment, Forest and Climate Change, Shri Ashwini Kumar Choubey, presided over a public event for sensitising youth, children and communities on the diverse values of wetlands and the need for their conservation. The activities included plantation drive, seed ball making competition, Mission LIFE and Save Wetlands pledge and sight visit around the Gokul Jalashay. A street play titled "Bolta Jalashay" was also enacted by students to sensitize the crowd about the importance of waterbodies. Over three hundred people including school students and local communities in a Wetland Walk and were also educated about the wetlands and how humans and waterbodies can co-exist in a healthy environment.

<https://www.indianbureaucracy.com/ashwini-kumar-choubey-calls-for-saving-wetlands-and-adopting-life/>

# जलाशय संरक्षण के लिए बच्चों को किया गया जागरूक

■ बक्सर (एसएनबी)।

स्वदेशी संसद सह केंद्रीय मंत्री अश्विनी कुमार चौबे ने विश्व महामास दिवस के अवसर पर ब्रह्मपुर विधानसभा के गोकुल जलाशय आर्द्रभूमि के प्रांगण में स्कूली बच्चों में जागरूकता के लिए दलपट्टा घाट का भ्रमण कराया। स्कूली बच्चों ने जलाशय संरक्षण को लेकर शपथ ली।

वहीं केंद्रीय मंत्री श्री चौबे ने कहा कि जलाशय मानव जीवन के लिए अमूल्य धरोहर को है। इसका संरक्षण हम सभी की जिम्मेवारी है। खासकर बच्चों में इसके प्रति जागरूकता अति आवश्यक है। जलाशय जीवन रेखा का आधार है। उसे हम सब जागरूक होकर संरक्षित करेंगे। केंद्रीय मंत्री श्री चौबे

जलाशय निरीक्षण करते एवम् केंद्रीय मंत्री अश्विनी चौबे।

ने प्रधानमंत्री नरेंद्र मोदी द्वारा पर्यावरण संरक्षण को लेकर दिए गए मिशन लाइव याने लाइफ स्ट्रॉल फॉर एनवायरमेंट से सभी को अवगत कराया। उन्होंने कहा कि दैनिक कार्यों में जागरूक होकर छोटी-छोटी

**केंद्रीय मंत्री अश्विनी चौबे ने मिशन लाइफ से कराया अवगत**

आदतों में सुधार लाकर पर्यावरण को संरक्षित करने में हम सभी अपना बहुमूल्य योगदान दे सकते हैं। उन्होंने जलाशय की उपयोगिता पर प्रकाश डाला। केंद्रीय मंत्री श्री चौबे ने कहा कि जीव जंतु सहित मानव जीवन के लिए जलाशय का योग अत्यंत आवश्यक है। उन्होंने बच्चों का गोल बकसर बांध कितने रोना किया।

बाहर के दिनों में यह चौबे ने तटदीप हो जाया। विश्व पर्यावरण दिवस के अवसर पर पूर्व में बच्चों द्वारा विभिन्न प्रतिस्पर्धाओं में बेहतर प्रदर्शन करने वालों को भी सम्मानित किया गया।

सुबिंधा राज्य मिला भारत मिलाव गैलेरी वीडियो क्राउन वैपिनन कारेकार अंतरराष्ट्रीय विमान-रेक सुबिंधा भव विचार

**ETV** बिहार

HOME / STATE / BUXAR / ASHWINI CHAUBEY ANNOUNCED GOKUL RESERVOIR RENOVATION AT COST OF 62 CRORES IN BUXAR

**Buxar News: '62 करोड़ की लागत से गोकुल जलाशय का होगा जीर्णोद्धार'- अश्विनी चौबे**

Published: Jun 8, 2023, 8:10 PM



<https://www.etvbharat.com/hindi/bihar/state/buxar/ashwini-chaubey-announced-gokul-reservoir-renovation-at-cost-of-62-crores-in-buxar/bh20230608181051322322009>

**अश्विनी चौबे ने प्रधानमंत्री मोदी के लाइफ स्ट्राइल फॉर एनवायरमेंट के मंत्र को स्कूली बच्चों से अवगत कराया**

By Divya Kumari Jun 8, 2023, 12:29 IST



MoEF&CC 14.6K Tweets Following

**Ashwini Kr. Choubey** @AshwiniKChoubey · Jun 17

मिशन #LIFE जलवायु परिवर्तन का मुकाबला करने और टिकाऊ जीवन को बढ़ावा देने के लिए आदरणीय प्रधानमंत्री श्री @narendramodi जी के मार्गदर्शन में भारत की एक वैश्विक पहल है। आज जागरूकता के लिए बक्सरवासी दौड़े।

#Buxar  
#ChooseLIFE  
#MissionLIFE



2 15 69 3,188

09-06-2023 बक्सर Page 4

## पर्यावरण संरक्षण व पर्यटन को ले मंत्री ने गोकुल जलाशय का किया भ्रमण

■ बक्सर न्यूज। ब्रह्मपुर

ब्रह्मपुर विधानसभा क्षेत्र के गोकुल जलाशय के किनारे ग्राम दलपट्टा घाट पर बक्सर संसद सह केंद्रीय राज्यमंत्री श्री अश्विनी कुमार चौबे का आगमन हुआ। पर्यावरण संरक्षण एवं गोकुल जलाशय को पर्यटन क्षेत्र बनाने के उद्देश्य से माननीय मंत्री के साथ स्कूली बच्चों को इसके प्रति जागरूकता व आर्द्रभूमि अंतर्गत गोकुल जलाशय का भ्रमण कराया गया। ग्रामीणों ने गोकुल जलाशय को पर्यटन क्षेत्र के रूप में विकसित करने की मांग करते हुए इसमें रोजगार की अपार संभावना एवं सरकार के राजस्व में वृद्धि की बात बताई। बता दें कि 25 किलोमीटर के क्षेत्र में फैला गोकुल जलाशय में महत्ती पालन, झींगा

पालन, मोती पालन, तैराकी, मोटर बोट सहित कई योजना को विकसित किया जा सकता है। गोकुल जलाशय के निकट हिरण और बारहसिंगा सहित विदेशी पक्षियों का आगमन होता है जो पर्यटकों के लिये आकर्षण का केंद्र बन सकता है। कार्यक्रम में गंगा

रामग बिहार प्रान्त के संवोजक शम्भुनाथ पांडेय, पर्यावरण से जुड़े नित्यनन्द ओझा, सत्येंद्र कुंवर, मंडल अध्यक्ष अय्यथ भूटेली तिवाही, रामप्रसाद पांडेय, रासबिहारी दुबे, संतोष ओझा, विनोद उपाध्याय, विकेश कुमार पांडेय सहित सैकड़ों लोग उपस्थित रहे।



गोकुल जलाशय का भ्रमण करते केंद्रीय मंत्री अश्विनी चौबे।

# केन्द्रीय राज्यमंत्री अरविनी चौबे ने बच्चों को कराया गोकुल जलाशय का भ्रमण जलाशय अमृत धरोहर, इसे संरक्षित करना जीवन का संरक्षण है : मंत्री

संवाददाता, बक्सर

सूचीय सांसद सह केन्द्रीय मंत्री अरविनी चौबे ने विश्व मासिकार दिवस के अवसर पर ब्रह्मपुर विधानसभा के गोकुल जलाशय आर्द्रभूमि के प्रति स्तब्ध बच्चों में जागरूकता के लिए कल्पना घाट का भ्रमण कराया, सूचीय बच्चों ने जलाशय संरक्षण को लेकर राय दी, केन्द्रीय मंत्री श्री चौबे ने कहा कि जलाशय मासिकार जीवों के लिए अमृत धरोहर की तरह है, इसका संरक्षण हम सभी की जिम्मेदारी है, छात्रवक्र बच्चों में इसके प्रति जागरूकता और आवश्यक है, जलाशय जीवन रेखा का आधार है, उसे हम सब जागरूक होकर संरक्षित करेंगे, केन्द्रीय मंत्री श्री चौबे ने प्रधानमंत्री नरेंद्र मोदी द्वारा पर्यावरण संरक्षण को लेकर दिए गए निर्देशों का अमल करने में सभी को अवगत कराया, उन्होंने कहा कि दैनिक बच्चों में जागरूक होकर छोटी-छोटी आवाजों में मुखारोपित पर्यावरण को संरक्षित करने में हम सब अपना महत्वपूर्ण योगदान दे सकते हैं, उन्होंने जलाशय को जलस्रोत पर कब्जा डालना, केन्द्रीय मंत्री श्री चौबे ने कहा कि जल संचयन, सफाई, मासिकार जैविक के लिए जागरूकता का होना अत्यंत आवश्यक है, उन्होंने बीजाज का गोलू बनाकर बांध किन्हीं रीत्यो किया, खासकर कि दिनों में यह पोषी में नष्ट हो जायेगा, विश्व पर्यावरण दिवस के अवसर पर पूर्व में बच्चों द्वारा विभिन्न प्रतियोगिताओं में भाग लेने प्रोत्साहित करने वाली श्री चौबे ने पर्यावरण किंवदन्ता ब्रह्मपुर विधानसभा क्षेत्र के गोकुल जलाशय के किन्हीं आम कल्पना घाट पर बक्सर सांसद सह केन्द्रीय राज्यमंत्री अरविनी कुमार चौबे का अभिमान हुआ, इस कार्यक्रम में उन्होंने लोग शामिल हुए, पर्यावरण संरक्षण एवं गोकुल



बच्चों से बात करते केन्द्रीय राज्यमंत्री.

## आपके द्वार जन चौपाल में कंचनपुर गांव पहुंचे अश्विनी चौबे

ब्रह्मपुर बसवार को देर रात जलमयों की नौ सवार भीमवार कार्यक्रम के जहाज बक्सर सांसद का आग्रह द्वार जन चौपाल का आयोजन प्रसन्न की योगान्तरा फावट किया कंचनपुर गांव में कोचमसरपत भवना मंडल अध्यक्ष धर्मि पांडेय की अध्यक्षता में थी मंत्री, इस अवसर पर बक्सर सांसद सह खाद्य एवं जलमय और रक्षा पर्यावरण राज्यमंत्री अरविनी चौबे ने स्थानीय शासक जनता से जनसुझाव लिया, कार्यक्रम के दौरान स्थानीय ग्रामीणों ने सांसद से कंचनपुर गांव मंदिर कंचनपुर को जनेवाली सड़क निर्माण हेतु पीसीसी दरवाजे के लिए अर्दान देवा, जिस पर सांसद अरविनी

कुमार चौबे ने दुर्गंत वरुणकर कर विद्युत जलवायु, वही मंडल अध्यक्ष धर्मि पांडेय ने सांसद के प्रति अत्यंत प्रशंसा किया, सांसद ने देश के प्रधानमंत्री नरेंद्र मोदी के प्राकृतिक एवं प्राणी विभाग पर जोड़ देते हुए बतवा के सांसद होने के नतीजे में बतवा है कि मैं बक्सर के विभाग को रक्षण कुल संरक्षण दू, जायदाम का अभाव नही दू किन्तु कुल-कुल में सांसद को धार दिया कि अपने बक्सर को निमी ठाकी बने जा बादा दिया है निमी पूरा करने के लिए आओ और प्रवास करने की जरूरत है, इस दौरान कार्यक्रम को धार वार लक्ष्मी में शिक्षक करि कुलानंद मिश्र ने बक्सर की महारत बारे में अपनी पहिलों से सांसद को

जाता बाबाई, बादा दे कि 25 किन्तु वीर के क्षेत्र में फेल मीकुर जलवायु में मछली पालन, झीला पालन, मोती पालन, तैराकी, मोटर बोट खिलाने को योजना को विकास किया जा सकता है, गोकुल जलाशय के निकट शिखर और बाराहिसा सहित विभिन्न पर्वतों का अभिमान होत है जो पर्यटकों के लिए

### Ashwini Kumar Choubey calls for adopting Lifestyle for Environment

June 19, 2023



The Ministry of Environment, Forest & Climate Change (MoEFCC) organised an event on Mission LIFE as part of Save Wetlands today in Buxar, Bihar. The event is in continuation to the Save Wetlands campaign organised at Gokul Jalashay, Buxar on June 08, 2023. The event was organised through Ministry's Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP) Centre at ADRI, Patna.

<https://www.indianbureaucracy.com/ashwini-kumar-choubey-calls-for-adopting-lifestyle-for-environment/>

### Ashwini Kumar Choubey Urges Adoption of Environment-Friendly Lifestyle to Protect Earth from Natural Disasters

The Ministry of Environment, Forest & Climate Change's Mission LIFE event in Buxar, Bihar, served as a platform to raise awareness, foster environmental consciousness, and promote the conservation of wetlands.

Shivam Dwivedi Updated 19 June, 2023 12:16 PM IST

30 X WhatsApp Telegram



<https://krishijagran.com/news/ashwini-kumar-choubey-urges-adoption-of-environment-friendly-lifestyles-to-protect-earth-from-natural-disasters/>

शहरों का तापमान बक्सर : अधिकतम 44.00° न्यूनतम 31.00° पटना : अधिकतम 43.00° न्यूनतम 32.00° prabhatkhabar.com

# तैराकी के लिए तैयार हो रहा गोकुल जलाशय, बनेगा पर्यटन केंद्र : मंत्री

संवाददाता, बक्सर

स्थानीय सांसद सह भारत सरकार के केन्द्रीय राज्य मंत्री अश्विनी कुमार चौबे एक दिवसीय दौर पर बक्सर पहुंचे जहां उन्होंने शहर के ऐतिहासिक किला मैदान से आर्द्रभूमि संरक्षण अभियान के तहत आर्द्रभूमि मैदान वृद्धि प्रतियोगिता को हरी झंडी दिखाकर रवाना किया, इस कार्यक्रम में आए हुए लोगों ने पर्यावरण का संरक्षण करने व उसे बचाने का संकल्प लिया, इस दौरान मंत्री ने कहा कि गोकुल जलाशय को तैराकी के लिए तैयार किया जा रहा है, जहां से अधिक से अधिक लोग तैराकी कर राष्ट्रीय और अंतरराष्ट्रीय स्तर पर होने वाले प्रतियोगिता में भाग ले सकें, इसके पश्चात केन्द्रीय मंत्री श्री चौबे नगर भवन पहुंचे, उन्होंने वहां जीवनशैली प्रदर्शनी का अवलोकन किया, पांच



मैराबन दौड़ में शामिल प्रतिभागियों को रवाना करते केन्द्रीय मंत्री.

विभिन्न राज्यों से वन व पर्यावरण पर कार्य कर रही संस्थाओं ने इसमें प्रिरक्त की, इसमें प्रकृति प्रदत्त वस्तुओं से तैयार दैनिक कार्यों में

उपयोग आने वाली सामग्रियों की प्रदर्शनी लगायी गयी थी, इसका उद्देश्य प्राकृतिक प्रदत्त वस्तुओं को जनता के उपयोग में लाने को प्रेरित करना था,

इस मौके पर केन्द्रीय मंत्री श्री चौबे ने कहा कि गोकुल जलाशय आने वाले समय में पर्यटन का केंद्र बनेगा, कार्यक्रम में पर्यावरण वन व जलबन्धु

परिवर्तन मंत्रालय के संयुक्त सचिव सुजीत कुमार बाजपेयी, भोजपुर डिवीजन के डीएफओ राजकुमार आठमी के डिप्टी डायरेक्टर विवेक तेजस्वी आदि विशेष रूप से उपस्थित थे, जीवनशैली प्रदर्शनी में गुवाहाटी, असम साइंस टेक्नोलॉजी कॉलेज, जे पी पंत नेशनल इंस्टीट्यूट ऑफ डिमालयन एनवायरनमेंट अरुन्धोड उतराखंड, वन व पर्यावरण विभाग रंची झारखंड, जलजीकल सवे ऑफ इंडिया पटना, वन व पर्यावरण विभाग पटना, एशियान डिवेलपमेंट इंस्टीट्यूट आर्री पटना, गैंगटोक सिक्किम, बिहार स्टेट पॉल्यूशन कंट्रोल बोर्ड, इंटरनेशनल इंस्टीट्यूट ऑफ हेल्थ, हाइजेनिक नयी दिल्ली के प्रतिनिधि उपस्थित थे, वही, राजद के विधायक रीतलाल यादव द्वारा वमचलामानस पर दिए विवाहित ब्यापन पर नाराजगी जतायी, उन्होंने

कहा कि बिहार के मुख्यमंत्री नीतीश कुमार और उपमुख्यमंत्री तेजस्वी यादव अपने विधायकों से जानबूझकर रामचरितमानस का अपभ्रंश करा रहे हैं, लगातार हिंदुओं के आस्था को ठेस पहुंचा रहे हैं, जिसे देश कभी बर्दास्त नहीं करेगा, ऐसा लग रहा है कि राजद के विधायक गोस्वामी तुलसीदास और महर्षि वाल्मीकि से पहले ही जन्म ले लिए थे, मंत्री अश्विनी कुमार चौबे ने 23 जून को महागठबंधन की होने वाली बैठक को लेकर विफल पर जमकर निशाना साधा, उन्होंने महागठबंधन पर निशाना साधते हुए कहा कि पहले तो यह तय कर लें कि इनका पीएम का मैटिरियल कैमन है, ऑफ हेल्थ, हाइजेनिक नयी दिल्ली के प्रतिनिधि उपस्थित थे, वही, राजद के विधायक रीतलाल यादव द्वारा वमचलामानस पर दिए विवाहित ब्यापन पर नाराजगी जतायी, उन्होंने

# बक्सर भास्कर

पटना, रविवार, 18 जून, 2023

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## मौसम

सूर्योदय 6.47 बजे सूर्यास्त 5.03 प्रातः  
तापमान

दिन 43<sup>0</sup> अधिकतम रात 30<sup>0</sup> न्यूनतम

पूर्वाग्रहानुसार आज बादल छाए रहेंगे व धुंध खाने की संभावना।

## लोकल सोना चांदी भाव

सोना	चांदी
24 कैरेट 60110	22 कैरेट 55100
	प्रति टिन्डो 73500

## शहर में आज

धार्मिक/सामाजिक

- योगप्रयास, स्नान बाजार रसमिता, होमगार्ड ऑफिस के सामने समय सुबह 06:30 बजे से
- गंगा स्नान महोत्सव स्थान - चौसा बाजार घाट, समय - सुबह 7:30 बजे।

# पर्यावरण अनुकूल जीवनशैली के लिए मैराथन दौड़

कित्ता मैदान में प्रधानमंत्री के लाइफ मंत्र के प्रति जागरूकता के लिए जीवकशैली मैराथन का हुआ आयोजन, संसद ने मैराथन दौड़ को हरी झंडी दिखाकर किया स्वागत

महाशय्या जलवा

रश्मि का दौड़ के पांच बजे थे किता का मैदान नीले रंग से रंगा हुआ था। यहीं जितने भी युवा और युवतियां यहां मौजूद थीं नीले रंग की टी-शर्ट में दिखाई दे रहे थे। मोरारजी गान्धी मैदान का सुबह करीब 5.30 बजे स्वर्ण संसद अश्विनी कुमार चौबे ने मैराथन को हरी झंडी दिखाकर स्वागत किया। साथ ही उन्होंने कुछ दू तक दौड़ दौड़ लवाई।

केंद्रीय राज्य मंत्री चौबे ने कहा कि प्रकृति को संरक्षित करने के लिए पर्यावरण अनुकूल जीवनशैली के प्रति जो मिशन लाइफ का वैश्विक मंत्र दिया है, उसे अपने दैनिक कार्यों में हम सभी को उलझने की जरूरत है। छोटी-छोटी आदतों में परिवर्तन करके पर्यावरण संरक्षण के लिए महत्वपूर्ण भूमिका का निर्वहन हम सभी कर सकते हैं। जीवन शैली मैराथन दौड़ अश्विनी कुमार चौबे ने समर्पित किया।



## देश के विभिन्न राज्यों से प्रतिनिधि हुए शामिल

प्रदर्शनी में गुवाहाटी, असम सांसद टेकनोलीजी कांतिशिला, जेपी पंग नेरान्त इस्टीमेट और हिमालयन एनवायरनमेंट अल्पोड़ा उत्तराखंड, वन

## नगर भवन में जीवनशैली प्रदर्शनी का अवलोकन

जीवनशैली मैराथन कार्यक्रम सम्पन्न होने के बाद केंद्रीय मंत्री चौबे नगर भवन पहुंचे। उन्होंने यहां जीवनशैली प्रदर्शनी का अवलोकन किया। पांच विभिन्न राज्यों से वन एवं पर्यावरण पर कार्य कर रही संस्थाओं ने इसमें गिरावट को। इसमें प्रकृति प्रदत्त वस्तुओं से लेकर दैनिक कार्यों में उपयोग आने वाली सामग्रियों की प्रदर्शनी लगाई गई थी। इसका उद्देश्य प्रकृतिक प्रदत्त वस्तुओं को जनता के उपयोग में लाने को प्रेरित करना था। उन्होंने कहा कि प्रकृतिक वस्तुओं को प्रदत्त करने के साथ ही पर्यावरण को संरक्षित करने में पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय के संयुक्त रश्मिनी कुमार बाबरीये, भोजपुर डिवाइजन के डीआरओ राजकुमार आदारी के डिप्टी डायरेक्टर शिवके तेजस्वी आदि उपस्थित थे।

व पर्यावरण विभाग रांची इतराखंड, जूनीकिल्ल सर्वे ऑफ इंडिया पटना, वन व पर्यावरण विभाग पटना, पर्यावरण डिप्लोमेट इंस्टीट्यूट आद्री पटना, गैस्ट्रोफेड मिडिकम, थिरार स्टेट पॉल्यूशन कंट्रोल बोर्ड, इंटरनेशनल इंस्टीट्यूट ऑफ हाथ, हाईजैविक नॉटिस्टी के प्रतिनिधि उपस्थित थे।

Ministry of Environment, Forest and Climate Change



## Shri Ashwini Kumar Choubey calls for saving Wetlands and adopting LiFE - Lifestyle for Environment

Posted On: 09 JUN 2023 7:03PM by PIB Delhi

In continuation to the World Environment Day (WED) celebrations, the EIACP Division, MoEF&CC, Government of India, through its Program Centre at ADRI, Patna, organised a 'Save Wetlands Campaign' on 8<sup>th</sup> June, 2023 at Gokul Jalashay, Buxar, Bihar to sensitise local youths about Mission LiFE and for saving wetlands. Minister of State, Ministry of Environment, Forest and Climate Change, Shri Ashwini Kumar Choubey, presided over a public event for sensitising youth, children and communities on the diverse values of wetlands and the need for their conservation. The activities included plantation drive, seed ball making competition, Mission LiFE and Save Wetlands pledge and sight visit around the Gokul Jalashay. A street play titled "Bolta Jalashay" was also enacted by students to sensitise the crowd about the importance of waterbodies. Over three hundred people including school students and local communities in a Wetland Walk and were also educated about the wetlands and how humans and waterbodies can co-exist in a healthy environment.



<https://pib.gov.in/PressReleasePage.aspx?PRID=1931100>



Ministry of Environment, Forest and Climate Change



## Shri Ashwini Kumar Choubey calls for adopting Lifestyle for Environment to save earth from natural calamities and disasters

Posted On: 17 JUN 2023 4:32PM by PIB Delhi

The Ministry of Environment, Forest & Climate Change (MoEFCC) organised an event on Mission LIFE as part of Save Wetlands today in Buxar, Bihar. The event is in continuation to the Save Wetlands campaign organised at Gokul Jalashay, Buxar on June 08, 2023. The event was organised through Ministry's Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIAACP) Centre at ADRI, Patna.



<https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1933049>

## Appendix II

### PHOTO GALLERY



Awareness drive on Traditional Water Management Practices at Kilkari Bihar Bal Bhawan, Patna



ADRI at National Workshop, MoEFCC



Mission LIFE Exhibition, Banka



Youth Parliament on Lifestyle for Environment at ADRI, Patna



Glimpses of Life Art Competition, Bhojpur



Glimpses of Plantation cum Youth Conference at Gokul Jalashay



Mission LiFE Style for Environment Marathon (LiFEathon) at Kila Maidan, Buxar



LiFE exhibition at Town Hall, Buxar

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**Published By,**

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