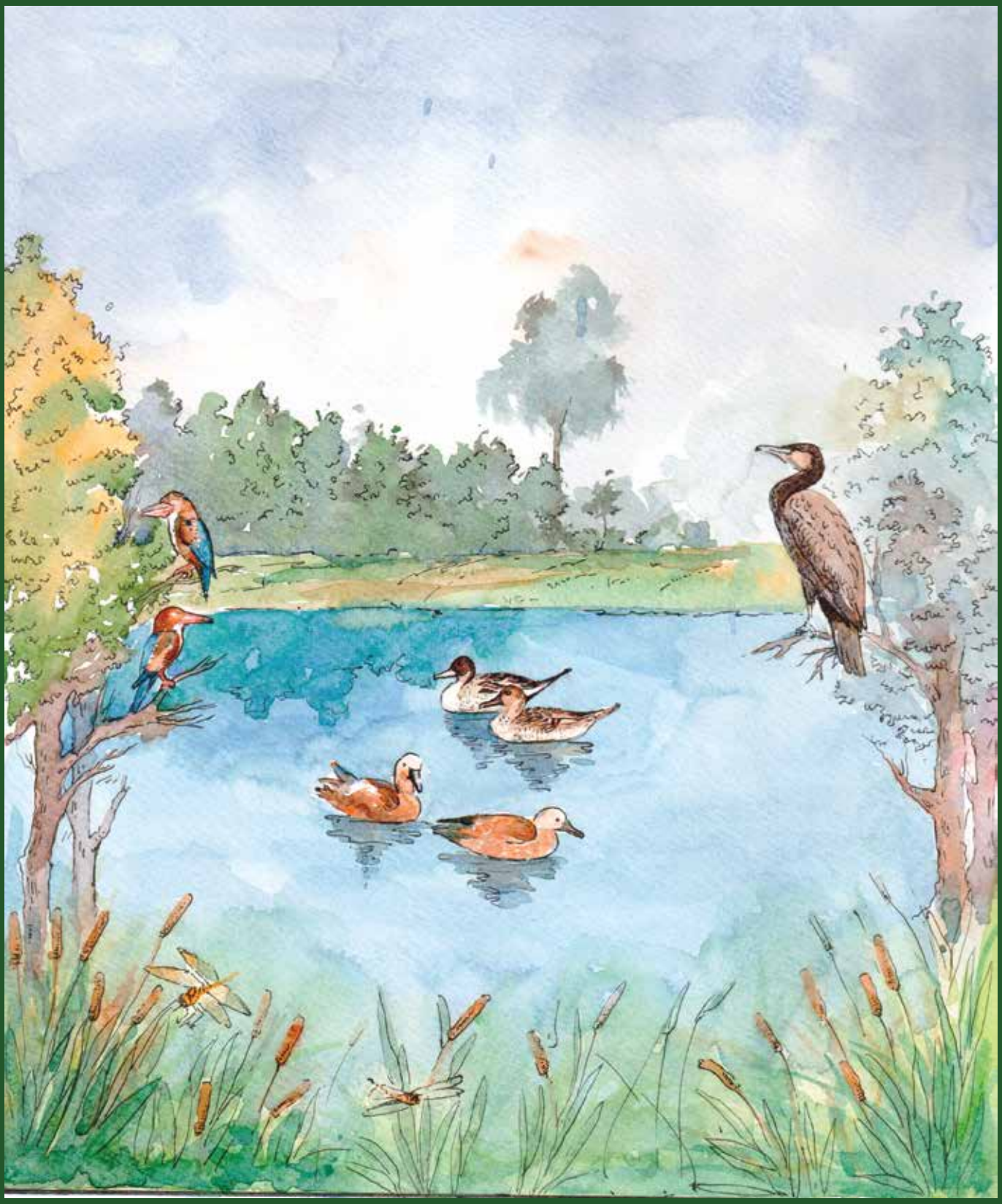
Draft Report

Nature Interpretation and Education for Biodiversity Conservation of Five Ganga River States



नमामि गंगे

भारतीय वन्यजीव संस्थान
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जल शक्ति मंत्रालय
MINISTRY OF
JAL SHAKTI

Report: Nature Interpretation and Education for Biodiversity Conservation of five Ganga River States (2020 – 2025)

This report presents the activities, outreach initiatives, and outcomes of environmental education, awareness generation, nature interpretation, and community engagement programmes conducted along the Ganga River. It documents the methodologies adopted, educational materials developed, stakeholder interactions, interpretation initiatives, school and community outreach activities, and conservation awareness programmes implemented across different states

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Preface

The River Ganga is not merely a river system; it is a living symbol of India's ecological heritage, cultural identity, and socio-economic sustenance. Flowing across diverse landscapes and supporting millions of people, the Ganga and its tributaries sustain an extraordinary range of biodiversity while nurturing civilizations, traditions, livelihoods, and spiritual practices. However, increasing anthropogenic pressures such as pollution, habitat degradation, unsustainable resource use, and declining ecological awareness continue to threaten the health and resilience of this iconic river system. Addressing these challenges requires not only scientific and policy interventions but also meaningful public participation rooted in awareness, education, and community engagement. This report presents the outcomes and experiences of environmental education, awareness, interpretation, and outreach initiatives implemented across five Ganga River states - Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, and West Bengal. Conducted under the broader vision of river conservation and biodiversity protection, the programme aimed to strengthen environmental literacy and encourage collective stewardship for the conservation of the Ganga River and its aquatic ecosystems. The initiative adopted a multi-dimensional approach that combined formal and non-formal education methods. Through these efforts, the programme sought to make scientific knowledge accessible, relatable, and action-oriented for diverse stakeholder groups, particularly students, teachers, local communities, and the general public. The report documents the methodologies adopted, activities conducted, outcomes achieved, and lessons learned during the implementation of the programme. The findings demonstrate that sustained outreach efforts, when combined with contextualized learning and stakeholder involvement, can significantly enhance awareness and inspire responsible environmental action. It is hoped that this report will serve as a valuable resource for educators, conservation practitioners, academic institutions, and organizations working in the fields of river conservation, biodiversity management, and environmental education. More importantly, it reflects a collective effort towards ensuring that the Ganga continues to thrive as a source of life, culture, and ecological resilience for future generations.

Contents

Summary

The report outlines a comprehensive environmental education and conservation initiative designed to promote biodiversity preservation and sustainable practices along the Ganga River. Spanning five states—Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, and West Bengal—the program utilizes environmental education to foster a shared responsibility for the river's ecological and cultural heritage among students, educators, and local communities. Recognizing the ecological, cultural, and economic significance of the Ganga River, the programme addresses the critical gap in environmental awareness and the need to translate knowledge into actionable conservation behavior. Environmental Education (EE) serves as a key strategy in this effort by enhancing environmental literacy, shaping attitudes, and encouraging community participation in conservation. The primary objectives of the initiative were to establish Ganga Knowledge Corners as platforms for disseminating information on river conservation and to generate support for aquatic biodiversity through structured awareness programmes, teacher training, and mass outreach activities. To achieve these objectives, a multi-pronged methodology was adopted, combining localized interventions—such as school awareness workshops, low-cost interpretation corners (Jalmala Samvaads), and interpretation centers—with large-scale outreach initiatives including radio talks, exhibitions, social media campaigns, publications, and community engagement activities.

A systematic approach was followed for conducting school awareness programs, including site selection through reconnaissance surveys, development of interactive and experiential learning modules, and delivery of site-specific awareness sessions. The impact of these interventions was assessed using a structured pre- and post-questionnaire survey design, with follow-up conducted after three months to evaluate knowledge retention. Additionally, teacher training programmes were conducted for both pre-service and in-service teachers to strengthen the integration of environmental education into classroom teaching, supported by resource materials such as the “Gyan Kosh” kit.

The initiative achieved significant outreach and measurable outcomes. A total of 185 awareness workshops were conducted across five states—Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, and West Bengal—reaching over 14,000 students. The results of the pre- and post-survey analysis indicated statistically significant improvements in students’ knowledge, with increases of 27.85% in riverine biodiversity, 39.93% in cultural heritage, and 19.04% in conservation values.

Furthermore, 106 low-cost interpretation corners were established across 58 districts, benefiting over 81,000 students and 1,800 teachers by providing permanent learning spaces within schools. Teacher training programmes successfully engaged 1,348 educators, equipping them with experiential teaching tools and pedagogical approaches to deliver conservation education effectively. Interpretation infrastructure was strengthened through the establishment of five interpretation centers, including major urban centers at Haridwar, Varanasi, and Kanpur, all of which reported consistent growth in visitor engagement. Mass outreach efforts, including participation in events such as the Mahakumbh Mela 2025, as well as the use of radio, exhibitions, social media, and community-based programmes, collectively reached approximately one crore individuals, significantly amplifying the impact of the initiative.

The findings highlight that experiential and context-specific environmental education interventions are effective in improving knowledge, attitudes, and intended behaviors toward conservation. The integration of localized learning approaches, participatory methods, and diverse communication tools proved critical in engaging different stakeholder groups. In conclusion, the initiative demonstrates that a multi-layered approach combining formal and non-formal education, supported by institutional mechanisms and community engagement, can serve as a scalable and impactful model for river conservation. However, sustaining and enhancing these outcomes requires continued efforts in strengthening institutional integration, ensuring long-term monitoring, and expanding outreach. Accordingly, key recommendations include scaling up experiential learning approaches, integrating programmes into formal education systems, establishing long-term monitoring frameworks, strengthening continuous teacher capacity building, leveraging digital platforms for wider outreach, promoting community participation, localizing educational content, enhancing inter-agency collaboration, expanding interpretation infrastructure, and linking awareness initiatives with actionable conservation practices.

Chapter 1 - Introduction

Environmental Education (EE) is an essential strategy for addressing severe modern challenges such as climate change, widespread pollution, and biodiversity loss (Alvarado, 2025; Husin et al., 2025). The primary need for environmental education arises from the urgency to address escalating environmental crises by transforming human attitudes, developing environmental literacy, and translating ecological awareness into practical, pro-environmental actions (Husin et al., 2025). It is a process that helps in development of skills, decision making and attitudes to recognize the environmental issues and appreciate the interrelatedness among humans and natural environment (IUCN 1970). By equipping individuals with necessary knowledge, cognitive skills, and confidence, EE acts as a powerful catalyst for community engagement, citizen science, and collaborative governance, enabling local populations to become active guardians of their natural territories (Alvarado, 2025; Chen et al., 2025). The need for EE is recognized in academic institutions across the world (Neal and Palmer, 2003). EE has also been a well-known concept in Indian Education systems as environmental protection and ecological values have always been integrated in EE in India (Ravindranath, 2007). It has become necessary to promote EE as a tool for life and learning shall be promoted since childhood considering the environmental conditions (Sonowal, 2009). EE frequently translates into measurable, observable actions to directly maintain, restore, or improve the health of ecosystems (Heidi et al., 2024). A key challenge in Environmental Education (EE) in India is its heavy reliance on theoretical teaching, which limits students' ability to apply knowledge in real-life contexts; therefore, adopting practical and experiential learning methods, integrating local and indigenous knowledge, and enhancing textbooks with multimedia tools are essential to make EE more effective and impactful (Bhatia, 2020).To promote students' commitment to local biodiversity protection methods like active classroom sessions, hands-on activities and field visits serve as a key to achieve sustainable biodiversity knowledge (Ramadoss and Poyyamoli, 2011). Several studies show that inclusion of environmental and ecological topics in academics increases students' awareness and affects their attitude, behavior and conservation values positively (Leeming et al., 1993; Zelezny, 1999; Rickinson, 2001; Humston & OrtizBarney, 2005; 2007). Educational programs often inspire participants to engage in direct site management (Heidi et al., 2024). In current times, EE increasingly leverages digital innovations like serious games, simulations, and augmented reality (AR) to visualize abstract climate concepts, simulate real-world consequences, and build deeper emotional connections with nature (Ahmadov et al., 2025). Community engagement and education is necessary to bridge the gap and promote

conservation. Agenda 21, drawn at the Rio Earth Summit in 1992, states that: “Education, including formal education, public awareness and training should be recognised as a process by which human beings and societies can reach their fullest potential. Education and awareness are critical for promoting sustainable development and improving the capacity of the people to address environmental and development issues. Both formal and non-formal education is indispensable to changing people’s attitudes” (UNCED, 1992). This highlights the importance of education as critical for achieving sustainable development. There is evidence that outreach programmes, have a conservation impact by helping to change both attitudes and behaviour. Education specifically has also been shown to influence attitudes. Despite the ecological, cultural, and economic significance of the Ganga River, there remains a notable gap in awareness among communities in its basin states regarding riverine biodiversity and the impacts of unsustainable practices. Many communities depend on the river but often lack an understanding of its ecological complexity, leading to actions that degrade water quality and biodiversity. When discussing a vast river like the Ganges, which spans 2,525 km across five states in, it is imperative not to narrow our focus to a single aspect. An interdisciplinary approach becomes essential for the conservation of both the water and its biodiversity. To achieve this, engaging with individuals directly or indirectly reliant on the waters of this sacred river is crucial. Environmental education programmes are necessary for bridging gaps by translating scientific knowledge into relatable learning, and promoting informed decision-making (Alvarado, 2025; Chen et al., 2025). Programmes for mass awareness and outreach are essential; and educational processes must be actively linked with local governance to successfully translate individual learning into "sustainable collective action" (Alvarado, 2025). By influencing attitudes and behaviours, such programmes play a vital role in encouraging community participation in the conservation and restoration of the river and its biodiversity. Communities with frequent environmental awareness campaigns exhibit significantly more positive conservation behaviours compared to less-exposed communities (Montana & Mlambo, 2018).

Nature interpretation and education is integral to biodiversity conservation of the Ganga River. Interpretation centres are focal points for dissemination of knowledge of natural or cultural heritage (Orams, 1996), stimulating, facilitating and extending people's understanding so that empathy and concern towards river and biodiversity conservation can be developed, prompting more responsible behavior (Bramwell and Lane, 1993).

1.1 Objectives–

1. Establishment of Ganga Knowledge Corners in select sites as a platform for dissemination of information towards Ganga River conservation and cleanliness
2. Garner support for aquatic biodiversity and Ganga conservation through outreach and conservation education programmes.

1.2 Methodology

1.2.1 Overall Framework

A comprehensive framework for "Awareness and Sensitization Programmes," divided into two main categories: (a) localized Awareness and (b) mass Awareness (Figure 1.1). Localized Awareness includes targeted initiatives like School Awareness Workshops, low-cost interpretation corners, Interpretation Centers, and publications tailored for school students, focusing on engaging smaller, specific groups. In contrast, Mass Awareness encompasses broader outreach methods such as Radio Talks, Puppet Shows, Nukkad Natak (street plays), Social Media campaigns, Publications, and both Static and Mobile Exhibitions, designed to reach a wider audience and maximize public engagement. Together, these strategies aim to educate and sensitize diverse populations through a mix of localized, community-focused efforts and large-scale outreach methods.

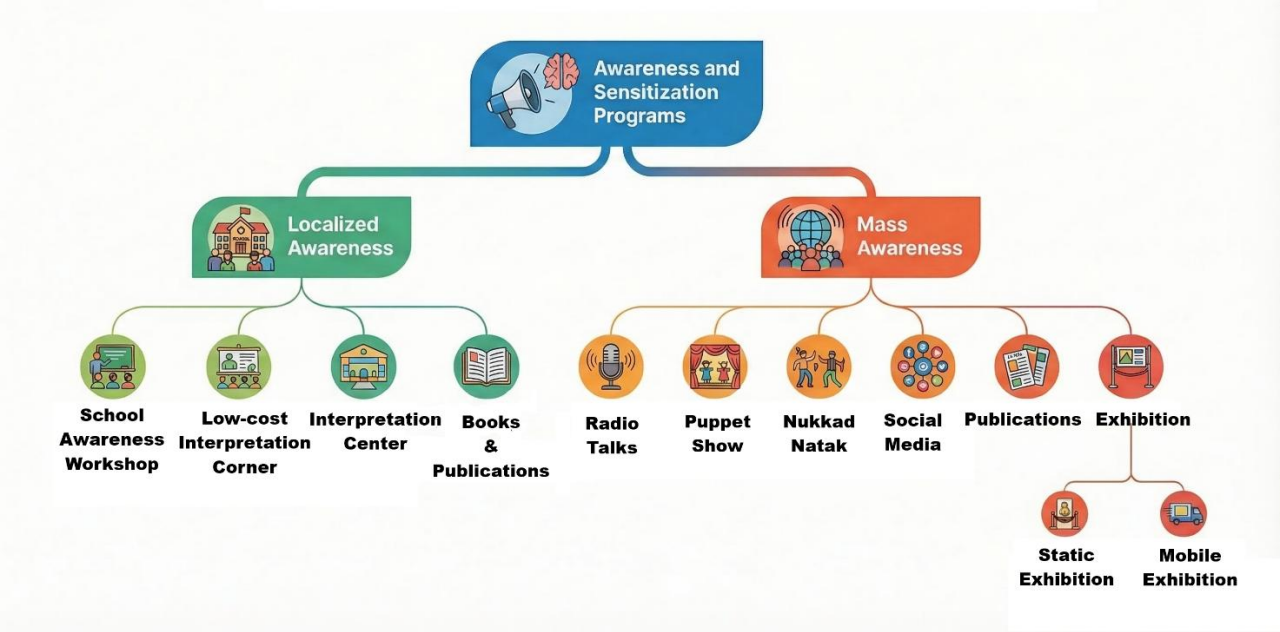

Figure 1.1 Flow chart representing various approach taken for conducting awareness and sensitization programmes

1.2.2 Approach: Objective 1 – Establishment of Interpretation Corners

1. Site Selection

- A reconnaissance survey was conducted by the project team along the Ganga River to identify suitable locations for implementing the programme.
- Schools with active administrative support, accessibility, and sufficient student strength were selected for both awareness workshops and "Jalmala Samvaad" sessions.

2. Awareness Programmes Design

- An interactive and experiential learning module on river biodiversity and conservation was developed, aiming to bring the river ecosystem into the classroom.
- Sessions were designed to enable students to critically reflect on issues affecting the river, including pollution, biodiversity loss, and conservation practices.
- Tools used included interpretation materials, game-based learning activities, and interactive discussions, power point presentation.
- Interpretation Corners were established within school premises to serve as ongoing learning spaces, displaying information on river biodiversity, conservation values, and heritage.

3. Pre- and Post-Questionnaire Survey

- To evaluate the effectiveness of the intervention and knowledge retention over time, a structured questionnaire-based survey was conducted in two phases:

  Pre-session Survey:

  - Administered prior to the interactive session and Jalmala Samvaad.
  - Collected demographic details, baseline knowledge of biodiversity, heritage, and conservation, as well as students' intentions and attitudes towards environmental stewardship.

  Post-session Survey:

  - Conducted three months after the Pre-questionnaire survey.
  - Targeted the same group of students who had participated in the original session.

    - Aimed to measure the retention of knowledge and attitudes developed through the programme.
- The questionnaire responses were later analyzed to assess the impact and effectiveness of the awareness initiative.

1.2.3 Approach: Objective 2– Outreach and Mass Awareness Programmes

To promote biodiversity and environmental awareness along the Ganga River, a multi-pronged outreach approach was adopted, targeting a wide range of stakeholders.

1. **Stakeholder Identification**

   Key stakeholders were identified, including school and college students, teachers (both in-service and pre-service), forest department officials and community members.

2. **Audio-Visual Material**

   A variety of interactive and culturally relevant activities were planned and designed to suit different audience groups. These included interactive sessions and workshops, edutainment/Performative Communication Tools like Puppet shows, and *nukkad nataks* (street plays), exhibitions (both mobile and static), social media and publications. The Figure 1.2 categorizes audio-visual material into three main types: Audio, Visual, and Audio-Visual. Audio content includes Interactive Sessions, Radio Talks, and Publications, focusing on sound-based engagement. Visual content encompasses Exhibitions and Social Media, emphasizing visual presentation and interaction. Audio-Visual material consists of Puppet Shows and Nukkad Natak (street plays), blending both audio and visual elements to create a more immersive experience. This classification highlights the diverse formats through which audio-visual content can be delivered, catering to different audience preferences and engagement styles.

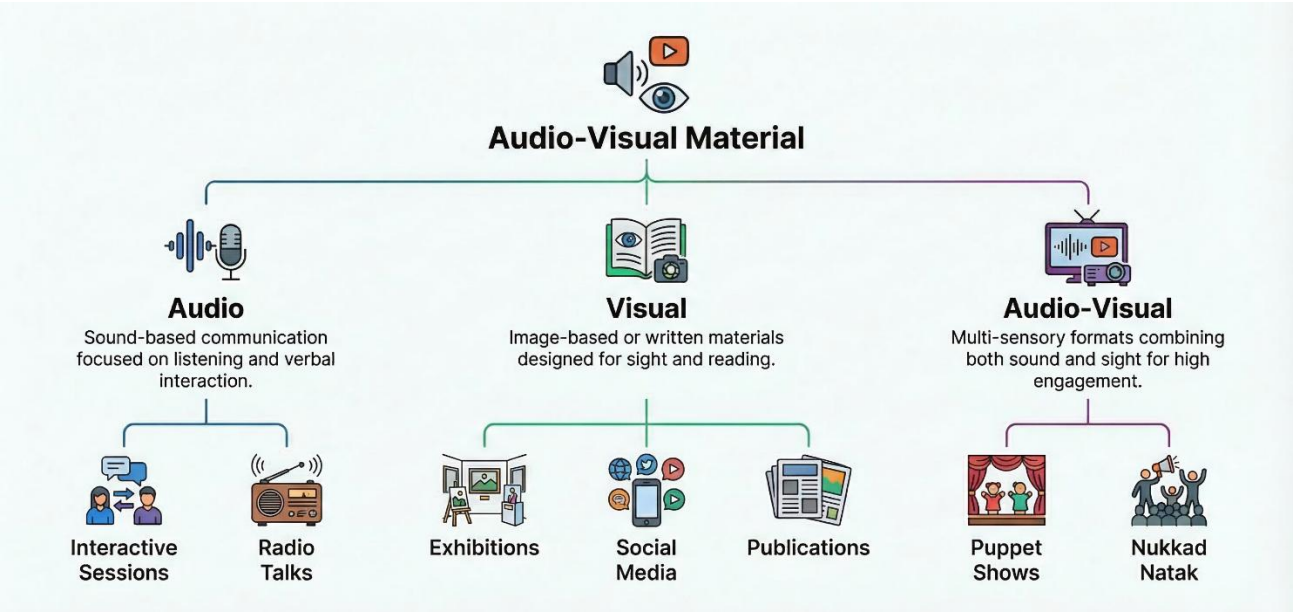

Figure 1.2: Flow chart representing various Audio Visual materials being utilized to conduct Mass awareness and outreach programmes

Chapter 2 - Awareness and Sensitization

Environmental awareness is closely connected to environmental knowledge, attitudes, and actions. It serves as the foundational step toward enabling individuals to engage in responsible environmental stewardship (Montana & Mlambo, 2018). An environmental awareness program educates children about their environment and ecosystem interdependence while encouraging scientific inquiry, positive attitudes toward nature, and active participation in conservation through hands-on activities (Roberts, 2009). Awareness programs provide the learning necessary to truly understand ecosystems and conservation (Karanth et al., 2025). School-based environmental awareness programmes are necessary for developing positive attitudes and behaviors toward biodiversity conservation in students. Integrating such awareness programmes into school curricula and activities can enhance students' understanding of biodiversity issues, while countering negative perceptions and promoting sustainable practices, addressing drivers of biodiversity loss like poaching and deforestation (Montana & Mlambo, 2018). Research demonstrates that effective educational strategies, particularly those combining modeling and direct contact with factual information, significantly improve students' attitudes (Morgan & Gramann, 1989). School awareness programs promote early environmental stewardship by enabling students to understand the cause-and-effect relationships between human activities and ecosystems, thereby preparing them to become responsible custodians of the environment (Kumar, 2023). Implementing such programmes can address misconceptions and promote conservation awareness, aligning with the need for public support in wildlife management (Morgan & Gramann, 1989 Awareness workshops act as practical extensions of theoretical knowledge, translating abstract concepts and formulas into real-world applications through interactive activities and structured training sessions (Zainudin & Rosini, 2010). The physical and psychological environment of these workshops plays a critical role in ensuring effective teaching and learning. A well-organized and comfortable setting promotes smooth instruction and boosts student engagement (Talib & Selamat, 2004). Structured awareness programs fill gaps in kmowledge by providing specific, localized environmental literacy, ensuring that students do not just passively appreciate nature, but truly comprehend how to protect their immediate surroundings (Karanth et al., 2025; Kumar, 2023). Moreover, activities within workshops encourage responsible behavior, efficient use of equipment, and adherence to safety protocols, thus fostering a culture of discipline and readiness among learners (Mohd & Rahizah, 2011). This setting is crucial not only for cognitive development but also for inculcating practical life skills.

Increasingly, it is acknowledged that sharing information with and improving the understanding of communities is vital for effective biodiversity conservation (Van der Ploeg et al., 2011; Ogunjinmi et al., 2012; Choudri et al., 2016). Raising environmental awareness and sharing information are recognized as crucial components in advancing sustainable development (Hossain et al., 2018). Awareness workshops in the Ganga River states are essential to promote a deeper understanding of the river's ecological significance and the urgent need for its conservation. The basin supports millions of people and harbors rich biodiversity, yet it faces severe threats from pollution, habitat degradation, and unsustainable practices. Local communities, especially students and youth, often lack access to structured environmental education programs. Conducting awareness workshops helped bridge this gap by providing relevant knowledge, encouraging critical thinking, and promoting responsible behavior.

2.1 Methodology

A reconnaissance survey was conducted along the Ganga River to identify suitable government schools within a 5–8 km radius of the river for programme implementation. Government schools were prioritized as they often have limited access to environmental education resources and infrastructure, making them important entry points for targeted educational interventions. Additionally, many of these schools cater to students from river-dependent communities whose livelihoods and daily lives are closely linked to the river ecosystem, thereby making them key stakeholders in conservation efforts. Engaging students from such backgrounds provides an opportunity to build early awareness and foster long-term behavioural change within communities. Priority was given to schools with strong administrative support, accessibility, and adequate student strength. An interactive and experiential learning module on river biodiversity and conservation was developed. The learning modules were site and issue specific tailored for individual sites and were delivered through interactive awareness workshops with the school students. Activities included oral/visual presentation, game-based learning methods and interactive discussions sessions. To evaluate the programme's impact, a structured pre- and post-questionnaire survey was administered, to understand changes in students' knowledge, attitudes, and intentions towards environment, with the post-survey conducted three months after the intervention to assess knowledge retention. Low-cost interpretation corners "Jalmala Samvaad" were also set up in schools as permanent learning spaces, where classrooms and galleries were utilized to showcase river biodiversity.

2.2 Results

2.2.1 Pre-Questionnaire Survey

A pre-workshop questionnaire survey was conducted among school students to assess their baseline knowledge, perceptions, and awareness levels related to riverine biodiversity, culture and heritage, and conservation values. The survey was administered prior to the intervention to establish a reference point for evaluating learning outcomes. A total of 60 schools (n = 3077) across the Ganga River states were included, ensuring a diverse representation of students from different geographical and socio-cultural contexts.

2.2.2 School Awareness Programmes

We conducted school awareness and sensitization workshops across five Ganga River states to create awareness about riverine biodiversity and related concerns. Site and issues specific awareness programmes were organized. A total of 185 awareness and sensitization workshops (Table 2.1) have been so far conducted along the Ganga River in the five states of Uttar Pradesh, Uttarakhand, Bihar, Jharkhand and West Bengal (Table 2.1). As part of the awareness workshops, a range of game-based learning activities were incorporated to enhance engagement and facilitate experiential learning among students. These included activities such as the “Web of Life” to demonstrate food chain interactions, biodiversity-themed Snake and Ladder focusing on Dos and Don’ts, riddle-based quizzes, puzzles, and origami exercises related to aquatic species. These interactive tools helped simplify complex ecological concepts and encouraged active participation. Among these, the Snake and Ladder game emerged as the most effective and popular activity due to its familiarity among students, ease of understanding, and its ability to seamlessly integrate conservation messages within gameplay. Its structured format, combined with visual cues and reward-based progression, made learning enjoyable while reinforcing positive environmental behaviours and discouraging harmful practices.

Table 2.1: Awareness Workshops conducted along the Ganga River

S.No.	States	No. of awareness workshops	No. of participants
1	Uttarakhand	36	3231
2	Uttar Pradesh	123	9355
3	Bihar	16	871
4	Jharkhand	5	487
5	West Bengal	5	296
	Total	185	14240

Image 2.1: Biodiversity Awareness Workshop at Govt. School, Almora, Uttarkhand

Image 2.2: Questionnaire survey being conducted at Govt. School, Prayagraj, Uttar Pradesh

2.2.3 Post-Questionnaire Survey

A post-workshop questionnaire survey was conducted to evaluate knowledge retention and learning outcomes after the intervention. From the analysis of the questionnaire of 60 schools (n = 3077) from the Ganga River states we found out that there was a knowledge gain amongst students across three categories. Comparing the responses, we found a 27.85% increase in their knowledge about riverine biodiversity (Figure 2.1), 39.93% increase in culture and heritage (Figure 2.2) and 19.04% in conservation values (Figure 2.3). We used Wilcoxon Signed-rank test to check if the pre to post changes are statistically significant and it gave a p-value < 0.05 indicating that there is significant change in the learning outcome of the students.

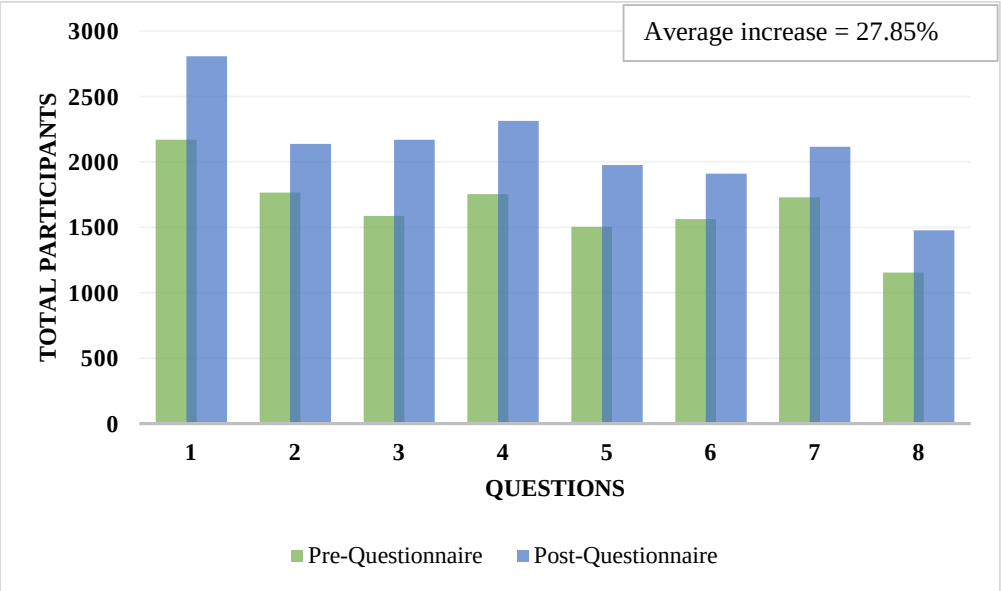

Figure 2.1 – Comparison of pre and post score and average percentage increase in knowledge level in the Ganga River states in the category “Riverine Biodiversity”.

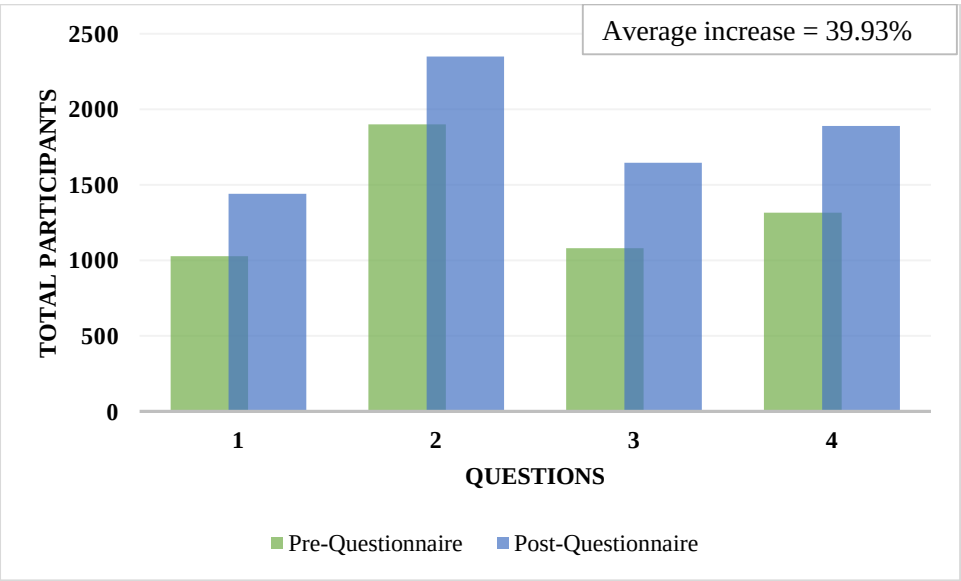

Figure 2.2 – Comparison of pre and post score and average percentage increase in knowledge level in the Ganga River states in the category “Culture and Heritage”.

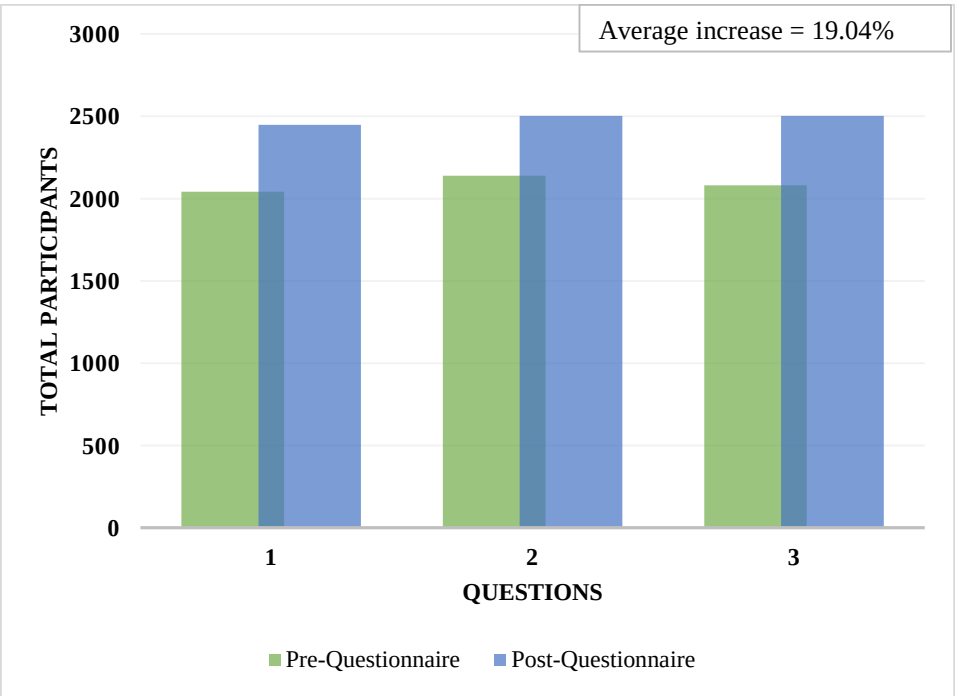

Figure 2.3 – Comparison of pre and post score and average percentage increase in knowledge level in the Ganga River states in the category "Conservation Values".

2.2.4 Low-cost Interpretation Corners

We have established low-cost Interpretation Corners in accessible locations along the Ganga River. They are strategically located to maximize access and engagement, especially in areas with large student populations near the riverbanks. Jalmala Samvaads have been established in government schools across 58 districts across five states of Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal. In total, 106 low-cost interpretation corners have been established making significant impact in education outreach (Table 2.2, Figure 2.4). These smaller-scale interpretation corners act as specialized libraries or galleries, equipped with models, panels, publications, and artwork focused on Ganga biodiversity. Strategically placed in government schools in the Ganga River states, these centers actively involve students during special events like Wildlife Day, World Environment Day, International Day of Biological Diversity etc. inviting participation from nearby schools, colleges and other academic institutions.

Table 2.2: Low-cost interpretation corners 'Jalmala Samvaad' established along Ganga River

S.No.	State	No. of Jalmala Samvaads established	No. of Students Sensitized	No. of Teachers Sensitized
1.	Uttarakhand	23	8463	365
2.	Uttar Pradesh	53	54090	961
3.	Bihar	19	9145	213
4.	Jharkhand	6	4274	136
5.	West Bengal	5	5928	145
	Total	**106**	**81900**	**1820**

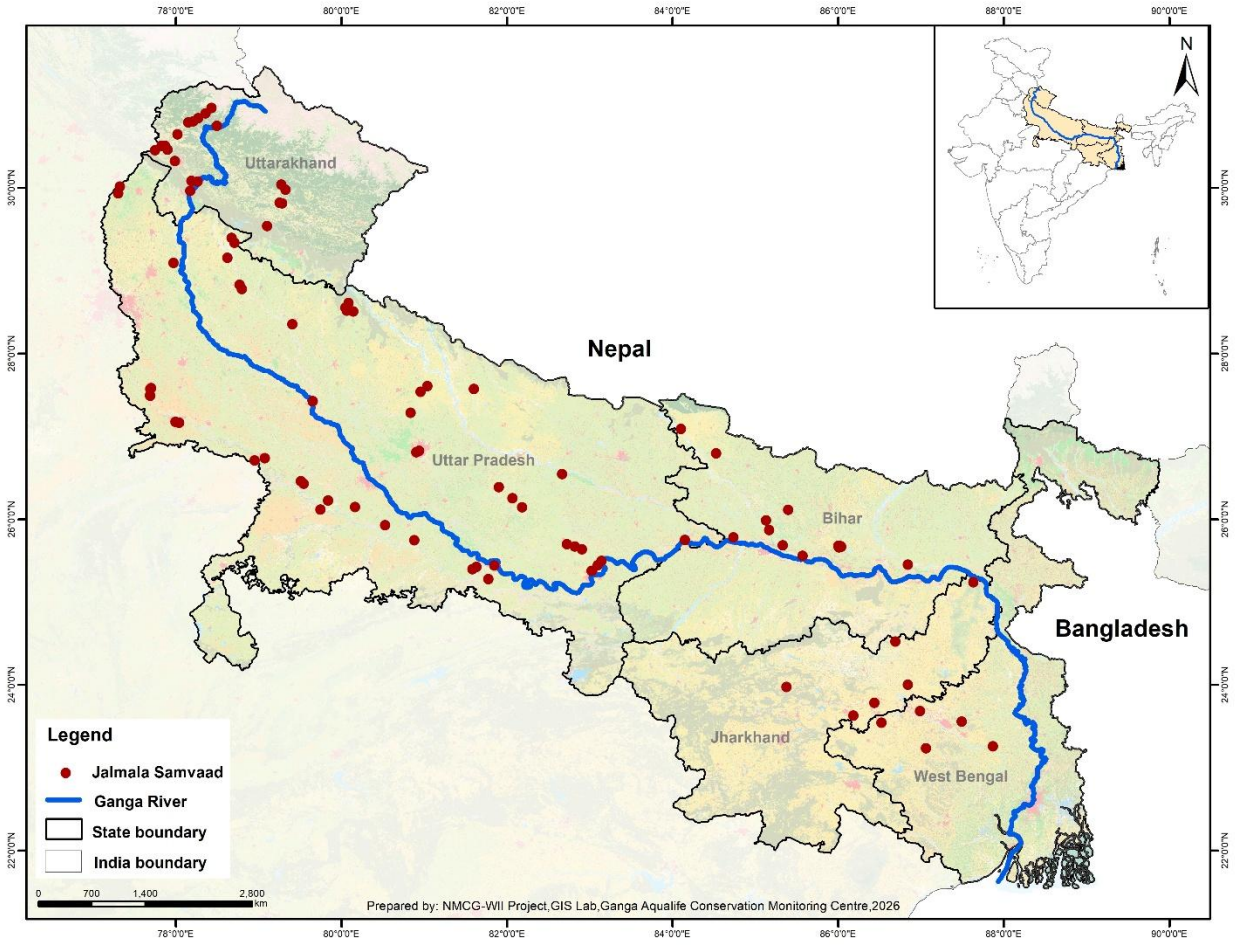

Figure 2.4: Jalmala Samvaad established in the five states along the Ganga River

Image 2.3: Jalmala Samvaad established at Govt. School, Uttarkhand

Chapter 3 - Teacher Training

Teacher education and teachers themselves are critical components of educational transformation and growth (Darling-Hammond, 2020). Teacher training programmes are thus essential to equip educators with the skills, knowledge, and tools needed to deliver high-quality education in dynamic and diverse classrooms. For conservation education to be effective, teacher training programs must evolve beyond simply imparting basic environmental facts. They require a holistic approach that integrates the environmental, economic, and sociocultural dimensions of sustainability, often referred to as Education for Sustainable Development (ESD) (Eliyawati et al., 2023). Research on teacher candidates reveals that short-term or one-off activities do not significantly change environmental behaviors; instead, systematic education and continuous applied training are necessary (Özyurt et al., 2025). Alarmingly, studies show that many teacher candidates currently possess low environmental awareness and struggle to define basic biodiversity components, highlighting a deep need for robust pre-service and in-service training (Özyurt et., 2025). Trainings are needed for developing competent and skilled educators who can enhance the quality of education and prepare future generations for the challenges of the world (Dange and Siddaraju, 2020). These programmes enhance pedagogical expertise, introduce innovative teaching methods, and foster cultural competence, enabling teachers to address varied student needs effectively. They aim to equip teachers with the necessary knowledge, skills, behaviours, and attitudes to perform their tasks effectively both inside and outside the classroom (Dange and Siddaraju, 2020). By keeping educators updated on technological advancements and evidence-based practices, training ensures they remain relevant and impactful. The quality of teaching directly impacts student cognitive development and their relationship with the natural world (Lukas et al., 2019). Students taught by trained educators show reliable, significant gains in identifying environmental threats, and grasping the ecological and economic importance of conservation (Lukas et al., 2019). This further facilitates intergenerational learning, where children act as catalysts to positively influence their parents' household behaviours and adoption of sustainable practices (Kendall et al., 2022).

Conducting teacher training is an investment in creating adaptable, inspired educators who foster inclusive, engaging, and successful learning environments. Moreover, such programmes increase teacher confidence, and improve retention, directly contributing to better student outcomes. There

is need for training of teachers, however, the current training programmes face several challenges, including limited high-quality research, a shortage of well-qualified teachers, low motivation among prospective educators, inadequate infrastructure, and a predominantly supply-driven approach (Kumar and Azad, 2016). Teacher training programmes can be enhanced to improve learning outcomes and ensure teachers are well-prepared to meet the complex learning needs of students in a rapidly changing social environment (Moeini, 2008). According to the study by Singh and Shakir (2019), several factors contribute to the weakening of teacher training programmes; these include insufficient opportunities for professional development, low teacher salaries, limited training in Information and Communication Technology (ICT), inadequate emphasis on research and innovation, infrastructural limitations, an imbalance between the demand and supply of teachers, resistance to innovative teaching methods, and the isolation of teacher education departments from the broader academic framework. A major challenge in existing training initiatives is the lack of ongoing support, supervision, and evaluation after the training concludes (Eliyawati et al., 2023; Lukas et al., 2019). Continuous evaluation is critical to inform program improvements, support teachers in implementing action plans, and ensure that conservation targets are actively being met in the classroom (Eliyawati et al., 2023; Lukas et al., 2019). Teacher training is crucial for the qualitative improvement of education, as highlighted by the Kothari Commission (1964-66). It is a vital strategy for conservation because it is uniquely scalable and multiplicative. By training a relatively small number of teachers, conservation programs can indirectly reach thousands of students and, subsequently, the broader community (Kendall et al., 2022)

We conducted teacher training programmes along the Ganga River to empower educators through interactive awareness programmes and environmental education tools, promote sustainable development and conservation awareness. These programmes aimed to equip teachers with the skills to inspire students in local communities, promoting knowledge about the ecological significance of riverine biodiversity, water resource management, and biodiversity preservation.

3.1 Methodology

The teacher training programme is conducted with both pre-service and in-service teachers. The selection of in-service and pre-service teachers for the training programme was guided by their availability and willingness to participate. For pre-service teachers, participants were chosen from the District Institutes of Education and Training (DIETs). In the case of in-service teachers, the focus was on those working in schools where student awareness workshops had already been

conducted, allowing for continuity and reinforcement of conservation education. All selected institutions and schools were located within the Ganga River states, primarily in close proximity to the river, to ensure contextual relevance and enhance the connection between local environmental issues and educational content. Training programme follows an interactive, activity-based approach aimed at enhancing educators' understanding of riverine ecosystems and conservation. It begins with a presentation on the followed by a series of hands-on activities designed to engage participants in experiential learning.

3.2 Results

3.2.1 Training of In-service and Pre-service teachers

A total of 489 pre-service, 34 lecturers (Table 3.1) and 825 in-services teachers (Table 3.2) have been trained through these training workshops. The teacher training programme was successfully implemented using an interactive, activity-based approach to enhance educators' understanding of riverine ecosystems and conservation. Each session began with a presentation on the biodiversity of the Ganga River and its tributaries, highlighting the ecological significance of the river system and the impacts of human activities on its health. This was followed by a series of hands-on, experiential learning activities designed to actively engage participants. Educators participated in group discussions using the instructional manual *"Discovering Ganga"* and took part in educational games such as *Snake and Ladder*, *Web of Life*, *Biodiversity Dart*, and *Species Puzzle*. These activities fostered critical thinking, collaboration, and innovative teaching strategies for integrating river conservation themes into classroom practice.

Table 3.1: Details of teacher training programme conducted in District Institution of Education and Trainings

S.No.	Institution	Total No. of pre-service teachers	Total No. of D.I.E.T. Lecturers
1	D.I.E.T. Uttarkashi	33	4
2	D.I.E.T. Agra	120	4
3	D.I.E.T. Sarnath	81	5
4	D.I.E.T. Kanpur	103	6
5	D.I.E.T. Prayagraj	85	9
6	D.I.E.T. Dehradun	67	6
Total No. of Teachers Trained		**489**	**34**

Image 3.1: Teacher training workshop with pre-service teachers at D.I.E.T. Agra, Uttar Pradesh

Table 3.2: Teacher training programme conducted with in-service School Teachers

S.No.	State	Total No. of In-service teachers
1	Uttarakhand	251
2	Uttar Pradesh	502
3	Bihar	49
4	Jharkhand	23
	Total No. of Teachers Trained	**825**

3.2.2 Gyan Kosh

Following the training, each school received a resource kit called "Gyan Kosh." This kit includes a teacher training manual, activity books, a factsheet on river biodiversity, a booklet addressing plastic pollution, educational games, puppets, origami materials, a pen drive containing relevant videos, and a water testing kit. These resources aim to empower teachers with the necessary knowledge and tools to integrate engaging and informative environmental education into their classrooms.

Image 3.2: 'Gyan kosh' a resource kit provided to schools and teachers after the awareness workshops

Chapter 4 - Interpretation Centers

Interpretation is the process of conveying the significance of a place or thing to people in a way that deepens their appreciation, fosters understanding, and encourages a positive outlook toward conservation. It aims to enrich visitors' experiences, communicate deeper symbolic meanings, and inspire changes in attitudes or behavior towards the natural or cultural environment (Prentice, 1996). People use interpretation to help them understand the place they are visiting (Stewart et al., 1998). Interpretive programs play a vital role in promoting conservation, serving as a primary tool to balance tourism development with environmental protection in nature-based areas (Kuo, 2002; Newsome et al., 2002). Nature interpretation and education is integral to biodiversity conservation of the Ganga River. As an institution for dissemination of knowledge of natural or cultural heritage through provocation and revelation of the relationships and meanings of the natural environment (Orams, 1997), interpretation centers stimulates, facilities and extends people's understanding so that empathy and concem towards biodiversity conservation can be developed, prompting more responsible behaviour (Bramwell and Lane, 1993; Stewart et al., 1998). Interpretation is being utilized as a means of contributing to the protection of the natural environment through revealing the meanings of an object, a culture or a place or enriching visitors' understanding of the place (Knudson et al., 1995; Moscardo, 1998; Tilden, 1977) while enhancing visitor enjoyment and satisfaction (Moscardo, 1998). The management goals of interpretation in the context of natural areas focus on change to low impact behavior and ultimately long-term conservation behavior. Research has revealed that the effectiveness of persuasive interpretation varies according to the type of environmental behavior (Manning, 2003; Marion and Reid, 2007; Roggenbuck 1992). For example, unintentional behavior and uninformed actions may be considerably altered by information and interpretive programs. Interpretation has a significant impact on increasing knowledge, and occasionally promoting favorable attitudes (Kim et al., 2011). Local people can benefit from an interpretation programme, for instance, it increases their understanding of how they can contribute to the protection of an area's natural resources upon which they depend for subsistence or some form of income. Interpretation can be seen as a process that helps visitors develop a sense of connection or care for a place. Interpretive exhibits act as portals that help people connect with their heritage and reflect on their relationship with the ecosystem (Gross and Zimmerman, 2002). Research demonstrates that interpretive programming is highly effective at increasing short-term knowledge gain, positively influencing visitors' attitudes, and enhancing

their overall level of connection to nature (Powell and Ham, 2008; Sharp et al., 2012)While most visitors may not stay long enough to form a deep bond, good interpretation can still take them a step closer to understanding and appreciating the place. This emotional connection can lead to empathy and a caring attitude, not just for that specific site, but also for other natural or cultural places around the world. In this way, interpretation can inspire people to care about conservation more broadly (Stewart et al., 1998).

4.1 Methodology

The approach for establishing interpretation centers along the Ganga River focused on strategic location, thematic relevance, and long-term sustainability. The central theme across all centers is the Ganga River—highlighting its biodiversity**,** journey from origin to destination**,** and the challenges posed by pollution**.** Each center was developed with context-specific content, interactive displays, and educational materials to engage diverse audiences, including students, local communities, and tourists. The planning process included site selection based on accessibility and ecological relevance, design of interpretive content tailored to local culture and river ecology, and collaboration with government stakeholders for long-term stewardship

4.2 Results

A total of five interpretation centers were developed, with three located in major urban centers—Haridwar, Uttarakhand, Kanpur and Varanasi, Uttar Pradesh—ensuring high footfall and visibility (Table 4.1). Two additional centers were designed as open-air interpretation spaces and have been handed over to the Forest Department for continued management and community engagement, in Sanjay Van Rudrapur and City Forest Ramnagar, Uttarakhand. . These interpretation centers assist in promoting an understanding and appreciation of the biodiversity and cultural significance of our National River – the Ganges.

The three urban Interpretation centers are named, “Ganga Avlokan” located in Haridwar, Uttarakhand, “Ganga Darpan” located in Varanasi and “Anubhuti” located in Kanpur, Uttar Pradesh.

Table 4.1: Total number of participants of educational tours and workshops, and visitors at Interpretation Center

S.No.	**Interpretation Center**	**Visitors/Educational Tours/Workshop participants**
1	Ganga Avlokan, Haridwar, Uttarakhand	150432

2	Anubhuti, Kanpur, Uttar Pradesh	169672
3	Ganga Darpan, Varanasi, Uttar Pradesh	50989

4.2.1 Ganga Avlokan, Haridwar, Uttarakhand

This is situated at Chandi Ghat, Haridwar, Uttara khand. The Center is designed to engage and educate visitors about the river Ganga and its biodiversity. These centers feature displays, dioramas, and exhibits, and panels that showcase the journey of the river Ganga - from origin to destination, livelihood that it provides and biodiversity that thrives in and around it. Visitor numbers increased at an average annual rate of approximately 56%, with particularly sharp growth observed in 2025. (Figure 4.1).

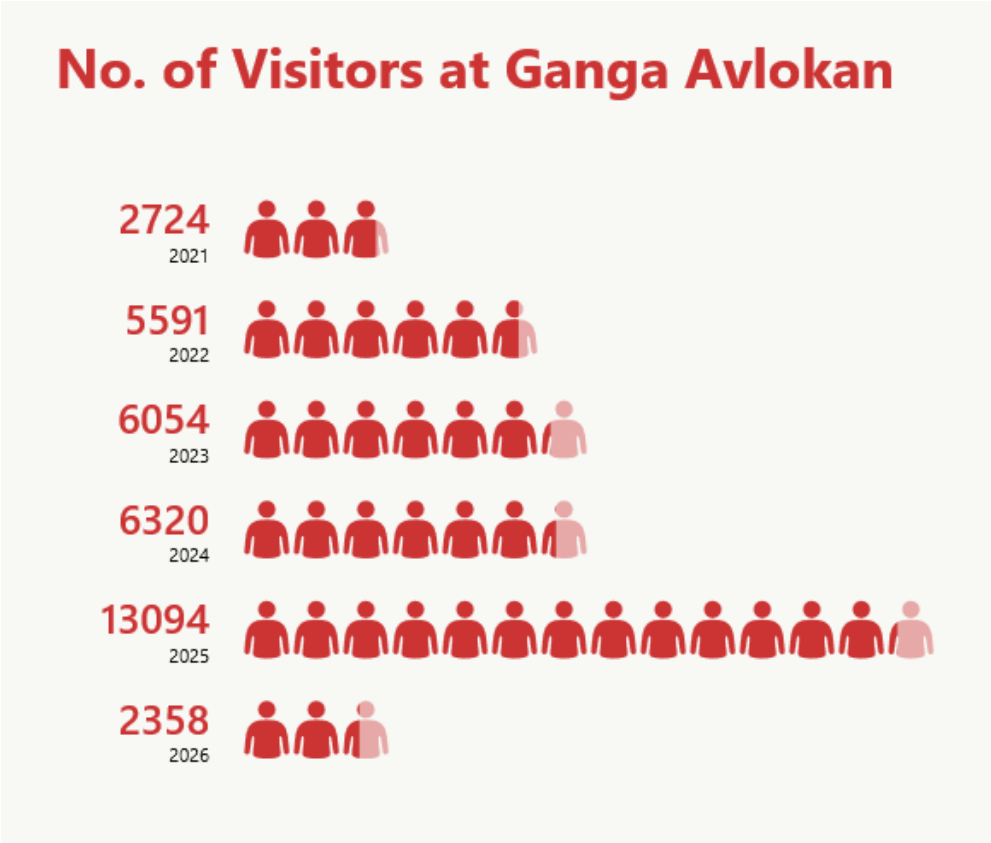

Figure 4.1: Total number of visitors at Ganga Avlokan since the year of inception

Image 4.1: Ganga Avlokan Interpretation Center established at Chandi Ghat, Haridwar, Uttarakhand

4.2.2 Ganga Darpan, Varanasi, Uttar Pradesh

"Ganga Darpan" an interpretation center has been developed at the Turtle Rescue and Rehabilitation Center, Sarnath, Varanasi. The center showcases Ganga as an integral part of our lives since ancient time. Visitor numbers showed an average annual increase of ~63%, though trends indicate significant fluctuations with sharp growth in recent years. (Figure 4.2).

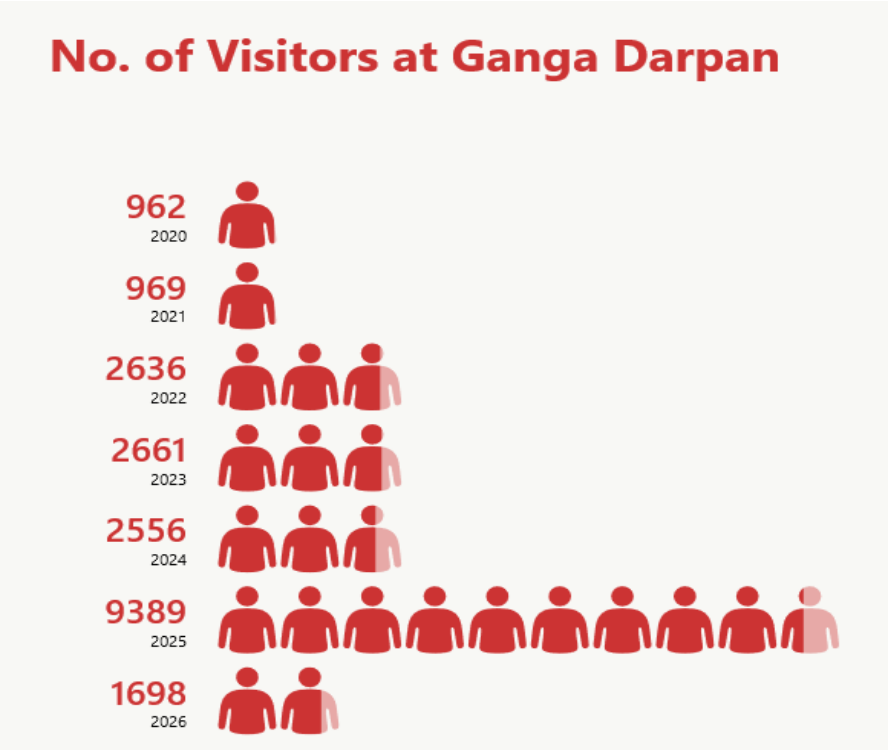

Figure 4.2: Total number of visitors at Ganga Darpan since the year of inception.

Image 4.2: Ganga Darpan Interpretation Center established at Sarnath, Varanasi, Uttar Pradesh

4.2.3 Anubhuti, Kanpur, Uttar Pradesh

"Anubhuti" has been developed at the heritage building of Allen Forest situated at Kanpur Zoological Park. Nestled on the banks of river Ganga, Kanpur stands as one of the North India's major industrial centers with its own historical, religious and commercial importance. Visitor numbers showed an average annual increase of approximately 48%, despite a slight decline observed between 2020 and 2021 (Figure 4.3).

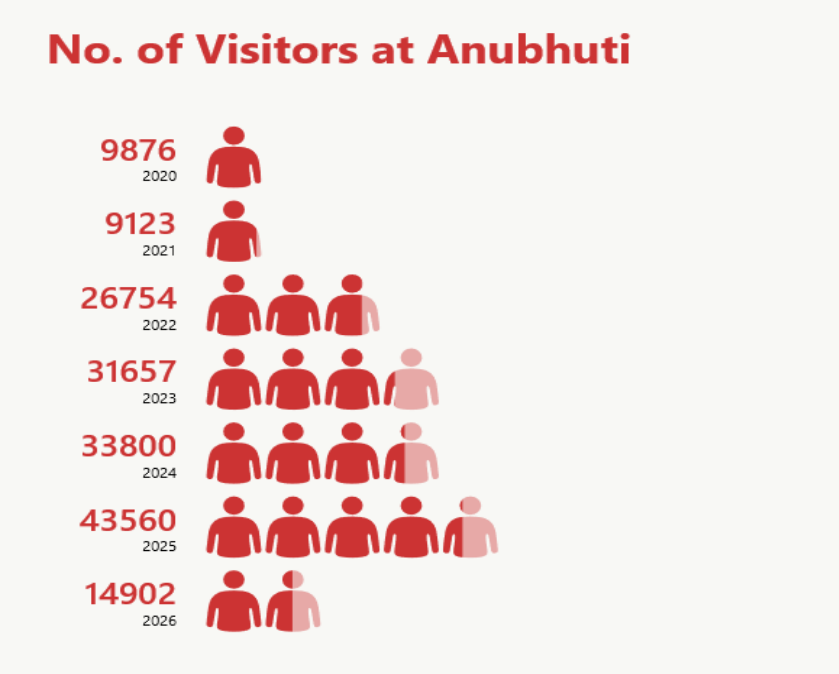

Figure 4.3: Total number of visitors at Anubhuti since the year of inception.

Image 4.3: Anubhuti Interpretation Center established at Kanpur Zoo, Kanpur, Uttar Pradesh

4.2.4 Sanjay Van, Rudrapur, Uttarakhand

An Open-air Interpretation centers have been established in Sanjay Van Rudrapur, Uttarakhand. Sanjay Van is a green area that is the part of Tanda range forest in Pantnagar town of Udham Singh Nagar District. The center was developed with the support of the Forest Department and has been handed over to their management.

Image 4.4: Sanjay Van open-air Interpretation center established at Rudrapur, Uttarakhand

4.2.5 City Forest, Ramnagar, Uttarakhand

This is also an open-air Interpretation center. City forest is part of the Jim Corbett National Park at Ramnagar in Nanital. The center was developed using 3D species model and informative panels with the support of the Forest Department and has been handed over to their management.

Image 4.5: City Forest open-air Interpretation center established at Ramnagar, Uttarakhand

Chapter 5 - Outreach and Conservation Education Programmes

Public support is crucial for biodiversity conservation. Public concern for biodiversity can influence policymakers and shape public policy (Doley and Barman, 2025). The cooperative nature of local communities is essential for implementing sustainable management strategies. Public participation, defined as collaborative efforts between communities and government to guide development programs and address specific needs, is therefore essential (Eneji et al., 2009). Communication is pivotal in driving social change, and effective communication can profoundly impact societal shifts towards sustainability and the restoration of biodiversity (De Lange et al., 2022). To ensure that the conservation practices are effective, focusing solely on protecting natural resources is no longer enough; efforts must be made to engage the people who directly or indirectly are dependent on these resources or are affected by them (Infield & Tolisano, 2019). Lasting change occurs when the local communities see themselves as a part of the solution, without engaging these people and addressing their needs or issues, conservation becomes an uphill battle (Dhliwayo et al. 2023). That's why conservation is no longer about protecting or preserving the nature in theory—it is also about living with it, alongside it – it's about co-existence. Conservation education bridges this gap. It is an initiative that focuses on making people active participants in the preservation of resources they rely on and creating a sustainable balance (Hutchings & Cassar, 2006). To promote a wide range of public support for conservation, effective science communication is necessary, reflecting public values and encouraging participation in decision-making (Kassas, 2002; Hooykaas et al., 2020). It builds a foundation of respect, knowledge, and shared responsibility by fostering environmental education, engaging communities and promoting eco-friendly livelihoods. It is widely recognized that enhancing communication and education in rural communities is key to sustainable natural resource management and can significantly advance environmental conservation, particularly in developing regions (Van Der Ploeg et al., 2011).

Connecting people deeply with the ecosystems that sustain them, this approach transforms conservation from an obligation into a shared commitment. It empowers individuals to protect the planet's future and makes protecting nature part of everyday life (Swargiary, 2023). Conservation education is not just an option but a necessity. Other enforcement although extremely necessary, they alone cannot secure the future of our rivers, forests, and wildlife. Engaging communities, providing sustainable livelihood options, educating young minds are the backbone of a conservation movement that resonates with people's values and realities (Gurung & Thapa, 2023;

Infield & Tolisano, 2019). Conservation outreach is vital for boosting conservation impacts by emphasizing communication, education, and public awareness to promote pro-environmental attitudes and behavioral changes (Doley and Barman, 2025). By empowering people to protect the natural resources that sustain their lives, instead of imposing restrictions, community engagement nurtures a sense of shared stewardship (Oskarsson, 2014). Similarly, river conservation requires a collaborative effort across all levels of society. When government policies align with the values and practices of local communities, it creates an environment conducive to sustainable and effective river conservation initiatives (Gilson & Garrick, 2021); whether in policy-making, or on-the-ground action each department, institution, and individual has a vital role to play (McKinley et al. 2017). Community-based education initiatives provide opportunities to share traditional ecological knowledge, foster intergenerational knowledge transfer, and actively involve local communities in conservation efforts. For environmental conservation projects to succeed, they must engage the public through citizen science, restoration efforts, education, or communication campaigns (Stern et al., 2017). Different engagement methods can lead to varied conservation outcomes (Stern et al., 2017). These programmes typically feature workshops, storytelling sessions, and hands-on activities (Varma and Kumar, 2024). Collective action can become a powerful force in protecting these ecosystems, if every person realizes their responsibility.

Mass awareness programmes were conducted in the Ganga River states to educate and engage large sections of the population on the importance of river conservation. Considering the ecological, cultural, and economic significance of the Ganga and its tributaries, it was crucial to develop a sense of responsibility among communities. These programmes aimed to increase understanding of river biodiversity, pollution issues, and sustainable practices, ultimately encouraging collective action for the protection of the river system. It is crucial to involve local communities who live near protected areas or habitats of endangered species in conservation efforts (Novacek 2008). Depending on their location and livelihoods, local people can be engaged in various ways by stakeholders and conservation biologists. This involvement helps to frame conservation in ways that are both understandable and relevant to the community's social context (Bickford et al. 2012).

5.1 Methodology

To effectively reach diverse audiences and promote river conservation along the Ganga River, a multi-pronged approach using audio, visual, and audio-visual materials was adopted. Audio methods included radio talks and interactive sessions to engage communities through local language and dialogue. Visual tools such as exhibitions, social media and publications helped communicate key messages in a clear and relatable manner. Audio-visual methods like puppet shows and nukkad nataks (street plays) brought stories of the river and its challenges to life, creating educational impact. Social media platforms were also used to extend outreach and sustain engagement. This integrated approach ensured that awareness efforts were inclusive, culturally resonant, and accessible to people of different age groups and literacy levels.

5.2 Results

Various mass awareness and outreach programmes were conducted along the Ganga River. They are listed below –

5.2.1 Interactive Programme – Awareness and Sensitization Workshop

Various interactive workshops were conducted on several events to create awareness about the river and its biodiversity in various states and districts along the Ganga River across five states. Approx 1 crore participants were sensitized through the awareness and sensitization programmes conducted under various initiatives as listed in Table 5.1.

Table 5.1: Details of various awareness and sensitization programmes conducted during various events

Activity	**No of people reached out (Approx.)**
Ganga Utsav	10,000
Nadi Utsav	8,00,000
Har Ghar Tiranga	1,50,000
Catch the Rain	25,000
Swachhta Hi Sewa	2,00,000
Maha Kumbh	50,00,000
Ek Ped Ma Ke Naam	10,000

Special Day Celebration	5,00,000
Amrit Dhara	25,000
Vriksharopan	50,000
Mission LiFE	2,50,000
Azadi Ka Amrit Mahotsav	7,00,000
Rashtriya Jal Khata Abhiyan	3000

5.2.2 Mahakumbh Mela

The environmental awareness and conservation activities conducted by the team, and the Ganga Praharis during Mahakumbh 2025 served as a powerful platform to advocate for river conservation and sustainable practices. At the Mahakumbh, in collaboration with its volunteers - Ganga Praharis, we conducted impactful environmental awareness activities at the NMCG Pavilion, Sangam, Arail Ghat, and the Kalash Awareness Stall. Through awareness programmes, cleanliness drives, street plays (Nukkad Nataks), and plastic waste management sessions, they educated diverse stakeholders about the importance of conserving rivers and aquatic biodiversity for ecological balance. A total of 50,00,000 people were sensitized through our activities and awareness including local community members, pilgrims, educational institutions, government officials, local vendors, and foreign visitors. The Ganga Prahari group played a pivotal role in mobilizing devotees through street plays and interactive discussions. These sessions highlighted the dangers faced by aquatic species like the Gangetic Dolphin, Gharials, Otters, and Mahseer fish, emphasizing the threats posed by pollution, habitat destruction, and climate change.

Image 5.1: Sensitization programme with Mahakumbh visitors about role of community participation in field of conservation

Image 5.2: Awareness about the plastic waste and importance of biodiversity for river ecosystem by Ganga Prahari

5.2.3 Radio talks

Radio talks are highly effective for creating mass awareness about riverine biodiversity due to their wide reach and accessibility. They deliver engaging, informative content to diverse audiences, including rural and urban communities, in local languages, making complex ecological issues relatable. By featuring experts, conservationists, or local voices, radio talks educate listeners about the importance of river ecosystems, threats like pollution, and conservation actions.

We conducted Radio talks on Radio Rishikesh and Aakashwadi Dehradun on various topics. The radio talk shows organized focused on raising mass awareness about environmental conservation, youth empowerment, and career opportunities, effectively engaging diverse audiences. Radio Rishikesh aired a total of 14 episodes on topics for riverine conservation, the role of women in Himalayan conservation (celebrated on Himalaya Day), and the significance of street plays for conservation awareness. Waste management, particularly plastic waste and composting, was highlighted during Swachhta Pakhwada. Youth-centric discussions on environment, development,

and their role in nation-building, were featured on International Youth Day and Independence Day. Career-oriented talks covered opportunities in forestry, biotechnology, wildlife, environmental science, commerce, science, GIS, and remote sensing, with specific emphasis on GIS applications. Additionally, wildlife photography was explored on World Photography Day. A radio show series of 8 and 6 episodes titled, “Ganga ki Baat” was also conducted through Aakashwadi Dehradun. By aligning with significant days and addressing pressing ecological and social issues, these radio talks developed public understanding and inspired action toward conserving riverine biodiversity and beyond.

Image 5.3 Radio show conducted at Radio Rishikesh on International Youth Day

5.2.4 Mobile Exhibition

As part of the Wildlife Week celebration under the aegis of the 75th Azadi Ka Amrit Mahotsav, a Yatra was organized to raise awareness about the significance of water and biodiversity and their impact on our lives. The journey traced the Ganga, Yamuna, and Gomti Rivers, addressing various audiences, including school students, village community members, pedestrians, the Forest department, and teachers (Table 5.2, Figure 5.1).

Table 5.2: Places visited during mobile exhibitions conducted along the Ganga River

S.No.	Activity	Place	No. of Participants
1	Flag off, Selfie point	Haiderpur Wetland, Bijnor	1500
2	Workshop with underprivileged Children along the Yamuna River	Delhi	5330
3	Educational activities with school students	Kanpur	8040
4	Painting competition in Kanpur ,Zoological Park	Kanpur zoo	7820
5	Awareness workshop with students	Zafarabad, Jaunpur	6720
6	Awareness workshop with students	Ghanshyampur, Sultanpur	5130
7	Community workshop with villagers	Dhakua, Kaithi, Varanasi	8300
8	Awareness workshop with students and locals	Rajbari, Varanasi	7270
		Total	**50,110**

Image 5.4: Awareness workshop conducted during Mobile Exhibition with school students

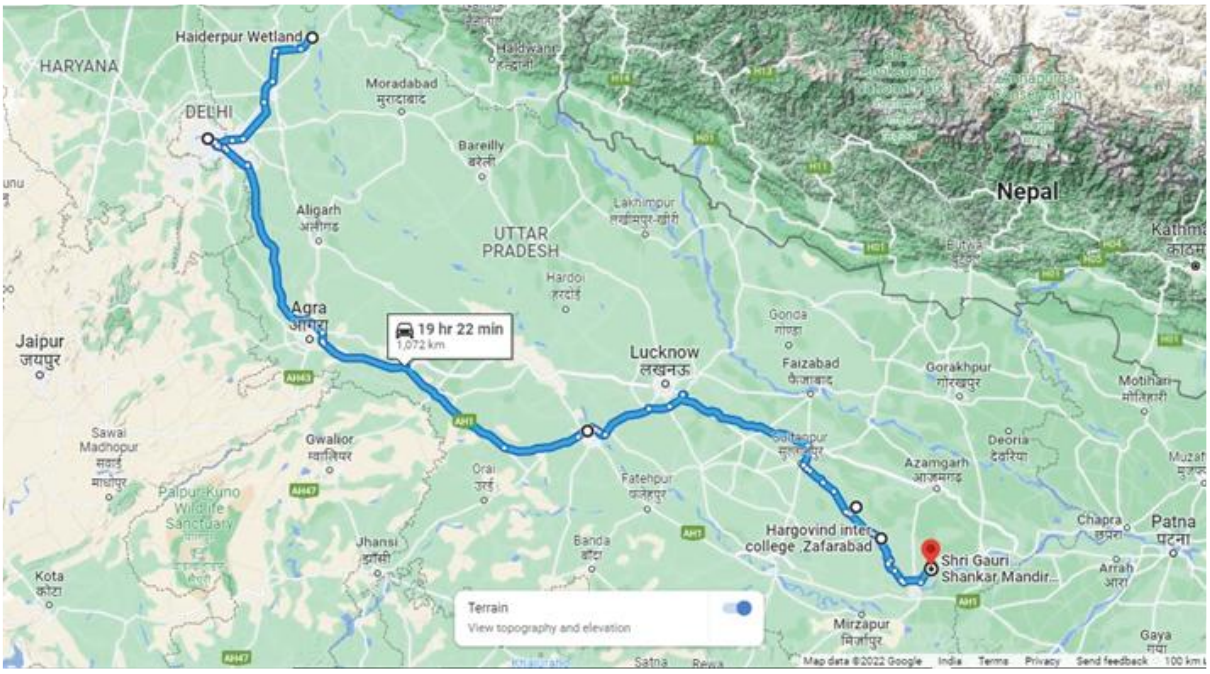

Figure 5.1: Distance covered during the Mobile Exhibition

5.2.5 Static Exhibition

Exhibitions are valuable for raising awareness about riverine biodiversity due to their ability to visually engage and educate diverse audiences. These display posters, models, and informational panels, provide clear, accessible information about river ecosystems, species, and threats like pollution. Set up in public spaces like schools, ghats etc they attract broad attention and encourage self-paced learning. Their cost-effective, reusable nature allows for repeated use across locations, ensuring consistent messaging. To sensitize community about biodiversity conservation of Ganga River various exhibitions were exhibited during various occasions. Table 5.3 provides a list of total number of participants who participated in the event.

Table 5.3: Total number of exhibitions conducted along the Ganga River

S.No.	Event	Location	No. of Participants
1	Exhibition at Shiv Ghat	Haridwar	200
2	Exhibition at Soor Sarovar wetland	Agra	210
3	Exhibition at USAC	Dehradun	162
4	Vigyan Sarvatra Pujyate' organized by Ministry of Culture, Government of India.	Nehru Stadium, Dehradun	4030
5	Vigyan Sarvatra Pujyate' book fair under Science and Technology Education Theme	UCOST, Dehradun	560
6	Biodiversity Exhibition in association with Azim Premji Foundation	Govt Upper Primary School, Selaqui	500
7	Exhibition on Clean Ganga Mission	Varanasi	100000
		Total	**1,05,662**

Image 5.5: Exhibition set-up at Dashashwamedh Ghat, Varanasi during World Environment Day

5.2.6 Social Media

As we are living in a digital world, we started to focus more on digital content and social media platforms to disseminate knowledge about river and its biodiversity. Also, as print media can only reach to limited audience and stakeholders, these platforms assist in reaching the masses in a convenient manner. Social media helps in creating awareness about riverine biodiversity by reaching vast, diverse audiences instantly with engaging content and stories. It leads to interaction, enabling users to share, comment, and participate in conservation campaigns, amplifying impact. Platforms also connect communities with experts and organizations, driving collective action and sustained interest in protecting river ecosystems. We have created Facebook and Instagram accounts named "Ganga Darpan" and "Glimpses of Ganga" and these pages are constantly updated with educational content to create awareness. So far through our social media pages on Instagram, Facebook and YouTube we have engaged over 15, 65,854 participants from all across the country and world. We also created an Environmental Blog named "Ganga Darpan" with an aim to provide a platform for sharing knowledge, experiences, best practices and stories in the field of river conservation, with a focus on education and outreach as well. So far we have published 92 blogs and stories, with a visitor engagement of around 3700, and 6000 views.

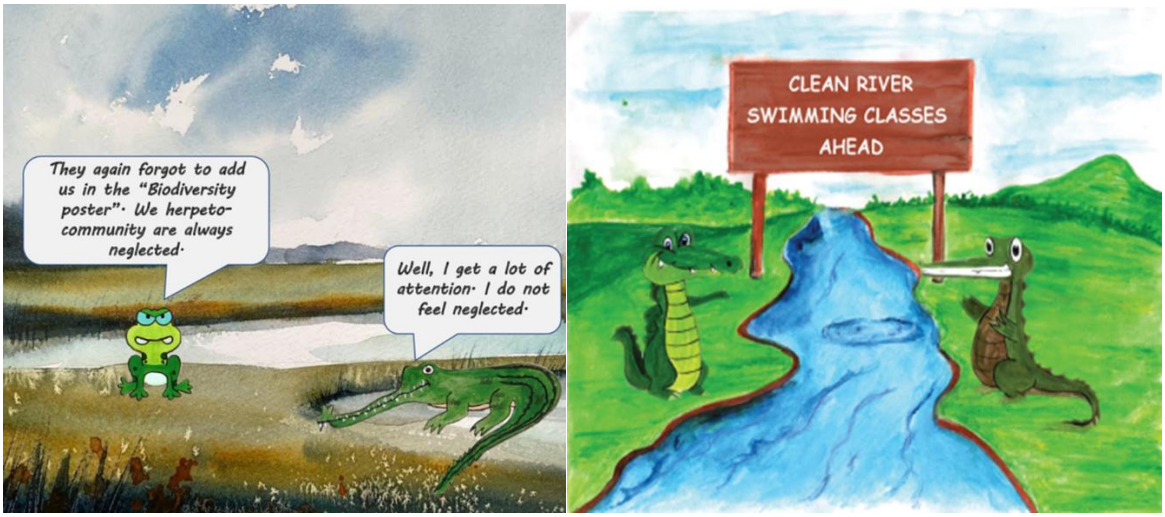

Image 5.6: Comic strips designed for Social media

5.2.7 Publications

Publications play a crucial role in enhancing awareness, whether they communicate existing knowledge or introduce new information to the public. In the context of promoting awareness about the Ganga and its biodiversity, specific publications have been meticulously designed, developed, and disseminated among diverse audiences, including the general public, school students, and teachers (Annexure I). These include both print media as well as digital media publications. We develop publications targeted for school students and teacher as well as for mass awareness. Through our publications we have reached to almost 15, 00,000 participants.

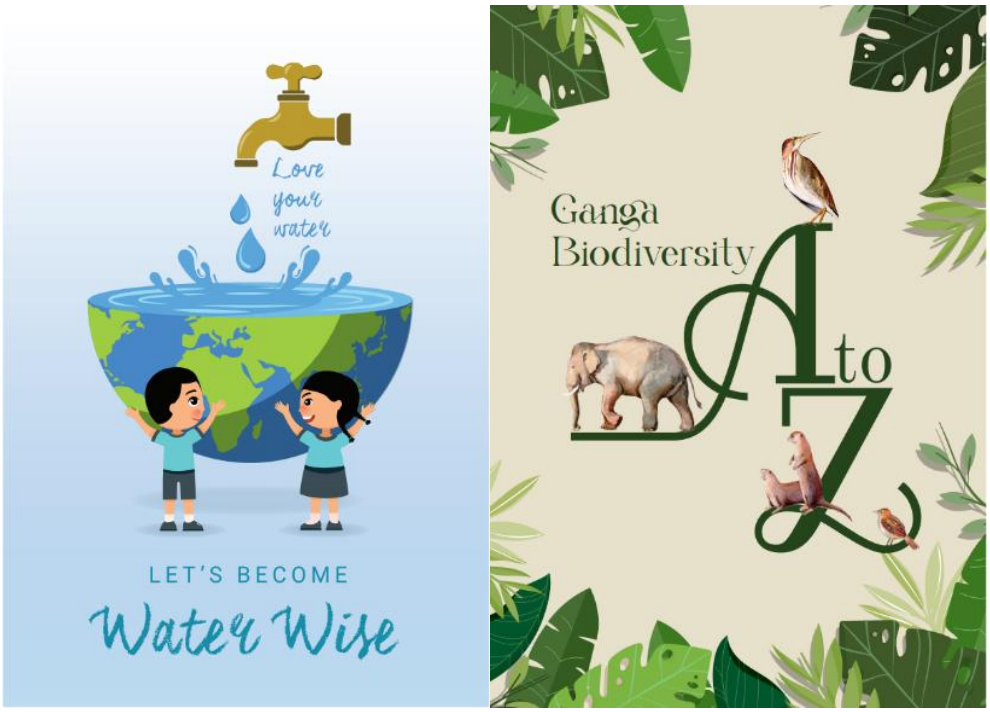

Image 5.7: Various publications designed for both students and the local communities

5.2.8 Village Walk

In Siror Village, Uttarkashi, a transformative initiative was undertaken to promote environmental awareness and celebrate the region's natural heritage. A thoughtfully designed village walk was established along the scenic banks of the Bhagirathi River. This trail was developed not only as a recreational pathway but also as an educational experience for both locals and visitors. Informative signages were strategically placed along the route, offering insights into the diverse flora and fauna that inhabit the region, as well as the ecological importance of the Bhagirathi River. These signboards were designed in simple, accessible language to engage people of all age groups, especially students and community members. The walk serves as a platform to connect people more deeply with their environment, fostering a sense of pride and responsibility towards biodiversity conservation.

Image 5.8: Village Walk established along the Bhagirathi River in Siror Village, Uttarkashi, Uttarakhand

5.2.9 Puppet Shows and Nukkad Natak

Puppet Shows and Nukkad Nataks play a vital role in addressing social issues and conveying moral messages to the audience. Through their creative performances and symbolic storytelling, they serve as a medium to address issue related to biodiversity conservation attracting masses. Various awareness activities, were conducted along many locations along the Ganga River mainly Nukkad Natak (street plays) (Table 5.4) and Puppet Shows (Table 5.5), were conducted across various locations along the Ganges River to educate communities.

Table 5.4: Nukkad Nataks conducted across the Ganga River in Uttar Pradesh

S.No.	Location	No. of Participants
1	Narora	25000
		25000
2	Kashipur, Sambal	4200
3	Kanpur	10000
		15000
4	Mirzapur	5600
5	Varanasi	25000
		12200
		8518
	Total	1,30,518

Table 5.5: Puppet Show conducted across the Ganga River in Uttar Pradesh

S.No.	Location	No. of Participants
1	Varanasi	50,500
2		50,000
3	Mirzapur	50,000
	Total	1,50,500

Image 5.9: Puppet show organized for the local community in Varanasi, Uttar Pradesh

Image 5.10: Nukkad Natak organized for the local community in Mirzapur, Uttar Pradesh

Chapter 6 - Conclusion

The Ganga River spanning across five north Indian states is of ecological and cultural significance to the local community and thus its conservation and preservation needs innovative techniques and methods to promote sustainable practices. The report emphasizes on the important role of Environment Education in creating awareness, changing attitudes and promoting responsible behavior for conservation of riverine biodiversity. Establishment of low-cost interpretation corners (Ganga Knowledge corners) in selected government schools along the rivers has provided accessible platform for knowledge dissemination about river, its biodiversity, and conservation practices. The interpretation corners along with interactive workshops have provided students with an opportunity to engage with various environmental issues like pollution, habitat degradation and biodiversity loss. They also have assisted in creating a sense of ownership towards the well-being of the river. The pre and post-questionnaire surveys has shown improvement in students' knowledge retention demonstrating the effectiveness of the intervention

Further, the Interpretation centers serve as a platform where complex information is presented in an easy manner making it easier for people to understand the ecological importance of the river. The establishment of five interpretation centers along the Ganga River, including Ganga Avlokan in Haridwar, Ganga Darpan in Varanasi, and Anubhuti in Kanpur and two open-air spaces managed by the Forest Department (Sanjay Van in Rudrapur and City Forest in Ramnagar), has advanced biodiversity conservation. With gradual increase in visitor numbers these centers are inspiring both local communities and visitors, successfully creating understanding, and responsible behavior towards the river's ecology.

The mass awareness and outreach programmes target diverse group of stakeholder like school students, teachers, forest officials, local community etc, and has further improved impact of the initiatives. Through audio-visual approaches such as puppet shows, nukkad nataks (street plays), exhibitions, social media campaigns, and publications, the initiative tries to bridge the gap between knowledge and action. The initiative's community-driven approach reflects the principles of Agenda 21 that emphasizes education as an important part of sustainable development.

By integrating formal education with non-formal activities, the initiative empowered local communities while focusing on the long-term conservation efforts along the Ganga River. But in order to sustain the efforts collaboration with schools, local authorities and communities is extremely necessary. Future initiatives are considering scaling up the establishment of interpretation corners and utilizing digital platforms to reach broader audiences, ensuring that the

conservation of the Ganga remains a shared responsibility. In conclusion, this entire programme shows that targeted environmental education interventions and community engagement serve as important tools for creating awareness and promoting biodiversity conservation. The Ganga Knowledge Corners and associated outreach activities have created a scalable model for promoting sustainable development. This initiative makes a substantial contribution to the goal of a cleaner, healthier, and more resilient Ganga River for coming generations by encouraging understanding, knowledge, and action among the younger generation and local stakeholders.

Chapter 7 – Recommendations

Based on the findings of the present study and the outcomes of awareness, training, and outreach interventions conducted across the Ganga River states, the following recommendations are proposed to enhance the effectiveness, scalability, and long-term impact of environmental education and conservation initiatives:

1. Strengthening Experiential Learning Approaches - There is a need to further integrate activity-based and experiential learning methods, such as field visits, nature walks, and hands-on conservation activities, to complement theoretical knowledge and promote long-term behavioral change among students.
2. Institutional Integration for Sustainability - Environmental awareness programmes and interpretation corners should be formally integrated into school systems to ensure continuity and sustained engagement beyond short-term interventions.
3. Long-term Monitoring and Evaluation - Periodic follow-up assessments should be conducted to evaluate long-term knowledge retention and behavioral change, thereby strengthening programme impact assessment frameworks.
4. Continuous Capacity Building of Teachers - Teacher training programmes should be supported by ongoing mentoring, refresher sessions, and evaluation to ensure effective classroom implementation of conservation education.
5. Leveraging Digital Platforms - The use of digital tools, including mobile-based learning, interactive content, and social media, should be expanded to enhance outreach and engagement, particularly among younger audiences.
6. Promoting Community Participation - Greater involvement of local communities and grassroots stakeholders is essential to translate awareness into collective conservation action.

7. Localization of Educational Content - Educational materials and programmes should be further tailored to reflect local biodiversity, cultural contexts, and region-specific environmental challenges for improved relevance.
8. Strengthening Institutional Collaboration - Partnerships with government agencies, non-governmental organizations, and academic institutions should be strengthened to ensure convergence of efforts and scalability.
9. Expansion and Maintenance of Interpretation Infrastructure - Interpretation centers and low-cost learning spaces should be expanded and supported with mechanisms for long-term maintenance and periodic content updates.

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Annexure – I

Games & Activities

Activities in school workshops for students are game-based, with the underlying concept of "education with recreation." The session began with a talk on River Biodiversity, outlining threats and conservation status. Subsequently, students were engaged in various games designed to convey conservation concepts through play. These games include "Web of Life," "Biodiversity Dart," "Save Our Rivers - Snake and Ladder," "Species Puzzle," "Origami," "Wildlife Sudoku (Quiz)," and "Animal Stapoo (Identify the pug marks)." These interactive games play a crucial role in biodiversity awareness workshops, making them engaging and interactive. The details are given here -

Web of Life - Web of Life is a fun game that teaches kids about the food chain. Each child gets a card with a component of biodiversity. We use a thread to show how everything is connected in the food chain – like the sun helping plants, bees pollinating, birds eating bees, and so on. If we make one thing extinct, it affects the whole chain. This game helps kids see how nature works and why every part is important.

Biodiversity Dart Game - The Biodiversity Dart Game is a fun way for kids to learn about nature. Using a dartboard, children throw darts at sections divided into good deeds and bad deeds related to nature, earning plus or minus points. Good deeds include actions that protect nature, while bad deeds involve things that harm it. Kids form teams and compete, aiming to understand how their daily actions impact nature. Through this friendly competition, we hope to inspire children to

consider how they can contribute to conserving their surroundings in their everyday lives.

Save our rivers (Snake and Ladders) - Snake and Ladders gets a green twist in our version. We replaced snakes with harmful deeds towards nature and ladders with good actions to protect it. The life-sized game lets children become the pawns, making it even more exciting. Our goal is to impart knowledge about their role in protecting the environment. This hands-on activity teaches kids that small actions by everyone can make a big difference in conservation efforts

Biodiversity Jigsaw - The Biodiversity Jigsaw is an engaging puzzle game featuring pictures of the local area's biodiversity. Tailored to our workshop's location, the game includes information about each species and its role in nature. By piecing together, the puzzle, children not only learn about the diverse wildlife in their surroundings but also understand the vital role these animals play in maintaining the area's biodiversity.

Origami - Wildlife Origami is a creative and educational activity where children learn the art of origami while exploring the world of wildlife. With specially designed origami sheets, kids can fold and create paper animals, birds, and insects, discovering the diversity of wildlife. Each origami model is accompanied by interesting facts about the species, helping children connect art with knowledge about nature.

Wildlife Scrabble - This is an interactive game that combines fun and learning. Children are grouped into teams and challenged with questions about wildlife and conservation. Armed with alphabet tiles, they creatively form answers, putting their knowledge and retention skills to the test. This engaging activity not only reinforces facts discussed in the workshop but also serves as a dynamic assessment of the workshop's impact on the children's understanding of wildlife and conservation.

Animal Stapoo - This is an exciting life-sized game that brings the world of wildlife tracking to kids. Teams of children gather around a sheet featuring footprints of various animals. In this instant game, we call out the name of an animal, and the teams race to identify the corresponding footprint or pugmark. Through this activity, children not only have fun but also develop skills in recognizing and understanding the identifying factors of animal footprints, providing them with a hands-on introduction to the fascinating field of wildlife tracking.

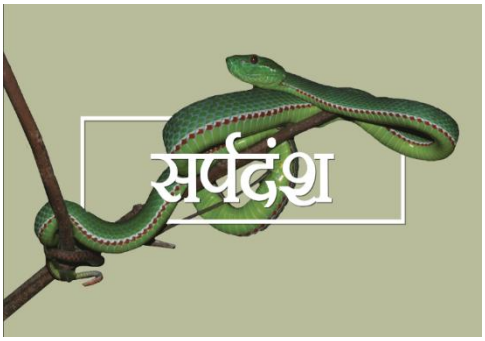
Riddle Game - The Riddle Game is a playful activity featuring 15 cards, each with a riddle on one side and its answer on the other. Kids engage in the game by guessing the answers, providing a fun and simple way to assess their factual knowledge about nature. Through this entertaining process, we can gauge their understanding of the roles played by various elements in their daily lives, fostering both enjoyment and learning.

Thumb print- Thumbprint is an inclusive activity designed for both children and adults. By incorporating diverse colour elements, participants learn how to transform a simple thumbprint into a variety of animals. Throughout the activity, we not only engage them creatively but also educate about the characteristics and details of each animal they paint. Thumbprint thus combines artistic expression with an informative exploration of the animal kingdom.

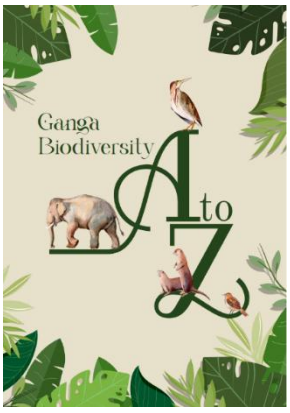
Annexure II

Print Media

1. **Sarpdansh:** A small booklet on snake bite named **"*Sarpdansh*"** has been modified, re-developed and distributed amongst the locals living along the Ganga River basin. *Sarpdansh* is a collection of myths about snakes that local people generally believe in and the facts about them. It also contains first aid and prevention methods that can be followed to avoid such situations.



2. **Ganga Biodiversity - A to Z**: This is a bilingual coloring book specially crafted for school students. Each alphabet is paired with information about a specific animal or plant species, with one page dedicated to details about the species and the facing page featuring a coloring activity. This innovative approach merges education with creativity, providing an engaging step towards conservation awareness among students through the exploration of diverse flora and fauna in the Ganga region.



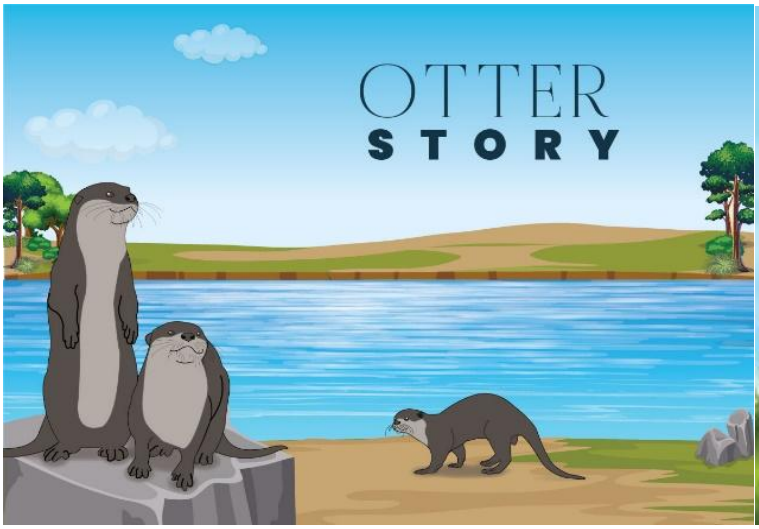
3. **Be Water Wise**: This is a compact bilingual booklet emphasizing the significance of water conservation. Packed with engaging games and activities, teachers can lead students through various aspects of water awareness, including pollution, wastage, and recycling. The activities are thoughtfully designed to make learning about water conservation enjoyable, encouraging students to modify their daily habits and contribute to water-saving efforts in both their homes and surroundings.

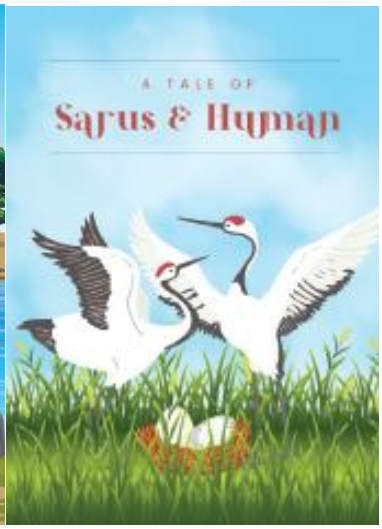
4. **Activity Book – Kindergarten**: The Activity Booklet is a small, bilingual guide that talks about why it's important to take care of nature. It's like a little book of games and things to do that teachers can show students. Each game is about different parts of nature, like stopping pollution, not wasting things, and taking care of animals. It's a fun way to help students understand how what they do can affect the environment. The booklet teaches them simple things they can do to keep the Earth safe and happy.

5. **Biodiversity of Uttarkashi**: The Biodiversity of Uttarkashi is a bilingual booklet that focuses on the birds, trees, plants, and mammals unique to the Uttarkashi district in Uttarakhand. This compact guide provides comprehensive information about each species, including scientific names, IUCN status, identifying features, basic geographical distribution, and general knowledge about the species. It serves as a small yet significant initiative to encourage the younger generation, living in close proximity to nature, to learn and appreciate the diversity of their surroundings. This booklet aims to foster a sense of curiosity and connection with the natural world among the youth.

Digital: E-books

Otter Story & Sarus Story – Small story books about smooth-coated otter and Sarus crane with engaging animated images and story line for kids.





Annexure III

Sample Questionnaire

भारतीय वन्यजीव संस्थान, उत्तराखण्ड

नाम – _____

पिता का नाम – _____ माता का नाम – _____

गाँव – _____ कक्षा – _____ आयु – _____

जन्मतिथि – _____ लड़का / लड़की

भाई-बहन – _____ निकटतम नदी – _____

फोन नंबर – _____ स्कूल – _____

जिला – _____ राज्य – _____

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1. हमारी राष्ट्रीय नदी कौन सी है?

   क) गंगा ख) यमुना ग) भागीरथी घ) अलकनंदा

2. गंगा और यमुना का संगम स्थल कहाँ है?

   क) हरिद्वार ख) प्रयागराज ग) दिल्ली घ) वाराणसी

3. भारत का राष्ट्रीय जलीय जीव कौन सा है?

   क) गांगेय डॉल्फिन ख) घड़ियाल ग) बाघ घ) शार्क

4. आपके राज्य का राजकीय पुष्प क्या है?
5. आपके राज्य का राजकीय पशु क्या है?
6. आपके राज्य का राजकीय पेड़ क्या है?
7. आपके राज्य का राजकीय पक्षी क्या है?
8. उत्तराखण्ड की पहली रामसर आर्द्रभूमि कौन-सी है?

   क) आसन संरक्षण रिजर्व ख) डोडीताल ग) नैनीताल घ) यमुना

9. गंगा नदी चार धाम यात्रा से कैसे जुड़ी है?

   _____

10. निम्नलिखित में से किस देव का बचपन यमुनानदी के किनारे बीता था?

क) श्रीराम ख) श्रीकृष्ण ग) शिवजी घ) यमराज जी

11. पुराणों के अनुसार यमुना नदी के पिता कौन हैं?

क) सूर्यदेव ख) वरुणदेव ग) अग्निदेव घ) वायुदेव

12. निम्नलिखित में से यमुना नदी का प्राचीन नाम कौन सा है?

क) गंगा ख) कालिंदी ग) भागीरथी घ) अलकनंदा

13. क्या आपने नदी गंगा या किसी अन्य नदी को बचाने के लिए पहले कोई कार्य किये हैं?

क) हाँ ख) नहीं

14. यदि आपके क्षेत्र में साँप दिखाई दे तो आप क्या करते हैं?

क) उसे मार देते हैं ख) उसे पकड़ कर दूसरी जगह छोड़ देते हैं

15. क्या आपको गंगा नदी के संरक्षण के लिए कार्य करना चाहिए?

क) हाँ ख) नहीं