

HUMANSCAPE OF THE *Riverscape*

COMMUNITY BASED CONSERVATION
PROGRAMMES FOR SPECIES
RESTORATION IN GANGA RIVER



भारतीय वन्यजीव संस्थान
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GANGE

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EXECUTIVE SUMMARY

Communities play a crucial role in conserving biodiversity in natural ecosystems. However, community-based conservation as a remedy, like government-based conservation, ignores the necessity of institutionalizing and managing common resources. Community-based conservation is generally seen as having two central objectives: to enhance conservation of biodiversity, and to provide economic, social, cultural, and political stability to dependent communities. Success of community-based conservation is often governed by the level of participation from stakeholders. For the present project, we used education and information, consultation, partnership, grass-root negotiation, empowerment, livelihood-conservation linkages, advocacy and community-based management to ensure and sustain the involvement of people and reinforce their participation from passive to self-mobilized.

Ganga River is the lifeline for millions of people across the Himalayas and the Gangetic plains. The unique importance of this multifaceted Ganga basin stems from its geographical, historical, socio-cultural, environmental, and economic values. Ganga as a natural ecosystem provides numerous ecosystem services. People are dependent on its regulating, provisioning, supporting and cultural services. High dependence on river resources and lack of livelihood opportunities, and poverty have adversely affected the ability of Ganga to provide crucial ecosystem services. To address this, involvement of stakeholders with different capacities and interest is critical in systematic conservation planning and implementation, which also secures the economic and social wellbeing of people.

The project titled "Biodiversity Conservation and Ganga Rejuvenation" at the Wildlife Institute of India, forms an integral part of the efforts of National Mission for Clean Ganga in achieving goals of Aviral and Nirmal Ganga by restoring Ganga's ecological integrity, with an approach of involvement of all stakeholders. The component 'Community Based Conservation Programme for Species Restoration in Ganga River' of the project was focused on developing and implementing site-specific strategies to ensure the long-term

participation of stakeholders, especially local communities for Ganga's biodiversity conservation.

Socio-economic structures, resource dependencies and cultural traditions change as the river flows from the Himalayas to Ganga Sagar, resulting in multiple stakeholders with varying needs and interests. To understand the stakeholder composition, stakeholder analysis was conducted and their salience was calculated to assess their position and legitimacy. To assess the cultural and socio-economic set-up, review of existing literature and records of government departments was conducted and, formal and informal interactions with stakeholders were held. Personal observations of the team members were also recorded and analyzed. A total of 50 stakeholder groups were identified in the five Ganga states. Stakeholders were further divided into primary, secondary and tertiary classes based on their level of interest, influence, and importance in decision making and implementation processes guiding integrated conservation planning. Availability, type and quality of the resources not only shape the stakeholder composition but also the socio-cultural structure of the communities residing along the river. Dependence on river resources is comparatively low in the upper stretch of Ganga than in the middle and lower stretches. Culturally and socially also the middle and lower stretches are more diverse due to the history of this region and diversity in the available resources. The Upper region shows influence from Tibet and Nepal in terms of local natural resource-based economy and traditions, while the middle region has been influenced from the Mughal era. Lower stretch especially Jharkhand (Sahibganj district) and West Bengal have distinctively different cultural setup. The dependence on river is quite high for livelihood, transport and food in this region. Although people living along Ganga are dependent on its resources, the association is complicated to understand and manage. However, these complexities and linkages need to be decoded to conserve Ganga river as an ecological, cultural and economic entity.

To better understand association of people with Ganga and ensure their involvement in its conservation, stakeholders (n= 55,178) were sensitized and trained through various workshops, meetings and training programmes (n= 1,895). The number of participants and their level of participation has increased. This shows change in attitude and behaviour of stakeholders, especially local communities. Regularly trained stakeholders have conducted awareness and cleanliness activities (n=

333) and sensitized 5,683 people in the five Ganga states.

To strengthen the Ganga conservation efforts by mainstreaming community participation, a motivated and trained cadre of "Ganga Praharis" (n=1,290) has been established. This cadre supports the local level institutions to monitor the quality of the natural resources at the grassroots level. Community participation through the Ganga Prahari programme is promoting local pride in taking care of the ecosystem and evoking a sense of belongingness within people towards Ganga. Ganga Praharis have been identified and recruited through interactions with individuals and members of various line agencies like the state forest departments, women self-help groups, youth groups, etc. As per their individual interests, Ganga Praharis have been trained through various skill development programmes (n=433) in ecological monitoring, plantation techniques, alternate livelihood skills, community mobilization and village level microplanning exercises. Ganga Praharis are being linked to various governmental and non-governmental agencies, both national and international, working for conservation and cleaning of Ganga. This cadre has been successfully structured in the Varanasi and Bulandshahr districts of Uttar Pradesh for a smooth execution and monitoring of activities. The structures also ensure involvement of District Ganga Committees, State Project Management Groups and NMCG. The role of WII is to provide guidance and facilitation. Trained Ganga Praharis are being given opportunities to assist the field-based surveys conducted by WII and other research institutes in the Ganga mainstem, and now in its tributaries. This trained cadre of Ganga Praharis are conducting various activities (n=316) ensuring conservation of biodiversity along the banks of Ganga. Taking these efforts further, 54 citizens from 17 countries have joined the Pravasi Ganga Prahari cadre — a platform created for Non-residential Indians, Foreign Nationals, Overseas Citizenship of India and Persons of Indian Origin. To support the Ganga Prahari activities, 107 Ganga Prahari Mentors have been registered who are providing technical support to Ganga Praharis at ground level. 64 schools have been registered as Bal Ganga Praharis schools making children sensitive towards Ganga and its biodiversity and inculcating the of sustainable practices in students' day to day lives.

To ensure the long-term association of Ganga Praharis with Ganga conservation their livelihoods were linked with the conservation goals. For this, 21 mobile

livelihood centres were established and 35 trainings have been conducted, through which 713 (M=27, F=686) Ganga Praharis received training. To link the trained Ganga Prahari to existing markets and to create market for the products developed at the livelihood centres, a floating livelihood centre "Jalaj" has been established at Varanasi. The business model of Jalaj has been a success and is being replicated at other sites also. Ganga Praharis are also linked with different Government schemes, programmes and organizations working towards rural livelihood development, and marketing of their services and products. Livelihood trainings have mainly focused on female Ganga Praharis, as women in rural setup have limited mobility and restricted access to resources. Livelihood centres are also a platform for women to voice their concerns. Skill-development instills confidence in them to contribute positively to their families and society.

To understand the linkage between socio-economic structure and ecological integrity of the Ganga river, it is important to understand the ability of this river to provide crucial ecosystem services as well as its contribution to local and national economy. The valuation of ecosystem services not only improves the understanding of local socio-ecological inter-linkages but also provides inputs for informed decision making, and mainstreaming conservation at local and national level. Values of ecosystem services need to be integrated in developmental planning, which will lead to better and efficient trade-offs at local and national level. To evaluate the ecosystem services of the Ganga River main stem, a framework that accounted for both the resource constraints as well as the relevance of the ecosystem services provided was developed and ecosystem services were identified in three Ganga stretches, i.e., upper (Gaumukh to Haridwar), middle (Haridwar to Varanasi) and lower (Varanasi to Ganga Sagar). The most resource efficient standardized method for conducting an economic appraisal was used. To understand the value of Ganga River to people dependent on its resources, 503 respondents were surveyed along the river using the opportunistic sampling technique. Water for drinking was the most cited ecosystem service in Upper Ganga, while in both Middle and Lower Ganga; water for irrigation was the most cited. 10.90%, 23.62% and 26.19% of the respondents in the Upper, Middle and Lower Ganga, respectively, mentioned that the Ganga River maintains population and habitat for diverse floral and faunal species. On the basis of an extensive literature review, reconnaissance and field surveys,

and inputs from survey teams, 22 key ecosystem services were identified. The extent and importance of provisioning services was primarily high only for the middle and lower stretch; except for power generation, which was high for the upper stretch due to the potential for hydroelectric power generation. For cultural services, the extent and importance is high for all the three stretches. Eight ecosystem services, namely, water for drinking and domestic use and power generation, benefits to agriculture, i.e., water for irrigation and soil fertility, riverbed material, provision of fish, water for transportation, and recreational and religious/spiritual services, were selected for valuation. In 10 urban centres along Ganga, namely, Srinagar, Uttarkashi, Haridwar, Meerut, Kanpur, Mirzapur, Varanasi, Patna Urban Area, Bhagalpur and Kolkata Municipal Corporation, 1574.29 MLD surface water and 1008.67 MLD ground water is being withdrawn daily, valued at ₹51.79 million and ₹33.19 million, assuming constant utility per unit of consumption. The cultivators in the Bihar Ganga districts earned, on an average, an estimated ₹107,614.34 million ($\pm 14,766.95$ million), ₹82,736.06 million ($\pm 19,120.29$ million) and ₹29,241.54 million ($\pm 5,018.29$ million) from the cultivation of paddy, wheat and sugarcane, respectively (at MSP), between 2012-13 and 2017-18 (t=6 years). It was reported by the farmers in Bhagalpur, Bihar, that the occasional floods helped reduce the cost of cultivation due to the nutrients replenished by flood waters. The nine commissioned hydropower plants in the Ganga and Alaknanda mainstem in Uttarakhand and the one nuclear power plant at Narora, prevented the emission of an estimated 9.93 million tCO₂ and 3.22 (± 0.18) million tCO₂, respectively, annually, considering coal burning thermal power plants as the alternative. While inland waterways have the lowest comparative inter-modal cost of transporting freight at ₹1.06/TKm as opposed to ₹1.43/TKm for railways and ₹2.62/TKm for roadways, when considering the comparative intermodal cost advantage of transporting freight on National Waterway 1, from Haldia to Prayagraj, inland waterways has a comparative advantage only over roads at ₹605.93/tonne, with a disadvantage of (-) ₹352.03/tonne versus railways. Lease holders in Uttar Pradesh Ganga districts earned a revenue of ₹547,263,143.80/- by dispatching 1,716,849 m³ of sand from an area of 658.21 acre. Fish vendors and traders in Varanasi (n= 53) and Narora (n = 30), reported an estimated average annual income of

₹168,226.42 ($\pm 316,996.52$) and ₹355,200 ($\pm 280,623.02$), respectively. In Varanasi, 44.71% of local businessmen (n=110) reported an average income between ₹35,000/- and ₹134,999/- during tourist season. Vendors (n=136) at Kumbh Mela, 2019 in Prayagraj reported a 210.07% (± 238) increase in daily income during Kumbh. A model based on payment for ecosystem service (PES) approach has been developed to advocate the inclusion of ecosystem service value of Ganga River in decision-making. On the basis of this model, we suggest that there is a need to develop and promote a PES programme, funded via a public-private payment scheme wherein both the Government and private sector entities pay for the provision of the ecosystem service. This programme can be replicated or adapted based on the requirements, at each level of governance — national, state, district and village, in order to generate a diversified, robust, efficient and sustainable combination of initiatives and programmes that attempt to create a market or correct for the market failures for the myriad ecosystem services

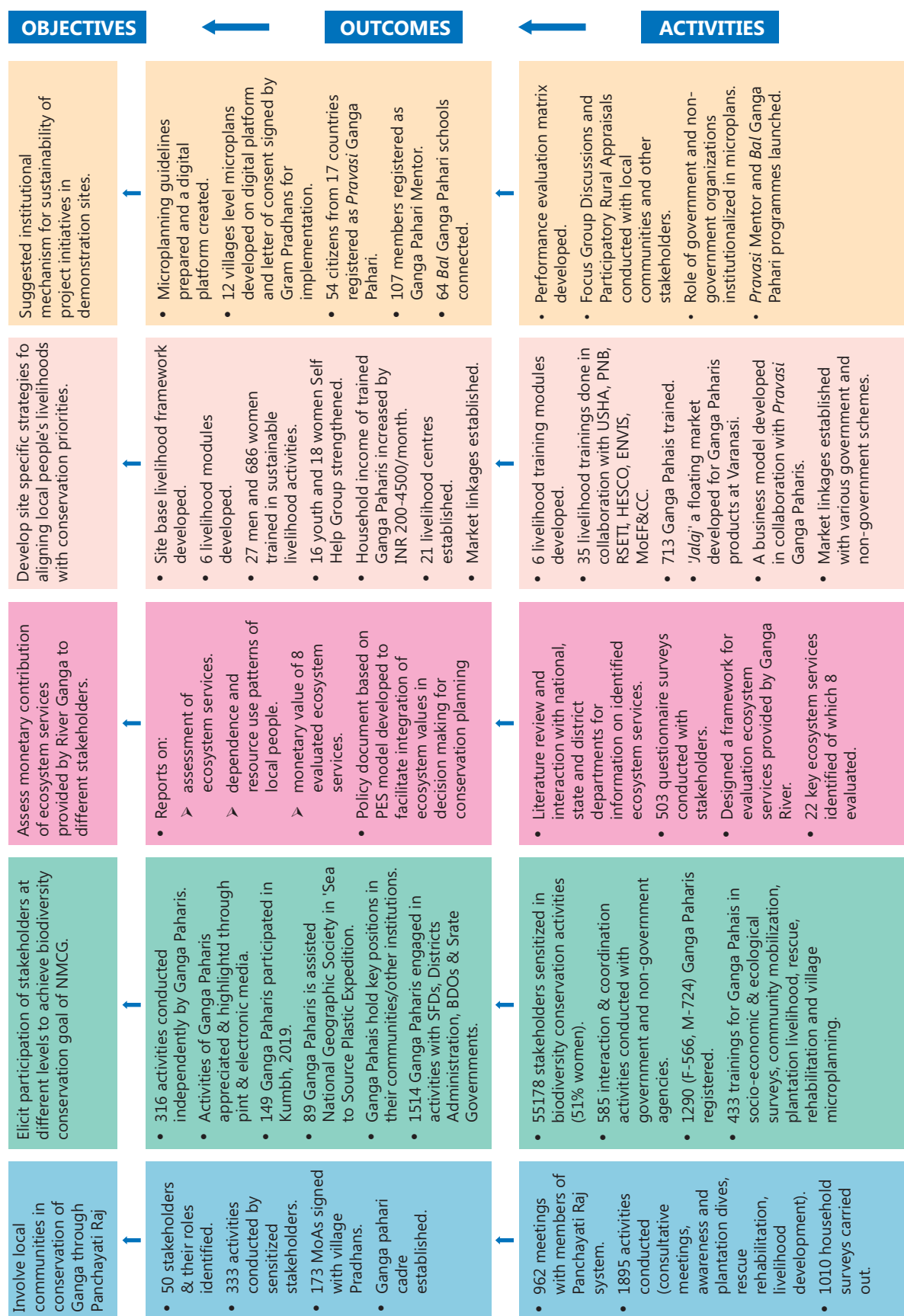
To ensure the sustainability of the conservation efforts and to streamline biodiversity conservation of the Ganga River in development planning, and to scientifically empower the local communities for effective decision making and implementation, village level microplans were developed. Prior to microplans, a village microplanning guideline has been developed after reviewing existing literature, gathering primary information from field and consultations with experts. Based on the village microplanning guideline, microplans have been prepared for select villages located in the three Ganga stretches (upper, middle and lower). Microplans were finalized after rigorous consultations with multiple stakeholders including local communities representing varied socio-economic backgrounds, members of local government, district administration and local institutions. Based on the integrated participatory approach, these village microplans address the issues of Ganga River conservation, socio-economic challenges, and discuss the potential future actions and recommendations for strengthening the engagement of multiple stakeholders and institutions. To maintain transparency and ease of implementation of the microplanning process, all microplans have been digitalized under which conservation and development challenges of the village have been categorized into nine strategic themes, of which six themes, namely, livelihood and skill development,

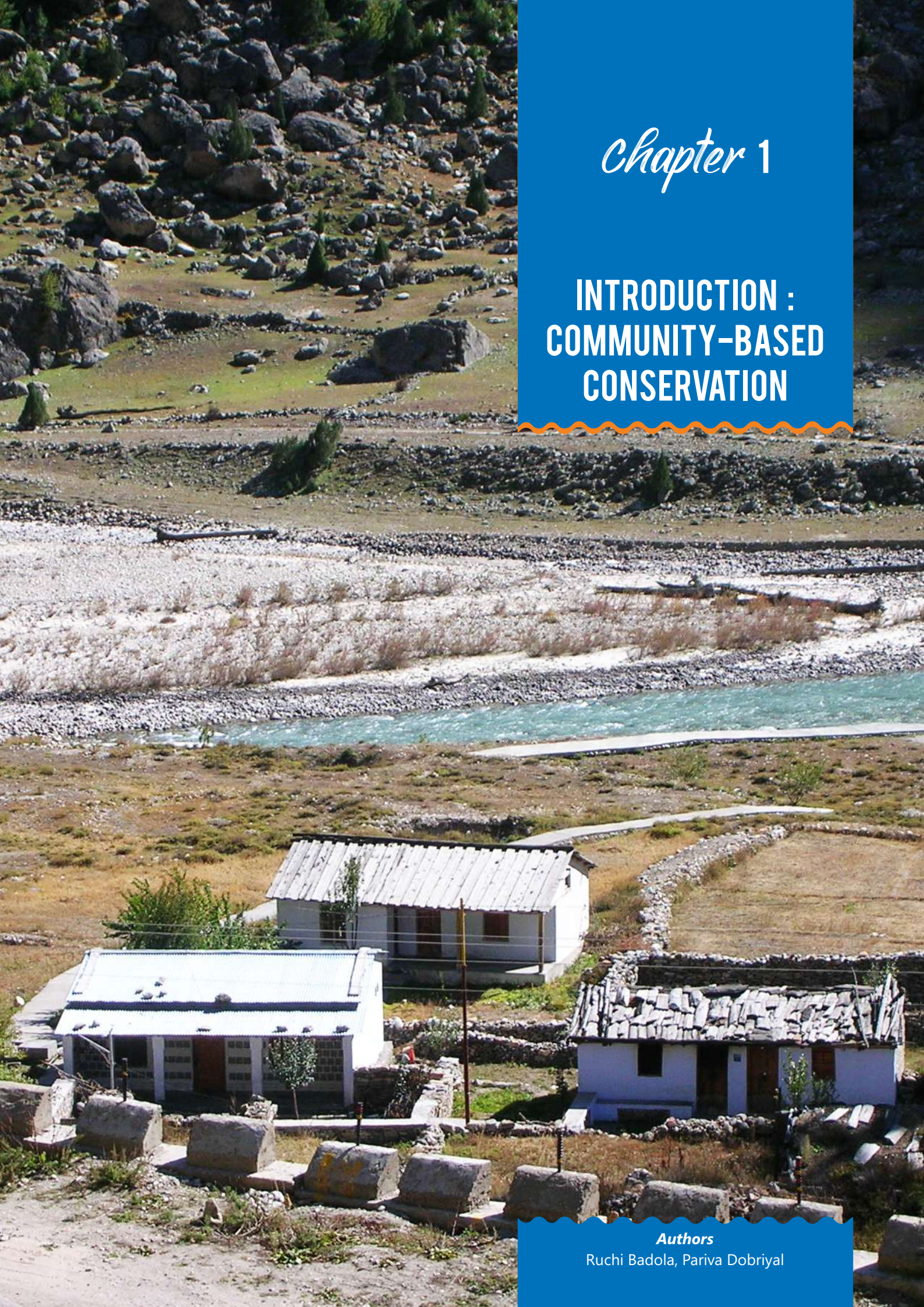
agriculture, animal husbandry, fisheries, renewable energy, and community based institutions were under the trust building category and three themes, namely, community awareness, hygiene and sanitation, and biodiversity conservation were under the generic category. Village microplans (n= 12) were developed for village Sirour (Uttarkashi district) in Uttarakhand; Rajghat, Udaigarhi, (Bulandshhar district) Domari, Tatepur, Rampur and Dhaka (Varansi district) in Uttar Pradesh; Shahzadpur and Teentanga Diyara in Bihar; and Maskaliyan, Ghat Jamini and Mokhimpur (Sahibganj district) in Jharkhand. The digital village microplan framework is active on the intranet services of WII.

As participation is an efficient tool to ensure conservation of biodiversity and ecologically balanced use of aquatic resources, stakeholders were involved in Ganga conservation using an integrated approach which focused on mainstreaming biodiversity conservation in village level development. We applied an interactive mechanism focusing on provision of space for deliberation and consensus building for better quality decisions, development of human capital and improving the legitimacy of decisions to facilitate mainstreaming biodiversity conservation. Our activities have addressed the dilemma of conservation versus development, intrusive resource management strategies and unplanned development leading to poor conservation outcomes. It is suggested that assumption regarding awareness among stakeholders should not be made and each stakeholder and individual should be sensitized to involve them in conservation efforts through specific strategies. Capacity of local people and other stakeholders need to be developed to contribute to conservation activities. Ganga Prahari cadre is an example of local communities taking initiatives for socio-ecological sustainability and have emerged as social leaders; each individual should be encouraged to take initiatives at her/his respective villages and areas and every effort should be recognized. Performing individuals should be provided social and economic incentives. Livelihood of local communities should be developed and linked with conservation goals. Biodiversity should be internalized in the mandate of local institutions and capacity of local level institutions should be developed to take informed and biodiversity sensitive decisions. Site-level mechanisms should be developed to institutionalize the efforts as it will ensure a more scientific approach and systematic implementation of conservation activities.

Activities and outcomes of Component 5- Community Based Conservation Programmes for Species Restoration in Ganga River at a glance

Component 5: Community Based Conservation Programmes for Species Restoration in Ganga Rive





Chapter 1

INTRODUCTION : COMMUNITY-BASED CONSERVATION

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Ruchi Badola, Pariva Dobriyal

Summary

Ganga as an ecosystem provides numerous ecosystem services that are critical for survival of about 40% of the total population of India. The river is not only a source of resources to people but for many it is only mean of living. The River flows through a densely populated area, which is under rapid development phase, leading to excessive use of aquatic resources. High dependence on river resources, lack of livelihood opportunities and poverty have adversely affected the ecological integrity of the Ganga and have influenced its ability to provide crucial ecosystem services. To address the issue, it is important to understand the types and extent of dependencies and socio-ecological nexus in the river basin, for which stakeholder involvement is the key. Stakeholders, with different capacities and interest is critical in systematic conservation planning and implementation at the same time securing the economic and social wellbeing of people.

To address the issue the project titled "Biodiversity Conservation and Ganga Rejuvenation" was initiated by Wildlife Institute of India, which forms an integral part of the efforts of National Mission for Clean Ganga in achieving goals of Aviral and Nirmal Ganga by restoring Ganga's ecological integrity, with an approach of involvement of all stakeholders. The component 'Community Based Conservation Programme for Species Restoration in Ganga River' of the project was focused on developing and implementing site-specific strategies to ensure the long-term participation of stakeholders, especially local communities for Ganga's biodiversity



conservation.

The field activities started with identification of key sites on the basis of socio-ecological variables followed by identification of stakeholders including local communities and line agencies such as state forest departments and district administration. Continuous dialogues were conducted with identified stakeholders to inform them about the values and contributions of Ganga River, aquatic biodiversity, and goals and activities of project. Members of different stakeholder groups were inspired to take part in the conservation and include biodiversity aspect in their routine work. They were involved in awareness, sensitization, cleanliness, plantation, rescue and rehabilitation, survey and monitoring activities. They were also encouraged to initiate such activities at individual and community level. Reconnaissance surveys including village level and consultative meetings were conducted at various locations along the Ganga River, which included interactions with representatives of local communities, government and non-government organizations, religious groups,

tourism sector, local businesses, educational institutions etc. Stakeholders were identified through these interactions and on the basis of salience. In accordance with their nature of work and linkages with Ganga River, awareness and sensitization and awareness activities were designed for various groups of stakeholders. Awareness and sensitization activities were followed by development and implementation of stakeholder group-specific strategies to involve them in the conservation activities, both directly and indirectly. Values and contributions of





ecosystem services were assessed to understand the linkages between local economy and bio-physical resources of Ganga. To ensure their long-term association with the conservation actions, different strategies were developed for each stakeholder group using microplanning approach. To sustain the efforts at the ground level and to internalize Ganga's biodiversity conservation at the village and district level development, capacities of individuals were treated as institutions and a trained cadre of Ganga Praharis was established. To ensure sustenance of these conservation activities and to mainstream the conservation in village level development, microplans for select villages were developed.

1.1. Introduction

Communities play a crucial role in conserving biodiversity in the natural ecosystems. However, community-based conservation as a remedy, like government-based conservation, ignores the necessity of institutionalizing and managing commons (Berkes, 2007; Charles, et al., 2020). Community-based conservation is commonly seen as having two central objectives: to enhance conservation of biodiversity, and to provide economic, social, cultural, and political stability to dependent communities (Campbell, 2007; Störmer et al., 2019).

Berkes (2004) argued 'community conservation starts from the ground up but deals with cross-scale relations, and that a more nuanced understanding is needed of "people, communities, institutions, and their interrelations at various levels'. This take on community-based conservation results in

governance networks. Governance includes the formal and informal rules, rule-making systems, and actor networks at all levels viz. local, regional and global, that influence how societies identify, design, and implement conservation actions (Biermann et al. 2009; Lebel et al. 2006; Scarlett and McKinney 2016). In recent past, approaches like "Integrated Conservation and Development Programmes" (ICDPs) and "community-based conservation" projects that try to establish harmony between conservation and development goals, have emerged in different parts of the world. Such initiatives have encouraged

consideration of implications of the integration of human populations to the objectives of biodiversity conservation and preservation.

Indigenous and rural communities have developed mechanisms that not only secure their economic benefits from natural resources but also protect the source ecosystem. Driving factors underlying these local conservation activities, however, are still largely neglected (Ruiz-Mallén et al., 2015).

Success of community-based conservation is often governed by the level of participation from stakeholders. Typology of eight levels of participation developed by Arnstein (1969) can be used to understand and develop a plan to involve targeted communities in conservation. According to Arnstein, the bottom two stages describe levels of "non-participation" in which participation is distorted into a public-relations vehicle by powerholders. Some forms of substitutions, such as 'education' and 'cure', are ineffective in replacing the genuine participation. The next three stages describe activities that allow and



encourage people to voice their concerns in decision-making process. However, their influence is limited as it is difficult to ensure that their views will be heeded by powerholders. Further up the stages, the common public gets access to power enabling them to negotiate or even have the ability to take decisions regarding resource allocation and their conservation (Chan, 2016). For the present project, we used education and information, consultation, partnership, grass-root negotiation, empowerment, livelihood-conservation linkages, advocacy and community-based management to ensure and sustain the involvement of people and reinforce their participation from passive to self-mobilized (Figure 1.1).

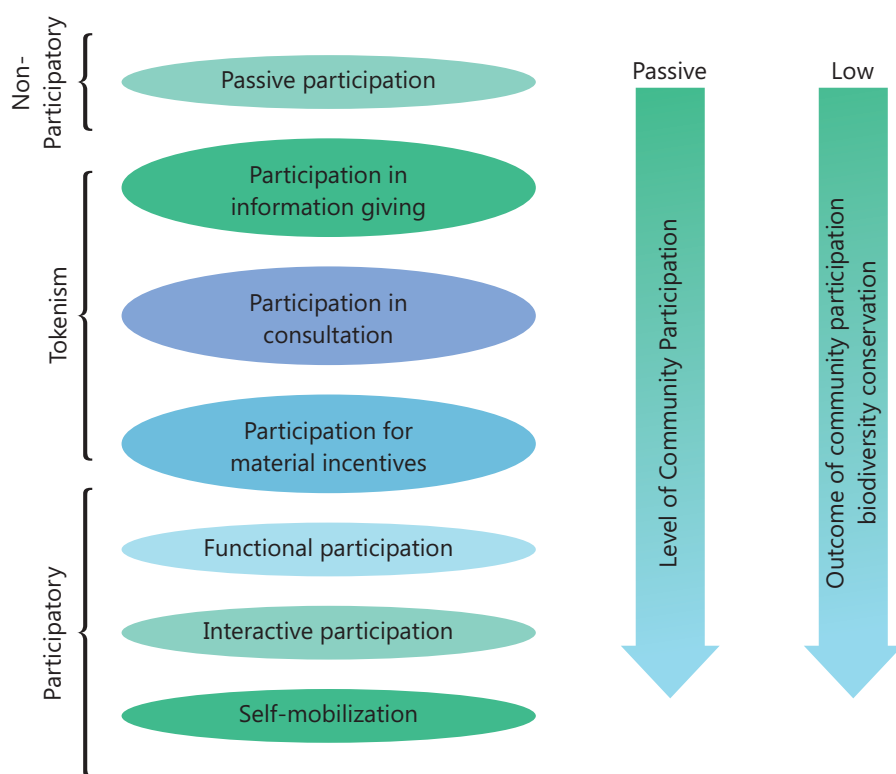


Figure 1.1: Arnstein's Ladder of Participation (modified from: Chan, 2016)

Ganga River is the lifeline for millions of people across the Himalayas and the Gangetic plains. The unique importance of this multifaceted Ganga basin stems from its geographical, historical, socio-cultural, environmental and economic value. Ganga as a natural ecosystem provides numerous ecosystem services. People are dependent on its regulating, provisioning, supporting and cultural services. Ganga regulates the local and regional climate, supplies goods such as food and water, and supports day to day life and activities of people. The river is also

centre for religious beliefs and provides recreational services that generate livelihood opportunities for people directly and indirectly. The Ganga flows through a landscape with vast ecological, social and economic conditions resulting in an array of stakeholders, who value this river and its associated ecosystems for a myriad of reasons.

In the Ganga basin, there are areas which are predominantly low-level subsistence systems and vulnerable to shocks such as climate variability and degradation of ecological quality. The vulnerability of the system results in the loss of ability of the system to provide ecosystem services, loss of livelihoods dependent on river and also affect the capacity of river system to support the faunal and floral

biodiversity. This situation is compounded with the increased demand for energy and water, and unplanned rapid development along the banks. This sometimes led to conflict between the upstream and downstream users. Therefore, a key challenge for the region is to negotiate reasonable and equitable allocation of resources of Ganga River. To initiate this process, participation of local communities along with other stakeholders and line agencies is crucial for sharing the benefits and addressing the impacts and the risks. These threats are aggravated as Ganga has been treated as an open resource and like any other natural system has been subjected to the tragedy of the commons (Hardin, 1968; Shie, 2020).

Ganga originates from an area with minimum human

interference but flows through a human dominated landscape with different economic and social background. Hence, the pattern and intensity of impact of changes in ecological properties of the river ecosystem on dependent communities varies with their socio-economic dependence on the services provided by this river ecosystem.

Another key issue impeding the Ganga conservation is the depleting ability of Ganga to provide crucial ecosystem services. These issues are aggravated by poverty, lack of economic opportunities, and casteism

leading to inadequate rights and distribution of resources for the majority population. To address this, involvement of stakeholders, with different capacities and interest is critical in systematic conservation planning and implementation, which also secure the economic and social wellbeing of people.

1.2. Aim

Strategize the long-term participation of stakeholders, especially local communities, in biodiversity conservation in Ganga River.

1.2.1. Objectives

To achieve the aim following objectives were formulated (Figure 1.2):

1. Involve local communities in conservation of Ganga through the Panchayati Raj System.
2. Elicit the participation of stakeholders at different levels to achieve the biodiversity conservation goal of National Mission for Clean Ganga (NMCG).
3. Assess the monetary contribution of ecosystem services provided by Ganga River to different stakeholders.
4. Develop site specific strategies for aligning local people's livelihoods with conservation priorities.
5. Suggest institutional mechanisms for the sustainability of project initiatives in the demonstration sites.

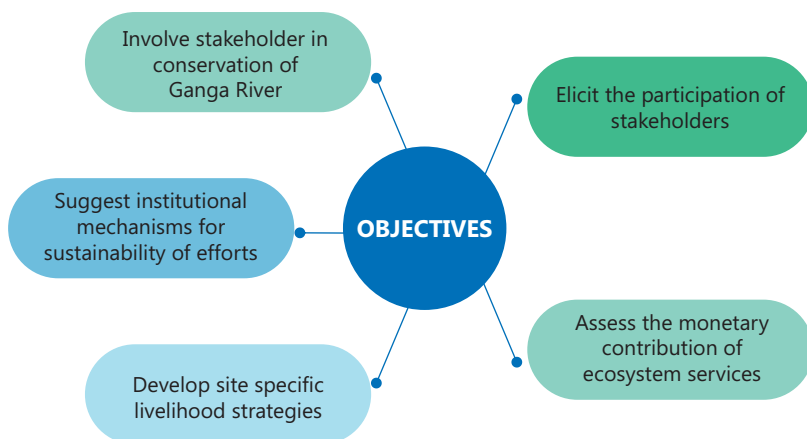


Figure 1.2: Objectives of the component

1.3. Approach for the project

1.3.1. Approach designed for stakeholder groups

To conserve the fragile habitats and threatened

aquatic species and to improve local communities' well-being, their direct involvement in conservation activities and their livelihood concerns should be considered. Community-based conservation aims to place local needs and livelihoods at its centre. This needs frequent contact and interactions with local people to integrate them in conservation and management actions. The project focuses on the interlinkages among the power and impacts of the stakeholders with respect to Ganga biodiversity. We assumed that community-based initiatives will be sustainable if the attitude of the stakeholders and local people is positive, the quality of governance is good, law enforcement is transparent, and availability of continuous technical and financial support. We emphasized on enabling and empowering individuals, provision of tools and resources, rather than cash, to approach the targeted groups. The outcome of our interventions led to change in attitude and behavior of stakeholders' mainly local communities, established linkages between conservation and economic development. Intensity and nature of externalities were also considered while developing strategies for the project activities (Figure 1.3).

The activities started with identification of stakeholders including line agencies such as state forest departments and district administration. Continuous dialogues were conducted with identified stakeholders to inform them about the values and contributions of Ganga River, aquatic biodiversity, and

goals and activities of project.

Members of different stakeholder groups were inspired to take part in the conservation and include biodiversity aspect in their routine work. They were involved in awareness, sensitization, cleanliness, plantation rescue and rehabilitation, survey and monitoring activities. They were also encouraged to initiate such activities at individual and community level. Reconnaissance surveys and consultative meetings were conducted at various locations along the Ganga River during which included interactions with representatives of local communities, government and non-government organizations,

religious groups, tourism sector, local businesses, educational institutions etc. Stakeholders were identified through these interactions and on the basis of salience (Chapter 2), key stakeholders were

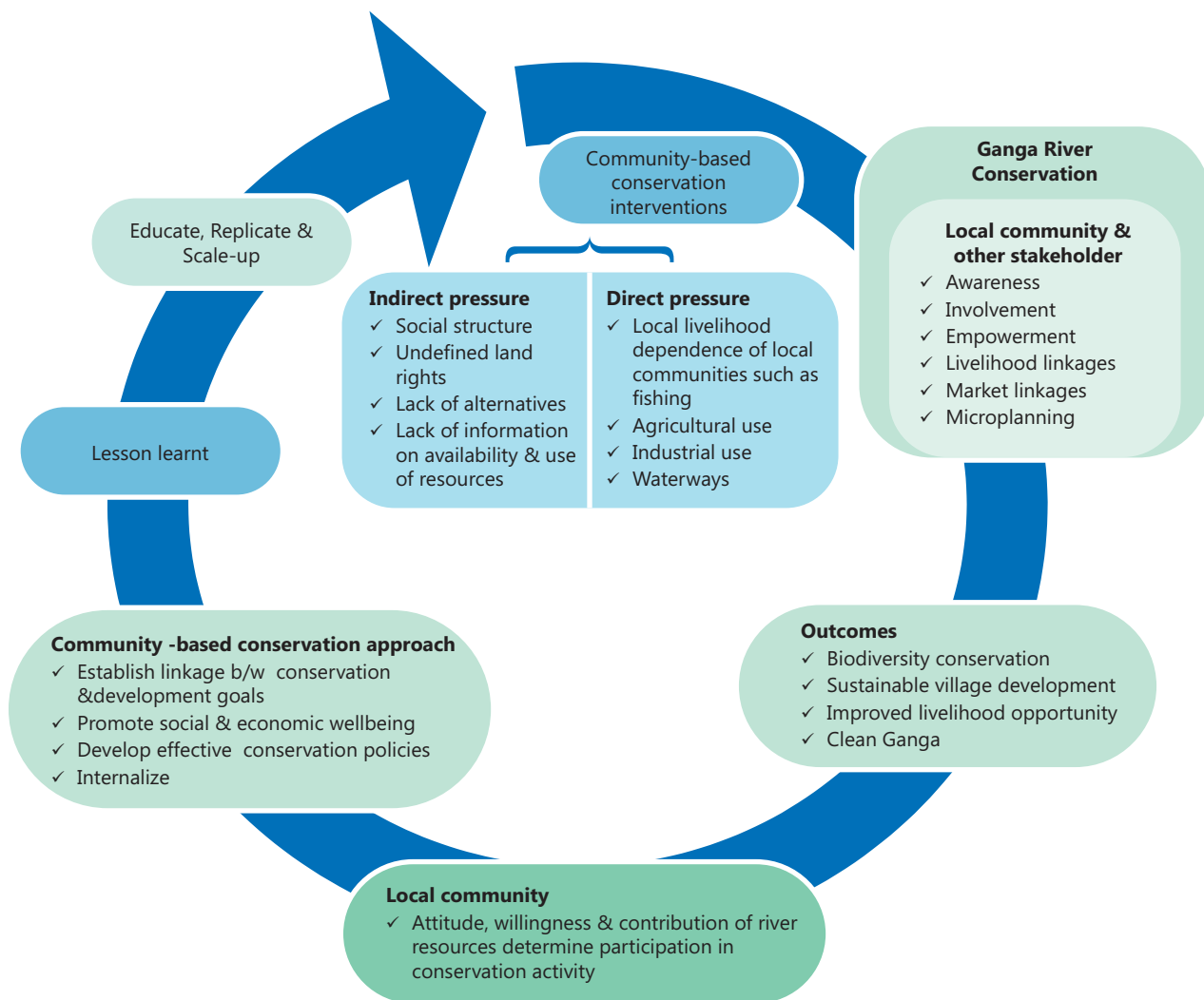


Figure 1.3: Conceptual model for Community-based Conservation approach

identified. In accordance with their nature of work and linkages with Ganga River, awareness and sensitization activities were designed for various stakeholders' groups. After repetitive and regular awareness and sensitization activities with identified stakeholders, strategies were developed to involve them in the conservation activities, directly and indirectly (Figure 1.3; Chapter 3). Values and contributions of ecosystem services were assessed to understand the linkages between local economy and bio-physical resources of Ganga (Chapter 6). To ensure their long-term association with the conservation actions, different strategies were developed for each stakeholder group using microplanning approach (Chapter 7).

Government and non-government organization

Interactions with officials and staff were conducted to sensitize them towards the Ganga biodiversity, project objectives and approaches. Several one-day workshops and meetings were conducted to orient

them. Assessment of working and planning documents for each government department including State Forest Department, District Administration, Irrigation Department, was conducted to develop strategies to encourage them to adopt an inclusive approach for sustainable and biodiversity sensitive development in their respective field areas (Figure 1.4).

Local Communities

As local communities are the primary stakeholders and have significant linkages with Ganga and its biodiversity, multiple strategies were used to involve them. Regular awareness and sensitization activities were conducted and linkages were established between conservation initiatives and social-economic issues faced by local people (Chapter 3). Interested people including youth and women were identified as Ganga Praharis and further trained to contribute towards conservation and cleanliness of Ganga river system (Chapter 4). To ensure their long-term

association with Ganga aqualife conservation, their economy was strengthened through various livelihood development activities such as skill development, value addition of local products, market development and linkages (Chapter 5). Village level microplans were developed to address the issues faced by local people such as livelihood, cleanliness, resource degradation and conservation of aquatic biodiversity in the area (Chapter 7).

Influential groups

Influential groups such as religious groups, head of the communities, and local politicians were approached to involve them in conservation activities. Key members of influential groups were identified using snowball technique and formal meetings were conducted with them to understand the nature of their linkages with Ganga and its biodiversity. Based on the nature and extent of their association with Ganga, sensitization and awareness workshops were designed and conducted (Chapter 3).

Educational institutions

Educational institutions located along the Ganga River were identified and regular awareness activities were conducted. University students and teachers were trained to monitor the biodiversity and create awareness among other stakeholders and local communities (Chapter 3).

1.3.2. Activities conducted

To engage stakeholders in conservation

The project activities on Biodiversity Conservation and Ganga Rejuvenation were conducted between June



2016 to December 2019 in all the communities of the five Ganga states i.e. Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal. In field, we realized that the awareness level is very low regarding Ganga biodiversity among people, hence activities framework was developed to make people aware. We designed the participation strategies based on literature review, and a scoping process and pilot surveys carried out at villages and towns located along the river. The team conducted several informal interactions, consultation meetings and workshops to make people aware. Later on, the team built alliances with local institutions such as SHGs, village panchayats, NGOs, private organizations and other key stakeholders. The idea behind the awareness campaigns was that a sense of belongingness and ownership should be developed in the people residing along the river. Awareness activities were followed by capacity building of motivated and interested individuals. Their capacities were built to conduct the conservation activities with backstopping from WII and on their own (Chapter 3).

To establish Ganga Prahari Cadre

Ganga Praharis have been identified through a series of site level consultative meetings and workshops held in select villages located on the banks of the Ganga River in all the five Ganga states. Focus has been made to identify individuals who can mobilize others in Ganga conservation efforts. The local communities were approached through other line agencies like State Forest Departments, Educational Institutes etc., to identify potential Ganga Praharis. To ensure a fair and just representation of youth from all the districts and villages,





personal interactions with individuals were held with the prospective candidates from National Cadet Corps (NCC), National Service Scheme (NSS) Mahila Mangal Dal, Yuva Mangal Dal, Nehru Yuva Kendra Sangathan (NYKS) and Ganga Vichar Manch. The primary criterion for identification is passion and zeal to serve the Ganga River for maintaining its integrity in terms of its cleanliness and biodiversity value. To bring women in the forefront of the conservation efforts, need assessments were conducted and livelihood centres were established as per their interest and availability of local resource material (Chapter 4).

To link local livelihoods with conservation

Need assessment surveys were conducted with village panchayat members, women, men, youth groups, farmers, and fishermen, and their interest, education status, availability of raw material and market was assessed. It was observed that young men were interested in hands on training in computers, tourist guide, nursery, plumbing and electrician, which could get them employment and women were interested in sewing and stitching, value addition of local produce, incense stick making, fruit and food preservation and health and wellness. Surveys were conducted to identify the livelihood schemes and projects of various governmental and non-governmental organizations, and resource persons in the vicinity. Subsequently, literature review and consultation meetings with experts were held to develop livelihood training manuals. Linkages were established with other agencies working for conservation and rural development i.e. state forest departments, district and block administration, National Rural Livelihood

Mission (NRLM), NYKS, Pradhan Mantri Kaushal Vikas Yojna (PMKVY), Rural Self-employment Training Institute (RSETI), NGO's and other institutes to conduct skill development trainings. Further, market linkages were developed to ensure the sustainability of these initiatives after the training phase (Chapter 5).

To understand the contribution of Ganga to local and national economy

Ecosystem services were selected for valuation based upon three factors, (a) the perception of various stakeholders regarding their contribution to human wellbeing and livelihood, (b) the extent and importance of services provided, and (c) the cost, time and man power requirement of conducting an evaluation, gauged by conducting a literature review and discussion with experts. By exploring the type of values to be elicited for each selected ecosystem service, using the Total Economic Value Framework, the available literature was reviewed to identify the valuation techniques. The resource requirements for executing the methods and the accuracy of results generated was examined and the most resource efficient standardized method was used. Sites for valuation were selected by conducting a reconnaissance survey. Secondary data was collected from records and website of concerned departments and existing literature that supplemented primary data collection at select sites (Chapter 6).

To promote biodiversity sensitive development through microplanning approach

Microplanning guidelines were developed based on extensive review of literature and consultation with



experts. 12 villages were identified in the three stretches, namely, Sirour in Uttarakhand (Upper stretch); Rajghat, Udaigarhi, Domari, Tatepur, Rampur and Dhaka in Uttar Pradesh (Middle stretch); Shahzadpur and Teentanga Diyara in Bihar (Lower stretch) and Maskaliyan, Ghat Jamini and Mokhimpur in Jharkhand (Lower stretch); and their microplans were developed. Based on the microplanning guideline on digital platform using SQL server a relational database was created. This digital framework was developed for digitalizing the 12 village microplans developed for the select villages. The framework consists of overall demographic, geographic, social, economic and ecological information of the village. On the digital framework, various conservation and development challenges of the village that were identified during the microplanning process have been categorized into nine strategic themes out of which six themes i.e. livelihood and skill development, agriculture, animal husbandry, fisheries, renewable energy and community-based institutions were under trust building category, and three themes i.e. community awareness, hygiene and sanitation and biodiversity conservation were under generic category. For each theme, indicators and sub indicators have been identified followed by scoring for assessing the present status and impacts of the activities on the Ganga River. A conceptual framework of the data



process and digital flow has been developed. The data can be collected through mobile application (both online and offline), door-to-door questionnaire surveys, field visits or meetings with authorities. The user fills the village information for both the general and the nine strategic plans followed by visualization and management of data on the desktop browser (Chapter 7).

To ensure the efficient implementation of project

A performance monitoring framework was developed to assess the progress and outcome of the 'Component 5- Community Based Conservation Programmes for Species Restoration in Ganga River'. The framework consists of indicators assessing inputs and outputs of each activity being conducted to achieve the objectives of the project. All the input and output indicators have means of verification to assess if enough activities have been done to achieve the

objectives. Four efficacy indicators have also been developed with their independent means of verification to assess the effectiveness of the activities (Annexure 1).







Chapter 2

SOCIETY, ECONOMY AND CULTURE ALONG THE GANGA

Coordinating Lead Authors
Ruchi Badola, Pariva Dobriyal

Summary

'Ganga' has greatly influenced the beliefs, cultures and lifestyles in India. Its resources have shaped the social and economic structure of people living in and outside the Gangetic river basin. Not only does the cultural scenario transform along the Ganga but the stake of people changes with the varying quality and availability of natural resources. Socio-economic structure, resource dependencies and cultural traditions change as the river flows from the Himalaya to Ganga Sagar, resulting in multiple stakeholders with varying needs and interests. To understand stakeholder composition, stakeholder analysis was conducted and their salience was calculated to assess their position and power. To assess the cultural and socio-economic set-up, review of existing peer reviewed literature, and records of government departments was conducted, and formal and informal interactions with stakeholders were held. Personal observations of the team members were also recorded and analyzed. A total of 50 stakeholder groups were identified in the five Ganga states. Stakeholders were further divided into primary, secondary and tertiary classes based on level of interest, influence, and importance in decision making and implementation processes guiding integrated conservation planning. Type, availability, and quality of the resources not only shape the stakeholder composition but also the socio-cultural structure of the communities residing along the river. Dependence on river resources is comparatively low in upper stretch than middle and lower stretches. Culturally and socially the middle and lower stretches are more diverse due to the dynamic history of the region.



2.1. Introduction

'Ganga' is not just a river but a lifeline for about 500 million people (Sanghi and Kaushal, 2014) and has greatly influenced the beliefs, cultures and lifestyles in India (Kumar, 2017). Its resources have shaped the social and economic structure of people living in and outside the Gangetic basin (Singh, 2008). In 2008 Ganga was declared the national river of India. Accredited to Ganga's sacred status, cultural and aesthetic values, the river is called 'Maa Ganga' meaning mother Ganga in English. Ganga is a transboundary river, covering large areas of India and Bangladesh – it originates in Gangotri and flows into the Bay of Bengal. The river and its basin support diverse terrestrial, riparian and aquatic ecosystems including several unique floral and faunal species and local and Indigenous cultures in the region (Nale et al., 2017). This diversity exists because the Ganga flows through different biogeographical zones i.e. Himalaya, Gangetic Plains and Coasts. Dependence of people on Ganga varies in these three zones. In the Himalaya, people are not directly dependent on the

river while in the Gangetic Plains and Coasts they are for sustenance and livelihoods. The Indo Gangetic basin (here on called Ganga basin) is one of the most densely populated as well as one of the most productive agricultural areas of the world (Kumar et al., 2006; Erenstein et al., 2010). Rice, wheat and sugar cultivation is a primary source of income along with small-scale livestock rearing, horticulture and tourism, which are dependent on natural resources of the river (Ambastha et al., 2007; Keil et al., 2016).

Ganga River holds a high religious and





spiritual value in religious beliefs, primarily Hinduism. Many cultural and religious values of the river are reflected in the ancient Indian scriptures such as the Vedas and Puranas. As Ganga is considered 'Mother Goddess', several stories are told of her journey from heaven to earth; popular among which is that she came on earth to reduce the suffering of people and to grant them Moksha i.e. salvation. Every year, several festivals and days are dedicated to celebrate the holiness of the river and its contribution to humankind. Apart from religious pilgrimage, Ganga and its tributaries also host various types of tourism activities such as rafting, boating, angling, and camping. The tourism activities provide alternative livelihood opportunities to the local communities. Most importantly, the river supports significant agricultural economies in the whole basin due to the fertile soil and availability of freshwater for irrigation. Additionally, the river is a main mode of transportation for local communities as well as for commercial purposes (Kumar, 2017). The socio-economic structure, dependencies and traditions of communities change as the river flows from Himalaya to Ganga Sagar.

Local communities are important stakeholders in resource management and conservation efforts, particularly in the developing world. Stakeholders, who reside in biodiverse ecosystems like tropical forests, are the largest direct users and ultimate decision-makers of forest fate, can be important investors in conservation, harbor local ecological knowledge that complements Western science and frequently have long-term legitimate claims on lands where they reside. Research partnerships with local

stakeholders can increase research relevance, enhance knowledge exchange and result in greater conservation success. Present chapter focuses on identification of stakeholders of Ganga River and analysis of their role in conservation of Ganga biodiversity.

2.2. Aim

To understand the socio-cultural set-up along the Ganga River and its contribution to Ganga biodiversity conservation.

Objectives

To achieve the abovementioned aim following objectives were formulated:

- 1) Identification of stakeholders of Ganga River and analysis of their role in conservation of Ganga biodiversity.
- 2) Assessment of transformation in socio-cultural setup along the geomorphology of the River.

2.3. Approach

2.3.1. Stakeholder assessment

As it is not possible to involve all the stakeholders in conservation activities using one strategy, stakeholders' composition needs to be assessed and appropriate strategies should be developed in accordance with their association with the ecosystem and mandate. Stakeholders can be identified and classified through several established methods, which can be executed with or without the participation of stakeholders (Reed et al., 2009; Nastran, 2014). However, stakeholder identified without their participation will not help in long term planning, hence understanding their attributes is crucial. Some





attributes may be similar or interconnected or interchangeable. Attribute used for the present study are classified in Table 2.1.

To identify the key stakeholders of Ganga River conservation, reconnaissance survey was conducted in the villages, blocks and districts located along the River. Formal and informal interactions with members of local communities, government and non-government organizations were conducted to understand their association with Ganga River and possible role in biodiversity conservation. Regular interactions and consultation meetings with Gram Pradhans, Village Panchayat members, Block Development Officers, Village Development Officers, Panchayat Secretaries, members of NGOs and local people were conducted. As Ganga is a multidimensional ecosystem and has multiple

stakeholders, it was hard to identify and reach stakeholders; hence, snowball technique was used (Atkinson & Flint, 2001, Reed et al., 2009). Regular interactions with members of identified stakeholder groups were conducted to assess their interest and power towards Ganga River cleanliness and conservation of its biodiversity. To understand linkages and dependence of various stakeholders with Ganga River and its biodiversity as well as among themselves, a structured questionnaire was used and representatives of each stakeholder groups were interviewed. This information was further validated with field observation, records and published literature (Figure 2.1).

Stakeholder classification method based on combination of three attributes viz. power, legitimacy and interest, was used. These three attributes comprehensively demonstrate the salience of the stakeholders. Salience is the prioritization of stakeholders on the basis of their power, degree of moral legitimacy and interest towards claim on the resources of Ganga river (Nastran, 2014) (Figure 2.2). Scores were given to stakeholders for their level of power, legitimacy and interest. The highest score was 3 for all the variables while 1 was the lowest. Salience was calculated using following formula for each stakeholder group:

$$D = \sqrt{(a^2 + b^2 + c^2)} \dots\dots\dots \text{Equation (1)}$$

Where D is salience, a is interest, b is power and c is legitimacy score

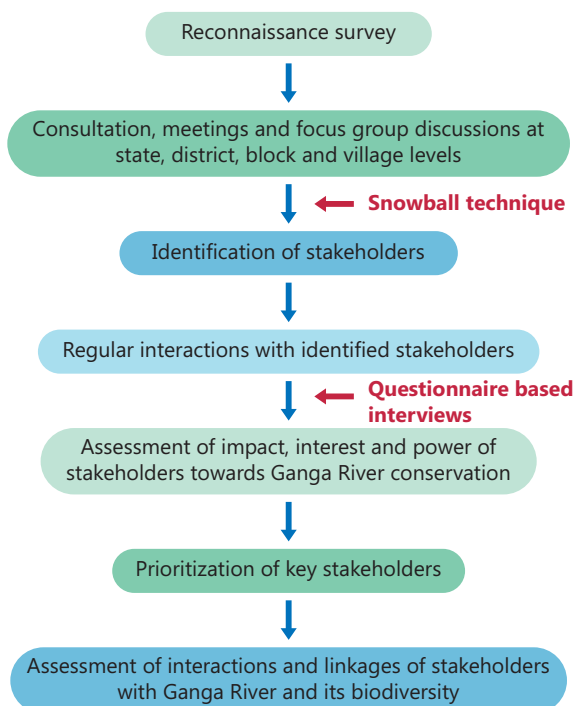


Figure 2.1: Approach to identify and classify stakeholders in Ganga River

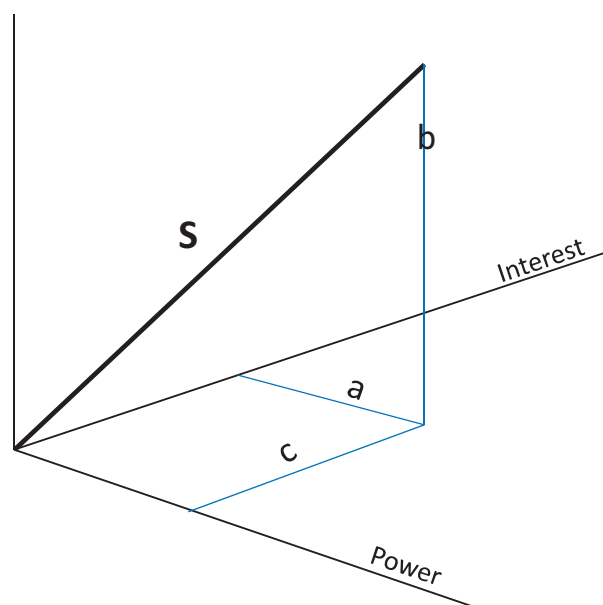
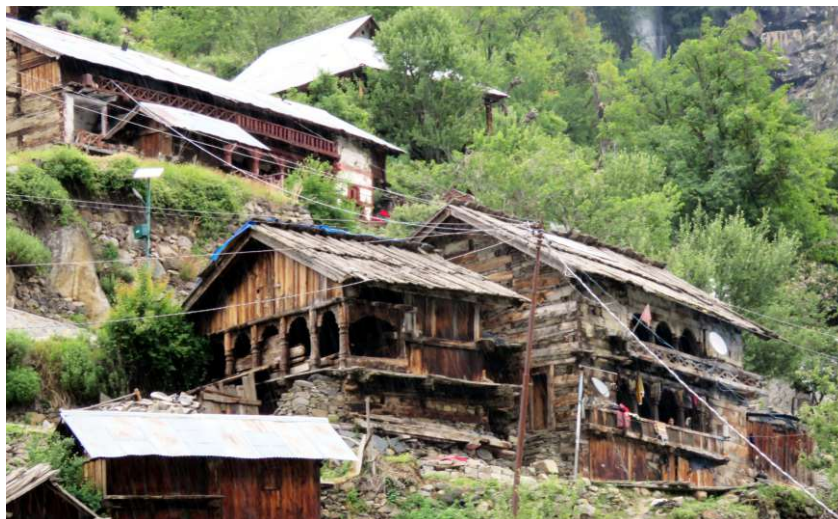


Figure 2.2: Approach to define salience of stakeholders (adopted from: Nastran, 2014)

2.3.2. Assessment of socio-economic and cultural setup

To understand the pattern of dependence of people on Ganga River and their socio-economic and cultural setup, formal and informal interactions were held with various identified stakeholders. Existing scientific, non-scientific and mythological literature along with newspaper repositories, online blogs and records of government and non-government organizations were reviewed to understand the structure and changes in the socio-ecological systems along main stem Ganga.



2.4. Outcomes

2.4.1. Stakeholders of Ganga River

Due to varying socio-cultural and economic background, and geographical conditions Ganga River has multiple stakeholders. A total of 50 stakeholder groups were identified in the five Ganga states based on their association with the river and its resources. Stakeholders were further divided into primary, secondary and tertiary classes based on level of interest, influence, and importance in decision making and implementation processes guiding integrated conservation planning (Table 2.1). As all the Ganga states have their specific working and administration models, stakeholders were analyzed for each state (Table 2.2 to 2.6).

Uttarakhand

In Uttarakhand, a total of 32 stakeholders have been identified, of which 18 are primary, nine secondary and five tertiary. 18 stakeholder groups have high interest while four have moderate and one group

have low interest. Power was high for 17 groups while it was moderate and low for nine. Saliency was highest (5.20) for primary stakeholders -Uttarakhand Forest Department, District Ganga Committee, Water and Sanitation Department, State Project Management Unit, secondary stakeholders - Municipal Corporations and tertiary stakeholders - National Mission for Clean Ganga and MoEF&CC. It is lowest (3) for NGOs and Tourism Sector (Table 2.2).

Uttar Pradesh

In Uttar Pradesh, 32 stakeholder groups have been identified, of which 22 are primary, three secondary and five tertiary. 23 groups of stakeholders have high interest, two have moderate and five have low interest. Power was high for 19 groups while it was moderate and low for eight and three groups, respectively. Saliency was highest for six stakeholder groups namely Uttar Pradesh State Forest Department, District Ganga Committee, Ganga Task Force and State Project Management Groups (primary stakeholders), Nehru Yuva Kendra Sangathan (secondary), and MoEF&CC (tertiary). Saliency was lowest for local industries, Inland waterways (primary) and Armed Forces (tertiary) (Table 2.3).

Bihar

In Bihar, a total of 25 key stakeholder groups were identified of which, 19 are primary, four secondary and one tertiary. Nine stakeholder groups have high interest while it was moderate and low for four and 11 groups. 14 stakeholders have high power to bring any change in biodiversity and habitat quality, seven groups have moderate power while only three have low power. Disaster





high interest while 14 have moderate and two have low interest. Power was high for 11 groups while it was moderate for 15 and low for four. Salience was highest (5.20) for National Mission for Clean Ganga and MoEF&CC (tertiary). It is lowest (3) for Inland Waterways Authority, Panchayati Raj institutions, Local communities, NGOs (primary), and Mining sector, Department of Disaster Management and Civil Defense (secondary) (Table 2.6).

Management Department (2.45) and Inland Waterways Authority (3.32) along with Electricity Supply Department, local industries, tourism sector (3) have lowest salience towards Ganga biodiversity. Salience was highest (5.20) for MOEF&CC, Environment, Forest and Climate Change Department and Bihar State Pollution Control Board (Table 2.4).

Jharkhand

In Jharkhand, 27 stakeholder groups have been identified, of which 17 are primary, six secondary and four tertiary stakeholders. 20 groups of stakeholders have high interest, two have moderate and five have low interest. Power was high for 19 groups while it was moderate and low for four groups, each. Salience was highest (5.20) for seven stakeholder groups namely Department of Forest, Environment and Climate Change, District Ganga Committee, SPMG and SBM Rural (primary), District Administration (secondary), and Educational Institutions, MoEF&CC (tertiary). Salience was lowest for local industries (secondary; 1.73), NGO and Department of Water Resources (primary; 3) (Table 2.5).

West Bengal

In West Bengal, a total of 30 stakeholders have been identified, of which 14 are primary, 12 secondary and four tertiary stakeholders. 14 stakeholder groups have

2.4.2. Socio-economic profile of communities residing in Ganga states

Ganga River flows through one of the most densely populated areas in the world with a population density of 520 persons per sq.km. Among the Ganga states, the population density is highest in West Bengal and lowest in Uttarakhand (Figure 2.3). Population living below poverty line is highest in Jharkhand and lowest in Uttarakhand (Figure 2.4). The GDP per capita is highest in Uttarakhand and lowest in Bihar, which is also the lowest in the country (Figure 2.5). These varying socio-economic conditions along with availability and accessibility of natural resources has led to a medley of community composition present along the Ganga River (Table 2.7).



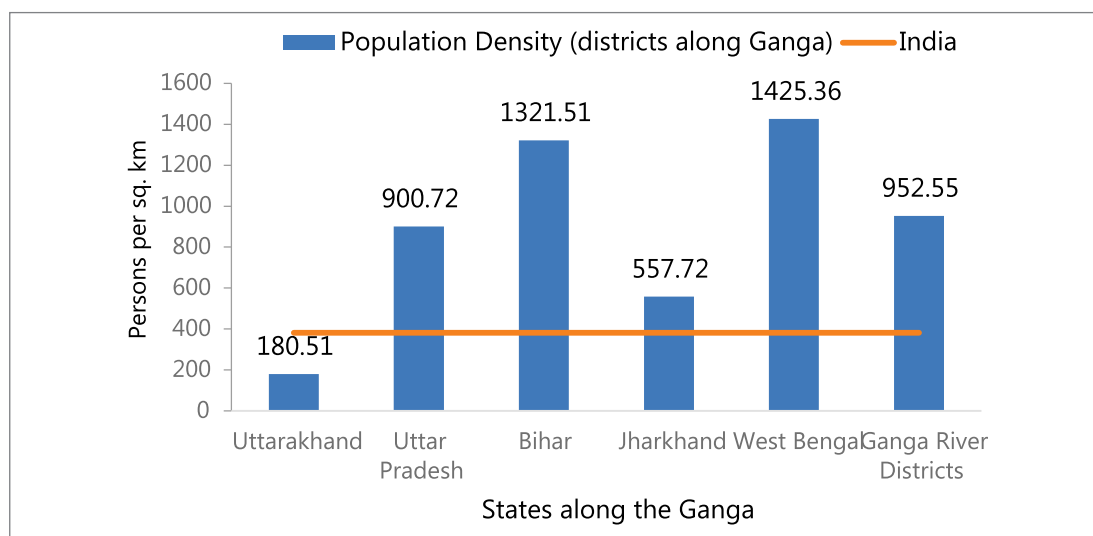


Figure 2.3. Population density in the Ganga states against the national average

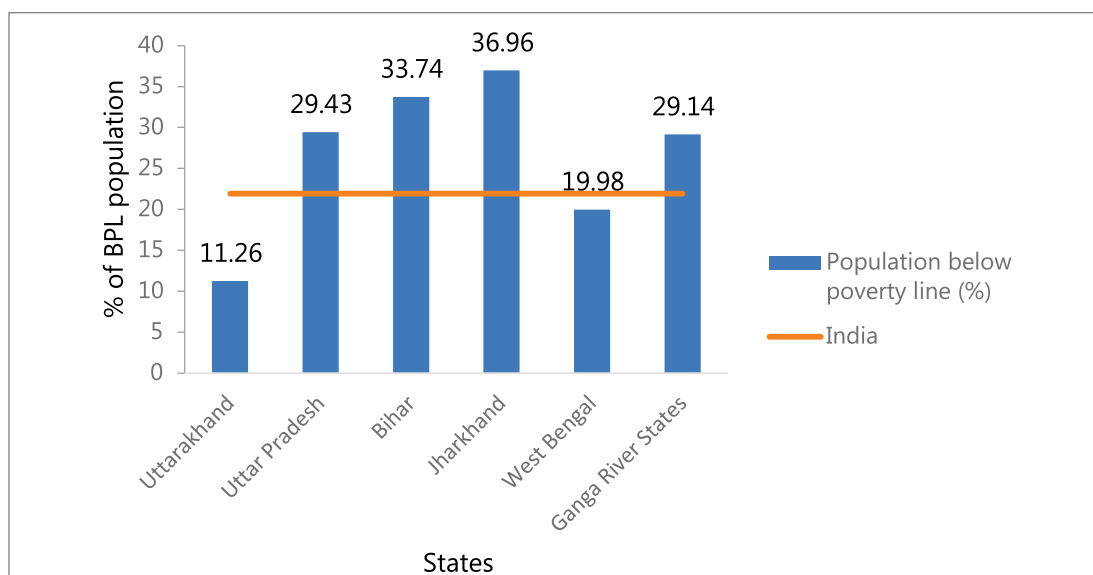


Figure: 2.4. Population below poverty line in the Ganga states against the national average

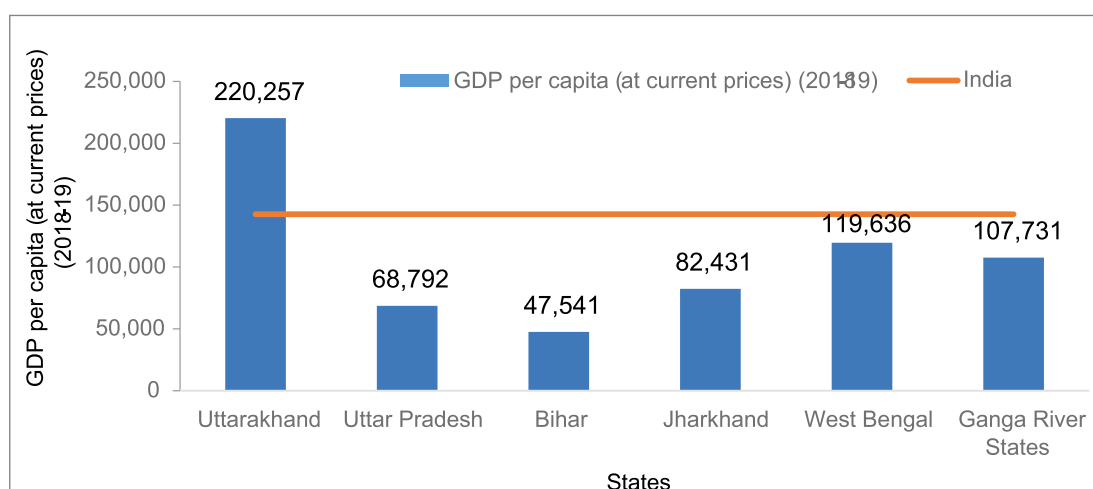


Figure: 2.5. GDP per capita of the Ganga states in comparison with the national average

Community structure

In the Himalayan stretch of the river also known as Garhwal region, only two communities i.e. Bhotia and Garhwali, reside in the villages located along the Ganga. Bhotia is a scheduled tribe and consists of several many sects and have Tibetan lineages. Bhotia (Indo-Mongoloid) and Garhwali (Indo-Aryan) are the main communities in the area. Bhotias are semi-nomads and have summer settlements in the higher altitudes while their winter houses are in lower regions. However, near and after Rishikesh the community starts getting diverse and has people follow various lifestyles and beliefs. Women in the upper stretch are more active and it was easier for the project team to approach and convince them to join the project activities (Table 2.7).

Livelihoods and dependence on Ganga

Bhotia people are mainly dependent on handicraft and tourism while agriculture and cattle and goat rearing are the main occupation for the Garhwali communities. The agriculture in the Himalayan villages is more dependent on forests and streams in catchment areas of the river and people rarely extract water from main stem. Recently, in the last two decade nature and religious tourism has evolved as a key livelihood activity for the people. Ganga has high religious and cultural values here along with high spiritual values; people from across the globe visit the river (Table 2.7).

Agriculture is the primary livelihood for the people in middle stretch, which is highly dependent on river waters and loamy soil. Riverbed agricultural is very prominent in this stretch. Fishermen community, locally known as Nishaad, practice fishing and boating for their livelihoods. In the lower stretch, fishing and

agriculture are the primary occupations. In Sunderbans, local communities are dependent on resources from the river and mangroves such as honey, fish, fuel etc.

Economic status of people in upper stretch i.e. Uttarakhand is better than the other two stretches. Our interactions (n= 200) at villages Siror, Matli and Mukhwa in Uttarkashi district (upper stretch) revealed that about 67% of the families are involved in religious and nature-based tourism that is related to Bhagirathi and its tributaries as well as the catchment area (Figure 2.6). Dependence on river was higher in Rishikesh and nearby villages, where almost 100% households are dependent on river rafting and camping. We observed a drastic shift from agriculture to tourism related activities. Local communities (n= 140) at Bijnore (middle stretch) show that wage labour (33.5%) and agriculture (24.3%) are the main occupation of the people. Agriculture is dependent on Ganga river and its tributaries such as Malan River. Less than 4% respondents were involved in fishing and boating, however, almost 50% of the respondents reported that they collect grasses (eg. Saccharum munja and Saccharum spontaneum) from river banks to make mats, which is the main secondary occupation in the area. At Varanasi (in the end section of the middle stretch) personal interviews with 340 villagers revealed that 34.8% of the respondents were engaged in daily labour followed by fishing (18.6%) and river dependent agriculture (15%) (Figure 2.6). In Sahibganj, the lower stretch, interactions with local people (n= 261) revealed that there is a change in traditional livelihood pattern and more people practice daily labour (39%) as the primary occupation followed by agriculture (26%), private job (16.4%) and fishing (8.18%) (Figure 2.6).

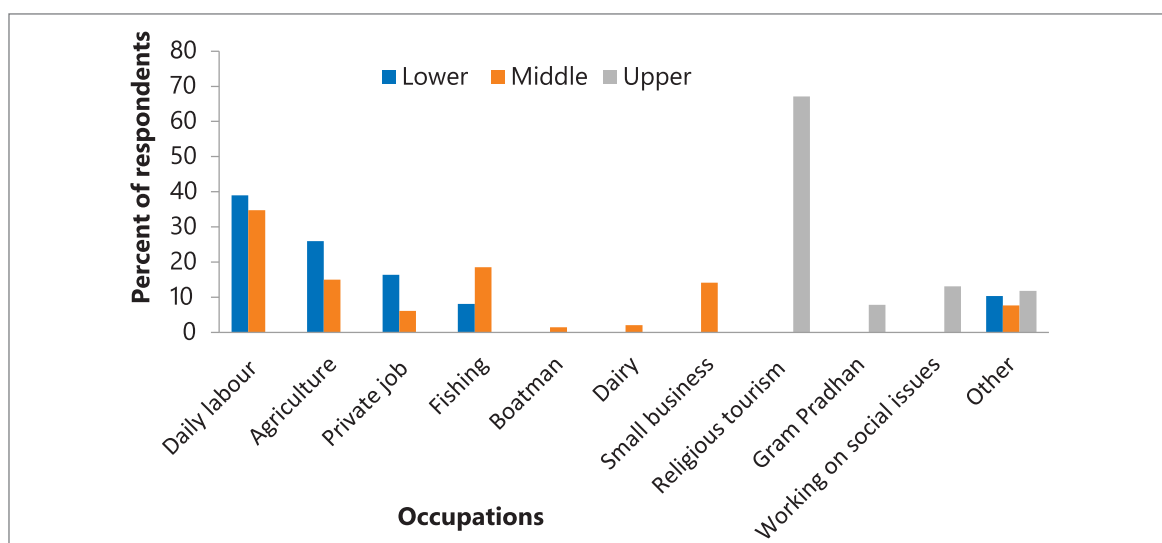


Figure 2.6. Occupational Pattern in three stretches of Ganga River

Land use and land cover

The Ganga Basin happens to be one of the most widely and heavily irrigated agricultural lands. The agricultural area consists of 64.14% of the total basin area, followed by area under forest. Area under wetlands and snow are minimum (Figure 2.7).

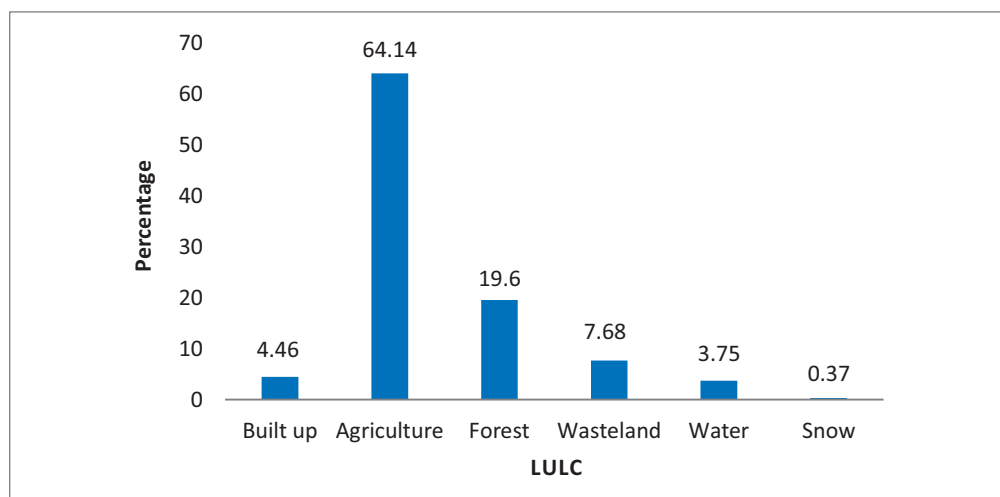


Figure 2.7. Land use and land cover classes in Ganga basin

Agricultural profile

Agri-scapes are extremely heterogeneous in the basin comprising of cold Himalayan upper catchments, fertile alluvial plains, semi-arid central highlands and the fragile delta region. About 62% of total workforce in Bihar, 52% in Uttar Pradesh, 49% in Uttarakhand and 39% in West Bengal is directly depend on agriculture (NSS, 2011). The actual productivity of agriculture, forestry, fisheries and livestock is only low-to-medium of the potential productivity. Agricultural output in the basin states increased from INR 1.97 billion during 1962-65 to INR 5.24 billion during 2003-06, yet at the same time average landholding size decreased. Number of small and marginal holdings (below two hectares) increased at a rate of 6.37%, from 42.23 thousand in 2005-06 to 44.92 thousand in 2010-11. Nature of farming is different at different locations, for e.g. farming at high altitudes from where the Ganga River originates includes growing native millets or off-seasonal crops that will provide more economic benefits to the local communities. In the state of Uttar Pradesh and West Bengal, different cropping patterns are observed wherein there is considerable usage of chemical fertilizers and pesticides. Therefore, sustainable agricultural practices aligned with the conservation goals are needed to be put in place for better yield and productivity that contributes in making the economy robust.

Fisheries

India is the second largest fish producing country in the world as it accounts for 6.3 per cent of the global fish production and 5% of the global fish trade (NFDB, 2018). Fishery is providing livelihood to over 14.5 million people in India. So, promoting sustainable

fishery in the Ganga basin is extremely vital to ensure sustainable extraction of the fish resources. There are various potential areas where production can be strengthened and has a vast opportunity to promote fishery beyond coastal states. Currently, fish farming is a major activity in many places and done in many locations along Ganga River. West Bengal, the largest fish producing state, is also situated along the Ganga river.

Animal husbandry

Animal husbandry is a very important supplementary source of income for the farmers especially in periods of crisis in upper, middle and upper-lower stretches of the river. Climate change and other limiting factors that discourage farm activities necessitate in promoting economic assistance to the farm. This not only aids income generation but also the inclusive growth of rural ecosystem. There is a need to promote high yielding breeds and varieties of the livestock as well as development of alternative sources of fodder.

Renewable energy

India is one of the leading countries in clean energy production and stand second in the global renewable energy production. A target of 175 GW of renewable power generation is set by the Ministry of New & Renewable Energy (MNRE) for 2022, which includes 100 Gigawatt (GW) of Solar power, 60 GW from Wind power, 10 GW from Biomass power and 5 GW from Small Hydro power. Wind energy contributes the major portion of 64.09% of total renewable energy capacity of the country. The potential for wind energy is high in Madhya Pradesh and West Bengal, among the Ganga basin states. About 5,000 trillion kWh per year solar energy is incident over India's land area with most parts receiving 4-7 kWh per sq. m per day.

The states of Uttar Pradesh, Madhya Pradesh and West Bengal have high potential for solar thermal and solar photovoltaics (PVs). India has an estimated potential of over 30,000 MW of power from biomass, but less than 2500 MW has been exploited. Thus, over 90% of capacity from potential still exists (MNRE, 2019).

Industries along the Ganga

In upper stretch, Uttarakhand has a flourishing tourism industry, due to the pilgrimage sites, rich biodiversity and adventure opportunities it receives tourists from all walks of life. Every year the International Yoga festival is held in Rishikesh drawing tourists from all over world interested in their spiritual enhancement. The rafting and other adventure sports offered by the proprietors in the tourism sector are particularly popular as corporate retreats. Every year hundreds of thousands of pilgrims complete the Char Dham Yatra. Apart from tourism, other key industrial sectors in the state are, information technology and information technology enabled services, pharmaceuticals and aromatic plants, hydropower, fast moving consumer goods. Uttarakhand is one of the leading fruit cultivating states in India. Middle stretch i.e. Uttar Pradesh is the industrial hub of Gangetic plains. Some key industrial sectors in Uttar Pradesh are civil aviation, information technology enabled services, agro and food Processing, electronics manufacturing, tourism, renewable energy, handloom and textiles, leather-based and sports goods industries, engineering goods, cement, chemicals and fertilizers, mineral-based industries, auto components, biotechnology. In lower Ganga, key industrial sectors in the state of Bihar include agro-based food processing and dairy, textile and leather, thermal and renewable energy, tourism, hospitality, rubber and plastics, transport equipment, chemicals, and tobacco. Textile, apparel and footwear, food and feed processing, mining and mineral extraction, iron and steel, chemicals, cement, automobile and auto-components, energy, and tourism are few key sectors in Jharkhand. Key industrial sectors in West Bengal include information technology, leather, textiles, agriculture and horticulture, tea production, metals and minerals, petroleum and petrochemicals, Iron and steel, automotive, fisheries, jute products and tourism. The state not only enjoys a vast network of roads and railways, but also has the advantage of the largest inland waterways in terms of spread, density and reach. It is well connected to international markets with the international airports in Kolkata and Bagdogra, and Haldia and Kolkata ports. The state is

blessed with abundant mineral resources and has suitable agro-climatic conditions, with six agro-climatic zones, for agriculture, horticulture and fisheries (Table 2.8).

Land and resource rights

Although land rights are not well defined in the whole Ganga basin, local people in Garhwal region have rights to sand and boulders from the Ganga and its first and second order tributaries. Local communities extract fodder, fuel wood, sand, boulders etc. according to Haq-Haqooq (rights) defined by their village level institution i.e. Panchayat and Van Panchayat. However, this mechanism is not very effective in some sites. In middle and lower stretch land rights are mainly controlled by the caste as most of the land along the Ganga is owned by higher castes such as Yadavs, Brahmins, Rajputs etc., which have its root in the Zamindari system that existed in the past. In the lower stretch a unique practice was present in the past known as Panidari, where the stretches of rivers were under control of a particular caste, and the lower castes did not have any right on the river resources (Table 2.7).

Cultural values

Cultural and lifestyles along the Ganga in have developed in accordance with the availability and accessibility of its resources. In upper stretch i.e. Himalaya, people are more culturally associated with the forest resources present in the catchment area of the River. Local beliefs and traditional practices in the region are more inclined towards the forests. However, there are many localized festivals such as 'Maun mela' are celebrated in the second order tributaries of the Ganga. In most of the places, forest and land in the catchment in upper stretch is dedicated to some local deity and is preserved under local informal regulations. During special days such as Ganga Ashtami, several local deities come to meet Ganga depicting the connections between local traditions and river. In Middle and lower stretches the linkages between local economy and Ganga resources are visible and can be seen in the caste system also. There are few caste groups particularly dependent on the Ganga for their survival. Food habits of people in all three stretches are also very influenced by the availability of the food resources. Market for these cultural services is developed in all the stretches however, the scalability is limited.

Religious values

Ganga is mentioned in the Rig Veda, an ancient

literature of Hinduism. It is believed that Ganga came on earth to clean the sins of people and to make their life better. The upper stretch receives visitors not only for religious purpose but also for spiritual purposes, which includes believers of several religions. In the middle and lower stretch, community becomes more diverse and consists of people from various religious and cultural backgrounds. People from various religious beliefs can be seen performing their rituals along the Ghats. Many important temples, mosques and Gurudwaras are located along the Ganga River. In West Bengal, Bonbibi or Bandurga, a Goddess, is considered as the guardian of the forest and worshipped by both Hindu and Muslim communities (Table 2.7). Varanasi, in middle Ganga, is not only considered as one of the most important Hindu religious site and pilgrimage but another part of the city called Sarnath is considered holy by Buddhism and Jainism followers. It is believed to be place of the Buddha's Dhammacakkappavattana Sutta, which was his first teaching to his disciples and birthplace of Shreyansanath, the Eleventh Tirthankara of Jainism. Bihar was an ancient seat of power, home to the remnants of two ancient universities of Nalanda and Vikramshila, birthplace of Guru Gobind Singh, Buddhism and Jainism. Several sites of historic and heritage importance, are located along the river (Figure 2.8).

Heritage values

Ganga River itself is a national heritage for India as its contribution and significance is deep rooted in the cultural and religious values. Architectural and archaeological treasures in the form of forts and palaces, places of worship etc. inherited from the numerous dynasties and kingdoms that thrived on her banks, from the Mauryan empire to the Mughal rule to the colonial era, draw history buffs from around the globe. Millions of devotees embark on the Char Dham yatra or Kavad yatra every year. The Ashrams in Rishikesh, the Ghats in Varanasi invite foreigners and locals, alike, in search of spiritual enlightenment.

Ganga not only is a base for cultural heritage but also contributes significantly to the natural heritage of the country and globally. There are two UNESCO natural world heritage sites i.e. Nanda Devi and Valley of Flowers National Parks and Sundarbans National Park are located along Ganga. Stretch from Brijghat to Narora, East Calcutta Wetlands and Sundarbans Wetlands have been recognized as Ramsar sites (<http://wiienviis.nic.in>).

Festivals and celebrations

Several festivals are observed to celebrate the contribution of mighty Ganga to people and their daily life. April to June Ganga Saptami, Ganga Pushkaran, Ganga Dussehra are celebrated. During July and August, the famous Kavad Yatra takes place, which is mainly celebrated in northern parts of India and followers walk miles to bring Gangajal (water of Ganga River) to Shiva's temple. In Varanasi, people wait for Dev Deepawali as it not only celebrates the calmness and strength of river but also provides livelihood opportunity to many including local businessmen and boatmen. Kumbh, one of the biggest congregations of humanity in the world, is celebrated in two cities i.e. Haridwar and Prayagraj (Figure 2.9). Several small and regional festivals are also observed at various locations along the river.

Handicrafts

India is a country of rich culture, history and traditions. Handicrafts are unique expressions and represent a culture, tradition and heritage of a country. India is one of the major producers and supplier of Handicrafts products in the world. The Indian Handicraft Industry is showing continuous growth rate of 20% every year. Ganga basin has a rich history, which can be seen in the handicrafts emerged from these areas. The banks of Ganga have artisan communities with different kind of crafts making knowledge right from the Gangotri to Ganga Sagar. There are about several handicrafts registered under Geographical Indications (GI) in 7 Ganga river states (Bihar, Chhattisgarh, Himachal Pradesh, Madhya Pradesh, Rajasthan, Uttar Pradesh and West Bengal) (Table 2.9).

Uttarakhand, mainly Uttarkashi and Chamoli district are well known for their wool products (especially colourful carpets) and are major source of income for Bhotia tribe. Some of the villages in these districts are dependent on wood and hill bamboo (ringaal). Durries or carpets from Agra, Uttar Pradesh have their unique designs. Beautiful prints for Farrukabad and ittar (distilled scents) of Kannauj, sarees and meenakari from Varanasi don't need any introduction. About Kannauj it was said that even the drains there smelled like roses. Bhagalpur silk and Madhubani paintings from Bihar have their own place in the craft history of India. Madhubani paintings are known for their depiction of culture and traditions of Bihar. In West Bengal artisans make idols of goddess Durga from the soil, the terracotta craft of the state is known globally. Zamdani sarees and refined cotton cloths are

highly appreciated by tourists and local residents.

Recreational benefits from Ganga

The Ganga River is lined with popular tourist destinations catering to all kinds of tourists, be it religious, spiritual, adventure, educational etc. There are five protected areas along the Ganga River, covering around 10% of the mainstem. With scenic landscapes and rich floral and faunal diversity, wildlife enthusiasts and shutterbugs descend upon these sites, whether it is to see elephants in Rajaji National Park, gharials and turtles in Hastinapur Wildlife Sanctuary, tigers in Rajaji National Park or Sundarbans BR or the Gangetic dolphins in Vikramshila Gangetic Dolphin Sanctuary. The river offers opportunity for a range of adventure sports, be it rafting and riverside camping in Rishikesh or hiking/trekking in Gangotri National Park. Tehri in District Uttarkashi hosts Asia's biggest lake festival and provides a host of activities like boating, jet skiing, banana rides, water skiing, surfing, canoeing, river rafting, paragliding, kayaking etc.

Biodiversity value

Ganga Basin includes 170 Wildlife Sanctuaries, 38 National Parks, 2 conservation reserve and 1 Tiger Reserve (that includes 5 species of aquatic and semi-aquatic mammals, 128 species of water and water associated birds, 27 species of reptiles, 90 species of amphibians and 275 fish species in Ganga alone) (Ganga Aqualife Conservation Monitoring Centre, WII). The aquatic wildlife of the Ganga and its habitats are in peril due to reduction in water flow, pollution and over exploitation of riverine resources. Restoring this is a challenging task and calls for novel innovations, understanding of science and stakeholders' cooperation. The Protected Areas along the Ganga Basin provides opportunity for biodiversity parks, besides the Ramsar sites in the basin also supports an array of biodiversity, which are visited by the nature tourists. About 49% of the main stem Ganga River has good population of aquatic diversity; these are identified as six high biodiversity zones by the Wildlife Institute of India. These zones can be managed as Ramsar sites, Conservation and Community reserves.

Ganga for Science

National and international scholars have studied various aspects of the Ganga River as a cultural, social, religious and ecological entity. Ganga River as a keyword, produces more than 3,89,00,000 results on Google and more than 54,000 results on Google

Scholar. A search on HOLLIS, Harvard Library's online catalogue, generated 71,836 results for articles, dissertations, books, reviews, book chapters, journals, archives/manuscripts and technical reports related to Ganga River. These results represent the amount of research work that has been conducted to understand the value of Ganga River and its contribution to sustaining life. There are numerous universities, institutes and colleges located along the river. Hemwati Nandan Bahuguna Garhwal University, Aligarh Muslim University, University of Allahabad, Banaras Hindu University, Patna University and St. Xavier's College to name a few. Close proximity to the Ganga affords the opportunity to conduct research on the river and its attributes. Aligarh Muslim University has 48 theses and dissertations on or about Ganga River. A search on the Shodhganga website, which is a digital repository of theses and dissertations submitted to Indian universities, with 'Ganga' as a keyword resulted in 3651 results. Banaras Hindu University set up Malaviya Research Centre for Ganga, River Development and Water Resources Management in 2015, a knowledge centre dedicated for Ganga related R&D activities. Ganga Aqualife Conservation Monitoring Centre has been established at WII, Dehradun for 'science-based conservation planning and dissemination of information'.

2.5. Conclusions

Ganga flows through different bio-geographical and cultural landscapes, resulting in a wide range of benefits to the people and varying patterns and intensity of dependence. This mosaic of socio-ecological set-up leads to multiple stakeholders with different linkages and associations with Ganga and its biodiversity. This adds to uniqueness of the River and, makes its conservation a matchless challenge. To ensure sustainable conservation efforts in Ganga River, site-specific and innovative techniques and approaches should be used.

Our stakeholder analysis shows that salience of village panchayats is highest as their socio-economic and ecological association is the highest and wellbeing of local communities depends on the benefits provided by Ganga River. Salience was also found to be high for the institutions and organization that have biodiversity conservation as their mandate, such as MoEF&CC and state forest departments, educational institutions followed by implementation agencies working at local and regional level such as State Project Management Units, District Ganga Committees and district administration. Silence was

lowest for the stakeholders engaged in developmental activities such as shipping corporations, department of planning and development and local businesses. Impact of local businesses has been observed to be both positive and negative as they provide alternative livelihood opportunities to the local people, and contribute to pollution and resource extraction. In our project, we developed linkages between stakeholders with low salience and stakeholders with higher salience. This has resulted in improved involvement and stake of stakeholders with low salience and increased

effectiveness of activities of stakeholders with high salience.

The complex dynamics of people and Ganga have resulted in multi-cultural landscape in the river basin. The association between Ganga and people living along it, mainly depends on the historic, mythological and economic activities that have occurred. The variation in association is clearly visible as one moves along the river. These complexes are often structured by river resources, their accessibility and quality, that further define interest and role of stakeholders.

Table 2.1: Attributes used to classify the stakeholders of Ganga River

Attribute	Question	Categories
Influence, Power	1. Does the stakeholder influence the Ganga or get affected by presence and condition of Ganga?	Affect/affected
	2. What is the influence of the stakeholder on Ganga River and its biodiversity?	Indirect/direct
	3. What is the scale of impact?	Low/medium/high
Importance	1. Are the stakeholder's needs and interests a priority?	Yes/no
Legitimacy	1. Do stakeholders have legitimate demands?	Yes/no
	2. How legitimate are the demands?	Low/medium/high
Role	1. What is the role of stakeholder in Ganga River conservation and cleanliness?	Dependent on resource / decision maker / designer / passively involved
Position, Compatibility	1. What is the stakeholder's position in relation to Ganga conservation and cleanliness?	Support / opposition Co-operative / competitive
Location	1. What is the location of stakeholder along the Ganga River?	Name of Ganga state and stretch
	2. What is the distance of stakeholder from the river?	Distance from main Ganga stem
Activity	1. How stakeholder involved in Ganga conservation and cleanliness activities?	Passive/active
	2. Does Ganga biodiversity affect stakeholder or vice versa?	Yes/no
	3. Does stakeholder have an indispensable role for the Ganga conservation?	Primary/ secondary/tertiary
Institutional level	1. On what level stakeholder is connected with the Ganga River?	Local on-site, local off-site
Interest	1. On what level is the stakeholder's interest and influence on Ganga biodiversity and cleanliness?	Low/medium/high
Dependence	1. What is stakeholder's possible contribution to Ganga conservation and cleanliness?	Low/medium/high
	2. What is the level dependence of stakeholder on Ganga River and its biodiversity?	Low/medium/high
Knowledge	1. How much does the stakeholder know about the Ganga river biodiversity and its values?	Low/medium/high
Leadership	1. Does the stakeholder lead any group, related to Ganga River?	Yes/no

Table 2.2: The stakeholder attributes' estimates and their salience in Uttarakhand state

Stakeholders	Type	Interest (a)	Power (b)	Legitimacy	Legitimacy Score (c)	Impact	Position	Salience $\sqrt{=(a^2+b^2+c^2)}$
District Administration	Primary	1	3	Yes	3	2	+/-	4.36
Forest Department	Primary	3	3	Yes	3	3	+	5.20
Religious group	Primary	1	3	Yes/no	2	3	+/-	3.74
NGOs	Primary	1	2	Yes/no	2	2	+/-	3.00
District Ganga Committee	Primary	3	3	Yes	3	2	+	5.20
Village Panchayat	Primary	3	3	Yes/no	2	3	+/-	4.69
Nagar Panchayat	Primary	3	3	Yes/no	2	3	+/-	4.69
Fisheries Department	Primary	2	2	Yes	3	3	+/-	4.12
Agricultural Department	Primary	3	2	Yes/no	2	3	+/-	4.12
Animal Husbandry	Primary	2	2	Yes	3	3	+/-	4.12
Mining Department	Primary	3	3	Yes/no	2	3	-	4.69
Water and sanitation	Primary	3	3	Yes	3	3	+/-	5.20
Local communities	Primary	3	1	Yes	3	3	+/-	4.36
Tourism sector	Primary	1	2	Yes/no	2	3	+/-	3.00
Irrigation Department	Primary	3	3	Yes/no	2	3	+/-	4.69
Hydropower	Primary	3	3	Yes/no	2	3	-	4.69
Local Institutions	Primary	3	1	Yes	3	2	+/-	4.36
SPMG	Primary	3	3	Yes	3	3	+	5.20
Educational/Research Institutes	Secondary	3	2	Yes	3	3	+	4.69
Armed forces	Secondary	1	1	Yes	3	1	+	3.32
NYKS	Secondary	2	2	Yes	3	1	+	4.12
Training institutes	Secondary	1	1	Yes	3	1	+	3.32
Department of Rural Development	Secondary	1	1	Yes	3	3	+	3.32
Municipal Corporations	Secondary	3	3	Yes	3	2	+/-	5.20
SRLM	Secondary	1	2	Yes	3	2	+	3.74
Small Businessmen/Vendors	Secondary	3	1	Yes/no	2	3	+/-	3.74

Stakeholders	Type	Interest (a)	Power (b)	Legitimacy	Legitimacy Score (c)	Impact	Position	Saliency $\sqrt{=(a^2+b^2+c^2)}$
Media	Secondary	2	3	Yes/no	2	2	+	4.12
UREDA	Tertiary	1	2	Yes	3	1	+	3.74
NMCG	Tertiary	3	3	Yes	3	3	+	5.20
MoEF&CC	Tertiary	3	3	Yes	3	3	+	5.20
Ministry of Rural Development	Tertiary	1	3	Yes	3	3	+	4.36
Other ministries	Tertiary	3	3	Yes/no	2	3	+/-	4.69

Table 2.3: The stakeholder attributes' estimates and their salience in Uttar Pradesh state

Stakeholders	Type	Interest (a)	Power (b)	Legitimacy	Legitimacy Score (c)	Impact	Position	Saliency $\sqrt{=(a^2+b^2+c^2)}$
District Administration	Primary	2	3	Yes	3	2	+	4.69
Forest Department	Primary	3	3	Yes	3	3	+	5.20
Religious group	Primary	3	2	Yes/no	2	3	+/-	4.12
Local industries	Primary	3	1	No	1	2	-	3.32
NAPS	Primary	3	3	Yes/no	2	3	+/-	4.69
NGOs	Primary	3	2	Yes/no	2	2	+/-	4.12
District Ganga Committee	Primary	3	3	Yes	3	3	+	5.20
Ganga Task Force	Primary	3	3	Yes	3	3	+	5.20
Village Panchayat	Primary	3	3	Yes/no	2	3	+/-	4.69
Nagar Panchayat	Primary	3	3	Yes/no	2	3	+/-	4.69
Fisheries Department	Primary	3	3	Yes/no	2	3	+/-	4.69
Agricultural Department	Primary	3	2	Yes/no	2	3	+/-	4.12
Animal Husbandry	Primary	2	2	Yes/no	2	3	+/-	3.46
Mining Department	Primary	3	3	No	1	3	-	4.36

Stakeholders	Type	Interest (a)	Power (b)	Legitimacy	Legitimacy Score (c)	Impact	Position	Saliency $\sqrt{=(a^2+b^2+c^2)}$
Municipal Corporations	Primary	3	3	Yes/no	2	3	+/-	4.69
Water and sanitation	Primary	3	3	Yes/no	2	3	+/-	4.69
Local communities	Primary	3	1	Yes/no	2	3	+/-	3.74
Tourism sector	Primary	3	2	Yes/no	2	3	+/-	4.12
SPMG	Primary	3	3	Yes	3	3	+	5.20
Irrigation dept.	Primary	3	3	Yes/no	2	3	+/-	4.69
Hydropower	Primary	3	3	Yes/no	2	3	+/-	4.69
Inland waterways	Primary	1	3	No	1	3	-	3.32
NYKS	Secondary	3	3	Yes	3	1	+	5.20
SRLM	Secondary	1	2	Yes	3	2	+	3.74
NEDA	Secondary	1	2	Yes	3	1	+	3.74
Educational/Research Institutes	Tertiary	3	2	Yes	3	3	+	4.69
Armed forces	Tertiary	1	1	Yes	3	1	+	3.32
MoEF&CC	Tertiary	3	3	Yes	3	3	+	5.20
Ministry of Rural Development	Tertiary	1	3	Yes	3	3	+	4.36
Other ministries	Tertiary	3	3	No	1	3	+/-	4.36

Table 2.4: The stakeholder attributes' estimates and their saliency in Bihar state

Stakeholders	Type	Interest (a)	Power (b)	Legitimacy	Legitimacy Score (c)	Impact	Position	Saliency $\sqrt{=(a^2+b^2+c^2)}$
Local Communities	Primary	3	1	Yes/no	2	1	+/-	3.74
NGOs	Primary	3	1	Yes/no	2	2	+/-	3.74
Research Institutes, Universities, Colleges, Schools	Tertiary	3	2	Yes/no	2	2	+/-	4.12
Media	Secondary	2	2	Yes/no	2	2	+/-	3.46

Stakeholders	Type	Interest (a)	Power (b)	Legitimacy	Legitimacy Score (c)	Impact	Position	Saliency $\sqrt{=(a^2+b^2+c^2)}$
District Administration	Primary	2	3	Yes	3	1	+	4.69
Department of Agriculture	Primary	2	3	Yes/no	2	1	+/-	4.12
Animal and Fish Resources Department	Primary	3	3	Yes/no	2	1	+/-	4.69
Disaster Management Department	Secondary	1	1	Yes/no	2	1	+/-	2.45
Energy Department	Secondary	1	2	Yes/no	2	1	+/-	3.00
National Thermal Power Corporation	Primary	1	3	Yes/no	2	2	+/-	3.74
Environment, Forest and Climate Change Department	Primary	3	3	Yes	3	1	+	5.20
Mines & Geology Department	Primary	1	3	Yes/no	2	1	+/-	3.74
Panchayati Raj Department	Primary	1	3	Yes/no	2	1	+/-	3.74
Bihar State Pollution Control Board	Primary	3	3	Yes	3	1	+	5.20
Planning and Development Department	Secondary	1	3	Yes/no	2	2	+/-	3.74
Rural Development Department	Primary	2	2	Yes/no	2	2	+/-	3.46
Water Resources Department	Primary	1	3	Yes	3	1	+	4.36
Inland Waterways Authority of India	Primary	1	3	No	1	1	-	3.32
Central Ground Water Board	Primary	1	3	Yes/no	2	1	+/-	3.74
SPMG	Primary	3	3	Yes/no	2	1	+/-	4.69
Community based institutions	Primary	3	2	Yes	3	2	+	4.69
Religious groups	Primary	3	3	Yes/no	2	1	+/-	4.69
Local industries	Primary	1	2	Yes/no	2	1	+/-	3.00
Tourism Sector	Primary	1	2	Yes/no	2	1	+/-	3.00
MoEF&CC	Tertiary	3	3	Yes	3	3	+	5.20

Table 2.5: The stakeholder attributes' estimates and their salience in Jharkhand state

Stakeholders	Type	Interest (a)	Power (b)	Legitimacy	Legitimacy Score (c)	Impact	Position	Salience $\sqrt{=(a^2+b^2+c^2)}$
Department of Forest, Environment and Climate Change	Primary	3	3	Yes	3	3	+	5.20
District Ganga Committee	Primary	3	3	Yes	3	3	+	5.20
Local institutions	Primary	2	1	Yes	3	1	+	3.74
Local Communities	Primary	3	1	Yes/no	2	3	+/-	3.74
Panchayati Raj Institutions	Primary	3	2	Yes/no	2	3	+/-	4.12
NGOs	Primary	2	1	Yes/no	2	2	+/-	3.00
Inland Waterways Authority	Primary	3	3	No	1	3	-	4.36
SPMG	Primary	3	3	Yes	3	2	+	5.20
SBM Rural	Primary	3	3	Yes	3	2	+	5.20
State Pollution Control Board	Primary	1	3	Yes	3	1	+	4.36
Religious Groups	Primary	3	3	Yes/no	2	3	+/-	4.69
Fisheries Department	Primary	3	3	Yes/no	2	3	+/-	4.69
Department of Agriculture, Animal Husbandry and Cooperative	Primary	3	3	Yes/no	2	3	+/-	4.69
Mining Department	Primary	3	3	No	1	3	-	4.36
Department of Drinking Water and Sanitation	Primary	3	3	Yes/no	2	3	+/-	4.69
Department of Water Resources	Primary	1	2	Yes/no	2	3	+/-	3.00
Irrigation Department	Primary	3	3	Yes/no	2	3	+/-	4.69
District Administration	Secondary	3	3	Yes	3	3	+	5.20
Electronic and Print Media	Secondary	3	3	Yes/no	2	3	+/-	4.69
Local Industries	Secondary	1	1	No	1	1	-	1.73
Local Businesses	Secondary	3	2	Yes/no	2	3	+/-	4.12
SRLM	Secondary	3	2	Yes	3	3	+	4.69
Tourism sector	Secondary	1	3	Yes/no	2	3	+/-	3.74
Educational Institutions	Tertiary	3	3	Yes	3	2	+	5.20
MoEF&CC	Tertiary	3	3	Yes	3	3	+	5.20
Ministry of rural development	Tertiary	1	3	Yes	3	3	+	4.36
Other ministries	Tertiary	3	3	Yes/no	2	3	+/-	4.69

Table 2.6: The stakeholder attributes' estimates and their salience in West Bengal state

Stakeholders	Type	Interest (a)	Power (b)	Legitimacy	Legitimacy Score (c)	Impact	Position	Salience $\sqrt{= (a^2 + b^2 + c^2)}$
Agricultural Department	Primary	3	2	Yes/no	2	3	+/-	4.12
Fisheries Department	Primary	3	2	Yes/no	2	3	+/-	4.12
Irrigation Department	Primary	3	3	Yes/no	2	3	+/-	4.69
Inland Waterways Authority of India	Primary	2	2	No	1	2	-	3.00
Shipping Corporation	Primary	2	3	No	1	3	-	3.74
Religious groups	Primary	3	2	Yes/no	2	3	+/-	4.12
Central Groundwater Board, Eastern Region	Primary	3	3	Yes/no	2	3	+/-	4.69
Panchayati Raj institutions	Primary	2	1	Yes/no	2	3	+/-	3.00
District Ganga Committee	Primary	3	2	Yes	3	2	+	4.69
Local communities	Primary	2	1	Yes/no	2	3	+/-	3.00
District Administration	Primary	2	3	Yes	3	3	+	4.69
West Bengal Pollution Control Board	Primary	3	2	Yes	3	3	+	4.69
NGOs	Primary	2	1	Yes/no	2	2	+/-	3.00
Thermal power plants	Primary	3	3	Yes/no	2	3	+/-	4.69
Mining sector	Secondary	2	2	No	1	3	-	3.00
University/Colleges/ Research Institutions	Secondary	2	1	Yes	3	2	+	3.74
State Project Management Group	Secondary	2	2	Yes	3	3	+	4.12
West Bengal Forest Department	Secondary	2	3	Yes	3	3	+	4.69
Tourism sector	Secondary	3	2	Yes/no	2	3	+/-	4.12
Kolkata Municipal Corporation	Secondary	3	3	Yes/no	2	3	+/-	4.69
East Kolkata Wetland Management Authority	Secondary	2	2	Yes	3	2	+	4.12
West Bengal Coastal Zone Management Authority	Secondary	3	3	Yes/no	2	3	+/-	4.69
Local industries	Secondary	2	2	Yes/no	2	1	+/-	3.46
West Bengal Renewable Energy Development Agency	Secondary	3	2	Yes	3	1	+	4.69
SRLM	Secondary	1	2	Yes	3	2	+	3.74
Department of Disaster Management and Civil Defense	Secondary	1	2	Yes/no	2	2	+/-	3.00
Print and Electronic Media	Tertiary	2	2	Yes/no	2	3	+/-	3.46
NMCG	Tertiary	3	3	Yes	3	3	+	5.20
MoEF&CC	Tertiary	3	3	Yes	3	3	+	5.20
Other Ministries	Tertiary	2	3	Yes/no	2	3	+/-	4.12

Table 2.7: Socio-economic and cultural set-up along the Ganga River

	Upper Stretch	Middle Stretch	Lower Stretch
Historic value	History of this region has its linkages with Nepal and Tibet. The region was divided into 52 small kingdoms known as <i>Garh</i> , (region got its name Garhwal from this). The region has been under British rule.	Magadha, a region of Bihar state was the centre of power, learning and culture in the past. One of the greatest empires in the Indian history, the Maurya empire, arose from the region that is now Bihar.	The strategic location of lower stretch made the stretch important during the Mughal and British periods. Trade and craft in the area emerged during fourth century BC or Maurya empire.
Mythological value	This stretch is mentioned in old mythological literature such as Mahabharata, Vedas, Upanishads. The area is known as 'Abode of Gods' as several mountains, streams and forests are dedicated to local deities.	In the beginning of the middle stretch, places and temples are associated with the story of Mahabharata. In Rig Veda, Gangetic dolphin and Ganga are mentioned. Lord Buddha gave his first sermon at Samath, Varanasi.	Presence of Hinduism and Buddhism in this stretch is prominent and visible in regional literature.
Community structure	Local community residing in the upper stretch consists of two sects i.e. Garhwali and Bhotia. Garhwali is a farming community while Bhotias are the tribal herders and have their roots in Tibet.	Community is more diverse in this stretch in terms of religious diversity. People belonging to various religious backgrounds such as Hinduism, Islam, Sikhism, Jainism, Buddhism etc. inhabit the banks of Ganga.	Lower stretch is also diverse in terms of community structure and consists of people belonging to different cultural and religious beliefs. Santhal is one of the main tribes of Jharkhand and West Bengal.
Social structure	Garhwali and Bhotia are the main dialect used in this stretch. However, in every few kilometers the dialect changes. Bhotia language also known as Rongpa is influenced by Tibetan.	Hindi and Urdu are the main languages in the middle stretch; however, dialect changes at every few kilometers. Khadi Boli, Kannuaji, Bhojpuri and Braj are the main regional dialects in the stretch.	Bhojpuri, Magahi, Maithili, Santhali, Angika and Bengali are the main languages in the lower stretch.
Food habits	Food includes both farm and forest products; however, at few sites people fish for self-consumption. Rice, wheat and millet are the staple food.	Rice and wheat are the staple food. However, food habits vary with the caste structure of the community. Upper castes with access to agricultural produce generally do not eat meat, while lower social strata consume meat and fish as their main food.	Rice, wheat and fish are the staple diet for West Bengal.
Spirituality and religious values	Upper stretch has high spiritual value and is visited by numerous visitors annually. Rishikesh city is also known as the spiritual capital of India.	Middle stretch has sites with high religious values i.e. Varanasi (Hinduism), Samath (Buddhism and Jainism), Alamgir Mosque (Islam).	Lower stretch has high religious value and host a huge number of religious visitors at Ganga Sagar every year.

		Upper Stretch	Middle Stretch	Lower Stretch
	Gender	Women are more educated and have better mobility. As most of the men migrate to cities for jobs, the decision-making responsibility regarding finances, family and even developmental schemes from various departments comes to women.	Women have very less or no stake in decision making as their mobility is restricted leading to poor awareness.	Mobility and awareness is limited in Bihar; however, it is better in Jharkhand and West Bengal, especially in the tribal villages.
	Education	Literacy rate is higher (79.63%). Educational status is better as many institutions and universities are present in the area. Dehradun city is known for its old schools established during the colonial era. Prestigious training institutions such as Indian Military Academy, Indira Gandhi National Forest Academy and Lal Bahadur Shastri National Academy of Administration are located at Dehradun.	Literacy rate is 67.68%. Old and well-established institutions such as University of Allahabad, Banaras Hindu University, Aligarh Muslim University are present.	Literacy rate is 72.43%. Ancient centres of learning were present in this stretch, one of them Vikramshila is located in Bhagalapur, Bihar. Visva-Bharati and Jadavpur Universities are located along the River.
Dependence on Ganga River		Direct dependence on Ganga River is quite low in the Upper stretch. People are more dependent on the forests in the catchment areas of tributaries and main stem Ganga.	Direct dependence of people on river and its resources is high, as livelihoods of the communities such as fishermen, boatmen and farmers are dependent on the waters of Ganga.	Direct dependence of people on river and its resources is high, as livelihoods of the communities such as fishermen, boatmen and farmers are dependent on the waters of Ganga.
	Fish	Fishing is present in the upper stretch only at few sites is practiced at the commercial scale.	Fishing is done at the commercial scale throughout the stretch.	Fishing is done at the commercial scale throughout the stretch.
	Water	Water from river is being extracted mainly for meeting the water supply demands of urban centres located along the Ganga River e.g. Uttarakashi, Srinagar. Hydropower generation is dependent on River and its tributaries.	Water is being extracted for water supply of urban centres, industries and irrigation.	Water is being extracted for water supply of urban centres, industries and irrigation.
		Agriculture is not dependent on the rivers but on the forest-originating streams and rains. Although after modern technologies at few places people have started using Ganga water directly.	This stretch has one of the most fertile land and agriculture is highly dependent on the river for irrigation. Riverbed farming locally known as Palez is prominent in the area.	The agriculture in the area is dependent on the flood in the river. According to our interactions with farmers, the production has reduced with fewer floods in past few years.

	Upper Stretch	Middle Stretch	Lower Stretch
Transport	Negligible	River is the main source of transport for many villagers in the area.	River is the main source of transport for many villagers in the area. Few villages can only be approached through boats.
Livelihoods	Marginal agriculture, livestock rearing and handicraft are the main occupation. However, tourism has emerged as a major livelihood activity in the area.	Agriculture is the primary source of livelihood for people Fishermen community, locally known as <i>Nishaad</i> , practice fishing and boating for their livelihoods.	Fishing and agriculture are the primary occupations. In Sunderbans, local communities are dependent on resources from river and mangroves such as honey, fish, fuel etc.
Land rights	Local communities extract fodder, fuel wood, sand, boulders etc. according to <i>Haq-Haqooq</i> (rights) defined by their village level institution i.e. Panchayat and Van Panchayat. However, this mechanism is not very effective in some sites.	Land rights are mainly controlled by the caste as most of the land along the Ganga is owned by higher castes such as <i>Yadavs</i> , <i>Brahmins</i> , <i>Rajputs</i> etc., which have its root to Zamindari system that existed in the past.	Land rights are mainly controlled by the caste. A unique practice was present in the past known as <i>Panidari</i> , where stretches of rivers were under control of a particular caste and lower castes did not have any right on the river resources.

Table 2.8: Industries along the Ganga river

Ganga River Stretch	Industries	Remarks
Upper (Uttarakhand)	Cultural and nature-based tourism	36,852,204 tourists visited in 2018, with 36,697,678 domestic tourists and 154,526 foreign tourists. In 2017, the four pilgrimage centres in the circuit namely, Gangotri, Yamunotri, Badrinath and Kedarnath, witnessed visitations by 448, 394, 1048 and 732 thousand tourists, respectively (Uttarakhand Tourism Development Board)
	Fruit cultivation	One of the leading fruit cultivating states in India, Uttarakhand has the highest production of pears, peaches and plums, second highest production of walnuts and third highest production of apples.
	Information technology and information technology enabled services	-
	Pharmaceuticals	-
	Agro-based and food processing and aromatic plants	Lemongrass, citronella, palmarosa, chamomilla, naramotha, Japanese mint, khuas and other aromatic plants grown in the state are used extensively in the cosmetics industry

Ganga River Stretch	Industries	Remarks
Middle (Uttar Pradesh)	Sugar production	Uttar Pradesh, known as the 'sugar bowl of India', is largest producer of sugar in India and has a total of 157 established sugar mills of which 119 were operational in the 2018-19 season (www.upcane.gov.in)
	Leather	Uttar Pradesh is the second largest producer of leather products in India, with most of the units located in Kanpur and Unnao along Ganga and Agra along Yamuna. During 2016-17, 31.35% of the total exports of leather, leather products and footwear from the country can be attributed to Uttar Pradesh (Ministry of Commerce & Industry, Press Information Bureau, 27 December 2018). West Bengal has developed into a flourishing hub for leather and leather goods over a span of three decades; 26.6% of the tanneries in India are located in West Bengal (www.wb.gov.in).
	Agriculture	Uttar Pradesh leads in the production of food grains, milk, potato, peas, guava, mango, gooseberry and watermelon. It is the leading producer of vegetables in the country, producing 28.32 million tonnes in 2017-18 (Horticulture Statistics at a Glance 2018).
	Horticulture	A major producer of horticulture crops and food grains, the state has a thriving food processing industry.
	Fabric production and handloom	Uttar Pradesh accounts for nearly 13.24% of fabric production in India, making it the third largest fabric producing state (www.investindia.gov.in). Uttar Pradesh dominates the production of rugs, mats and carpet in India at 46.8% (Handloom Census 2019-20). West Bengal dominates the saree production market with a 35.3% share.
Lower (Bihar, Jharkhand and West Bengal)	Agro-based food processing and dairy	Bihar is fourth largest producer of vegetables in India at 15.86 million tonnes in 2017-18. The wide variety of fruits and vegetables in Jharkhand due to its climate, which enables year-round cultivation of crops like cauliflower, cabbage etc., supports the food and feed processing industry. West Bengal is the second largest producer of tea and vegetables, and the largest producer of rice. It produced 29.55 million tonnes of vegetables in 2018-19 (www.investindia.gov.in)
	Tourism	Being a power seat in Indian history and the birthplace of Jainism and Buddhism, Bihar is a popular tourist destination among devotees and history buffs alike. 34,709,584 tourists visited Bihar (www.bihartourism.gov.in) in 2018. It was the ninth most visited state by foreign tourists in 2018, with 1,087,971 visits (3.8%). West Bengal was the sixth most visited state in India by foreign tourists in 2018, with 1,617,105 visits (5.6%) and seventh most visited state in India by domestic tourists in 2018, with 85,657,365 (4.6%) (Ministry of Tourism, Government of India).

Ganga River Stretch	Industries	Remarks
	Silk	An exclusive product of Bihar is the Tussar silk of Bhagalpur. During 2015-16, the state produced around 72.2 tonnes of raw silk (www.investindia.gov.in). Jharkhand is the largest Tussar silk producing state, with a contribution of 40% to India's Tussar silk production in 2015-16 (Department of Industry, Government of Jharkhand; www.ibef.org).
	Mineral	Jharkhand is a mineral rich state with 40% and 29% of India's mineral and coal reserves, respectively; making it an ideal location for the establishment of auto-component industries, power projects, cement plants etc. It has the second largest deposits of iron ore in the country and the leading producer of minerals. West Bengal accounts for 16% of the total mineral production in the country and coal accounts for 97% of extracted minerals (www.ibef.org).
	Steel	Jharkhand accounts for 20-25% of the steel produced (www.investindia.gov.in). The only state to produce coking coal, uranium and pyrite, it is the leading producer of coal, mica, kyanite and copper.

Table 2.8: Geographical Indications (GI) registered handicrafts in the Ganga River basin states

[Source: Development Commissioner (Handicrafts), Ministry of Textiles]

State in Ganga basin	Handicraft
Himachal Pradesh	• Chamba Rumal • Kangra Paintings • Kinnauri Shawl • Kullu Shawl
Uttar Pradesh	• Agra Durrie • Banaras Brocades and Sarees • Banaras Gulabi Meenakari Craft • Banaras Metal Repouse Craft • Farukhabad Prints • Firozabad Glass • Ghazipur Wall-hanging • Handmade Carpet of Bhadohi • Kanpur Saddlery • Khurja Pottery • Lucknow Chicken Craft • Lucknow Zardozi • Mirzapur Handmade Dari • Moradabad Metal Craft • Nizamabad Black Pottery • Saharanpur Wood Craft • Varanasi Glass Beads • Varanasi Soft Stone Jali Work • Varanasi Wooden Lacquerware and Toys
Madhya Pradesh	• Bagh Prints of Madhya Pradesh • Bell Metal Ware of Datia and Tikamgarh • Chanderi Saree • Leather Toys of Indore • Maheshwar Sarees and Fabrics
Rajasthan	• Baagru Hand Block Print • Blue Pottery of Jaipur • Kathputlis of Rajasthan • Kota Doria • Molela Clay Work • Pokaran Pottery • Sanganeri Handblock Printing • Thewa Art Work • Warangal Durries
Bihar	• Applique-Khatwa Patch Work of Bihar • Bhagalpur Silk • Madhubani Paintings • Sikki Grass Work of Bihar • Sujini Embroidery Work of Bihar
Chhattisgarh	• Bastar Dhokra • Bastar Iron Craft • Bastar Wooden Craft • Champa Silk Saree and Fabrics
West Bengal	• Bankura Panchmura Terracotta Craft • Baluchari Saree • Bengal Dokra • Dhaniakhali Saree • Bengal Patachitra • Madur Kathi • Nakshi Kantha • Parulia Chau Mask • Shantiniketan Leather Goods • Santipore Saree • Wooden Mask of Kushmandi

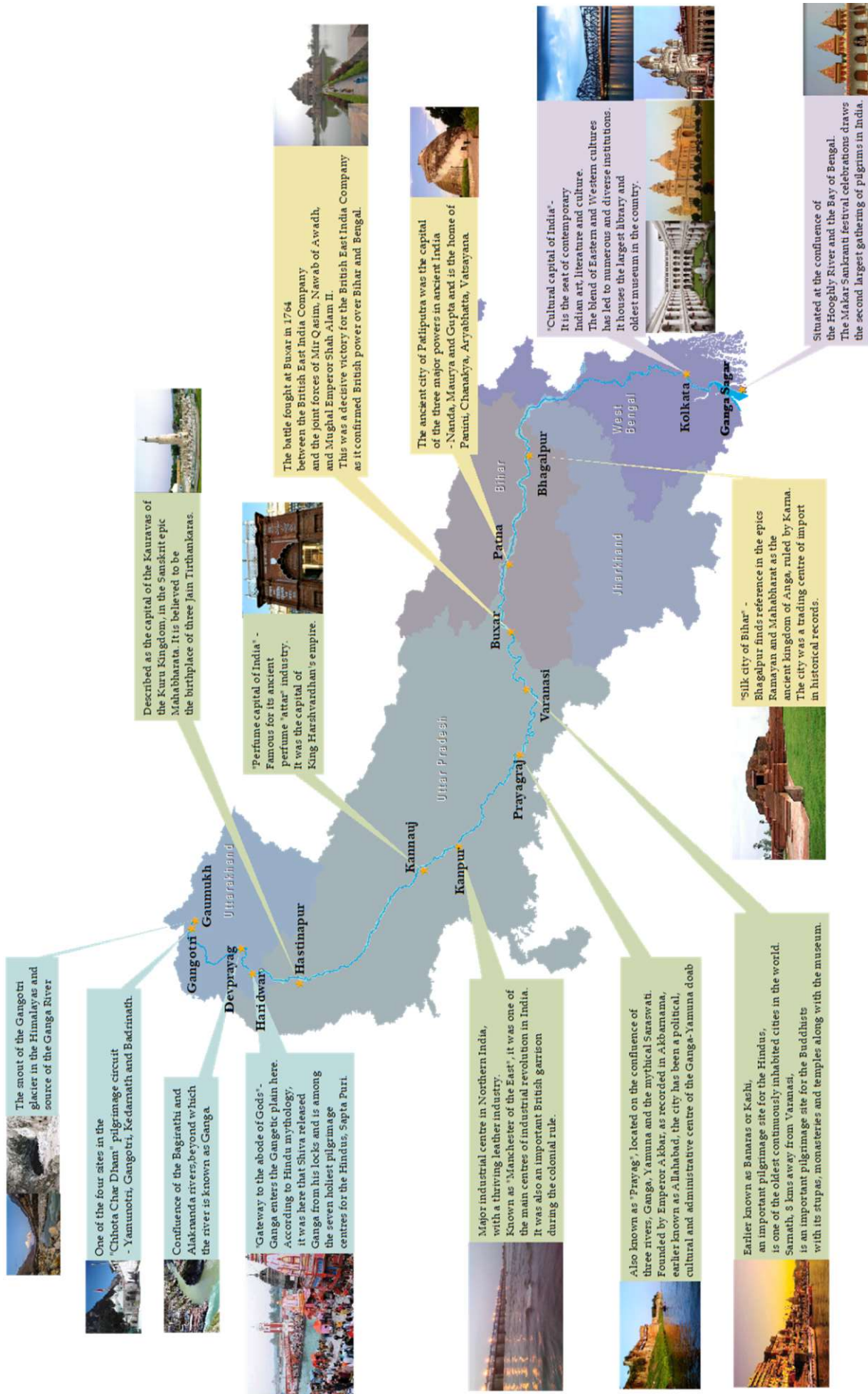


Figure 2.8: Key heritage and historical sites located along the Ganga river



Figure 2.9: Key festivals and celebrations dedicated to Ganga River







A photograph of a man herding a large flock of sheep on a paved mountain road. The man, wearing a green turban and a brown jacket, is walking towards the camera, holding a long stick. The sheep are of various colors, including white, black, and brown. The background features tall evergreen trees and a steep, rocky mountain slope.

Chapter 3

ENGAGING STAKEHOLDERS IN GANGA BIODIVERSITY CONSERVATION

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Summary

Local communities residing alongriver Ganga depend on its resources for their social, cultural and livelihood requirements. However, during the conversations and meetings with various stakeholders, we realized that there is a lack of awareness among them at the grassroot and the district level. Hence, to ensure the participation of stakeholders in the process of Ganga biodiversity conservation, they were sensitized and trained through various activities like workshops, meetings, rallies, awareness campaigns, plantation and cleanliness drives, street plays, songs, poems, slogans, wall painting, etc. After regular interactions with them, an activity framework was developed and specific awareness activities were conducted with each stakeholder group. Activities were designed in accordance with their work and association with Ganga River.

55,178 people were sensitized about Ganga biodiversity conservation through 1895 activities, of which 766 were consultative meetings, 271 were awareness programmes followed by 263 sensitization workshops, amongst many others. Maximum participation was observed in sensitization workshops, followed by awareness programmes and consultative meetings. Of the total participants, 45% were men and 55% were women. Highest participation was observed for local people (47%) followed by students (20%) and *Ganga Praharis* (18.6%). Participation not only increased in terms of number of participants but also the level of participation. The project activities also provided a platform for local stakeholders to voice their concerns. In later stage of the project people, especially women, took part in meetings and initiated awareness and cleanliness activities in their respective villages (n=333). Sensitized and trained members of local communities and other stakeholders groups further sensitized their community and other stakeholders (n= 5,683) on a very large scale, which can be treated as one of the main tangible outputs of the project.

3.1. Introduction

Biodiversity conservation programmes involve social, political, economic, cultural, and environmental variables and their interactions. Hence, conservation problems are typically complex, uncertain, multi-scaled, and, affect multiple actors and agencies. A



need for clear policy making which is flexible to changing circumstances and embraces a diversity of knowledge and values is observed throughout the working of this project. . To accomplish this, stakeholder participation is increasingly being pursued and embedded into environmental decision-making processes on local and international scales (Stringer et al., 2007). However, involving people in decision making is time consuming and costly; and it may not give the desired results. There are more examples of failed attempts to work with stakeholders than success stories.. Still, conservationists are interested in adopting participatory approachwhether it works or not, to give those who are affected by, or who can affect, by decisions a chance to have their say. This right is being increasingly included in law. The Aarhus Convention stipulates that all environmental decisions must involve stakeholders. Local communities are now being involved in environmental decision-making processes across the world (Luyet et. al, 2012).

However, proponents of participatory approaches argue that there are also many pragmatic benefits to be gained from working with stakeholders. They argue that the reason for failure of stakeholder engagement in the past is that people have not done it right. Poor engagement may be more damaging than no engagement at all. There is now empirical evidence showing that environmental decisions that were taken in collaboration with stakeholders were of higher quality and more durable. Decision quality can be higher because decision-makers can access a wider range of higher quality information upon which to base decisions, rather than relying solely on textbook answers from researchers (McIntosh, 2011). By getting a wholesome picture in this way, unintended consequences may be anticipated and avoided. The

long-term durability of decisions can be enhanced through participation, because the design of interventions, projects and technologies can be more effectively adapted to local circumstances, needs and priorities.

For example, by establishing common ground and trust between participants, and learning to appreciate the legitimacy of each other's viewpoints, participatory processes may have the capacity to transform adversarial relationships and find new ways for participants to work together. This may lead to a sense of ownership over the process and outcomes. If this is shared by a broad coalition of stakeholders, long-term support and active implementation of decisions may be enhanced. Depending on the nature of the initiative, this may significantly reduce implementation costs. Surely, even if a few of these additional benefits can be realised, it is worth trying to engage stakeholders in conservation.

Ganga is among the largest rivers of India flowing through five states covering about 26% of the country's area. The river supports the lives of 43% of Indian population with a total length of about 2525 kms. The areas along Ganga river in four states has a higher population density and lower literacy rate than the average density of 328 person per square km and literacy rate 74.04% in India (Census 2011;

<http://censusindia.gov.in/2011>).

These numbers as social indicators indicate that the communities in these states are possibly not very developed and the level of awareness on such sensitive issue is not very good.

People from the five states economically depend on the river resources for electricity, agriculture, fishing etc. The Ganga River has a significant status and spiritual values from ancient ages for Hindus

and other religions, being a place for very important historical events. The river also serves the people for bathing, laundry and other domestic purposes.

Therefore, the local communities have a significant impact on the Ganga River due to their direct and indirect dependency on the river including religious rituals and livelihood activities, which show that the local stakeholders have a role to play in Ganga conservation process.

3.2. Aim

To elicit participation of stakeholders in Ganga biodiversity conservation.

3.3. Approach

The activities under project 'Biodiversity Conservation and Ganga Rejuvenation' were conducted between June 2016- December 2019 with various stakeholders in the five Ganga states i.e. Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal. Activities were designed and conducted in line with nature, role and interest of the stakeholder groups. These activities ranged from continuous dialogue with influential groups such as religious groups and politicians to sensitization and awareness programmes with local communities, youth groups and educational institutions. Involvement of stakeholders from national and state level to ground level was ensured. The stakeholders were informed of the ecological and socio-economic aspects of the Ganga River to inspire them to participate in the conservation process and motivate them to initiate conservation and green development activities at their respective sites and mandate (Figure 3.1).

3.3.1. Strategy Design

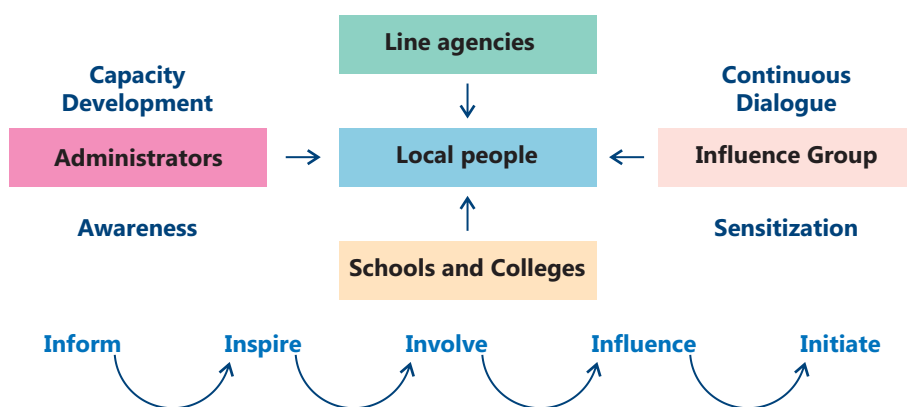


Figure 3.1. Approach to engage stakeholders in the Ganga River conservation process

The participation strategy was designed based on literature review and a scoping process. A pilot research and scoping exercise was carried out prior to the actual designing of the stakeholder's participation. The non-participant process was used to identify and established contacts with the local stakeholders, including local communities (Bessette, 2004). The team conducted several consultation meetings, workshops with different stakeholders including

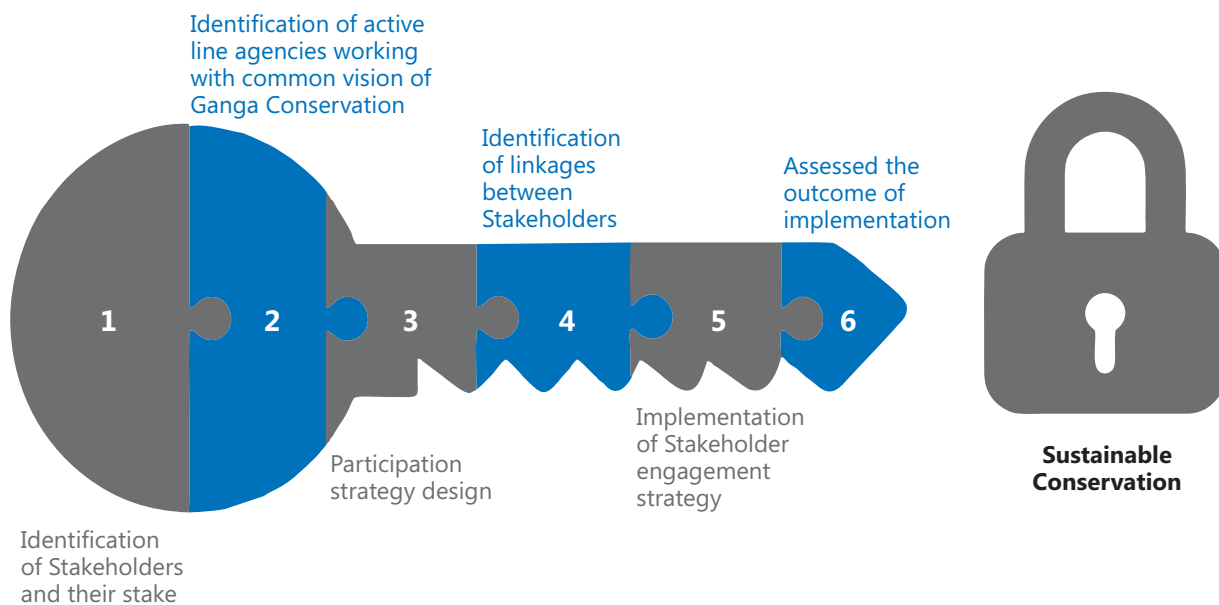


Figure 3.2. Strategy to engage stakeholders in Ganga Conservation

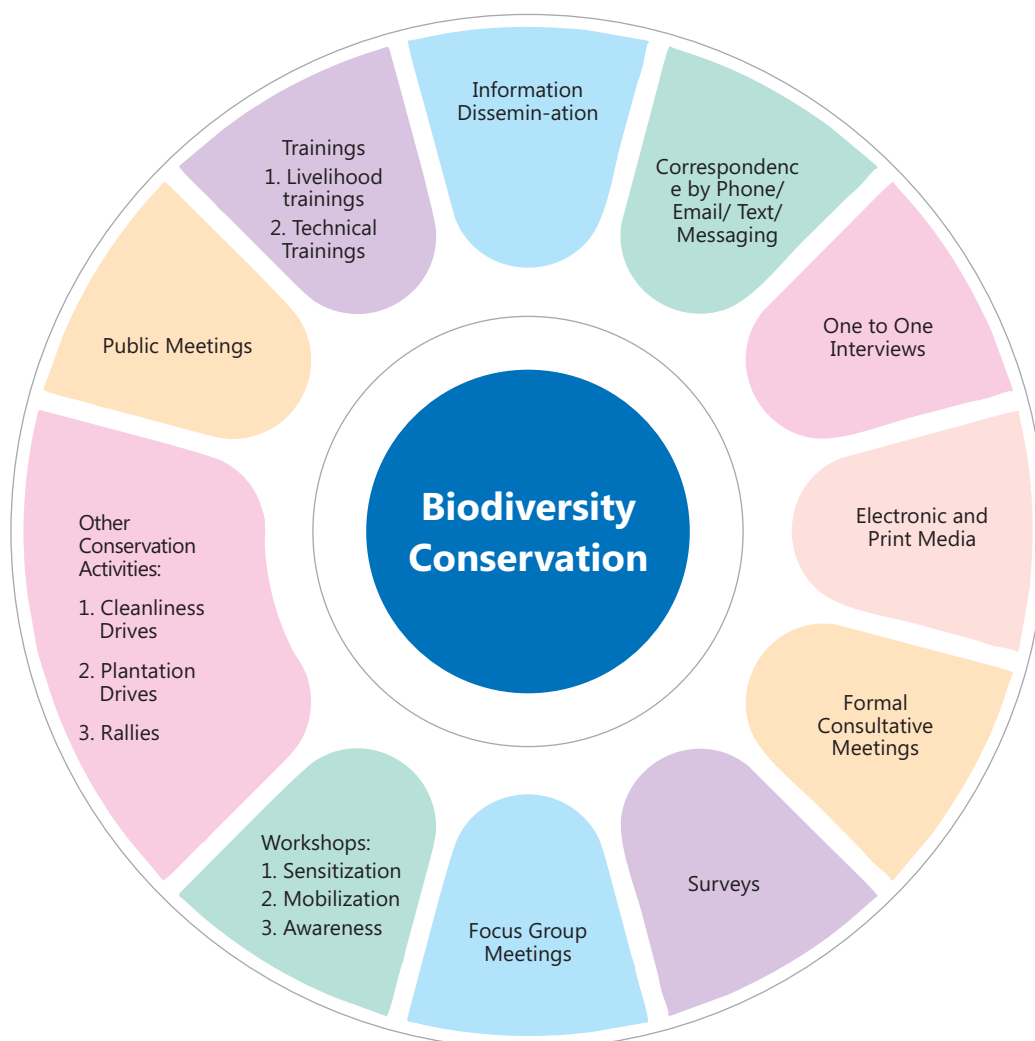


Figure 3.2: Stakeholder engagement activities



and plantation drives to instil a sense of ownership. Alliances were established with government and non-government organizations. Thereafter, motivated and interested individuals, mainly youths, were selected and trained in various conservation activities such as ecological monitoring, awareness, plantation and livelihood activities. The most common educational

government and private institutions to overlook their area of interest, and, introduced the project objectives. Informal interactions were carried out with the local communities in order to understand the ground realities, threats to biodiversity, steps that need to be undertaken and drivers of the threats.

3.3.2. Engaging Stakeholders in Ganga and Biodiversity Conservation

Initial contacts were made through personal visits to the members of local communities and line agencies. Time efficient techniques including calls, mails, messages, letters, meetings, trainings, and information dissemination using different mediums were used to initiate the dialogue at individual, village, block and district levels.

The project came up with a participation strategy, which is one of the main tangible outputs of the project (Figure 3.1). After the introduction of the project objectives and approaches, people were encouraged to participate in the project activities such as awareness rallies, cleanliness

and training approaches adopted during the project for engaging primary stakeholders are presented in Figure 3.2.

3.3.3. Data Analysis

The data from the activities was recorded in a summary transcript. Pragmatic database was developed and data from all the five states was entered in the Excel spreadsheets. Prior to analysis, data was sorted and checked for any errors. For qualitative analysis, we followed the approach suggested by Laws et al. 2013 which says that the organization and analysis of data can start from the point at which it is collected in the field, and the



collected data reflects the qualitative characteristics in order to make the analysis more meaningful.

3.4. Outcomes

A total of 1895 activities were conducted in the five states of which 766 were consultative meetings, 271 were awareness activities followed by 263 sensitization workshops, amongst many others (Table 3.1, Figure 3.3; Annexure 2).

Table 3.1. Total state wise activities and stakeholder participation during the project tenure (2016-19) in five Ganga States

Type of Activity	State	Uttar Pradesh	Jharkhand	Uttarakhand	Bihar	West Bengal	Total
Total	Total No. of Participants	37934	8930	4733	2784	797	55178
	No. of Activities	1133	236	344	147	35	1895
Training Workshop	Total No. of Participants	1358	309	590	135	55	2447
	No. of Activities	32	5	9	4	3	53
Socio-economic Survey	Total No. of Participants	158	11	58			227
	No. of Activities	4	3	3			10
Sensitization Workshop	Total No. of Participants	6481	4603	1407	653	72	13216
	No. of Activities	163	30	64	6	2	263
Rescue & Rehabilitation	Total No. of Participants	185	63		17	185	265
	No. of Activities	24	3		10	24	37
Pollution Monitoring	Total No. of Participants	55					55
	No. of Activities	2					2
Plantation Drive	Total No. of Participants	2674	107	132	454	70	3437
	No. of Activities	79	3	6	34	3	125
Others	Total No. of Participants	2406	169	214	58	23	2870
	No. of Activities	33	4	14	6	3	60
Orientation	Total No. of Participants	630	30		391		1051
	No. of Activities	39	2		6		47
Mobilization Workshop	Total No. of Participants	1500	14	93	131	22	1760
	No. of Activities	52	1	4	3	2	62
Livelihood Activity	Total No. of Participants	3215	219	51			3485
	No. of Activities	70	7	2			79
Ecological Survey	Total No. of Participants	87	2	5	1	10	105
	No. of Activities	11	1	3	1	4	20
Cultural Activity	Total No. of Participants	5872	101				5973
	No. of Activities	7	1				8
Consultative Meeting	Total No. of Participants	4427	735	1092	413	65	6726
	No. of Activities	380	121	211	48	6	766
Cleanliness Drive	Total No. of Participants	2181	74	28	77	14	2374
	No. of Activities	80	3	2	5	2	92
Awareness Programme	Total No. of Participants	0529	2493	1063	454	472	11187
	No. of Activities	157	52	28	24	10	271

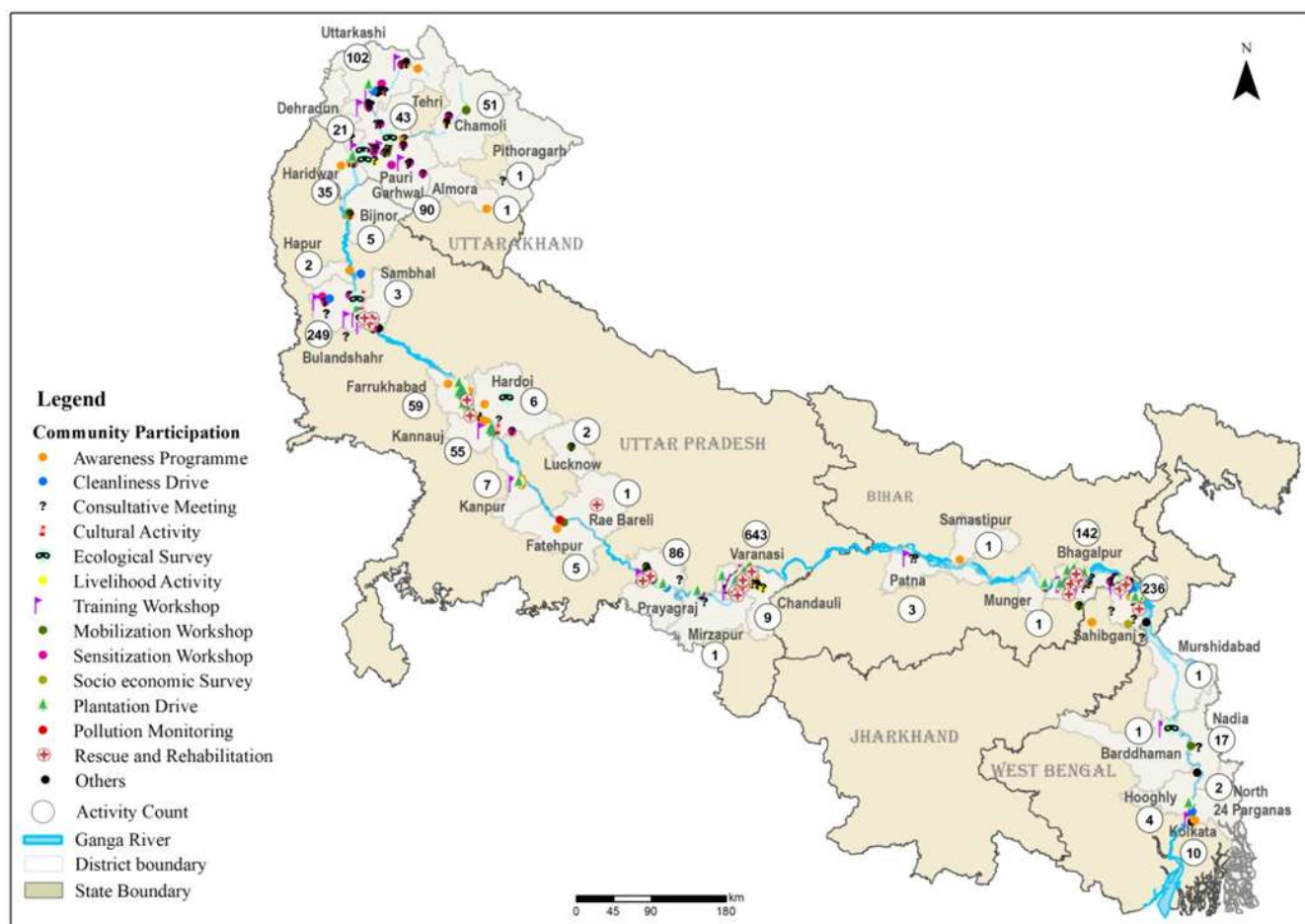


Figure 3.4: Location of Stakeholders involved in project activities in all five Ganga states

A total of 55,178 participants from different stakeholder groups were sensitized about the aquatic flora and fauna of the Ganga River, the issues faced by the river and the steps that can be taken to conserve the river and its biodiversity. Maximum participation was observed in sensitization workshops, followed by awareness programmes and consultative meetings (Table 3.1). 45% of the total participants were men while 55% were women (Figure 3.4).

From the overall participants engaged in Ganga conservation activities, in all five Ganga states through the participatory approach, 47% participants belonged to local communities of the target areas followed by students and *Ganga Praharis* at 20% and 18.6%, respectively (Figure 3.5, Table 3.2).

The project involves a wide range of stakeholders, with special focus on women, in training activities both at national and state level. This added significantly to effective implementation of the project and its sustainable legacy of increased local capacity in generating livelihood opportunities, contribution to conservation projects and human well-being. The participation of women was higher in second and third year than men because of the project's skill development interventions.(Figure 3.6).

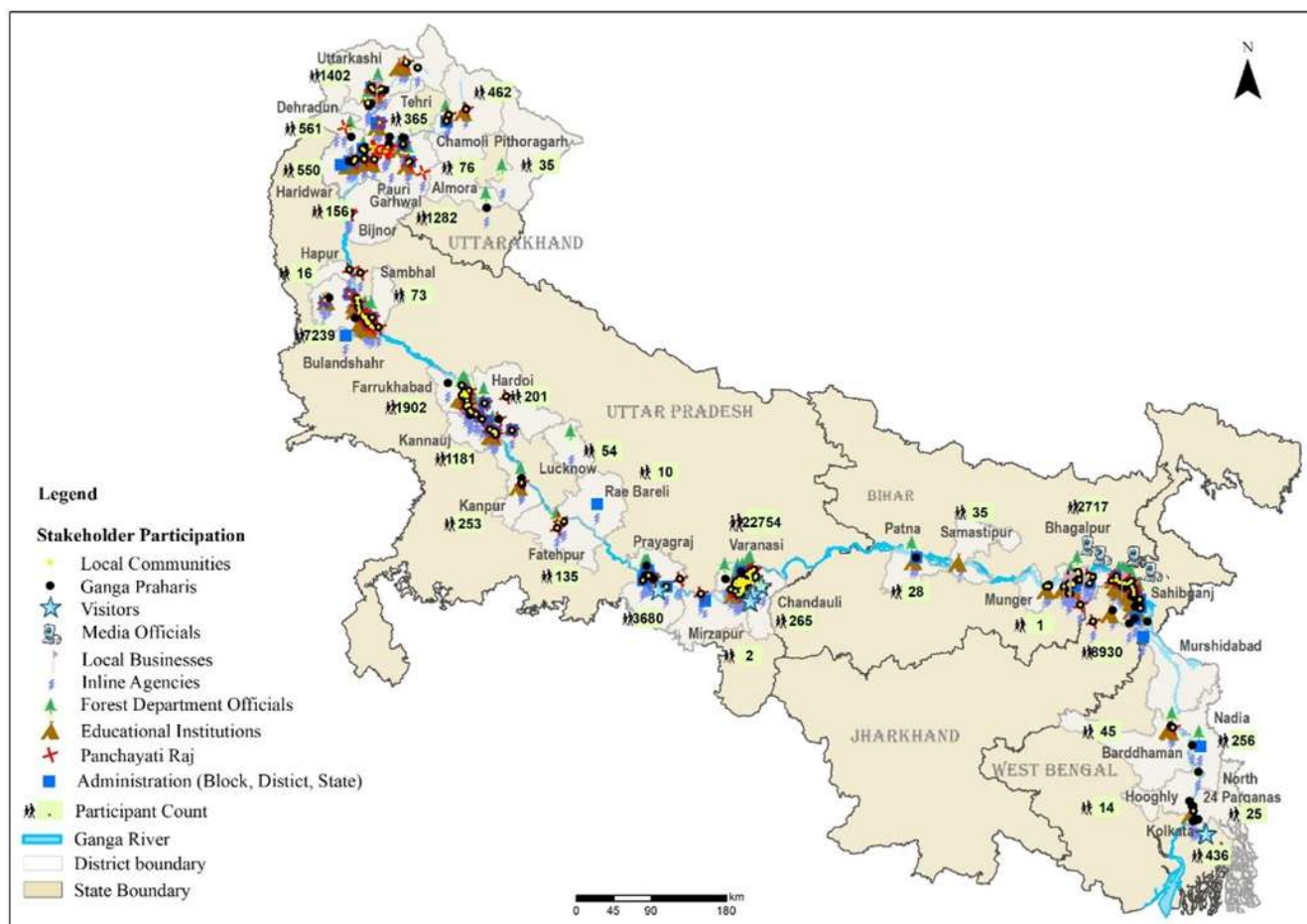


Figure 3.4: Location of Stakeholders involved in project activities in all five Ganga states

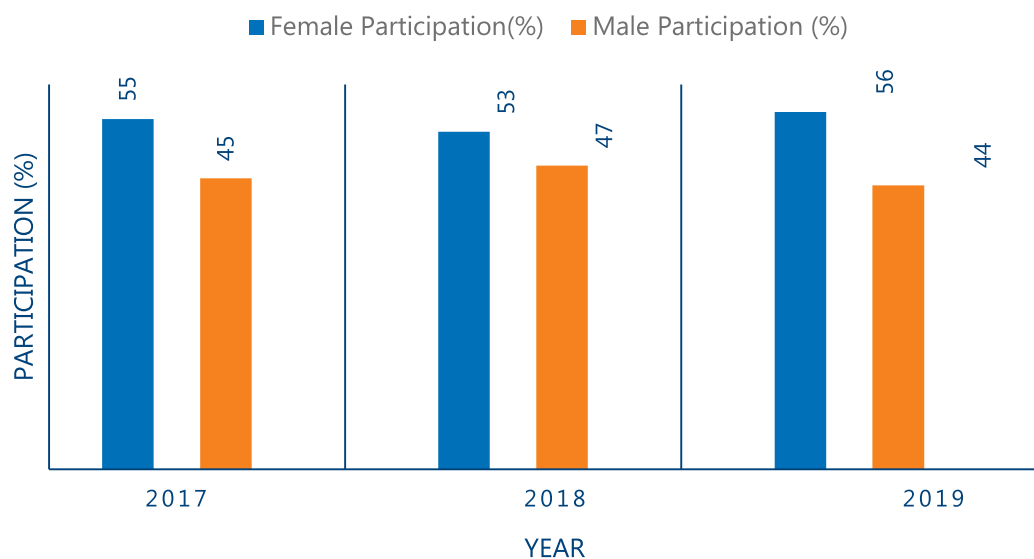


Figure 3.5: Mainstreaming gender in stakeholders' participation

Table 3.2: State wise number of stakeholders involved in conservation

Stakeholders State	Participants from Educational Institutions	Ganga Praharis	Media Officials	Participants from State Government	Visitors/ Tourists/ Pilgrims	Local Businessmen	Bal Ganga Praharis	Participants from other inline agencies	Pravasi Ganga Praharis	District Administration Officials	Block Administration Officials	Local Communities	Forest Department Officials	Panchayati Raj Officials
Bihar	847	788	5	00	00	9	00	2	00	25	1	1092	8	7
Jharkhand	5034	1545	00	00	00	00	00	127	00	107	23	1778	197	93
Uttar Pradesh	3825	6940	00	00	3305	00	00	384	17	920	358	20977	491	717
Uttarakhand	1194	678	00	4	00	19	62	121	38	138	10	2076	250	143
West Bengal	52	305	26	6	320	00	00	00	00	3	00	101	14	2
Total	10952	10256	26	6	3625	31	62	634	55	1193	392	26024	960	962

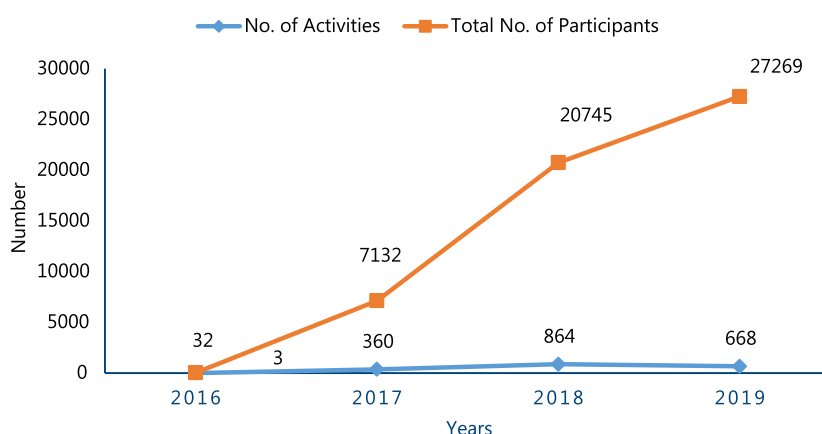


Figure 3.6: Impact of cross-sectoral coordination and regular interaction on community participation

3.4.1. Impacts of the initiatives

- Increase in number of activities from 2016 to 2018, shows that the increased efforts to raise stakeholder participation resulted in increased participation. Even though the number of organized activities decreased in 2019, the participation increased. This can be attributed to the continuous project activities, conservation interventions and collaborations with local institutions that were carried out on regular basis at the field sites (Annexure 2).
- The project has also become a platform for local stakeholders to share their perspectives on conservation and cleanliness of Ganga. As an outcome of trainings, increased sensitization and awareness, the motivated participants from local communities and other stakeholder groups started taking initiatives independently with the help of other local people. They further sensitized people on a very large scale, which can be treated as one of the main tangible outputs from the project. 333 output activities were conducted by the trained people whereby 5683 people were sensitized (Table 3.3; Annexure 2).
- Stakeholders including local people have developed contacts with Wildlife Institute of India and other institutions and are availing their technical expertise and resources for cleanliness of Ganga River and biodiversity conservation. The participatory approach changed people's attitude towards Ganga and its biodiversity conservation. By the end of phase 1, the stakeholders realized that everyone has a role to play in the Ganga conservation process. Key stakeholders were identified and involve in high-level microplanning and decision-making process
- One of the evident fortes of this project is that it brought together a wide range of partner organizations, with harmonizing capabilities and contributions to work for a common agenda.

Table 3.3 Output activities conducted by motivated and trained stakeholders

Type of Activity	Awareness Programme		Cleanliness Drive		Consultative Meeting		Cultural Activity		Ecological Survey		Livelihood Activity		Mobilization Workshop		Plantation Drive		Rescue & Rehabilitation		Sensitization Workshop		Others		Training Workshop		Total Count of Meeting Type of Meeting	
	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants	No. of Activities	Total No. of Participants
State																										
Uttarakhand	12	173	2	28	4	33			3	5	2	51			6	132									29	422
Uttar Pradesh	53	1058	33	567	13	168	4	214	5	7	1	40	0	0	13	117	13	16	5	390			4	110	144	2687
Bihar	21	242	5	77	1	5			1	1			1	31	34	454	10	17	4	453			1	21	78	1301
Jharkhand	27	629	2	53	30	113				0			1	14	1	57	2	60							63	926
West Bengal	8	238	2	14					4	10					3	70					2	15			19	347
Total	121	2340	44	739	48	319	4	214	13	23	3	91	2	45	57	830	25	93	9	843	2	15	5	131	333	5683

3.4. Conclusions

The project supports and upgrades findings of previous studies and authenticates the arguments that the promotion of stakeholder participation and effective collaboration in biodiversity conservation and Ganga rejuvenation is critical to development and remains highly relevant to sustainable conservation. Implementing participatory processes effectively takes time, resources and commitment, but results in a more sustained stakeholder engagement. Establishing mutual trust and respect between stakeholders is essential and was facilitated in this instance by the fact that many of the partner agencies had worked in the river stretch before, often in close collaboration with local communities and institutions. Moreover, it reveals the requirement and importance of suitable and applicable support from line agencies, including funding agencies, over a long period, in achieving this. It was found important to develop a written participation designed strategy, comprising mutually assigned values and objectives that can add both to the process of forming trust and transparency and to build the capacity of the stakeholders with implementation. The results from the project showed that stakeholder participation in biodiversity conservation and Ganga rejuvenation activities and implementation of restoration plans could lead to good collective outcomes, such as increased faith among stakeholders and improved knowledge on the subject. The stakeholder participation in turn have a sustainable impact on conservation practices. This may be a sufficient reason to promote the expansion of well-designed stakeholder involvement. The project also promotes expansion of participatory monitoring of biodiversity in the river stretch e.g. monitor important habitat, like plants and aquatic species, with the help of mobilized local people, for example *Ganga Praharis*. It can be further implemented in the river



conservation projects.

The project also suggested that livelihood interventions through skill development and capacity building play an important role in establishing a link between the local communities and sustainable conservation. It provided a platform to share their

concerns and experiences, livelihood enhancement activities and identity at local and regional levels, while conserving biodiversity. The project evolved from one designed primarily by technical expertise, to one that was driven by needs and priorities on the ground, notably those related to livelihoods (Figure 3.7). The project activities show that participatory approach contributes in achieving the objectives of project while addressing the concerns and needs of the people. More of this type of on-ground implementation is required to enable sharing of lessons learned, and a wider

application for all the rivers that requires restoration in India. Our approach can be replicated and upgraded to address the conservation issues of similar aquatic ecosystems at the basin level.

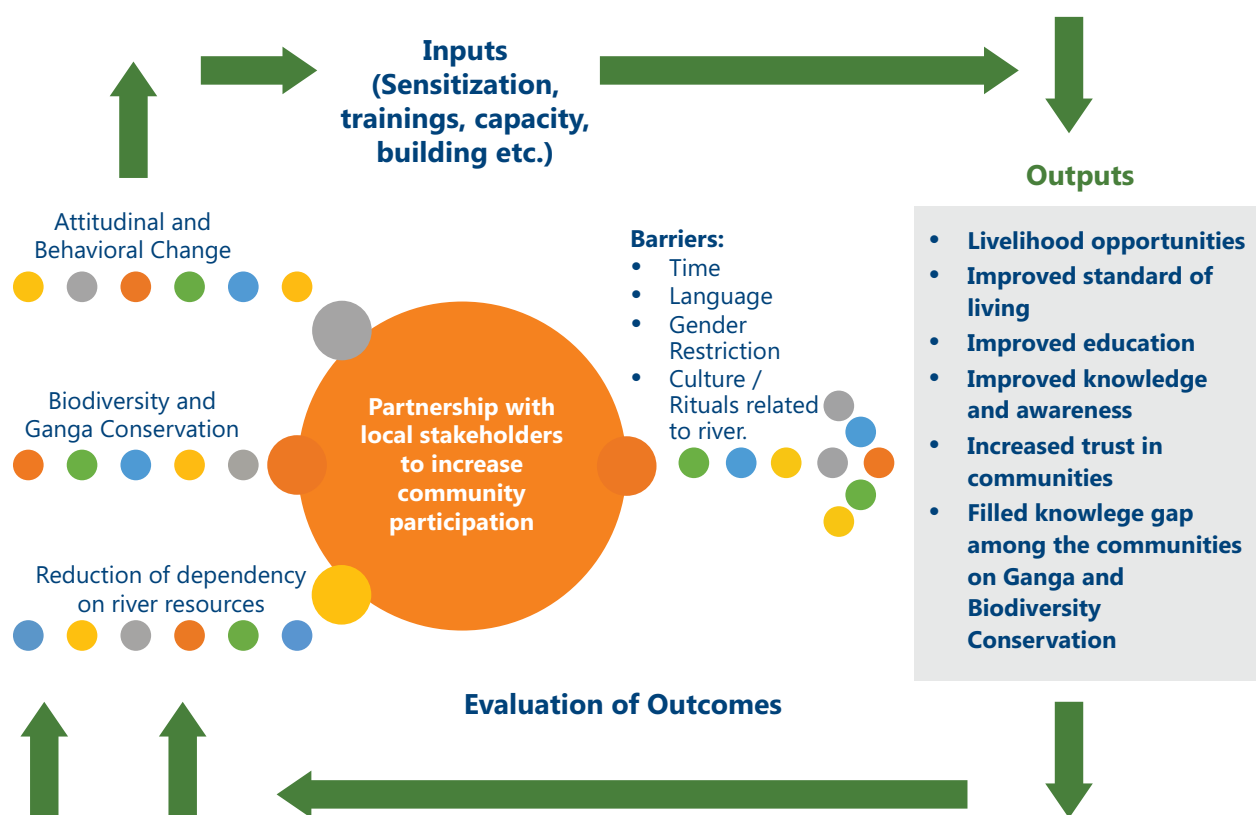


Figure 3.7: Participation process initiated by project



A photograph of three men in white shirts and caps cleaning a wooden boat in a river. One man is using a broom to clean the boat's interior, while another is holding a net. The water is green and murky. The background shows a grassy bank.

Chapter 4

A LIFE LESS ORDINARY: *GANGA PRAHARIS*— GUARDIANS OF THE GANGA

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Summary

To strengthen the Ganga conservation efforts, ensure local communities' participation in conservation, reduce the direct dependency of the local communities on the river, and mainstream them in the conservation efforts, a motivated and trained cadre of *Ganga Praharis* (n=1290) has been established.

This trained cadre of *Ganga Praharis*, from local communities are working towards maintaining the river's ecological integrity as well as its Aviral and Nirmal Dhara. The creation of this cadre was visualized in the framework of participatory conservation efforts, where people involved in the process usually live in communities with considerable social cohesion and regularly work together on shared projects of community and biodiversity conservation concerns. This initiative aims to support the local institutions in efforts towards conservation of river ecosystem by mobilizing local communities at the grassroots level and mainstreaming conservation in the village level developmental process.

Ganga Praharis were identified through a series of regular site-level consultative meetings and workshops held in select villages located along the banks of the Ganga River and its tributaries. The primary criterion for identification was their passion and zeal to serve the River. Once identified, a complete profile of an individual *Ganga Prahari* was collected including specific information such as contact details, educational qualification, background, profession, age, area of interest and their identity proof. After identification, these volunteers were trained and inducted in the cadre.

This cadre supports conservation of biodiversity at the grassroots level. They are also assisting local institutions such as Village Panchayats to promote



biodiversity sensitive development. Community participation through *Ganga Prahari* programme is promoting local pride and evoking a sense of belonging towards the Ganga River ecosystem. *Ganga Praharis* have been identified through interactions with individuals and members of line agencies such as the state forest departments, women self-help groups, youth groups etc. As per the interest and educational qualification, *Ganga Praharis* have been trained (n=433) in ecological monitoring, tree plantation techniques, alternate livelihood skills, community

mobilization techniques and village level microplanning exercises. Trained and motivated, these *Ganga Praharis* are being linked to various national and international agencies. This cadre has been successfully structured at Varanasi and Bulandshahr district of Uttar Pradesh for the smooth conduct and monitoring of the activities carried out by *Ganga Praharis*. *Ganga Praharis* are being given preference to work/assist the field-based surveys conducted by WII and other research institutes. This trained cadre is conducting various activities (n=316) ensuring conservation of biodiversity.





Taking these efforts further and developing a support system for the grassroots level initiatives of *Ganga Praharis*, 54 citizens from 17 countries have joined the Pravasi Ganga Prahari programme — a platform created for Non-residential Indians, Foreign Nationals, Overseas Citizenship of India and Persons of Indian Origin. To provide technical expertise to the *Ganga Praharis*, 107 Ganga Prahari mentors have been registered. To ensure the sustainability of the programme and to make children sensitive towards Ganga and its biodiversity, schools have been registered as Bal *Ganga Praharis* schools (n=64) in the districts located along the Ganga. The capacities of the *Ganga Praharis* have enhanced in a way that they are able to access resources, both physical and financial, from various institutions and organizations and divert them to the cause of biodiversity conservation.

4.1. Introduction

The main reasons for engaging community in governance is that it leads to better and more responsive services, addresses people's disengagement from

politics and the democratic process and helps build social capital. (<http://social-capital.net/docs/1802-community-network-governance.pdf>) The concept of community involvement, grassroots level engagement and volunteer efforts has been successfully acknowledged before but most of these efforts have not given desired results.

Brundtland Report (World Commission on Environment and Development), 1987, recognized human-resource development as a crucial aspect to be considered for strategies formulation for environmental conservation. (Our Common Future; Brundtland Report 1987). In 1992, the UN Conference on Environment and Development at Rio deduced that people, whether at local, national or international level, could attain sustainable development. (<https://sustainabledevelopment.un.org/milestones/unced>).

The creation of the cadre of *Ganga Praharis* aims to ensure the sustainability of conservation efforts not just in terms of participation of interested individuals also the effectiveness of these efforts, creating a human resource to sustain the conservation actions at ground level.

This bottom up approach connects the micro level grassroots efforts and the decision makers. The crux of the *Ganga Praharis* concept is to inculcate behavioral changes that enables people to respond rationally towards their natural environment and its utilization. Self-mobilisation approach of community engagement wherein people participate by taking initiatives independently of external institutions to change systems and develop contacts with external institutions for resources and technical advice they need, but retain control over how resources are used (Cornwall, 2008, Pretty, 1995), implies a transparent system wherein people are able to sustain



conservation efforts through transparent systems even when direct support by the state may end. *Ganga Praharis* are community members residing along the Ganga River. The aim was to create a self-mobilized group of trained individuals who would perform the task of conserving the threatened biodiversity of Ganga River but also, also motivate other members of community and stakeholder groups to contribute towards the aim of biodiversity conservation and Aviral and Nirmal Ganga. *Ganga Praharis* have been trained through a series of national, state and site level workshops in diverse skills such as ecological surveys, rescue and rehabilitation of aquatic species, awareness meetings, social interactions and green livelihood skills. They are linked to various local environmental authorities, non-governmental stakeholders in their respective states and various other national, academic and research institutions for their capacity development. *Ganga* conservation activities with an approach of mass movement are now being conducted.

4.2. Aim

To create and strengthen grassroots level human capital to ensure sustainability of efforts for Ganga River conservation.

4.3. Approach

The local communities along the Ganga River have been engaged through:

- Creating awareness on benefits of a clean and vibrant Ganga and inculcating a sense of belongingness.



- Linking local communities and their livelihoods with the overall efforts of various agencies working for a Clean Ganga thereby creating a convergence point at the grassroots level.
- Linking local people's livelihood and well-being with a clean and vibrant Ganga.

Ganga Praharis have been identified through a series of site level consultative meetings and workshops. Focus was made to identify individuals who can mobilize other community members in *Ganga* conservation efforts. These local people were also approached through other line agencies like State Forest Departments, local groups and other administrative departments and NGOs. To ensure a fair and just representation of youth from all the socio-economic strata, personal interactions with individuals were held. Members of existing infrastructures such as National Cadet Corps (NCC), National Service Scheme (NSS), Yuva Mangal Dal, Nehru Yuva Kendra Sangathan (NYKS), *Ganga Vihar Manch*, and local youth, women and NGOs were also approached. The primary criterion for identification in a candidate was their passion and zeal to serve the *Ganga* River for maintaining its integrity in terms of its cleanliness and biodiversity value. To bring women to the forefront of conservation and provide them a platform to voice their opinions efforts were made. Livelihood development was used to ensure the sustainability of the programme and *Ganga Praharis* especially women were trained in alternative green livelihood at the established livelihood centres as per their interest, availability of local resource material and market demand.





4.4.1. Ganga Prahari profile

Measures of social capital need to be drawn from large representative samples for it become a serious indicator of regional and national well-being by using indicators that have been pretested and refined for their suitability (Woolcock, 2001). A total of 1290 *Ganga Praharis* have been identified across the five Ganga states (Figure 4.1), of which 56.1% are women. More than 88% of the *Ganga Praharis* are below the age of 40 years and come with various occupational backgrounds such as students (27.4%), farmers (8.4%) and

housewives (6.7%). *Ganga Prahari* cadre also consists of people with different levels of education, from people with no formal education to professionally trained individuals (Table 4.1).

4.4. Outcomes

A functional cadre of motivated and trained *Ganga Praharis* has been established across the five Ganga River states to aid in and carry forward conservation activities across the Ganga River.

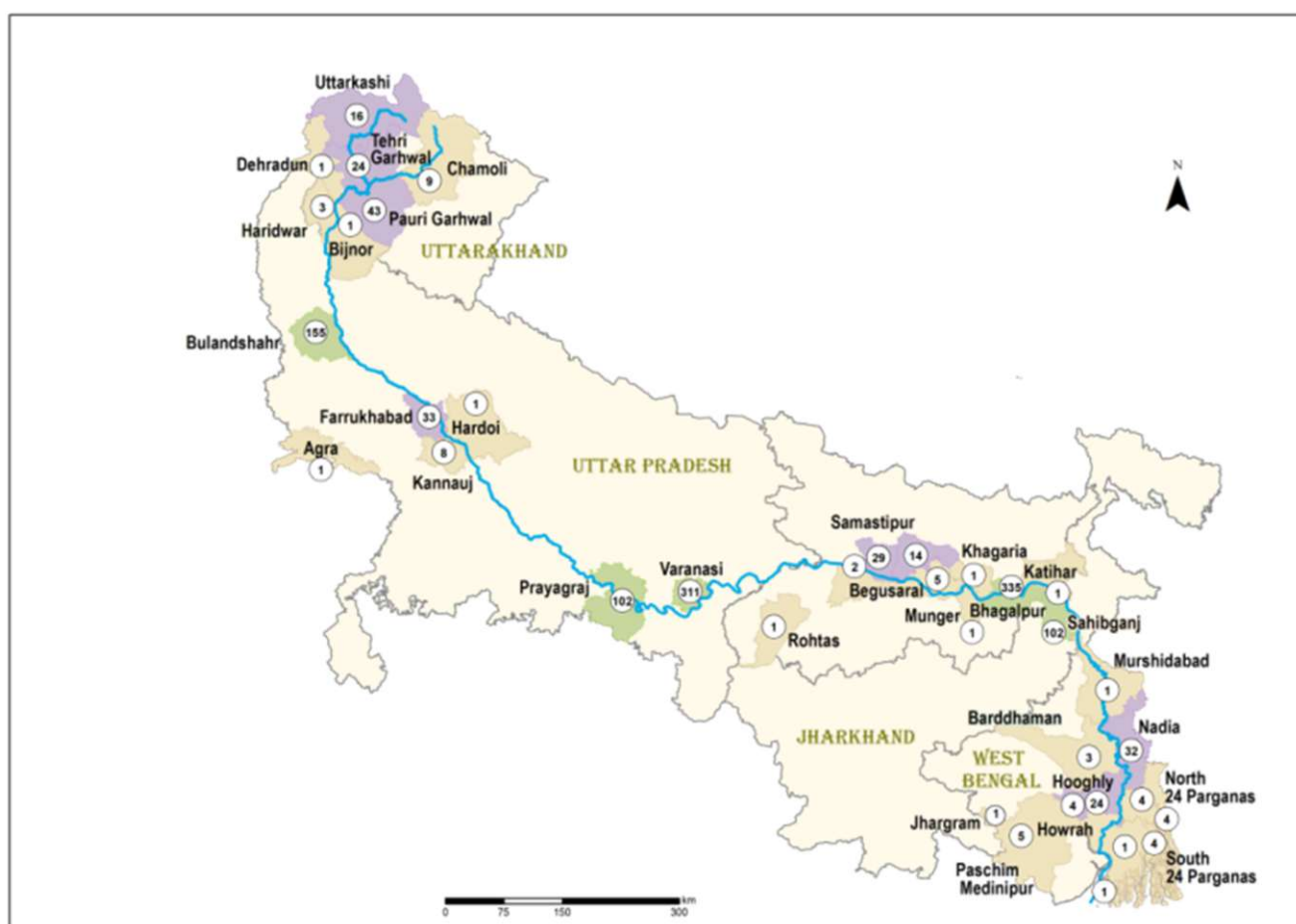


Figure 4.1: Location map of Ganga Praharis

Table 4.1: Profile of Ganga Praharis

		No.	Percent
Total Ganga Prahari		1290	
Gender	Male	566	43.9
	Female	724	56.1
Uttarakhand (n= 96)	Male	32	33.3
	Female	64	66.7
Uttar Pradesh (n= 612)	Male	301	49.2
	Female	311	50.8
Bihar (n= 389)	Male	329	82.7
	Female	60	15.1
Jharkhand (n= 102)	Male	23	22.5
	Female	79	77.5
West Bengal (n= 91)	Male	39	42.9
	Female	52	57.1
Age	0-20	443	34.3
	20-40	694	53.8
	40-60	141	10.9
	60 above	12	0.9
Education	Illiterate	66	5.1
	Literate	37	2.9
	Primary	121	9.4
	Secondary	474	36.7
	Sen. Secondary	269	20.9
	Graduate	221	17.1
	Post Graduate	57	4.4
	Professional Degree	45	3.5
Occupation	Agriculture	109	8.4
	Business	77	6.0
	Environmentalist	22	1.7
	Government Job	13	1.0
	Homemaker	87	6.7
	Labour	41	3.2
	Private Job	96	7.4
	Social work	27	2.1
	Student	354	27.4
	Teacher	21	1.6
	Unemployed	443	34.3

4.4.2. Ganga Prahari Structure

The Ganga Prahari structure has been successfully formalized for two key districts i.e. Bulandshahr and Varanasi, in Uttar Pradesh (Figure: 4.2 & 4.3; Annexure 3).

In Bulandshahr district, selected villages have been divided into six clusters of three villages each (apart from Udaighari where four villages have been added to this cluster) under the leadership of a Cluster leader. At the block level, Dibai and Anoopshahr

block, two block cluster leaders will supervise and report to the community officer from WII, who will administer the activities and report the same to WII. In this process District Ganga Committees and SPMGs will be involved as partners. In Varanasi district, selected villages have been divided into eight clusters of four to six villages, each, under the leadership of a Cluster leader. At the block level, three block cluster leaders have been identified who will supervise these clusters at Kashividyapeeth (three clusters), Chhapra

(one cluster) and Chairaigaon (four clusters). These block cluster leaders will further report to the community officer from WII, who will administer the activities and report the same to WII through the

District Ganga Committee and SPMGs.

WII team at its headquarters will do the overall supervision and finally report the activities and proposed programmes to NMCG, New Delhi.

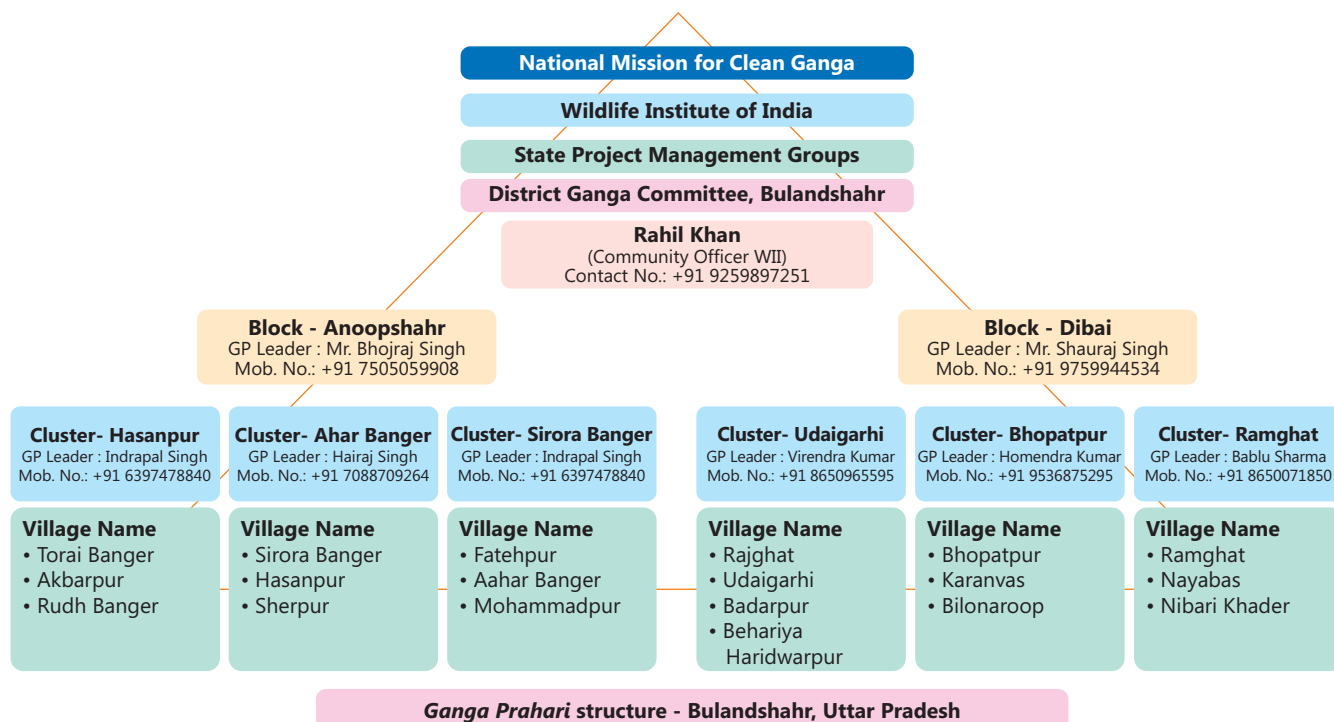


Figure 4.2: Structure of Ganga Prahari - Bulandshahr, Uttar Pradesh

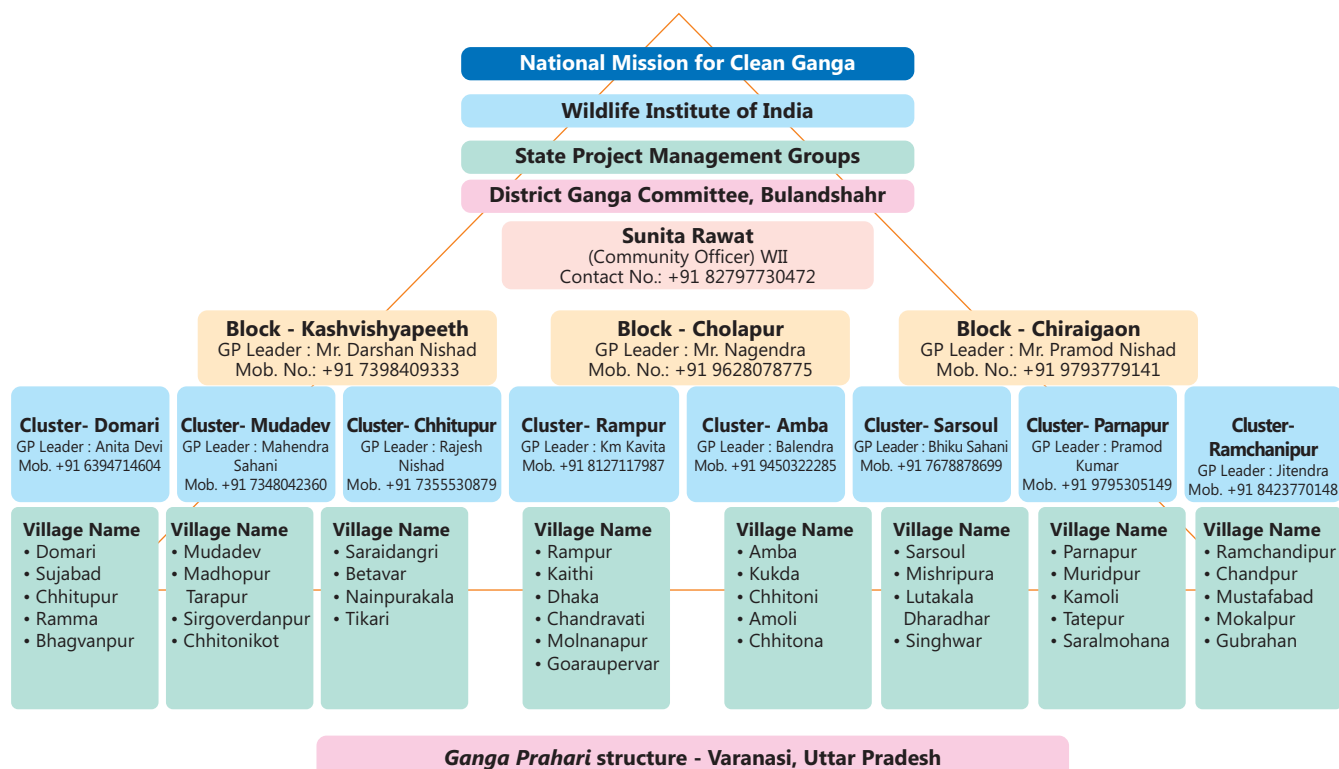


Figure 4.3: Structure of Ganga Prahari - Varanasi, Uttar Pradesh

4.4.3. Input given by WII and output activities conducted by Ganga Praharis

The *Ganga Praharis* were trained by WII (N=433) during various awareness programmes (n=118), consultative meetings (n= 108), sensitization workshops (n=57), livelihood activity (n=35), trainings on project objectives, and rescue and rehabilitation (n=20), cleanliness drives (n=27), ecological surveys (n=13), orientation programmes (n=12), plantation drives (n=19), mobilization workshops (n=8),

questionnaire surveys (n=3), other activities (n=13) conducted at site, state and national level (Table 4.2; Figure 4.4).

Motivated and trained *Ganga Praharis* are actively conducting activities (n=316) such as awareness programmes (n=133), consultative meetings (n= 19), sensitization workshops(n=7) , trainings on project objectives, and rescue and rehabilitation (n=35), cleanliness drives (n=56) and plantation drives (n=63) in their respective sites (Table 4.2; Figure 4.5).

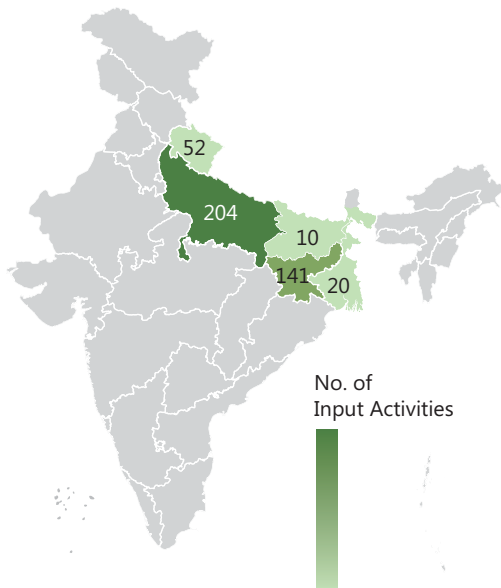


Figure 4.4: Activities conducted to enhance skills of Ganga Praharis in five Ganga states

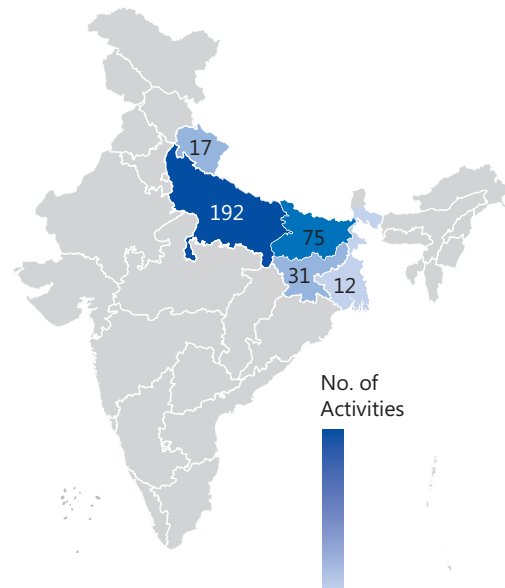


Figure 4.5: Output activities conducted by Ganga Praharis in five Ganga states

Table 4.2: Input provided by WII-NMCG project team and output activities conducted by Ganga Praharis in their respective areas

S.No.	Activities	Input Activities by WII-NMCG team	Output Activities by Ganga Praharis
1.	Awareness programme	118	133
2.	Consultative meeting	108	19
3.	Sensitization workshop	57	7
4.	Livelihood activity	35	-
5.	Trainings (project objectives and rescue & rehabilitation)	20	35
6.	Cleanliness drive	27	56
7.	Ecological survey	13	-
8.	Orientation programme	12	-
9.	Plantation drive	19	63
10.	Mobilization workshop	8	1
11.	Questionnaire survey	3	1
12.	Other (Cultural, Ganga Amantran Expedition, Wetland and Water Programme, National Geographic Society expedition)	13	1
	Total	433	316

4.4.4. Extended programmes

Pravasi Ganga Prahari cadre has been created for NRIs, Foreign Nationals, OCIs and PIOs. This cadre currently comprises of 54 citizens from 17 different countries (Figure 4.6). Further, to train, guide and support the Ganga Prahari activities, a Ganga Prahari mentor platform has been created; 107 mentors have

registered on this platform (Figure 4.7 & 4.8). To further sustain this programme, a Bal Ganga Prahari cadre has been created under which 64 schools have been identified and 8908 school children have been sensitized through 74 programmes so far (Figure 4.9; Annexure 3).

Pravasi Ganga Prahari



Figure 4.6: Presence map of Pravasi Ganga Praharis



Figure 4.7: Importance of a Ganga Prahari mentor

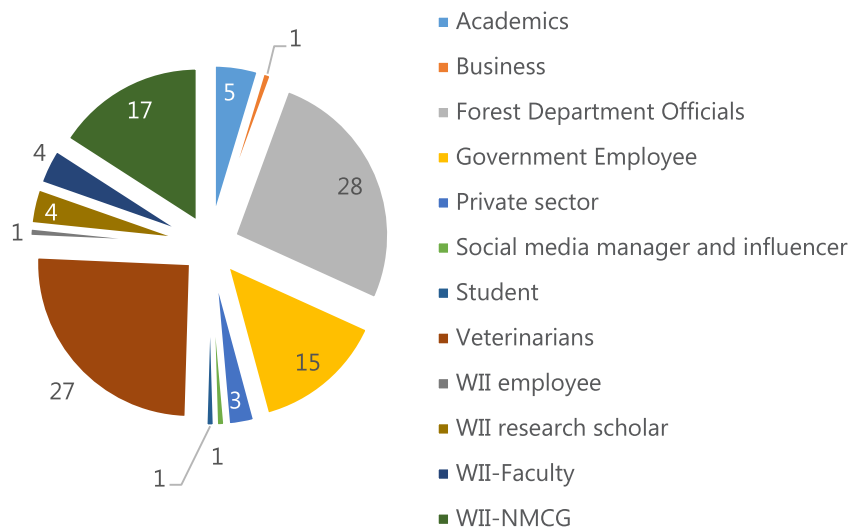


Figure 4.8: Composition of Ganga Prahari mentor group (N=107)

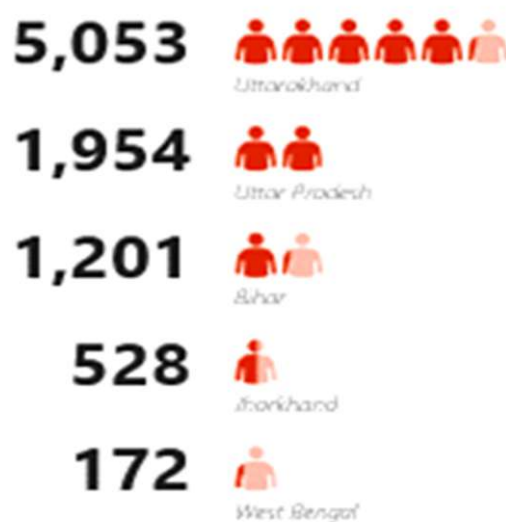


Figure 4.9: Total number of students sensitized under Bal Ganga Prahari programme in five Ganga states (N=8909)

4.5. Achievements

Ganga Praharis have not only been recognized for their efforts in their area but also at the state, national and international level. Ganga Prahari Sh. Darshan Nishaad interacted with the Hon'ble Prime Minister of India during a mega plantation drive held at Varanasi in April 2019. During the Kumbh Mela in Prayagraj, Uttar Pradesh, 149 *Ganga Praharis* (Figure 4.10) actively participated in the smooth conduct of the Kumbh Ganga Prahari programme. The Hon'ble Minister of Jal Shakti felicitated them on the occasion

of World Environment Day 2019 in New Delhi. They also interacted with and assisted the teams from International Business Machine (IBM) and National Geographic Society (NGS), who have appreciated the *Ganga Praharis* for their strong on ground presence and untiring efforts towards cleanliness of Ganga River and conservation of its biodiversity. They are holding key positions in their communities and other institutions such as Gram Pradhan, District Coordinator of NYKS and NMCG-WII team at WII (Annexure 3).

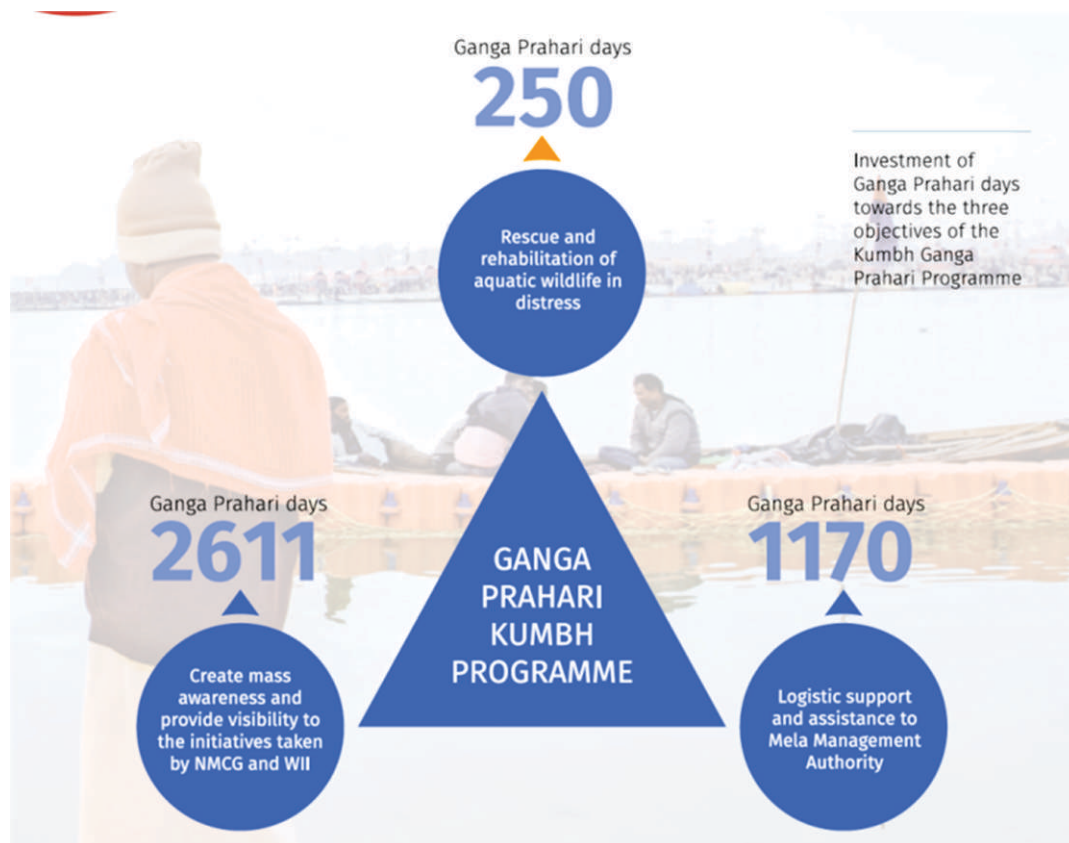


Figure 4.10: Ganga Prahari days invested towards the three objectives of the Kumbh Ganga Prahari programme

4.6. Conclusions

The NMCG-WII team has successfully involved members of local communities across the five Ganga river states and identified community champions, *Ganga Praharis*, who will lead the conservation activities and ensure their sustainability. Motivated and trained during various training programmes and capacity building workshops, *Ganga Praharis* are independently conducting activities pertaining to cleanliness of Ganga River and conservation of its biodiversity. As per their interest or skills, they are further linked to the concerned agencies for training/skill development and enhancement opportunities. WII also recommends them to the governmental departments such as the Forest Department, Irrigation Department, Fishery Department, State Programme Management Groups (SPMGs) and other research and development organizations for work opportunity. These organizations can directly contact the Ganga Prahari via their database hosted on the home page of NMCG. Their independent efforts are being supported and guided by numerous research, administrative and social institutions, especially WII, for resources, logistic

and technical support. WII has created the Pravasi Ganga Prahari and Ganga Prahari mentor programme to further guide, support and train the *Ganga Praharis*, this includes people from across the country and the world.

This trained cadre of *Ganga Praharis* is successfully ensuring; protection and conservation of biodiversity. They are motivating the communities residing along the stretch of Ganga to adopt sustainable practices for collection/use of bio-resource. *Ganga Praharis* are thus ensuring cleanliness of the Ganga River in their village and are a successful grassroots level movement for a clean and vibrant Ganga.

Photo gallery showing *Ganga Prahari* activities and achievements

Picture 1:
Ganga Prahari Shri Darshan Nishaad from Varanasi Uttar Pradesh interacting with the Hon. Prime Minister of India Shri Narendra Modi and Chief Minister Uttar Pradesh Shri Adityanath Yogi



Picture 2:
National level Launch of *Ganga Prahari* database at New Delhi during Biodiversity Day celebration

Picture 3:
Ganga Prahari participating in the Rafting expedition led by Indian Mountaineer Ms. Bachendri Pal





Picture 4:
Ganga Prahari with the team of Door Darshan - National show Rag Rag mein Ganga



Picture 5:
National Geographic Society team training *Ganga Prahari* in tracking plastic waste using Marine Debris Tracker

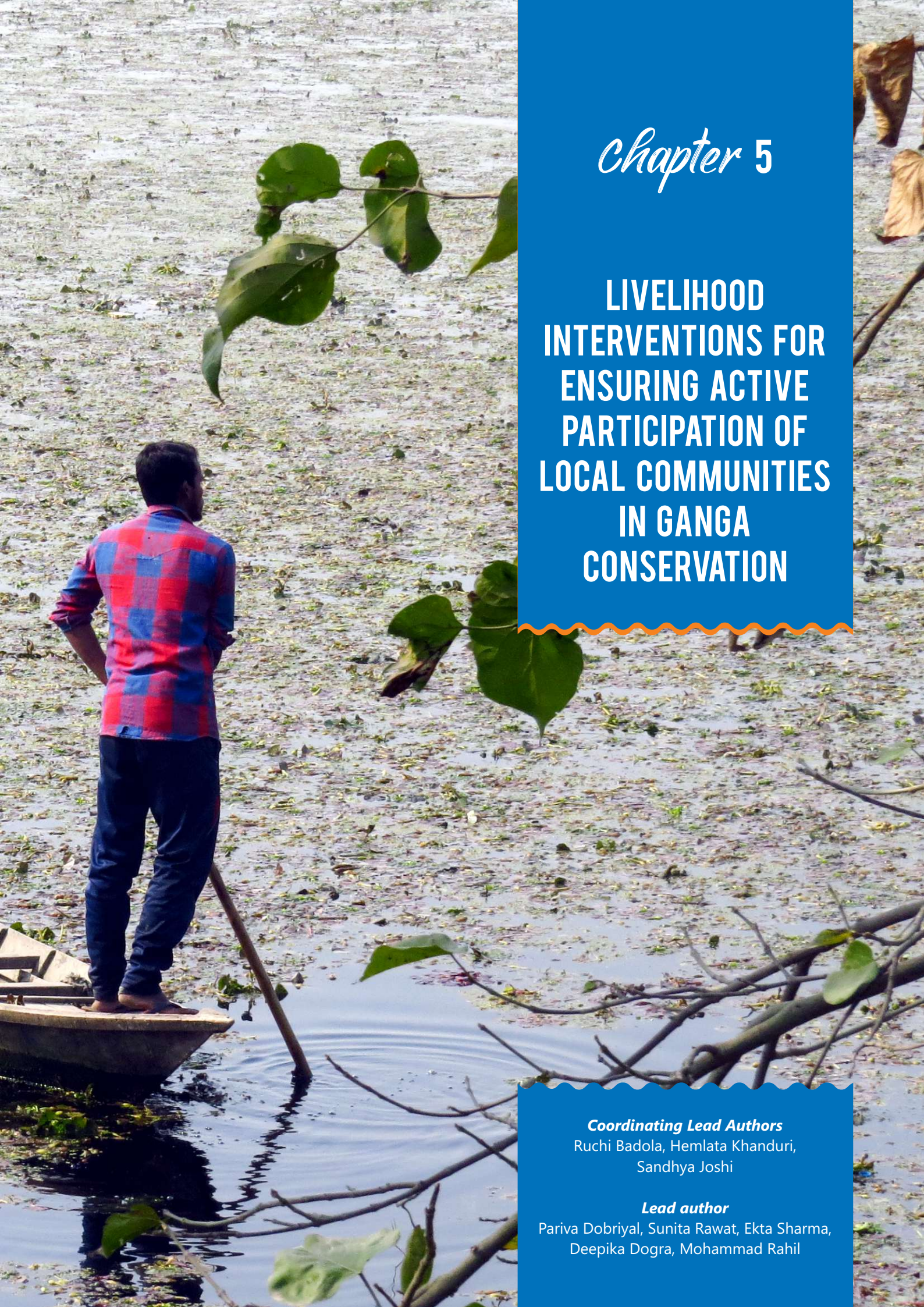


Picture 6:
Ganga Prahari's interaction with the Japanese delegation

Picture 7:
Ganga Prahari visited by the Minister for Road Transport & Highways of India and Shipping Ministry of Micro, Small and Medium Enterprises during the Kumbh Mela 2019







Chapter 5

LIVELIHOOD INTERVENTIONS FOR ENSURING ACTIVE PARTICIPATION OF LOCAL COMMUNITIES IN GANGA CONSERVATION

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Summary

Involvement of local communities in conservation process is integral to ensure the sustainability of the conservation efforts. Thus, to ensure their participation, especially; women and youth, and align local economy with conservation goals, site-specific alternate livelihoods and green skills were imparted. In order to do so, livelihood frameworks in line with the interest of local communities were developed and market surveys were conducted to understand skill level and resource availability viz; low cost native raw materials. The markets were also studied to understand the linkages and demand. The project used cutting-edge scientific methods as well as grassroots level interactions with local communities and other stakeholders along the principles of "Jan Bhagidari" to derive replicable models for an integrated science-policy-society interface. The concepts of Swachh Bharat Abhiyan and Arth Ganga were integrated with the project for a greater result. The project is a pioneering effort towards a comprehensive basin scale Ganga biodiversity conservation through a unique combination of scientific work and community involvement, with linkages between livelihood security and sustainable development with potential for experiential learning, providing a base for the Arth Ganga.

People residing in villages located along the Ganga River are highly dependent on the river resources for their livelihood and daily needs. The high dependence not only makes these communities vulnerable to any environmental and economic shock but also pose a threat to ecological integrity of the river. Hence, it



becomes crucial to engage local people in conservation processes. Conservation practitioners will have to ensure the participation of each section of the society, focusing on the economically and socially marginalized groups such as women and poor.

Under the WII-NMCG project, it was ensured that people representing various socio-economic, cultural, educational backgrounds are participating in the project activities, not only on the ground but also in project management and implementation. Various activities as described in chapter 3, were conducted to increase the reach of conservation activities and elicit people's participation. For sustaining the participation of people, their livelihoods were linked with conservation goals. Livelihood skills of local people in alternative sustainable livelihoods were developed through effective trainings and market linkages.

Series of site specific discussions were conducted with the target groups to understand need of alternate livelihood skill trainings. It was observed that the youth were interested in undertaking computer, tourist guide, nursery, plumbing and electrician

trainings, which they could use to earn their living. Women on the other hand were inclined towards sewing & stitching, value addition of local products, incense-stick making, food processing, preservation and health & wellness as these livelihoods were suitable to their social setup. Potential livelihood schemes, current projects and resource persons for each training were explored to maximize the efficiency of the efforts and further link them to conservation activities. Linkages were established with the departments and organizations working for rural





5.1. Introduction

Livelihood of rural communities are often intertwined with harvesting of natural resources. Availability and accessibility (Pour et al., 2018). Aligning local livelihoods with conservation goals is the major challenge for sustainable management of natural resources. This could be achieved through changes in conservation philosophies and include social-economic and cultural concerns of local people in conservation planning (Wei et al., 2018). Previous research has revealed that biodiversity conservation efforts will be more effective if different

genders, races, ethnicities, and cultures are included in the processes (Tallis & Lubchenco, 2014). The interlinkages between social and ecological system need to be understood well, to develop effectively involve communities especially women and poor (Briggs et al., 2018). The benefits should also be ensured to a larger section of the society.

Women have been managing the household resource use, mainly in the rural areas where most of the population is directly dependent on natural resources. Not only at the user end but also at the revolutionary and decision-making levels their role has been realized in decision making. Previous summits and grassroot level movements such as the 1992 United Nations (UN) Earth Summit, India's Chipko movement and Kenya's Green Belt Movement have highlighted the role of women's voices and perspectives in sustainable development (Mago and Gunwal, 2019). Agencies of UN have promoted the effective participation of women in the decision making.

Women empowerment and gender equivalence is one

livelihood development such as National Rural Livelihood Mission (NRLM), Rural self-employment and training institutes of lead banks (RSETI), Integrated Livelihood Support Project (ILSP), Department of Science and Technology (DST), NGO's, USHA-International Limited and Green Skill Development Programme (GSDP) of ENVIS centre under Ministry of Environment, Forest and Climate Change (MoEFCC). Livelihood skill development centres were established at select locations, which were mostly mobile and make-shift to minimize resource investment and increase area coverage. A total of 21 mobile livelihood training centres were established and a total of 35 trainings have been conducted, wherein 713 (M=27, F=686) Ganga Praharis were trained in different skills. To link the trained Ganga Prahari to existing market and to create a market for the products developed at the livelihood training centres, a floating livelihood centre "Jalaj", has been developed at Varanasi. The business model of Jalaj is now been recognized and will be replicated at other sites also in phase II of the project. Ganga Praharis are also linked with different Government schemes, programmes and organizations working towards rural and livelihood development, and marketing of services and products. Livelihood trainings have mainly focused on female Ganga Praharis, as women in a rural setup have limited mobility and restricted access to resources. Livelihood centres have also developed as a platform for the women to voice their concerns on issues related to livelihood and Ganga conservation. It has instilled confidence in them that they can also contribute positively for their family and society.



of the goals of sustainable development which is not only necessary for social development but crucial for conservation of biodiversity in the areas with high natural resource dependencies (Shinde and Kamal, 2020). If we look into recent conservation history of India, we can find that female environmentalists of India have inspired environmental movements all over the world. Chipko movement to Narmada Bachao Aandolan, several women environmental activists led the movement to protect biodiversity and its resources have got international recognition (Tripathi et al., 2020).



Rural communities have fewer choices available to them and limited capacity to adapt to change; this makes their participation in conservation difficult (Bryan et al., 2009). One fourth of the Indian population resides in the villages, towns and cities situated along the Ganga River and most of them are below poverty line (Jha and Tripathi, 2014). Their economic conditions make them heavily dependent on the natural resources of the River. Thus, it is very crucial to involve the communities in the conservation activities and at the same time strengthen their capacity in alternate skills so as to generate an extra source of income for the family. In order to encourage community participation in conservation activities, we need to give them some incentives. Livelihood and skill development interventions are a constructive way to engage local communities in conservation (Fisher et al., 2018).

Under the NMCG-WII Biodiversity and Ganga Conservation Project different activities are being organized for engaging communities in biodiversity conservation. Conduct of alternative livelihood and

skill development trainings is used as a strategy to engage communities, especially women in conservation activities. It is envisaged that alternative livelihood activities will support in improving relationships with local communities and improve collaboration of local people for conservation measures.

5.2. Aim

Develop sustainable livelihood models for local people living along the Ganga River.

Objectives

- To create a platform to motivate and engage the community, especially women, in the conservation activities.
- To provide local people with means of livelihood that are in consonance with the socio-cultural and ecological values of the area.

5.3. Approach

Selection and activities for project and project objectives were done in such a way that promote and encourage the river dependent socially and economically marginalized section to participate in conservation processes.

Women researchers were trained and motivated through one to one interaction to take up the project initiatives at various locations along the Ganga. Assessment of social conditions in and around the basecamp site was done and measures for their security were taken before deputing a woman project personnel.

To engage a fair representation of local





people in conservation activities, regular sensitization meetings, awareness programmes and personal interactions were conducted in select villages. Need assessment was conducted where the participants i.e. village Panchayat members, women, men, youth, farmers and fishermen community, revealed their choices of trainings. It was observed that young men were interested in hands on trainings in computers, tourist guide, nursery, plumbing and electrician, which

could get them employment, and women were interested in sewing and tailoring, value addition to local produce, incense stick making, fruit and food preservation and health and wellness etc.; young girls were especially interested in health and wellness training. Surveys were conducted to identify the potential livelihood schemes, projects, resource persons and availability of raw material for the trainings. Thereafter, livelihood training manuals were developed. Linkages were established with agencies i.e. forest department, district and block administration, National Rural Livelihood Mission (NRLM), Nehru Yuva Kendra Sangathan (NYKS), Pradhan Mantri Kaushal Vikas Yojna (PMKVY), USHA foundation, Rural Self-employment Training Institute (RSETI) of lead Banks, NGO's and other institutes to conduct skill development trainings. Further, market linkages with livelihood development schemes of governmental and non-governmental organizations were established to ensure the sustainability of these initiatives (Figure 5.1; Annexure 4).

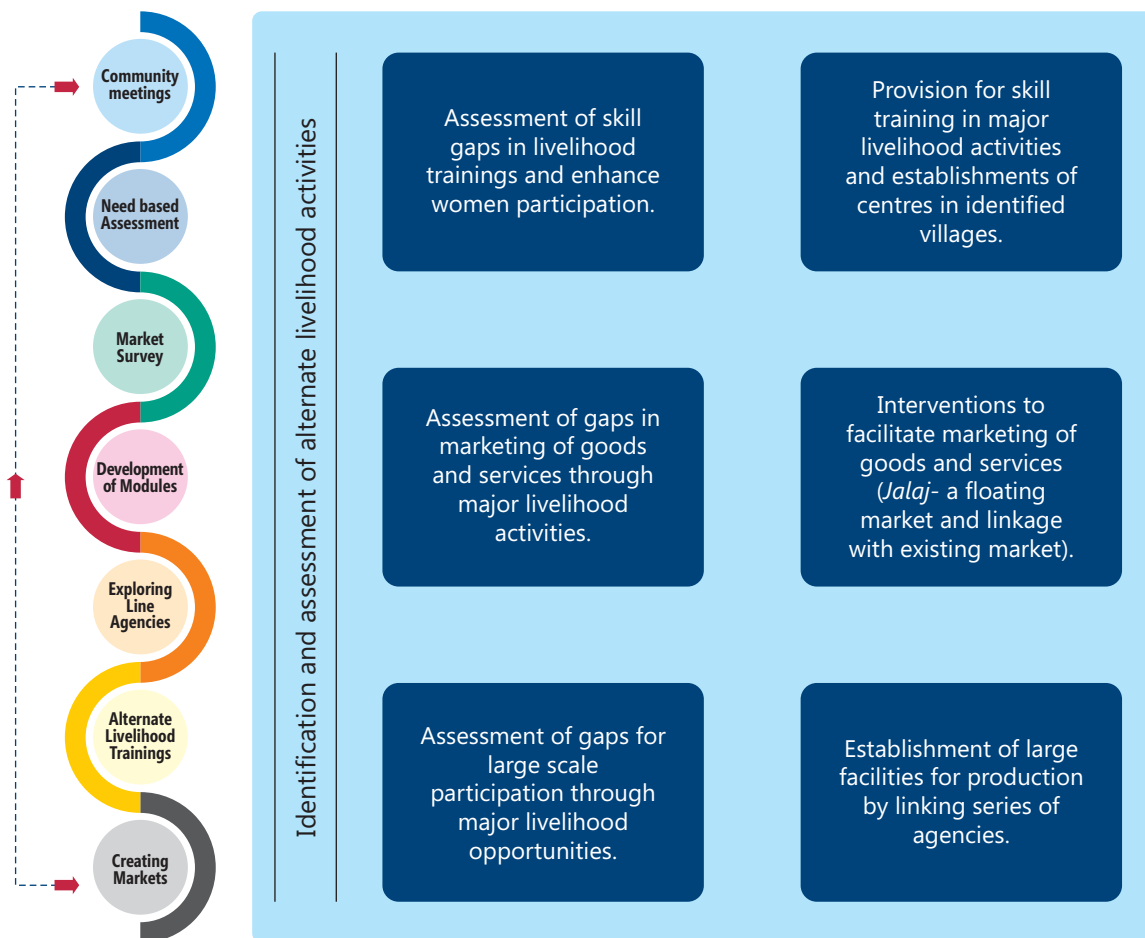


Figure 5.1: Process and components of alternate livelihood development initiatives

5.4. Outcomes

5.4.1. Women participation in project implementation

The project was conceived and initiated with the support and leadership of a woman, the then Hon'ble Minister of Water Resources, River Development and Ganga Rejuvenation, Sadhvi Uma Bharti. The project and mainly the components that involve participation of stakeholders are led by a woman scientist Dr. Ruchi Badola. In the project, there are a total of three project scientists, two subject matter specialist, one ecodevelopment officer, two project associates, eleven project fellows, one community officer, ten project assistant, and 15 field assistants. The project has created an opportunity for women, who constitute 48% of the team, to build and strengthen the scientific skills by providing exposure to various aspects of biodiversity conservation as well as livelihood opportunities.

Along the Ganga River, a range of activities (n= 1895) have been conducted, of which women have

participated in 79.3% of the activities, and 55% of the total participants (n= 55178) were women.

5.4.2. Livelihood trainings for communities along the Ganga River

Based on the preferences of the individuals, 35 livelihood trainings in sewing and stitching, prasad (laddoo) and incense stick making, health and wellness, fruit preservation, handicraft making using plastic and locally available products, bakery, nursery development, biodiversity-based tourism, and jute bag making have been imparted at select sites in Uttarakhand, Uttar Pradesh and Jharkhand. Collaboration with RSETI, Punjab National Bank, Bulandshahr, USHA foundation and Green Skill Development Programme of ENVIS Centre, MoEF&CC, was done to ensure the effectiveness of the trainings. These training workshops have enhanced women participation in cleanliness of Ganga River and conservation of its biodiversity. During these trainings 713 Ganga Praharis have been trained, of which 686 were female (Figure 5.2, Table 5.1; Annexure 4).

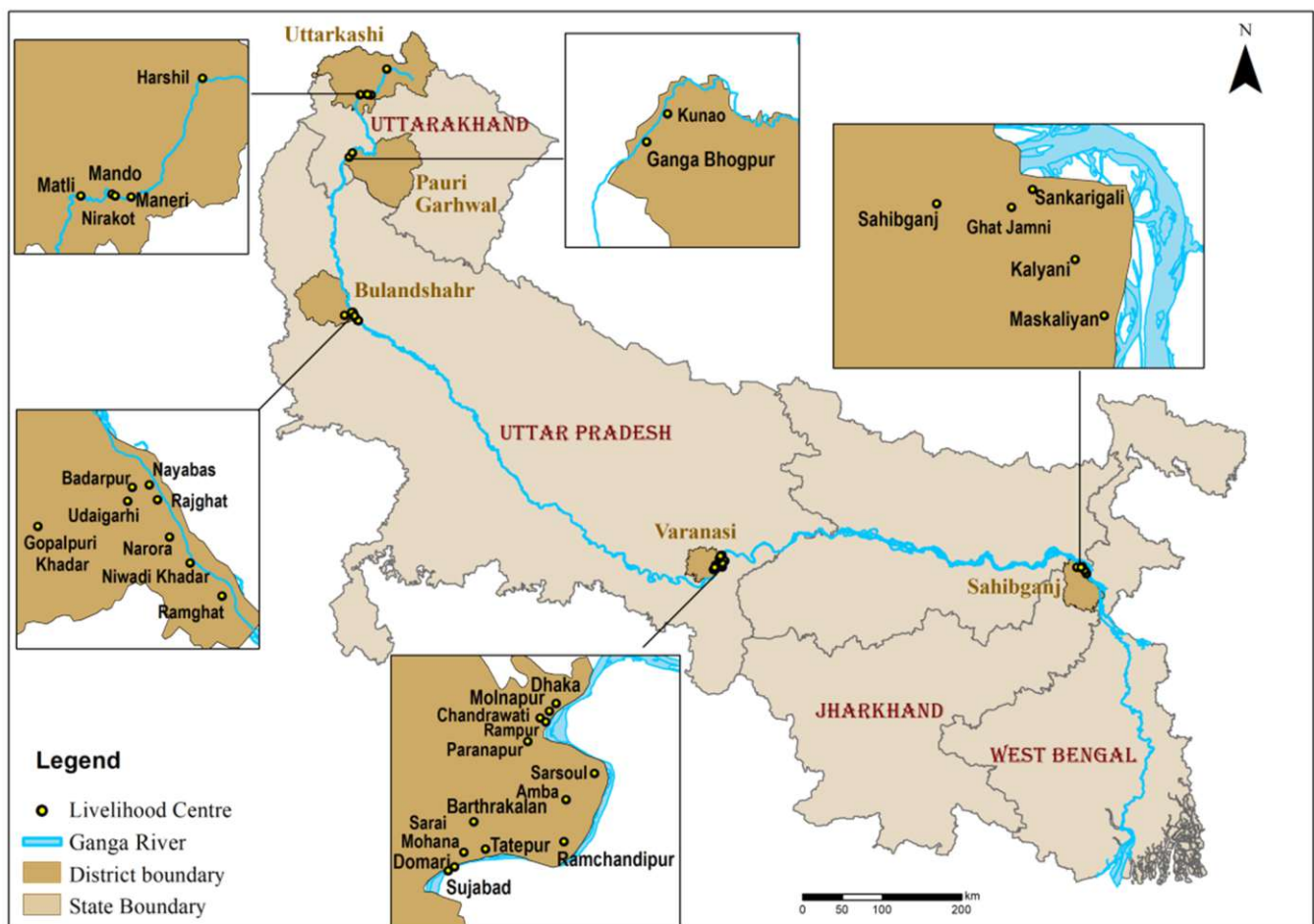


Figure 5.2: Locations of livelihood trainings conducted

Table 4.2: Input provided by WII-NMCG project team and output activities conducted by Ganga Praharis in their respective areas

S.No.	Training	No. of trainings	No. of Ganga Praharis	Women Ganga Praharis	Increase in income (INR/month)
1	Sewing and Stitching	17	368	368	200-4500
2	Prasad and incense stick making	5	92	92	500-2500
3	Jute bag making	1	20	20	100-500
4	Baking	3	30	30	500-1500
5	Health and wellness	3	80	80	2000-4500
6	Tourist guide	1	20	20	1000-3500
7	Nursery development	1	15	15	1000-3000
8	Handicraft	1	52	52	500-2500
9	Fruit processing and value addition	3	36	36	200-1500
	Total	35	713		-

Six livelihood training manuals have been developed. Each manual describes the schedule and content of different trainings such as a 21 day module for health and wellness, 10 day module for prasad (laddoo) and incense stick making, 10 day module for nursery development, 21 day module for biodiversity-based tourist guide, 2 month module for electrician training and 3 month module for stitching and sewing training. These have been developed after discussions with livelihood experts.

Livelihood schemes, organizations and Institutes like RSETI, PMKVY and N/SRLM were roped in at various sites along Ganga for training support. In district Bulandshahr, trainings and workshops were organized by RSETI and USHA Foundation in villages of Dibai block. In Varanasi district, linkages were established with N/SRLM district officials and PMKVY centers. Women Initiative for Self Employment (WISE), the women empowerment unit of Himalayan Environmental Studies and Conservation Organization (HESCO) — a renowned NGO in the state of Uttarakhand was identified as lead training agency for imparting alternate skill and livelihood trainings to the rural communities. A MoU was signed with USHA foundation and RSETI Bulandshahr, for providing advance trainings in Bulandshahr district of Uttar Pradesh. Four extensive trainings under the Green Skill Development Training Programme by ENVIS, MoEF&CC were imparted in district Varanasi of Uttar Pradesh. Further trainings were given at the NMCG-WII established livelihood centers at various sites in Uttar Pradesh, Uttarakhand and Jharkhand by the experts from WISE-HESCO (Annexure 4).

5.4.3. Details of livelihood trainings conducted

Sewing and stitching

The first training centre was established in village Rampur, block Cholapur, district Varanasi, in the month of February 2018; 25 women participated in this training. Following this, trainings were conducted in villages Dhaka, Tatepur, and Molnapur in district Varanasi, and villages Rajghat, Udaigari, Badarpur, Niwari khadar, Nayabas and Ramghat in district Bulandshahr of Uttar Pradesh; and villages Kalyani, Maskalayan and Ghat Jamni in district Sahibganj of Jharkhand. During these trainings, 343 women were trained.

Prasad (laddoo) and incense stick making

To add value to the resources available in the area, training in prasad (laddoo) and incense stick making was conducted using the local grain flour like wheat, gram, bajra, maize, rice, flowers etc. These trainings were conducted in villages Dhaka and Domari in district Varanasi, and villages Rajghat and Gopalpuri Khadar in district Bulandshahr of Uttar Pradesh; and villages Maskalaiya and Sankarigali in district Sahibganj district of Jharkhand. A total of 92 women participated in these trainings.

Health and wellness

Health and Wellness trainings were imparted in Narora with participants from villages Udaigarhi, Rajghat, Niwari Khadar and Gopalpuri Khadar; Varanasi in Uttar Pradesh with participants from villages Rampur Chandrawati, Domari, Bartharakala and Sujabad; and Sahibganj in Jharkhand with participants from villages Sankarigali, Maharajpur,

Kalyani, Maskalaiya, Balapokhar, Fatehpur and Karampura. Participants were trained to use locally available biodegradable, chemical free products for improving health and beauty such as milk, oils, curd, turmeric, lentils, fuller's earth, rice flour, herbal leaves and flowers etc. A total of 80 female participants were trained.

Fruit preservation

In the state of Jharkhand, one of the fruit growing belt of the country, fruit preservation training was conducted by the trainers from WISE-HESCO. Training centres were established in villages Maskalaiyan and Sankarigali in Shahibganj, Jharkhand. Fruit preservation training for 6 participants from Uttarkashi district, Uttarakhand was organized at the HESCO headquarter in Dehradun. 6 women participants were trained in these centres.

Handicraft

52 participants from village Matli in district Uttarkashi of Uttarakhand were trained in two batches, in handicraft making from household and plastic waste.

Baking

15 women from villages Kunao and Ganga Bhogpur in block Yamkeshwar, district Pauri Garhwal in Uttarakhand and 15 women from village Domari, block Kashi Vidyapeeth, district Varanasi in Uttar Pradesh have been trained in making bakery items like biscuits, cupcakes, Nankatai and muffins from local products.

Sewing and stitching training by USHA foundation

USHA foundation conducted basic and advance trainings in sewing and stitching in two phases. Participants were from villages Rajghat, Udaygarhi, Badarpur, Niwadikhadar and Gopalpuri Khadar in block Dibai of district Bulandshahr, Uttar Pradesh. A total of 20 women participated in these trainings.

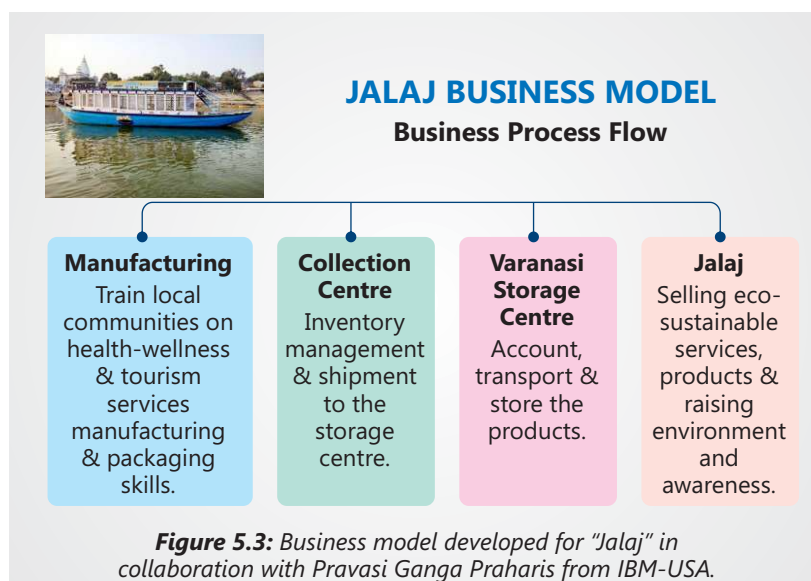
5.4.4. Green Skill Development Training Programme

A certificate course on Green Skill Development Programme of ENVIS centre, under MoEF&CC was conducted at Sarnath, Varanasi, in Uttar Pradesh. Trainings were imparted in four courses i.e. health and wellness, nursery development, prasad and incense stick making, and biodiversity-based tourist guide. A total of 77 participants were trained in these trainings.

- The health and wellness program encouraged the use of organic herbs for everyday health and grooming.
- Farming is the most widely practiced occupation in the Gangetic plains. Nursery training programme was conducted for the farmers to employ ecologically and economically advanced farming techniques. They learnt preparation of low-cost Poly-house, nutrient rich bio-compost for sustainable farming and techniques to reduce threats from conventional farming practices.
- Training on prasad and incense stick making from available local food grains with green packaging was imparted. This was specially designed to add value to locally grown grains and to recycle disposed-off flowers at religious places like temples and ghats.
- Biodiversity-based tourist guide programme was designed to train youth in biodiversity-based tourism while engaging tourists in nature walks, heritage walks and exploring Ganga River in Varanasi, Uttar Pradesh. They were briefed on habitat degradation, species identification, captive breeding programmes and status of species found in Ganga River. These participants were trained to sensitize tourists on the biodiversity of Ganga River.

5.4.5. Market linkages

To create market for the products prepared by Ganga Praharis, a floating livelihood centre "Jalaj" was established at Varanasi. This boat "Jalaj" comprises of a small shopping complex and sells the products at different villages situated along the Ganga River. A business model in collaboration with IBM was developed for the "Jalaj" (Figure 5.3; Annexure 4).



Women of village Matli in block Dunda of district Uttarkashi, Uttarakhand are making rugs and mats using old plastic bags. They have been formalized with a bank linkage with support from WII into a SHG — “Ganga Prahari Ajeevika Evam Sahayata Samuh” and have been registered with the Integrated Livelihood Support Project in district Uttarkashi for market linkages (Figure 5.4). A women group from village Kunao, district Pauri Garhwal, who were trained in baking, is selling their products through collaboration with a canteen run by an eco-development committee at Rishikesh (Annexure 4).

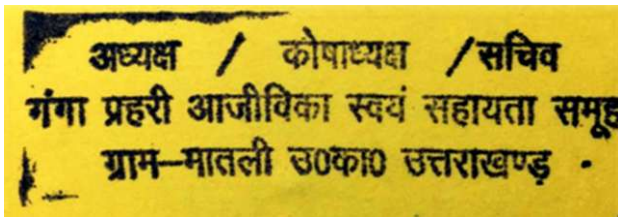


Figure 5.4: Official stamp of the self-help group Matli, Uttarkashi, Uttarakhand

5.4.6. Direct contribution of livelihood activities

- The impact assessment survey conducted with 213 Ganga Praharis trained during livelihood trainings in Narora and Varanasi, Uttar Pradesh, revealed that the average income of Ganga Praharis trained at livelihood centres has increased by INR 200-4500 per month (Table 5.1).
- More women registered themselves as Ganga Praharis after attending the livelihood trainings and participated in activities conducted by WII or Ganga Prahari leaders. Number of Ganga Praharis and especially women Ganga Praharis also increased with the livelihood trainings (Figure 5.5).

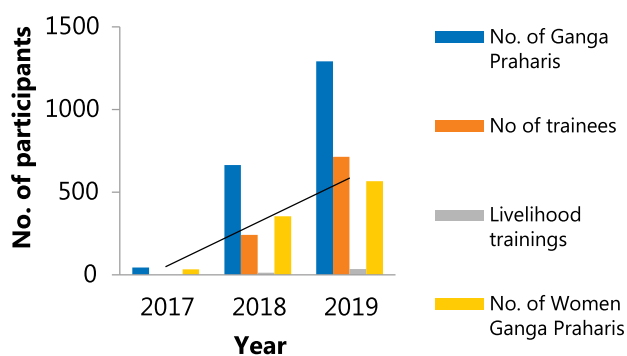


Figure 5.5: Increase in number of total Ganga Praharis and women Ganga Praharis with livelihood trainings

5.5. Impacts of livelihood development activities

Following social and behavioral changes have been induced by the livelihood trainings:

Increased participation and mobility of women

Livelihood trainings have not only provided earning opportunities to the rural women but have changed their attitude and perception towards Ganga and its biodiversity. As a result of this, the women participation in conservation activities has increased tremendously (Figure 5.5). The livelihood trainings increased the mobility and built confidence among rural women. Young girls who were earlier hesitant to come out of their houses are now actively participating in exchange programmes and trainings workshops and seminars organized in and outside their villages and communities.

Change in attitude

The training centres emerged as a platform to create awareness on cleanliness of Ganga River and conservation of its biodiversity. Sessions on status of species in Ganga, their importance and role of community in its conservation helped to orient them towards the objective of biodiversity conservation. Regular activities like cleanliness drives, plantation drives and awareness rallies were conducted with the participants.

Social inclusion

People from all castes and sections of society attended the training programmes. This developed a connection among them and gave them a platform to share their experiences and activities.

Sustainable use of river resources

After attending the alternate livelihood trainings large, numerous women came out to participate in activities pertaining to cleanliness of Ganga River and conservation of its biodiversity in their respective villages and towns. Training and orientation in these centres have evoked a sense of ownership in them and they are more sensitive towards the sustainable use of natural resources extracted from the river, and are mobilizing other members of the community for the same.

Increased ability to participate in decision making

Women Ganga Praharis along with others are participating in decision making especially at the household, village, and district level. They are also contributing towards processes and decisions being



taken for the village level developmental planning. They are assessing the market and their own abilities, and are asking for specific livelihood activities to be conducted in their villages, where earlier it was only the WII team that designed the structure of the livelihood trainings. They have also actively taken part in microplan preparation meetings and workshops and provided their suggestions and concerns.

5.6. Conclusions

The project activities include capacity building of young women scientists and researchers and livelihood activities for the rural women along the Ganga River. The activities have contributed towards ensuring women participation in process and decision making regarding Ganga biodiversity conservation. At local or village level, existing institutions and self-help groups were also revived and strengthened through regular dialogue and trainings. Members of 18 women SHG and 16 youth SHGs of NYKS participated in livelihood trainings conducted. These livelihood trainings worked as a catalyst in strengthening these groups. The trainings not only provided them livelihood opportunities but also contributed towards their personality development through regular exposure visits and interactions, confidence building, and improved knowledge of their surroundings and conditions. As a result of these interventions, the trained Ganga Praharis have initiated a movement for social and

economic upliftment of their communities and have emerged as leaders in their respected areas. Livelihood development has also given a social identity to the Ganga Praharis in their communities and the recognition has encouraged other people also to join the project. The linkages with various organizations has provided sustainability to the livelihood development programme and has also increased the effectiveness of the biodiversity conservation efforts. The linkages have promoted inclusion of conservation in the mandate of various organizations and agencies.

These livelihood initiatives have raised the income of the trained participants by INR 200 – 4500 per month. These initiatives have created a niche for conservation at the village level developmental processes and have generated a partnership for successful conduct of conservation activities.

Livelihood training centers have now become community spaces especially for women to discuss various social-economic and ecological aspects, including the ways to conserve the biodiversity of Ganga River, and importance of a clean Ganga ecosystem. They also feel confident to put forth their view on the social, economic and environmental issues in their area. Trainees at the centers have developed a sense of ownership, and hence they take up regular cleanliness and plantation drives, awareness rallies with the involvement of other community members.







Chapter 6

ECOSYSTEM SERVICES OF GANGA RIVER



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Summary

The Ganga River hosts a vast population of diverse stakeholders with varying demands on the river and its resources. To evaluate the ecosystem services of the Ganga River mainstem, a framework that accounted for both the resource constraints as well as the relevance of the ecosystem services provided was developed and ecosystem services were identified in three Ganga stretches i.e. upper (Gaumukh to Haridwar), middle (Haridwar to Varanasi) and lower (Varanasi to Ganga Sagar). The most resource efficient standardized method for conducting an economic appraisal was used. To understand the value of Ganga River to people dependent on its resources, 503 respondents belonging to different stakeholder groups were surveyed along the Ganga River, using the opportunistic sampling technique. Water for drinking was the most cited ecosystem service in upper Ganga, while in both middle and lower Ganga, water for irrigation was the most cited. 10.90%, 23.62% and 26.19% of the respondents in the upper, Middle and Lower Ganga, respectively, mentioned that the Ganga River maintains population and habitat for diverse floral and faunal species. One the basis of an extensive literature review, reconnaissance and field surveys, and inputs from survey teams, 22 key ecosystem services were identified. The extent and importance of provisioning services was primarily high only for the middle and lower stretch; except for power generation, which was high for the upper stretch due to the potential hydroelectric power generation. For cultural services, the extent and importance is high for all the three stretches. Eight



ecosystem services, namely, water for drinking and domestic use and power generation, benefits to agriculture i.e water for irrigation and soil fertility, riverbed material, provision of fish, water for transportation, and recreational and religious/spiritual services, were selected for valuation. In 10 urban centres along Ganga, namely, Srinagar, Uttarkashi, Haridwar, Meerut, Kanpur, Mirzapur, Varanasi, Patna Urban Area, Bhagalpur and Kolkata, 1574.29 MLD surface water and 1008.67 MLD ground water is being withdrawn daily, valued at ₹51.79 million and ₹33.19 million, assuming constant utility per unit of consumption. The cultivators in the Bihar Ganga districts earned, on an average, an estimated ₹recreationa million ($\pm 14,766.95$ million), ₹82,736.06 million ($\pm 19,120.29$ million) and ₹29,241.54 million ($\pm 5,018.29$ million) from the cultivation of paddy, wheat and sugarcane, respectively (at MSP), between 2012-13 and 2017-18 (t=6 years). It was reported by the farmers in Bhagalpur, Bihar that the occasional floods helped reduce the cost of cultivation due to the nutrients replenished by flood waters. The nine



commissioned hydropower plants in the Ganga and Alaknanda mainstem in Uttarakhand and the one nuclear power plant at Narora, prevented the emission of an estimated 9.93 million tCO₂ and 3.22 (± 0.18) million tCO₂, respectively, annually, considering coal burning thermal power plants as the alternative. While inland waterways have the lowest comparative inter-modal cost of transporting freight at ₹1.06/TKm as opposed to ₹1.43/TKm for railways and ₹2.62/TKm for roadways; however, when considering the comparative intermodal cost advantage of transporting freight



derived from ecosystem, (b) regulating — benefits derived from the regulation of ecosystem processes, (c) supporting — ecosystem services that are necessary for the maintenance of all other ecosystem services, and (d) cultural — non-material benefits obtained from ecosystems (The Economics of Ecosystems and Biodiversity). However, in this study, with the main focus on benefits and beneficiaries, we have merged the supporting and regulating services categories.

Ganga River, along with the Brahmaputra River, drains one of the largest, most

diverse and densely populated river basins in the world, providing life sustaining 'ecosystem services' to people residing along its banks (Table 6.1). With an estimated population density of 952.55 per square kilometre (Census 2011), as against 382 per square kilometre for India, the Ganga River hosts a vast population of diverse stakeholders with varying demands on the river and its resources, be it cultural, religious, social and economic. According to CPCB (2013), 7x10⁷ cusec of Ganga's surface water (33x10⁷ cusec), and 7x10⁷ cusec of Ganga's annual groundwater potential (11x10⁷ cusec) is being utilized. The local communities along the river are dependent upon the river for their very survival, be it water for drinking and domestic use or the ability to make a living by fishing, agriculture etc. Ganga has great cultural and religious significance that transcends not only the boundary of its basin but the borders of the country as well (Asanarong et al. 2017).

on National Waterway 1, from Haldia to Prayagraj, inland waterways has a comparative advantage only over roads at ₹605.93/tonne, with a disadvantage of (-) ₹352.03/tonne versus railways. Lease holders in Uttar Pradesh Ganga districts earned a revenue of ₹547,263,143.80/- by dispatching 1,716,849 m³ of sand from an area of 658.21 acre. Fish vendors and traders in Varanasi (n= 53) and Narora (n = 30), respectively, reported an estimated average annual income of ₹168,226.42 (± 316,996.52) and ₹355,200 (± 280,623.02), respectively. In Varanasi, 44.71% of local businessmen (n=110) reported an average income between ₹35,000/- and ₹134,999/- during tourist season. Vendors (n=136) at Kumbh Mela 2019 in Prayagraj reported a 210.07% (± 238) increase in daily income during Kumbh.

6.1. Introduction

Convention on Biological Diversity (CBD, 2018) defines an 'ecosystem' as "a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit".

Ecosystem functions and processes provide enumerable direct and indirect benefits that contribute to human wellbeing, collectively termed as 'Ecosystem Services' (CBD, 2008). These "benefits from nature" contribute to the quality of human life and support local and global economies. Any change in the state of ecosystems and the consequent impact on the provision of ecosystem services will impact human wellbeing. The Millennium Ecosystem Assessment (MEA, 2005) categorizes these ecosystem services into four groups, (a) provisioning — products



Table 6.1: Ecosystem services provided by river ecosystems

Ecosystem Service Category	Ecosystem Services		
	River Mainstream	Flood plain /Wetland	Riparian Area
<i>Provisioning</i>	Consumptive use: drinking, domestic, agriculture & industry Non-consumptive use: power generation & navigation/transport Aquatic organisms (fish etc.) Raw (biotic) material Riverbed material (sand, stones etc.)	Consumptive use: drinking, domestic, agriculture & industry Non-consumptive use: power generation & navigation/transport Aquatic organisms (fish etc.) Raw (biotic) material Riverbed material (sand, stones etc.)	Food Raw (biotic) material Raw (abiotic) material (NTFPs etc.) Pest control
<i>Regulating & Maintenance (or Supporting)</i>	Maintaining Populations & Habitats Water cycling Water purification Nutrient cycling	Maintaining Populations & Habitats Water cycling Water purification Nutrient cycling	Climate regulation Carbon storage & sequestration Erosion prevention Flood protection Soil formation Waste treatment Bank stabilization Maintaining Populations & Habitats Pollination Water supply & regulation Water purification Nutrient cycling
<i>Cultural</i>	Recreation Tourism Religious & Spiritual Education	Recreation Tourism Religious & Spiritual Education	Recreation Tourism Religious & Spiritual Education

The current resource use/river management scenario is not only inequitable and unjust; but the increasing anthropogenic pressures, and planned and unplanned development of and along the Ganga River is degrading the river ecosystem and its ability to provide vital ecosystem services. Generally, policy decisions undertaken do not account for ecosystem services due to lack of documentation of quantified values. The evaluation of the ecosystem services, in both functional and monetary terms, will play a significant role in the decision-making processes pertaining to the management of Ganga River and its resources.

6.2. Aim

Identification and evaluation of key ecosystem services provided by Ganga river mainstem.

6.2.1. Objectives

- To identify the key ecosystem services provided by the Ganga River.
- To develop a framework for assessing the ecosystem services of Ganga River.
- To evaluate select ecosystem services provided by the Ganga River at select sites.

6.3. Approach

6.3.1. Assessment approach

Evaluating all the ecosystem services of a river as long and diverse as the Ganga is a cumbersome task requiring vast resources — financial, human and time; hence, a framework was designed for their valuation that not only accounts for the resource constraints but also the relevance of the ecosystem services provided, considering the vast and diverse population that resides along the Ganga River. Reflecting the variations in geology, geomorphology, soil type, climate, flora and fauna, and social and economic issues, the main stem of the Ganga River can be divided into three stretches i.e. upper Ganga (Gaumukh to Haridwar), middle Ganga (Haridwar to

Varanasi) and lower Ganga (Varanasi to Ganga Sagar). Given the distinctions in the three segments of the river, the ecosystem services provided by them will differ in type and extent; therefore, the identification of key ecosystem services for evaluation was carried out stretch-wise by conducting an extensive literature review, and reconnaissance and field survey. Ecosystem services were selected for valuation based upon three factors, (a) the perception of various stakeholders regarding their contribution to human wellbeing and livelihood, (b) the extent and importance of services provided, and (c) the cost, time and man power requirement of conducting an evaluation, gauged by conducting a literature review and discussion with experts (Figure 6.1; Annexure 5.1).

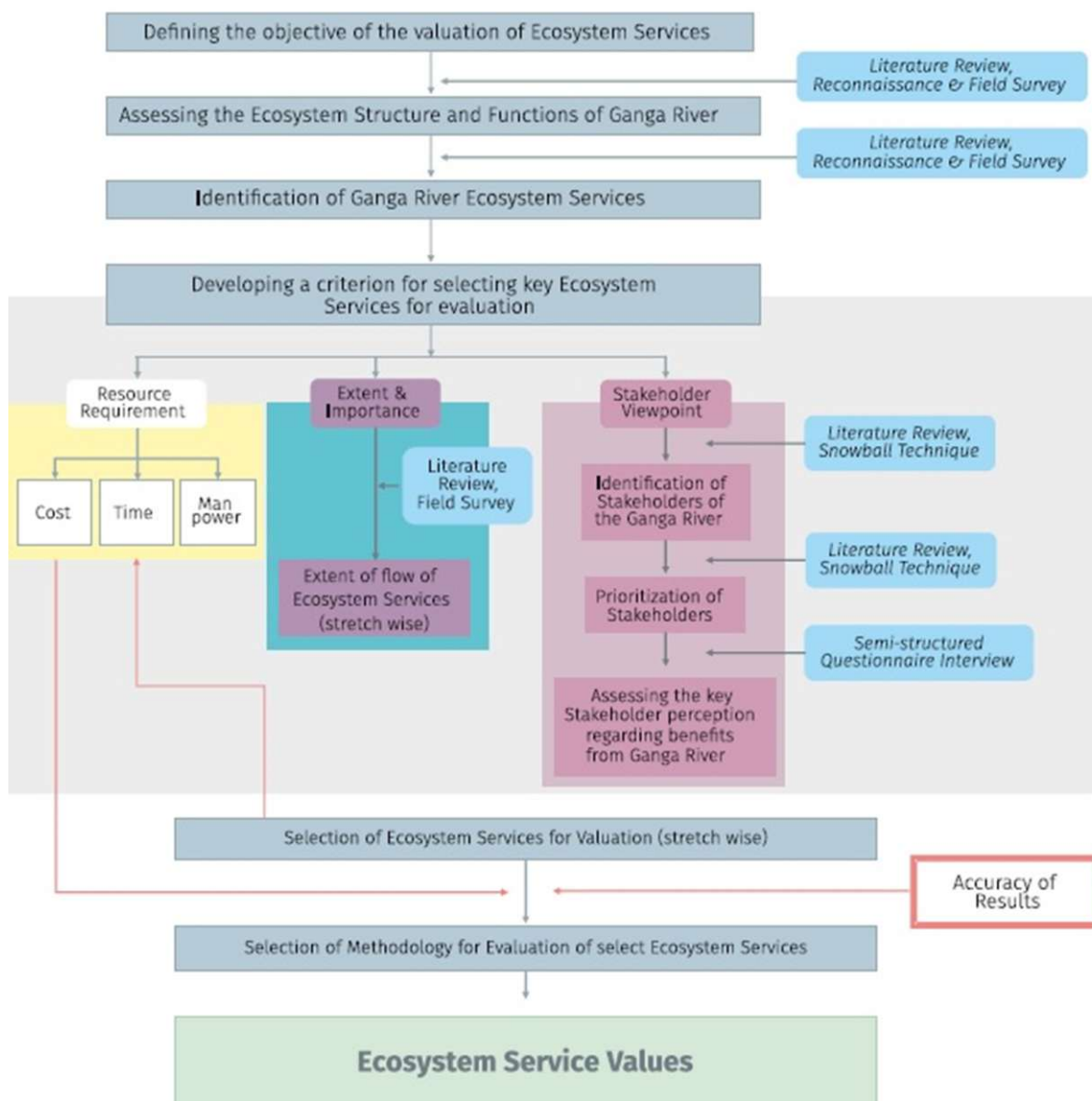


Figure 6.1: Framework for the evaluation of Ganga River ecosystem services

6.3.2. Valuation techniques

By exploring the type of values to be elicited for each selected ecosystem service, using the Total Economic Value (TEV) framework, the available literature was reviewed to identify the valuation techniques. The resource requirements for executing the methods and

the accuracy of results generated was examined and the most resource efficient standardised method was used (Table 6.2). Sites for valuation were selected by conducting a reconnaissance survey. Secondary data was collected from records and websites of concerned departments, existing literature, which was supplemented primary data collection at select sites.

Table 6.2: Methodology adopted for evaluating the select ecosystem services at select sites

Ecosystem Service	Study Site	Methodology
Water for drinking and domestic use	Upper Ganga (Srinagar, Uttarkashi, Haridwar) Middle Ganga (Meerut, Kanpur, Mirzapur, Varanasi) Lower Ganga (Patna Urban Area, Bhagalpur, Kolkata Municipal Corporation)	Benefit Transfer Data: Secondary data from Government departments/ reports; peer reviewed literature
Benefits to agriculture (water for irrigation and soil fertility)	Lower Ganga (Bihar)	Market Price Data: Secondary data from Government departments/ reports
Water for power generation	Ganga River mainstem & Alaknanda	Benefit Transfer Data: Secondary data from Government departments/reports; peer reviewed literature
Water for transportation	Middle & Lower Ganga (National Waterway 1 — Prayagraj to Haldia)	Avoided Cost Data: Secondary data from Government departments/reports
Riverbed material	Middle Ganga (Uttar Pradesh)	Market Price Data: Secondary data from Government departments
Provision of fish	Middle Ganga (Varanasi, Narora)	Market Survey Data: semi-structured questionnaire-based interview survey
Recreational/ religious/ spiritual services	Middle Ganga (Varanasi, Prayagraj)	Market Survey Data: semi-structured questionnaire-based interview survey

6.4. Outcomes

6.4.1. Value assigned to ecosystem services by various stakeholders

Stakeholders groups (n = 30) were identified and prioritised for survey, based upon their influence and dependency, via an extensive literature review and snowball technique. The opportunistic sampling technique was used to conduct a semi-structured questionnaire-based survey of the stakeholders. A total of 503 respondents were surveyed along the Ganga river — 175 in upper Ganga, 131 in middle

Ganga and 197 in lower Ganga. In upper Ganga, water for drinking was the most cited ecosystem service (60.90% of the respondents), followed by water for irrigation (56.41%) and religious/spiritual services (44.87%). In middle Ganga, water for irrigation was the most cited ecosystem service (55.91% of the respondents), followed by religious/spiritual services (39.37%), and water cycle and water for drinking (28.35%). In lower Ganga, water for irrigation was the most cited ecosystem service (65.48% of the respondents), followed by provision of fish (50.60%), and water for drinking and religious/spiritual services

(48.21%). 10.90%, 23.62% and 26.19% of the respondents in upper, middle and lower Ganga, respectively, mentioned that the Ganga River

maintains population and habitat for diverse floral and faunal species (Figure 6.2a,b; Annexure 5).

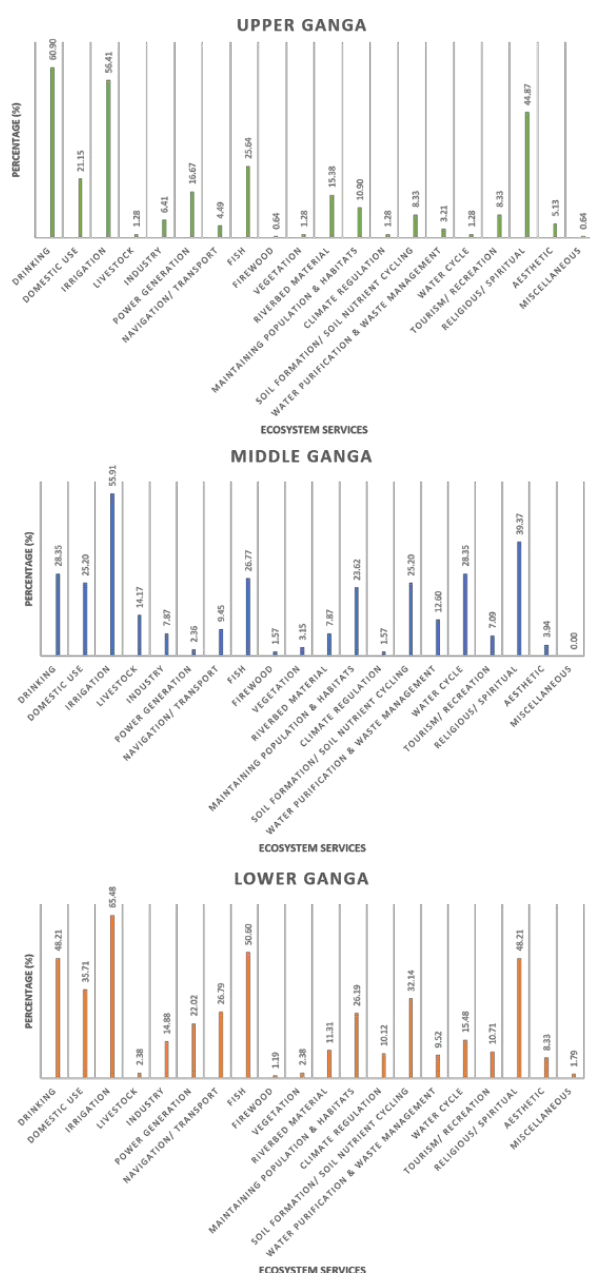


Figure 6.2a: Ecosystem services cited by stakeholders from upper, middle and lower Ganga stretches

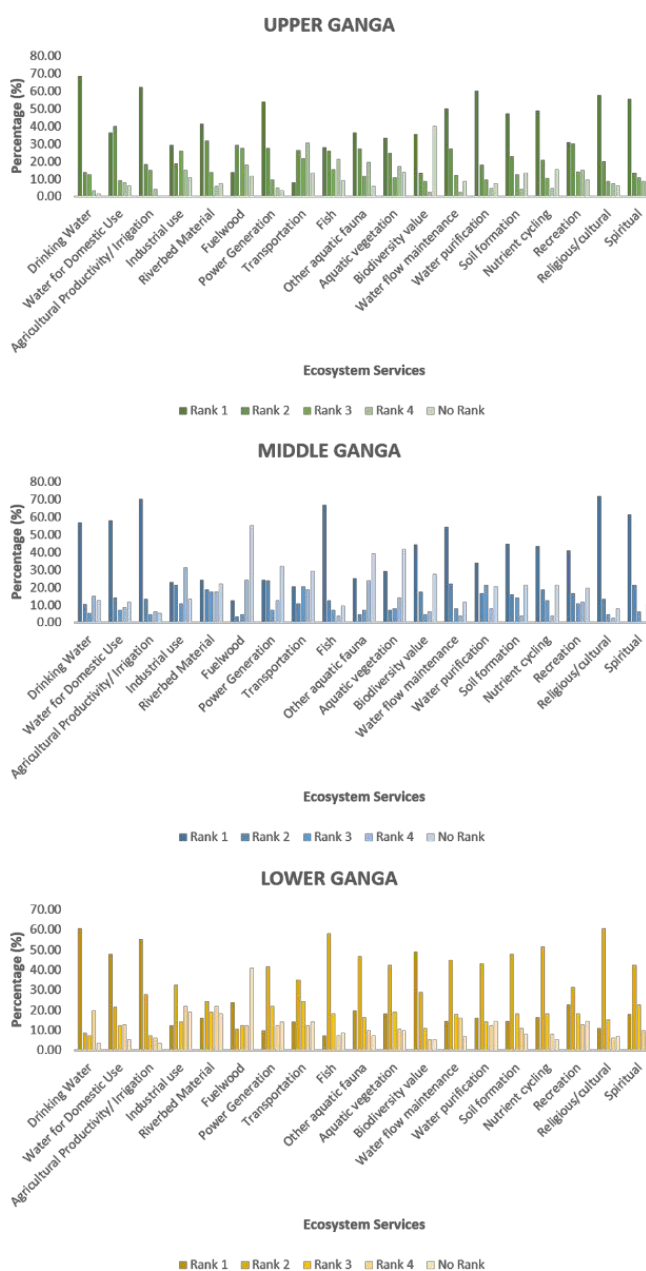


Figure 6.2b: Extent of the ecosystem services provided by the Ganga River as perceived by stakeholders from upper, middle and lower Ganga stretches

6.4.2. Ecosystem Service Extent Assessment

The extent and importance of ecosystem services provided by Ganga River was assessed by conducting

an extensive literature review, surveying the river and conducting meetings with representatives of various stakeholder groups (Table 6.3; Annexure 5).

Table 6.3: Ecosystem services provided by Ganga River and their extent

Ecosystem Services	Upper Ganga	Middle Ganga	Lower Ganga
Provisioning Services			
Consumptive use of water			
Drinking	•	●	●
Domestic use	•	●	●
Agriculture (irrigation)	•	●	●
Livestock (drinking, bathing etc.)	•	●	●
Industry	•	●	●
Non-consumptive use of water			
Power generation (hydro, nuclear and thermal)	●	•	•
Transportation	○	●	●
Resource Material			
Fish and other aquatic fauna for food	•	●	●
Fuelwood	•	•	●
Riverine vegetation for multiple uses	•	•	•
Riverbed material	•	●	●
Regulating & Supporting Services			
Maintaining population & habitat	●	●	●
Regulation of micro climate	●	●	●
Soil fertility	•	●	●
Soil formation (sediment deposition)	○	●	●
Water purification and waste management	●	•	•
Water cycle	•	•	•
Storm protection (through mangroves)	○	○	●
Cultural Services			
Tourism	●	●	●
Religious/Spiritual	●	●	●
Aesthetic	●	●	●
Heritage sites	●	●	●
Ecosystem Services: ○ → none; • → little/sometimes; ● → medium; ● → large			

6.4.3. Ecosystem Service Evaluation

After assessing the Ganga River ecosystem and its functions, 22 key ecosystem services were identified, of these eight ecosystem services, namely, water for drinking and domestic use and power generation, benefits to agriculture i.e water for irrigation and soil fertility, riverbed material, provision of fish, water for transportation, and recreational and religious/spiritual services, were selected for valuation.

Water for drinking and domestic use

Ganga River is an important source of water for drinking and domestic use for the 54 'Class-I' cities and 30 'Class-II' towns situated along its banks. The water supply system of 10 urban centres along the

Ganga River, namely, Srinagar, Uttarkashi, Haridwar, Meerut, Kanpur, Mirzapur, Varanasi, Patna Urban Area, Bhagalpur and Kolkata Municipal Corporation, including Joka in Southwest Kolkata, Anandapur and Patuli in Eastern Kolkata, was examined (Figure 6.4). It was noted that 1574.29 MLD surface water and 1008.675 MLD ground water is being withdrawn daily to meet the demands of the population. A study by Venkatachalam (2014), estimated the willingness to pay of urban poor for improved water supply in Chennai, Tamil Nadu at ₹ 370.12 per month; based on this estimate, the water extracted is valued at ₹51.79 million and ₹33.19 million, assuming constant utility per unit of consumption (Annexure 5).

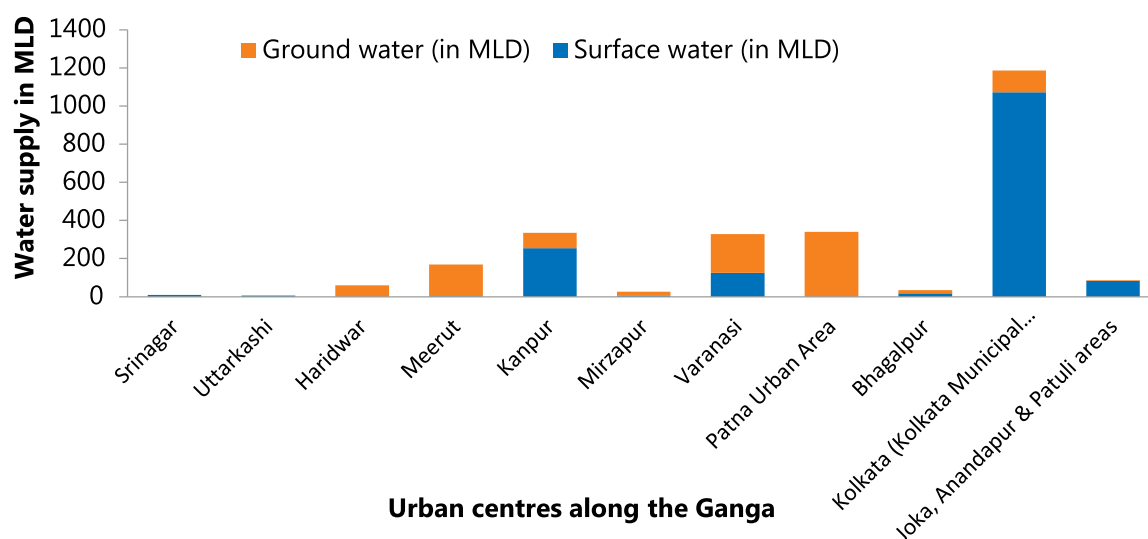


Figure 6.4: Urban surface and ground water supply of ten urban centres along Ganga River

Benefits to agriculture (water for irrigation and soil fertility)

Ganga and its tributaries drain a large flat and fertile plain in North India, irrigating millions of acres of agricultural fields along the river banks. There are five major canal systems in the middle reaches of the Ganga with a total head discharge of 40636 cusec and a Cultivable Command Area of 2,708,123 ha. Eutric Cambisols, among the most productive soils on earth (Food and Agriculture Organisation), cover 34.03% of the area in the five Ganga states (Figure 6.5). The Ganga states have a total cropped area of 45,955,000 ha (averaged over 2012-13, 2013-14, 2014-15), which comprises of 82.5% of the total geographical area of these states. There are an estimated 34,799,700 agricultural households (June 2012-July 2013) in the

five Ganga states, which is 60.28 % of the estimated 57,731,200 rural households. The districts along the Ganga River in Bihar support 2,059,792 cultivators, which account for 16.03% of the cultivators in the Ganga districts, who earned on an average, between 2012-13 and 2017-18 (t=6 years), an estimated ₹107,614.34 million (±14,766.95 million), ₹82,736.06 million (±19,120.29 million) and ₹29,241.54 million (±5,018.29 million) from the cultivation of paddy, wheat and sugarcane, respectively (at MSP).

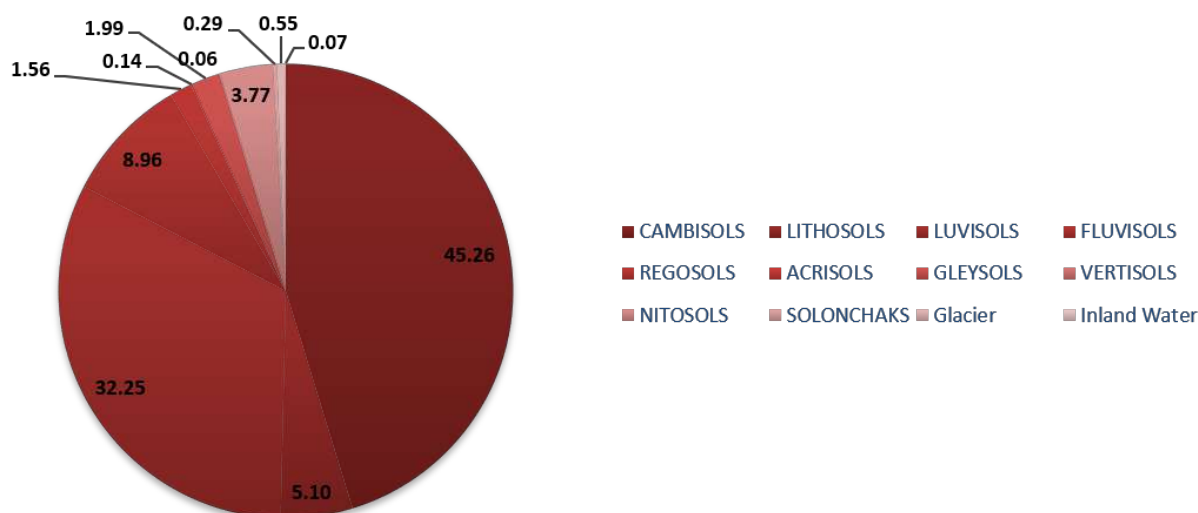


Figure 6.5: Percentage area under different soil categories in the five Ganga states

Power generation (hydro, nuclear and thermal)

In the upper stretch, Ganga River flows on a steep and narrow bed, made of mostly rocks and boulders, and is considered to have tremendous potential for harnessing hydropower. In the middle and lower stretch, there are nuclear and thermal power plants that draw water from the river for their cooling systems. In the Ganga and Alaknanda mainstem, there are currently nine commissioned hydro power plants (HEP) (> 1MW) with an estimated potential of 2777.3 MW and annual generation of 10,441.54 million units. The Narora Atomic Power Station (NAPS) with an

estimated potential of 440 MW, generated 3402.50 (± 194.80) million units annually, between 2015-16 and 2018-19. There are currently 17 commissioned thermal power stations, 14 coal and three gas powered, with an estimated potential of 14,091.40 MW. Based on the study by Gagnon et al. (2002) and considering coal burning thermal power plants as the alternative, the nine HEPs and NAPS prevented the emission of an estimated 9.93 million tCO₂ and 3.22 (± 0.18) million tCO₂, respectively, annually (Figure 6.6; Annexure 5).

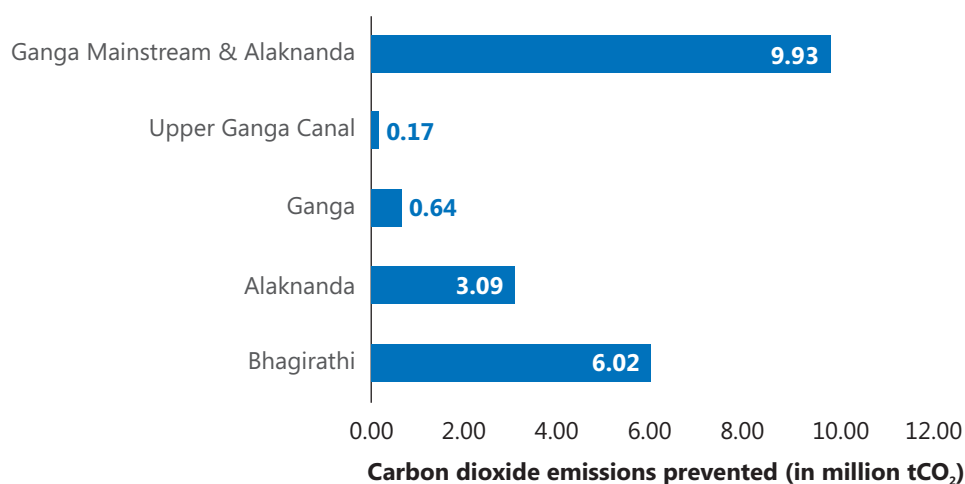


Figure 6.6: Emission of Carbon dioxide (in million tCO₂) prevented by the commissioned hydropower plants along Ganga mainstem and Alaknanda

Table 6.4: Comparative intermodal cost (₹/Tonne) of transporting freight from Haldia to Prayagraj, along National Waterway 1

Mode	Total Distance (km)	Total Cost (₹/Tonne) (before GST)	Total Cost (₹/Tonne) (after GST)
Railways	956	1300.16	1365.17
Roadways (NH 19)	885	2212.50	2323.12
Inland Water Transport	1620	1717.20	1717.2

Source: Based on the estimates by RITES 2014

Provision of riverbed material

In the Uttar Pradesh Ganga districts, 1,716,849 m³ quantity of sand was dispatched from an area of 658.21 acre by lease holders, on which they earned revenue of ₹547,263,143.80/- (as on 27th January, 2020). The fertile alluvial Indo-Gangetic plains produce over 65% of the bricks manufactured in India (Centre for Science and Environment). The alluvial soil in the Indo-Gangetic plain is suitable for manufacturing different types of bricks; there are 2389 brick kilns operating in the state of Bihar.

Provision of fish

Ganga River supports 236 fish species — 58 species in upper Ganga, 135 species in middle Ganga and 180 species in lower Ganga, belonging to 58 families, including the commercially important Indian Major Carps (WII-GACMC, 2018). Fish vendors and traders surveyed in Varanasi (n= 53) and Narora (n=30), respectively, reported an estimated average annual income of ₹168,226.42 (± 316,996.52) and ₹355,200 (± 280,623.02), respectively.

Recreational value

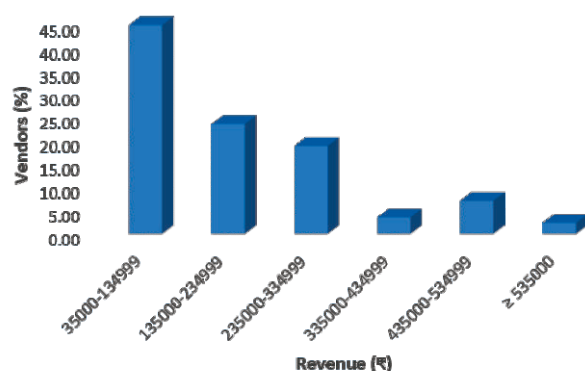
Ganga River has deep cultural significance, drawing people to its banks from all walks of life across the globe, supporting the economy of various cultural centres along the river. Local business owners (n =

110) were surveyed in Varanasi in order to assess the importance of tourism for their livelihood. 44.71% of the vendors that responded (n = 85) earned between ₹35,000 and ₹134,999 during the tourist season (Figure 6.7). Vendors (n = 136) at the Kumbh Mela 2019 in Prayagraj reported a 210.07% (± 238) increase in daily income during Kumbh, with an average daily income of ₹6,231.56 (±26,852.17) during Kumbh as opposed to ₹2,251.79 (±7,717.24) during business as usual scenario i.e. without Kumbh (Annexure 5).

6.5. Conclusions

Valuation of ecosystem services can aid in recognising, demonstrating and capturing ecosystem service values in policy, planning and management pertaining to natural resources (Haines-Young and Potschin, 2010). Ganga River ecosystem provides multiple direct and indirect benefits that affect the human wellbeing of the numerous stakeholders that are dependent upon it. Valuation of these ecosystem services can be an indicator of the values of some of the ecosystem services provided by this river, and can aid an informed decision-making process. Values generated can be useful in raising awareness, environmental accounting, setting priorities, assessing liability and designing an implementation strategy (Pascua et al., 2017) for the Ganga River that is just and ensures the sustained provision of these ecosystem services.

Ganga River caters to a large population of numerous stakeholders, who exercise competing demands on the river and its limited resources. Any meaningful attempt to rejuvenate the Ganga River will include the engagement of its stakeholders at all levels (Bower et al., 2017). One popular market-based mechanism to facilitate this is "Payment for Ecosystem Services" (PES); defined as "financial incentives given directly to landholders to compensate them for implementing good (or comparatively "better") land management, including conservation activities, to "voluntarily (voluntarily in this case does not imply "freely" or

**Figure 6.7:** Revenue earned by local business owners in Varanasi during the tourist season (September to April)

"without a return")" provide (or continue providing) certain required (by private or public entities) services instead of monetizing their "natural capital" otherwise" (Capodaglio and Callegari, 2018). PES schemes have the ability to induce behaviour change by making river conservation more attractive from an

economic perspective than "business as usual". The framework and evaluation can help identify the benefits and beneficiaries to develop a PES model that engages the custodians of the Ganga River in its conservation (Box 6.1).

Box 6.1

A payment for ecosystem services model to integrate ecosystem service value of Ganga in policy making

Payment for Ecosystem Services (PES) is "a voluntary transaction where a well-defined ecosystem service (or a land use likely to secure that service) is 'bought' by a (minimum of one) ecosystem service buyer from a (minimum of one) ecosystem service provider; if and only if the service provider secures ecosystem service provision (conditionality)" (Fripp 2014, Smith et al. 2013, Wunder 2005) (Figure 1).

A 'PES scheme can develop in one of two ways: either at least one set of stakeholders recognizes a noticeable depletion in resources, leading to true demand, or a particular aim is identified, usually in relation to protection or management of national resources and a PES system is introduced to create a market for the service' (Savy and Turpie 2004).

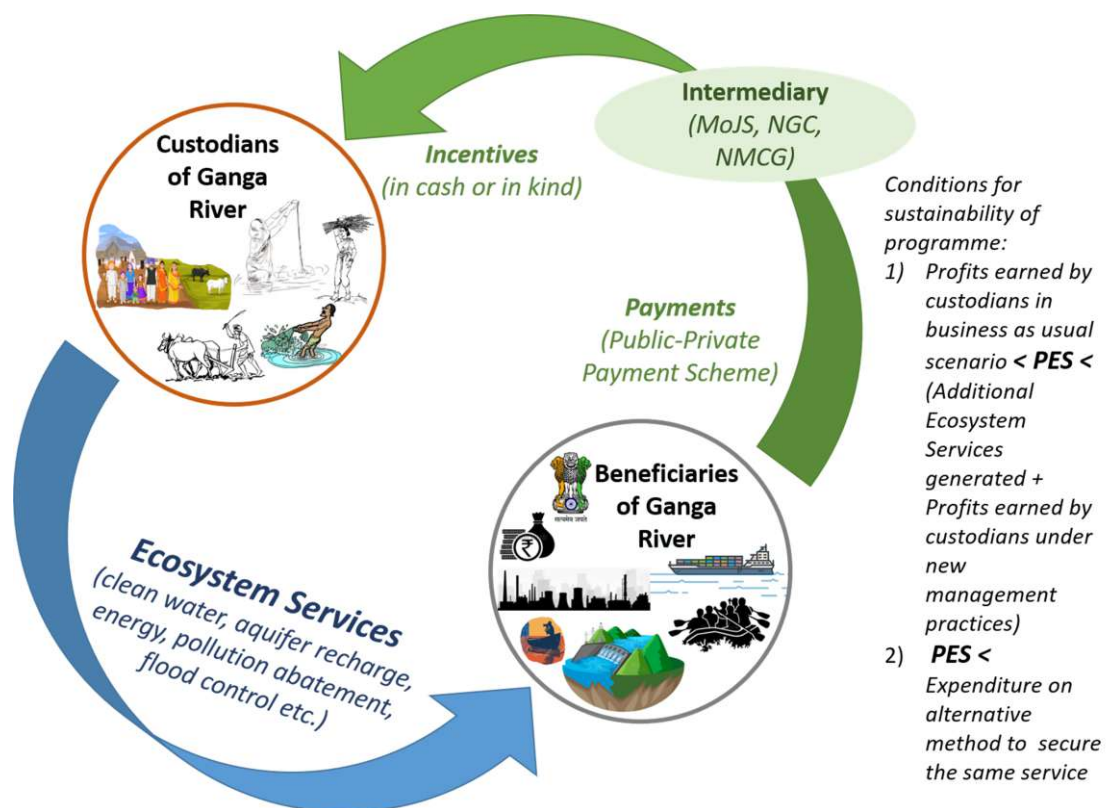


Figure 6.8: The underlying principle beneath a Payment for Ecosystem Services programme

Given the geographical extent of the Ganga River basin and poor economic status of its primary custodians and beneficiaries, an eco-compensation scheme designed to induce behaviour change in the local communities, particularly riverside communities, to enhance the productivity of the river ecosystem and ensure the sustainable supply of its services (Figure 2). The local communities, especially the farming and fishing community, must be incentivised, in cash or kind, to adopt best practices by the Government, centre or state, through various schemes that target an element of sustainable farming or fishing. With aquatic biodiversity conservation as the goal, interventions must be prioritised and initiated in the conservation priority zones identified in mainstem Ganga.

A detailed study of the river basin must be undertaken to identify and map the direct and indirect drivers of change, specifically the anthropogenic influences, and flow of ecosystem services locally, regionally and globally. Stakeholders at all levels of influence and impact must be identified, the beneficiaries verified and the benefits valued. Site specific interventions for biodiversity and river conservation, and the corresponding incentives for the interventions must be designed and implemented. In order to ensure the sustainability, efficacy and efficiency of the PES programme, a system of responsibility and accountability must be established, including a monitoring protocol with a clear evaluation criterion.

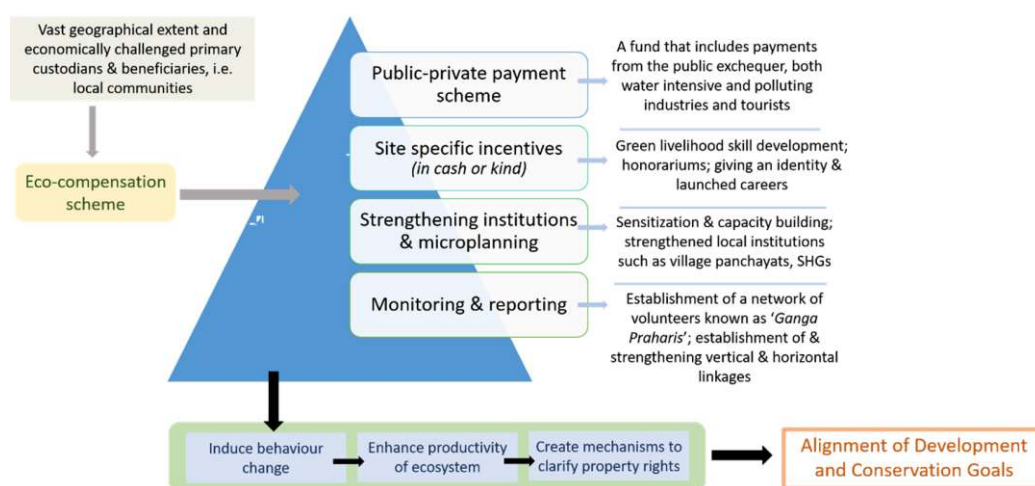


Figure 6.9: A payment for ecosystem services model for the Ganga River.

There are three types of PES financing schemes, namely, public payment scheme, private payment scheme or self-organised private deals, and public-private payment schemes (Figure 3). In the case of a mixed economy like India, with elements of both capitalism and socialism, and given the

geographical scale of the Ganga River and the diversity of its stakeholders in the primary, secondary and tertiary sectors of the economy, a public-private payment is most apt than a purely private or purely public payment scheme.

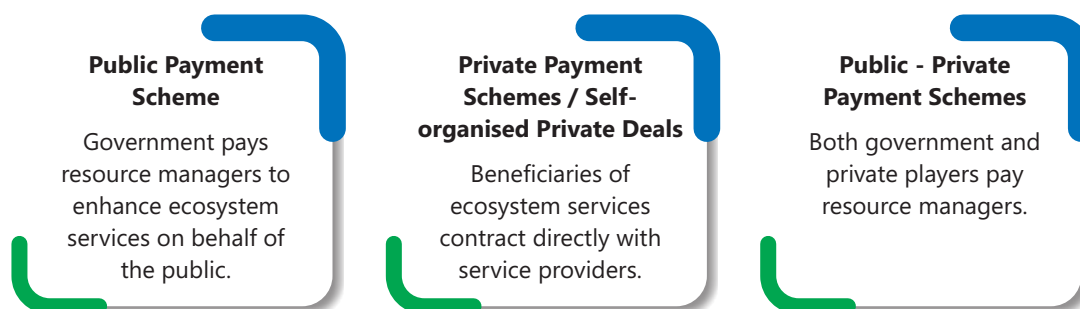


Figure 6.10: Financing schemes for a Payment for Ecosystem Services programme.

To finance the PES programme, budgetary allocations must be made in both the central and state budgets to a fund created specifically for the programme. Given the deep cultural and religious significance of the River, there is a thriving religious-based tourism along the River, especially in cultural and spiritual centres like Varanasi, Haridwar, Prayagraj, Rishikesh etc., which witness heavy tourist footfall, particularly during festival season. Tourists and hospitality sector actors like hotels, tourist operators etc. must be asked to contribute a token amount into the fund. Actors in the hydro, nuclear and thermal power sector, both generation and transmission, must also contribute to the fund. Urban centres and industries along the river drawing water directly from the River must contribute a token amount into a river conservation fund.

Additionally, Industries along the river that directly or indirectly benefit from River, such as agro-based industries, must encouraged to into partnership with local communities to facilitate the sustainable management of source of raw material; for example, sugar mills can be encouraged to enter into partnership with sugarcane farmers for the adoption of sustainable cultivation practices.

Investments must be made into physical, human and social capital that support the generation of financial capital to encourage investment into and enhance the natural capital. Need to develop a PES programme funded via a public-private payment scheme wherein both the Government and private sector entities pay for the provision of the ecosystem service, that can replicated or adapted based on the requirements, at each level of governance, national, state, district and village levels, in order to generate a diversified, robust, efficient and sustainable combination of initiatives and programmes that attempt to create a market or correct for the market failures for the myriad ecosystem services. In order to improve the efficacy and efficiency of the PES programmes, continuous monitoring and evaluation of the management practices and the generation and delivery of the ecosystem services is must, in order to ensure additionality (increase in ecosystem services generation), and minimize wastage of resources. A scientific baseline must be prepared that not only details the current generation and delivery of resources, but also contains information on degradation and improvement under the current management regime.

Additionally, the multitudinous services that the Ganga River provides interrelate in a 'complex dynamic' manner, resulting in synergies and trade-offs between the different ecosystem services. Development initiatives focusing on the production of a particular ecosystem like hydro power generation can increase the production of some ecosystem services like power generation, recreation, at the cost

of others such as biodiversity, fish etc.; benefiting some at the cost of others. River management strategies to ensure sustainable provision of ecosystem services must incorporate an analysis of the impact of any intervention to enhance the supply of one service on the provision of others.







Chapter 7

MAINSTREAMING GANGA BIODIVERSITY CONSERVATION IN LOCAL DEVELOPMENT PLANNING USING DIGITAL TECHNOLOGY: DIGITAL VILLAGE MICROPLANS

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Summary

This chapter summarizes the efforts to streamline biodiversity conservation of Ganga River in development planning as well as scientifically empower the local communities for effective decision making and implementation process. A village microplanning guideline has been developed after review of existing literature, collection of primary information from the field and consultation with experts. Based on the village microplanning guideline, microplans have been prepared for the villages located in the three Ganga stretches i.e. upper, middle and lower. Microplans were finalized after rigorous consultations with multiple stakeholders including local communities representing varied socio-economic backgrounds, members of local governments, district administration and local institutions. Based on the integrated participatory approach, these village microplans address the issues of Ganga River conservation, socio-economic challenges, and discuss the potential future actions and recommendations for strengthening the engagement of multiple stakeholders and institutions. To maintain the transparency and ease of implementation of microplanning process, all the microplans have been digitalized, under which conservation and development challenges of the village have been categorized into nine strategic themes of which six themes, namely, livelihood and skill development, agriculture, animal husbandry, fisheries, renewable energy and community-based institutions were under trust building category, and three themes, namely, community awareness, hygiene and sanitation and biodiversity conservation were



under generic category. Village microplans (n= 12) were developed for villages Sirour in Uttarakhand; Rajghat, Udaigarhi, Domari, Tatepur, Rampur and Dhaka in Uttar Pradesh; Shahzadpur and Teentanga Diyara in Bihar; and Maskaliyan, Ghat Jamini and Mokhimpur in Jharkhand. The digital village microplan framework is active on the intranet services of WII.

7.1. Introduction

In India, the concern of conservation and restoration of Ganga River is of national importance and necessitates involvement and participation by multiple stakeholders representing national, regional, state and local level institutions. Integration of Ganga River conservation in local development planning was carried out through village level microplanning. It is an all-inclusive process involving local communities and village councils, known as Gram Panchayat, in identification, prioritization, planning, decision making and implementation stages of development and conservation planning along with establishing alliances and convergence with institutions, concerned departments and stakeholders (Burki et al.

1999; World Bank, 2000; Bardhan, 2002; Kessy and McCourt, 2010; Kowler et al. 2016). It ascertains participation from local communities and other stakeholders, motivating people to ponder over potential solutions, encouraging them to implement the action plan prepared by them (Hadingham, 2003; Vincent & Stephen, 2015; Wahid et al. 2017).

During the microplanning process, an enormous amount of social, ecological and economic information about village in collated, therefore, it becomes





challenging in communicating the same with the concerned government departments, institutions and other line agencies while maintaining the transparency of the data. Use of technology such as IT tools and GIS has contributed in planning, administration and governance at the grassroots level. Use of digital technologies have significantly contributed in cost effectiveness, time management, data handling and sharing and in various fields (Dunleavy et al. 2006; Milakovich, 2005; Obi, 2007; West, 2005; Milakovich, 2014).

7.2. Aim

To create a digital framework and a repository of village microplans developed for mainstreaming biodiversity conservation of the Ganga River in local development planning.

7.2.1. Objectives

1. To promote mainstreaming conservation of biodiversity of the Ganga River in local development planning and decision-making processes.
2. To strengthen inter-departmental coordination involving various government and non-government institutions at all level.

7.3. Approach

For the study, the selection of villages was based on four criteria: 1) the distance of the villages from the Ganga River, 2) biodiversity value of the area, 3) dependence of local communities on the River for their livelihood security and, 4) their willingness towards participating in biodiversity conservation activities for the Ganga River. The method involved mainly three processes that is 1) development of microplanning guideline, 2) preparation of village microplans and, 3) digitalizing the village microplans using various softwares. The development of village microplans is based on an integrated participatory model framework, providing a platform for interaction between multiple stakeholders on social, ecological, conservation and developmental issues and conflicts, as well as, institutional challenges (Figure 7.1; Annexure 6).

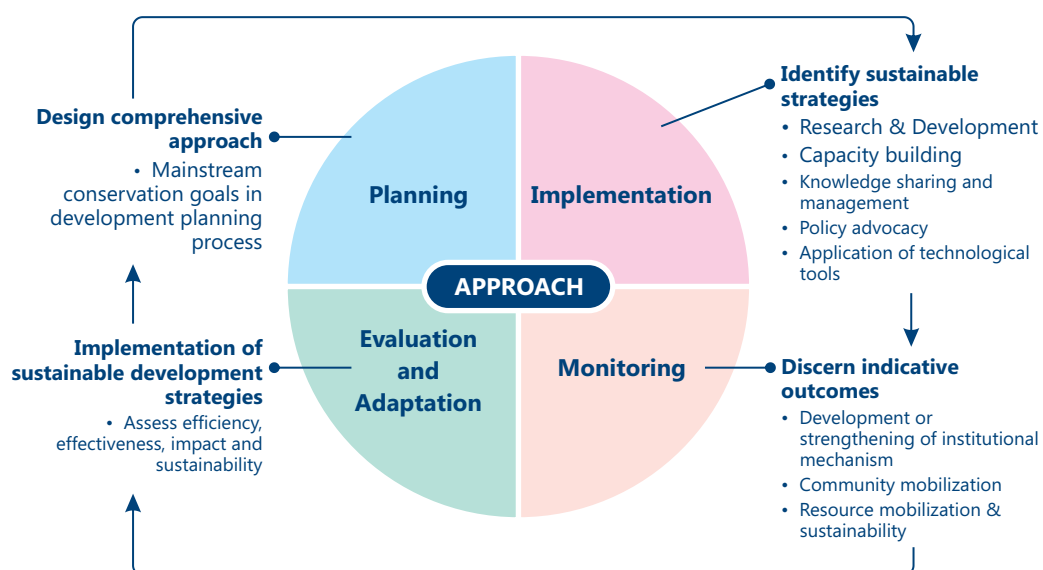


Figure 7.1: Approach for conservation sensitive village development planning

7.3.1. Development of Village Microplanning Guideline

Development of the village microplanning guideline involved extensive literature review on the concept of decentralization, community-based conservation, village level microplanning, local development planning, digital technologies used in nature conservation etc. followed by consultations, meetings and workshops with multiple stakeholders of various

departments and line agencies on different aspects of village microplans such as awareness, livelihood and skill development, convergence with departments and line agencies, and digital linkages.

7.3.2. Development of Village Microplans

Based on the microplanning guideline, village microplans were prepared for select villages. Before starting the process of developing microplans for the villages, a Memorandum of Agreement (MoA) was

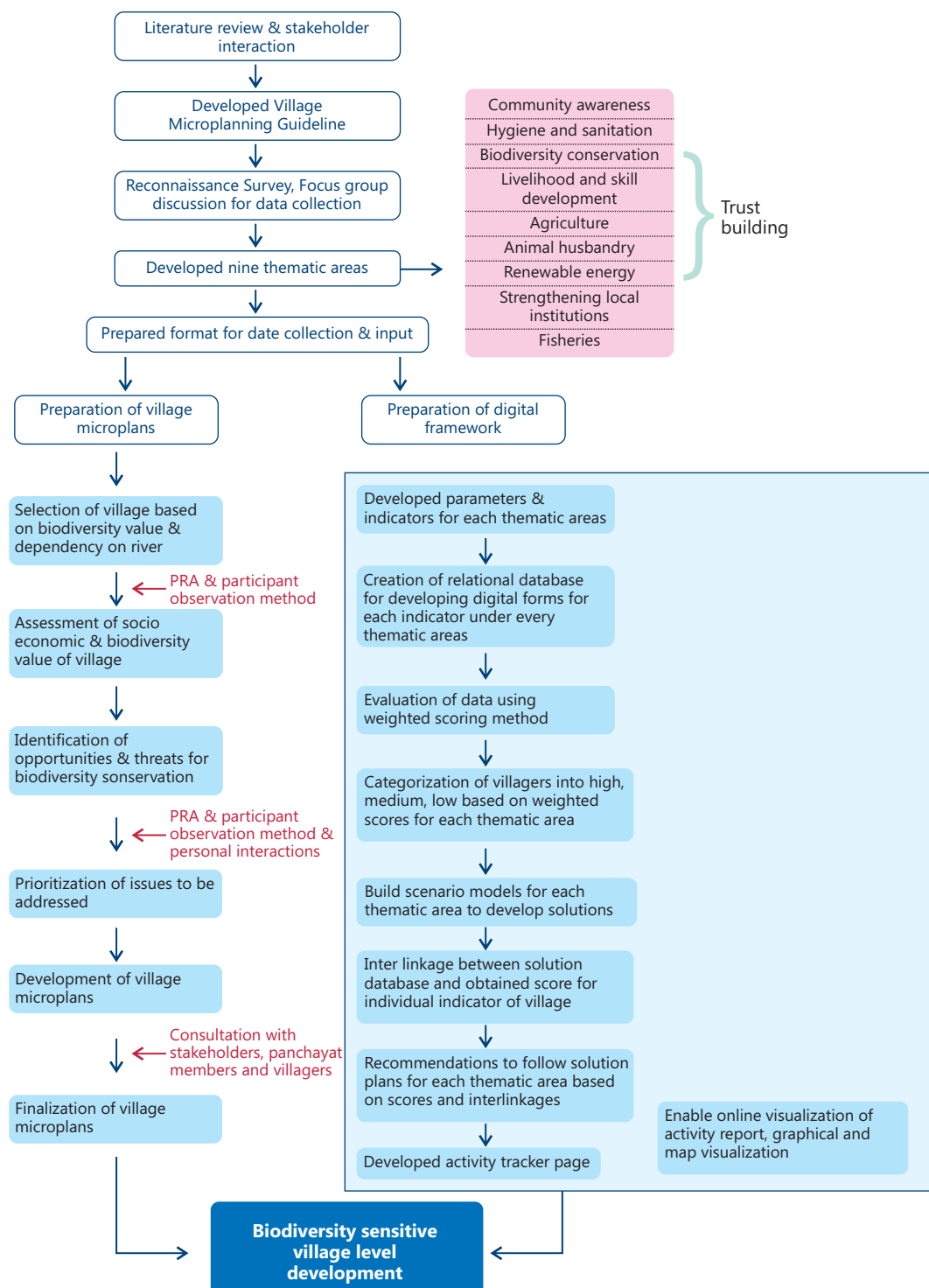


Figure 7.2: Flowchart depicting the approach adopted for preparation of village microplan

signed (n= 12) by the Gram Pradhan (Village Head) of the respective Gram Panchayat as their support for conducting the project activities in the village. Using questionnaire-based interviews, stakeholder meetings, and focus group discussions (n= 30) with various groups including Gram Panchayat and ward members, women and youth groups, fishermen, farmers, shopkeepers etc. were conducted to collect information on the socio-ecological challenges prevalent in the village. Consultative meetings were conducted with block development office and various departments of district administration in order to design the microplan in a holistic manner. The draft microplan was discussed in detail for its feasibility and finalized by the Gram Pradhan, ward members and other members of the local communities. A letter of consent was signed by the Gram Pradhan as an approval for support and implementation of the microplan (Figure 7.2).

7.3.3. Development of Digital Framework of Village Microplan

On a digital platform using the SQL server, a relational database was created (Figure 7.2). In this framework, conservation and development challenges of the village have been categorized into nine strategic themes of which six themes, namely, livelihood and skill development, agriculture, animal husbandry, fisheries, renewable energy and community-based institutions were under trust building category and three themes, namely, community awareness, hygiene and sanitation and biodiversity conservation were under generic category. For each theme, indicators have been identified followed by scoring for assessing the present status and impacts of the activities on the Ganga River.

7.4. Outcomes

7.4.1. Microplanning guideline

A village microplanning guideline document has been prepared elucidating the aim, process of microplanning and role of various stakeholders including agencies and institutions (government and non-government departments, local communities and other line agencies) in implementing the village microplans. The guideline also comprises of the list and role of concerned departments and line agencies whose involvement in the implementation of the microplans is crucial along with the participation of local communities and institutions at the grassroots level. This guideline is a reference document for developing village microplans (Figure 7.3).

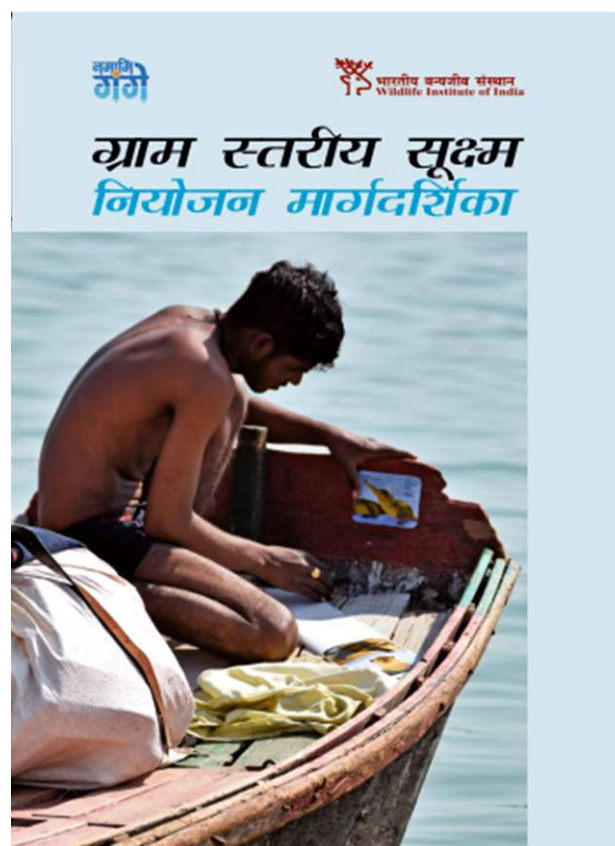


Figure 7.3: Microplanning Guideline

7.4.2. Village level microplans

Village microplans were developed for villages Sirour in Uttarakhand; Rajghat, Udaigarhi, Domari, Tatepur, Rampur and Dhaka in Uttar Pradesh; Shahzadpur and Teentanga Diyara in Bihar; and Maskaliyan, Ghat Jamini and Mokhimpur in Jharkhand (Figure 7.4). The microplans discuss in detail the socio-ecological challenges of the Ganga River conservation along with the roles and responsibilities of various stakeholders.

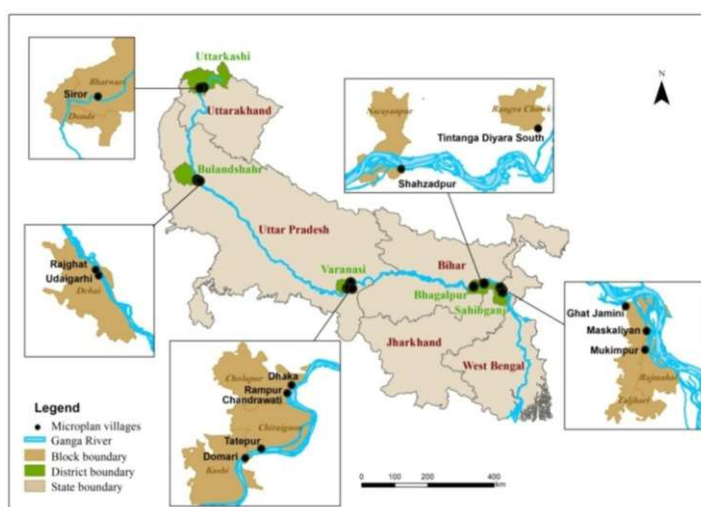


Figure 7.4: Map depicting the location of 12 villages for which village microplans have been developed

7.4.3. Digital microplans

The digital village microplan framework is active on the intranet services of WII (Figure 7.5). Digital microplans are in line with the village microplans developed. The digital framework addresses the identified issues of village development and Ganga conservation categorized under nine strategic plans

(Annexure 6). The digital microplan has nine strategic areas. Among them three are generic that is biodiversity conservation, community awareness, and hygiene and sanitation; and six are trust building strategies viz., community-based institution, livelihood and skill development, renewable energy, agriculture, animal husbandry, fishery addressing various issues of Ganga conservation and village development.

Figure 7.5: Snapshot representing the basic form of the digital microplan for collecting basic information of the village

Key social and ecological issues/challenges identified across all the three stretches in the 12 village microplans i.e. lack of awareness among stakeholders on Ganga biodiversity conservation, dependence on resources of Ganga due to lack of livelihood alternatives, over exploitation of biological resources e.g. fishing, non-functional and lack of local institutions, ineffective waste management, disposal of religious waste into river, agricultural runoff, and lack of convergence between departments and

sectors for implementation. Strategies were developed to address the identified issues/challenges along with the roles and responsibilities of multiple stakeholders in designing and implementing a conservation sensitive rural development plan for Ganga River (Figure 7.6; Annexure 6). Letter of consent have been signed by all the 12 Gram Pradhans to ensure their support during implementation of the microplans.

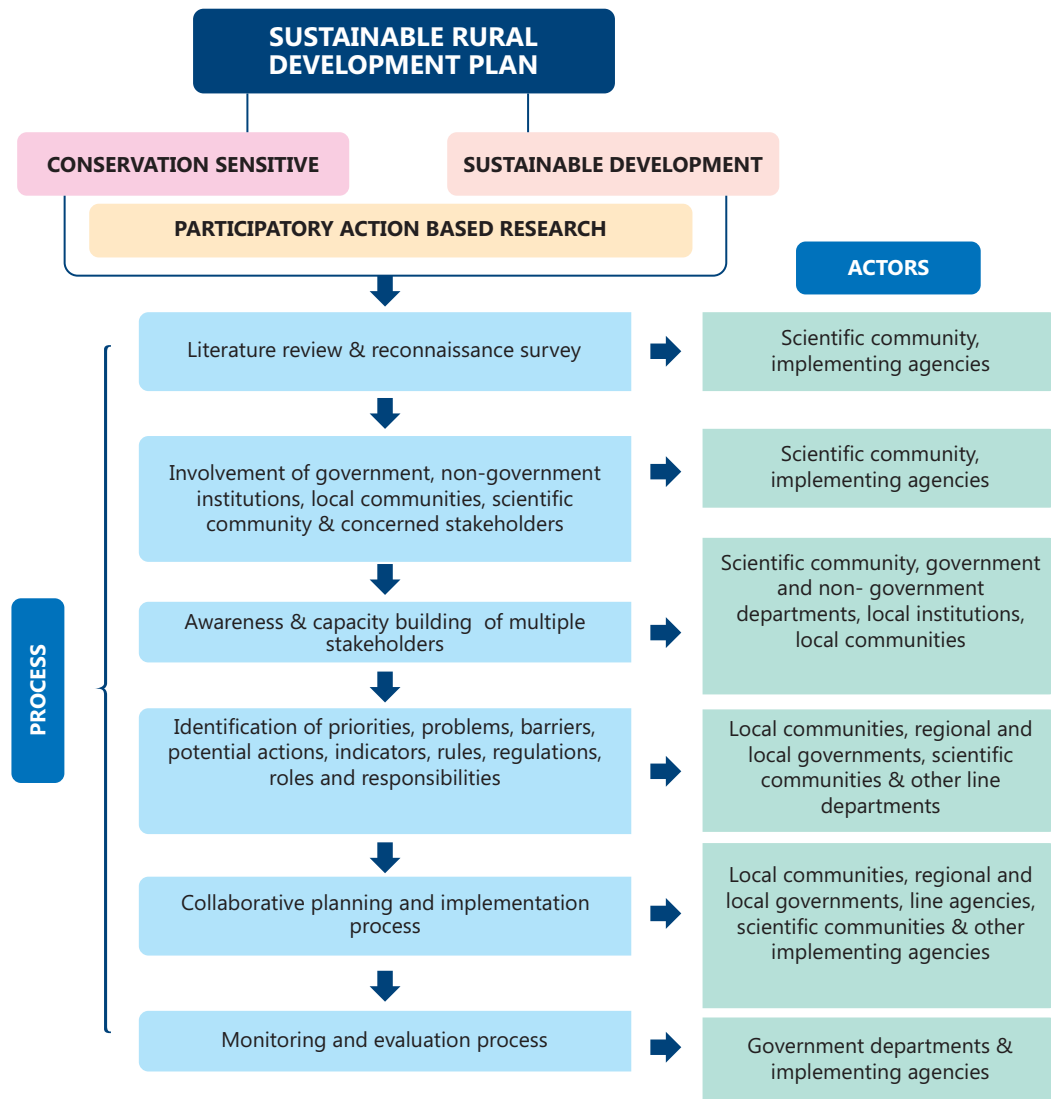


Figure 7.6: Roles and responsibilities of stakeholders in developing conservation sensitive village microplans

For instance, in digital village microplan format data assemblage of one of the nine strategic plans i.e. Hygiene and Sanitation was carried out for eight villages that were Siror in Uttarakhand; Rampur Chandrawati, Domari, Dhaka and Tatetpur in Uttar Pradesh; Tintanga Diyara in Bihar; and Ghat Jamini and Mokhimpur in Jharkhand representing the three stretches of the Ganga River. There are three sub indicators under this plan: a) construction and use of toilet, b) access of dustbin installed by Gram Panchayat, and c) waste management. The data collected was fed into indicators and sub indicators and scoring of each sub-indicator was carried out. For every village the same procedure was carried out (Annexure 6).

7.5. Conclusions

Community-based conservation facilitated by participation from local, state, regional and central institutions have become the paradigms of conservation (Redmore et al., 2017). Developing participatory village microplans for biodiversity conservation of Ganga River and sustainable development of village was conceived to understand and ensure involvement from local level stakeholders in identifying, prioritizing and mitigating conservation and development concerns of the village and strengthening their participation in implementing the actions suggested by them.

As discussed above, 12 village microplans have been developed for villages located along the Ganga River.

Each of the nine comprehensive strategic plans has a direct or indirect impact on conservation of the Ganga River. In the process of developing village microplans with the local communities, it was observed that the social and ecological challenges were more or less similar across the 12 villages. These village microplans provide an opportunity to synergistically address the conservation and developmental

challenges, wherein the development priorities are aligned with the Sustainable Development Goals (SDGs) and conservation targets. Liaising and alliances with local level institutions, government departments and non-government organizations through village microplans can contribute in strengthening the implementation of various policies and programmes of the government and non-government organizations in an effective and efficient manner. These village microplans for Ganga conservation and village sustainable development can contribute in providing a strong platform for the decision and policy makers in developing conservation sensitive village development plans.



Digitalization of these village microplans has been envisaged with an aim to enhance and ensure the engagement of multiple stakeholders in implementation of microplans along with cross-sectoral and inter-departmental coordination and management. It contributes in maintaining accountability and transparency between multiple stakeholders at all levels. Digital village microplans also provides a platform for scientists, conservationists, planners, decision makers, policy makers, implementers and user groups for reviewing and developing enhanced, innovative and sustainable initiatives for developing conservation sensitive rural development plans while facilitating smooth and transparent information sharing, monitoring and

evaluation of the various programmes and policies implemented at the grassroots level.







An aerial photograph of a village nestled on a hillside. The houses are built on terraced land, surrounded by lush green trees and vegetation. The roofs of the houses are made of dark, possibly tiled or thatched material. The overall scene is a peaceful, rural landscape.

Chapter 8

CONCLUSIONS

Authors

Ruchi Badola, Pariva Dobriyal

8.1. Conclusions from project activities

As participation is an efficient tool to ensure conservation of biodiversity and ecologically balanced use of aquatic resources, stakeholders were involved in Ganga conservation and cleanliness. An integrated approach was adopted to not only mainstream biodiversity conservation in village level development planning, but also to involve local stakeholders in it by applying three overlapping and interacting mechanisms by which participation is expected to enhance river basin management, which are: (1) providing space for deliberation and consensus building for better quality decisions, (2) mobilizing and developing human and social capital for better quality decisions and their implementation, and (3) ensuring legitimacy of decisions to facilitate mainstreaming biodiversity conservation (Carr, 2015; Figure 8.1). From our experiences in the field, we conclude that:

1. Stakeholders in the Ganga River were identified and their roles and interests were assessed on the basis of their association with Ganga and its biophysical resources. They were sensitized to the issues related to sustainable use of natural resources, conservation of aquatic biodiversity and cleanliness.
2. Synergistic alliances were developed with these stakeholders to involve them in conservation actions and to advocate inclusion of biodiversity conservation in their mandate.
3. While working with local communities, we realized that to sustain the project activities in the field and to convey the message to people, interested and enthusiastic local people need to be involved, hence a cadre of motivated people known as Ganga Prahari was created. Ganga Praharis work as foot-soldiers and torch-bearers. They have been trained to conduct activities such as cleanliness and plantation drives, socio-economic and ecological surveys, aqualife monitoring, water monitoring, awareness campaigns etc.
4. We developed the Ganga Praharis cadre with a concept that if given appropriate training and direction, an individual can act like an institution. The concept of creating this cadre of Ganga Praharis is in line with previous experiences (e.g. Agrawal and Gibson, 1999) that institutionalized community-based conservation actions are more effective than non-institutionalized ones. The central approach of the Ganga Prahari cadre is to enhance their skills, capacities, awareness and opportunities.
5. To ensure the visibility of Ganga Praharis on regional, national and global scale, an online database was developed. This database can be accessed by anyone interested in availing the services of this trained and motivated grassroots level human resource. Through this approach an effective link between conservation and local livelihoods has been established.
6. Livelihoods of Ganga Praharis were linked with conservation activities; and to conduct effective and systematic livelihood development activities, collaboration with identified stakeholders, working for local livelihood and rural development, was done. To sustain the livelihood development efforts, existing markets were explored and linked as well as new markets were created wherever required.
7. We realized that participation of people is increasing with awareness but the participation was limited to male members of the society as the livelihood schemes that were being taken to villages were not addressing the social norm and taboos related with women's limited mobility in rural Indian society. Livelihood centres were opened in the villages to train rural women in livelihood activities in accordance with their interest. Many women Ganga Praharis started their own business ventures. This led to increased participation of women.
8. Ganga Praharis were linked with various agencies and organization to provide them a platform to use their skills and ensure sustainability of their livelihoods and conservation efforts. The agencies and organizations were selected on the basis of their mandate (Figure 8.2).
9. The trainings, not only contributed toward skill development and participation from youth and women but they have also emerged as the social leaders among their communities and in villages. They are now taking initiatives towards social and economic betterment of their communities. They are participating in local level development planning processes and providing their inputs to advocate mainstreaming of biodiversity in decision making.
10. To institutionalize these efforts and to include these initiatives in the mandate of local level institutions such as village panchayats, and to

promote biodiversity sensitive development, village level microplans were developed that will be implemented in the second phase of the project. Capacity of Ganga Praharis is being developed to assist WII and NMCG in developing and implementing the microplans and a network of stakeholders was created to ensure the sustainability of the efforts at the site level.

8.2. Lessons learnt

Our activities have not only addressed the dilemma of conservation versus development, but have also contributed to overcoming intrusive resource management strategies and planned development that have led to poor conservation outcomes. On the basis of our experience in the field, especially with respect to the success of approaches implemented to achieve project goals, lessons learnt are as follows:

1. Assumptions should not be made about the awareness among stakeholders regarding biodiversity conservation. Each stakeholder and individual should be sensitized.
2. To engage the stakeholders including local communities in conservation, constant interactions should be held with them at all levels i.e. individual, stakeholder, village, district, state and national. Specific strategies should be developed to approach the people at all levels on the basis of their association and dependence on aquatic systems.
3. Capacity of local people and other stakeholders need to be developed to contribute towards conservation goals. Stakeholders including local people should be enabled to contribute to informed decision making.
4. Capacity building and exposure opportunities should also address the social issues such as gender.
5. Each individual should be encouraged to take initiatives at her/his respective villages and areas and every effort should be recognized. Performing individuals should be provided social and economic incentives.
6. Livelihoods of the local communities should be linked with conservation activities to ensure their long-term participation. Livelihood skills of local people need to be developed and linkages with existing market should be established. Market has to be created wherever needed.
7. Capacity of local level institution should also be developed to take informed and biodiversity sensitive decisions.
8. Inclusion of biodiversity and its conservation should be promoted and advocated in mandate of departments, organizations and local level institutions i.e. village panchayats.
9. Site-level mechanisms should be developed to institutionalize the efforts as it will ensure scientific approach and systematic implementation of the conservation activities.

8.3. Way Forward

To ensure the sustainability of conservation efforts following points should be taken care of:

1. Ganga and its biodiversity have always been treated as open access resource, hence, stake of local communities and other stakeholders in Ganga and its conservation should be increased. Participation of stakeholders should be internalized in Ganga conservation.
2. All the conservation activities should be implemented at the basin level and key tributaries should be targeted.
3. As Ganga is linked with people's emotions, traditions, religion, lives and livelihood, there must be a mass movement to take the message of Ganga conservation to the highest authorities and most marginalized groups.
4. Resource allocation for long-term conservation activities, in terms of funds and commitment of highest authorities as reflected through policy implementation, has to be maintained.



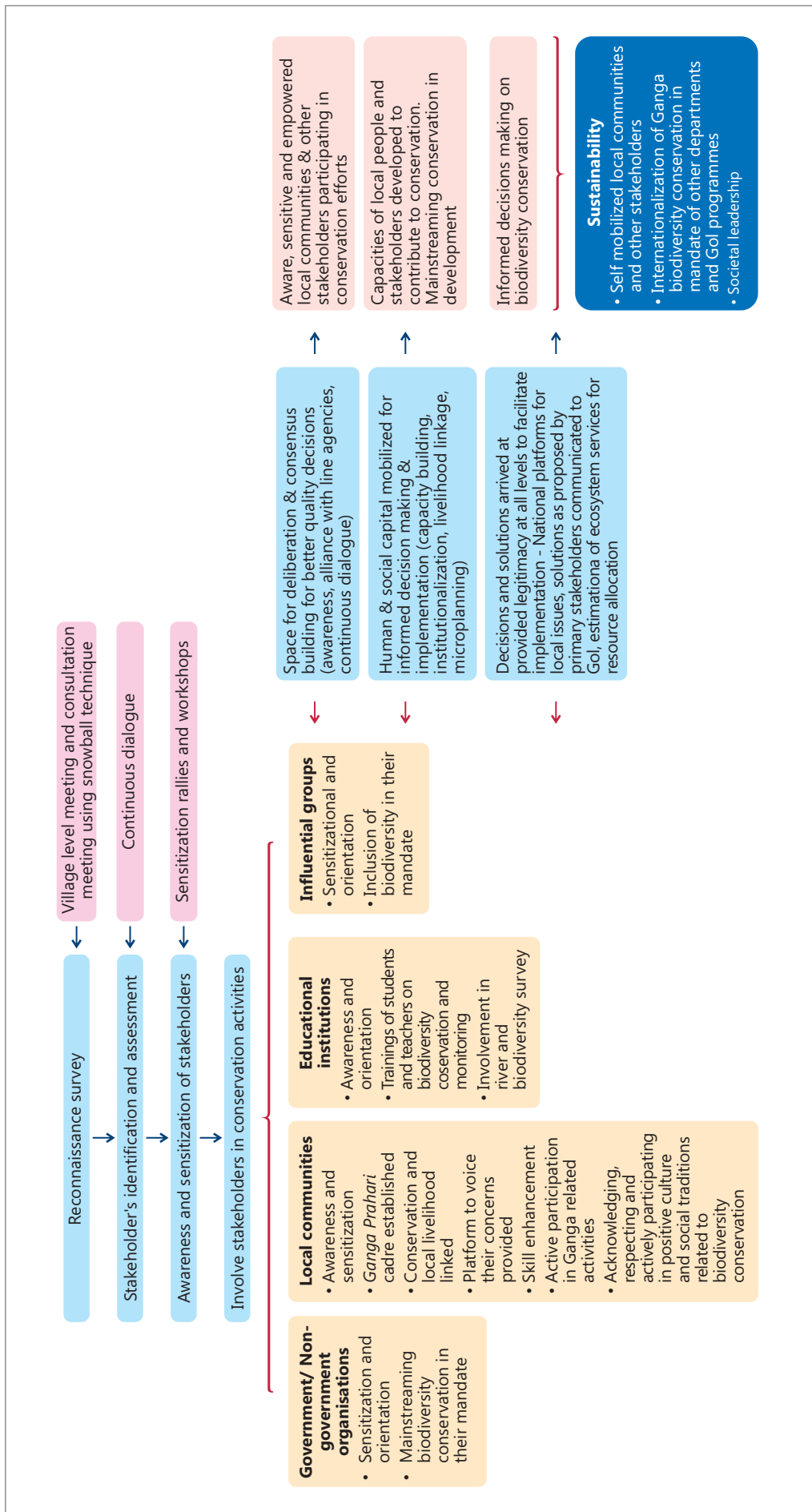


Figure 8.1: Approach to involve people in Ganga biodiversity conservation goal

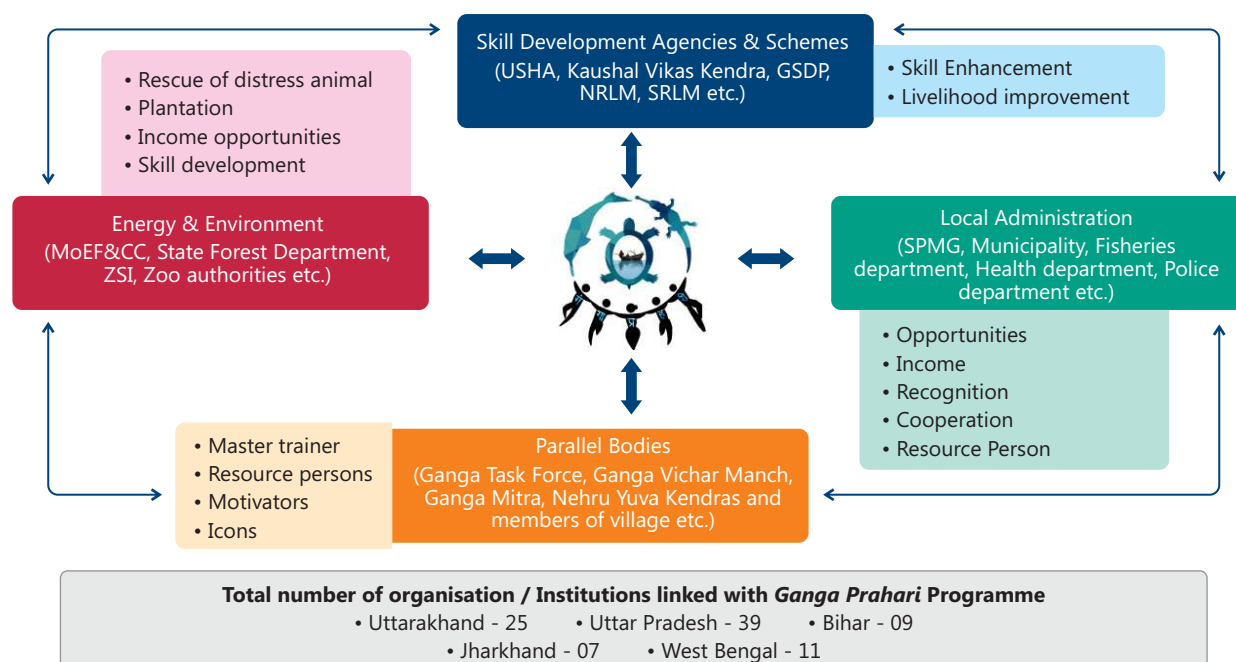


Figure 8.2: Ganga Prahari linkages with various sectors and organizations

List of Annexure

Annexure No.	Annexure Title	Sub-annexure No.	Sub-annexure Title
1	Logical Framework for Performance Assessment of "Biodiversity Conservation and Ganga Rejuvenation"		
2	Engaging stakeholder in Ganga Biodiversity Conservation		
3	A Life less ordinary: Ganga Prahari- Guardians of the Ganga	1	Ganga Prahari Brochure
		2	Ganga Prahari Database
		3	Pravasi Ganga Prahari Brochure
		4	Pravasi Ganga Prahari Database
		5	Ganga Prahari Mentor Database
		6	Ganga Prahari Youtube Series (Annexure 6.1, 6.2, 6.3)
		7	Ganga Prahari Kumbh Programme Report
4	Livelihood Interventions for Ensuring Involvement of Communities in Ganga Conservation	1	Training manual for health and wellness
		2	Training manual for <i>prasad (laddoo)</i> and incense stick making
		3	Training manual for nursery development
		4	Training manual for biodiversity-based tourist guide
		5	Training manual for stitching and sewing
		6	Training manual for electrician training
		7	<i>Jalaj</i> brochure
5	Ecosystem Services of Ganga River	1	Framework for evaluating ecosystem services of Ganga river
		2	Cultural Services of Ganga
6	Digital Village Microplans: Mainstreaming Ganga Biodiversity Conservation in Local Development Planning Using Digital Technology	1	Report on finalization workshop on microplanning guideline
		2	Village microplanning guideline
		3	Village microplan for gram panchayat Sirour, Block Bhatwari, District Uttarkashi, State Uttarakhand
		4	Village microplan for gram panchayat Rajghat, Block Dibai, District Bulandshahr, State Uttar Pradesh
		5	Village microplan for gram panchayat Udaigarhi, Block Dibai, District Bulandshahr, State Uttar Pradesh
		6	Village microplan for gram panchayat Domari, Block Kashi Vidyapeeth, District Varanasi, State Uttar Pradesh
		7	Village microplan for gram panchayat Rampur, Block Cholaipur, District Varanasi, State Uttar Pradesh
		8	Village microplan for gram panchayat Dhaka, Block Cholaipur, District Varanasi, State Uttar Pradesh
		9	Village microplan for gram panchayat Tatepur, Block Chiraigaon, District Varanasi, State Uttar Pradesh
		10	Village microplan for gram panchayat Shahzadpur, Block Narayanpur, District Bhagalpur, State Bihar
		11	Village microplan for gram panchayat Teentanga Diyara, Block Rangrachowk, District Bhagalpur, State Bihar
		12	Village microplan for gram panchayat Masakaliyan, Block Taljhari, District Sahibganj, State Jharkhand
		13	Village microplan for gram panchayat Ghat Jamni, Block Rajmahal, District Sahibganj, State Jharkhand
		14	Village microplan for gram panchayat Mokhipur, Block Rajmahal, District Sahibganj, State Jharkhand

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Logical framework for 'Component-5: Community Based Conservation Programmes for Species Restoration in Ganga River'

Objective 1: Involve local communities in conservation of Ganga through the Panchayati Raj System.

Proposed	Achieved	Outcomes
- Purposive sampling and surveys for conducting stakeholder analysis. - Facilitating establishment of local level institutions. - To put in place a system of regular meetings of council members for ensuring effective working Proposed output: - Establishment of village level institutions with representations of all concerned stakeholders.	- Reconnaissance survey along the river in all five states followed by 1010 Household surveys conducted 962 meetings conducted with members of Panchayati Raj system - A total of 1895 activities conducted in villages and towns along Ganga River including consultative meetings, awareness programmes, cleanliness drives, plantation drives, rescue & rehabilitation and livelihood development activities.	50 stakeholders and their roles identified - Aware and sensitized stakeholders conducted 333 activities for biodiversity conservation including awareness programmes, plantations, cleanliness drives, rescue and monitoring of aqualife. 173 MoAs signed with village Pradhans wherein villagers pledged to support NMCG and WII for cleanliness and biodiversity conservation of Ganga River. - Village level institution Ganga Prahari established along entire river stretch.

Remark: 100% target achieved

Objective 2: Elicit the participation of stakeholders at different levels to achieve the biodiversity conservation goal of National Mission for Clean Ganga (NMCG).

Proposed	Achieved	Outcomes
- Capacity building programme for identified stakeholders, cadre of "Ganga Prahari" and staff of government bodies. - Coordination meetings among members of institutions and management team of concerned departments to promote partnerships among them. Proposed output: - Local communities and other stakeholders sensitized and trained to participate in conservation of Ganga. - A synergistic alliance of institutions in place to facilitate participation of different stakeholders and ensure sectoral coordination. - A trained and motivated cadre of "Ganga Prahari" to support the local institutions and monitor the quality of the natural resources of Ganga. - Strengthening of skills and capacities of existing staff of concerned government agencies.	55178 stakeholders (45% men and 55% women), viz. local communities, Ganga Praharis State Forest Department, district administration, educational institutes, media officials, tourists and pilgrims, local businessmen, Bal Ganga Prahari, Pravasi Ganga Praharis, sensitized towards biodiversity conservation - Interactions conducted: → State Forest Departments (SFDs)-144 → State Project Management Groups - 5 → District Administration- 204 → Block Development Officials (BDOs)- 72 → State government officials- 6 → Other line agencies- 154 - Total 1290 (F- 566, M- 724) Ganga Praharis registered 164 Ganga Praharis trained in National Training Workshop (March 2018). 433 trainings imparted to Ganga Praharis in socio-economic and ecological surveys, community mobilization, plantation and cleanliness drives, alternate livelihood activities, rescue and rehabilitation of animals in distress and village microplanning. - Liaison with government and non-government organizations established and institutionalized in village microplans.	- Synergistic alliance with government and non-government agencies i.e. SFDs, PNB-RSETI, USHA, HESCO, ILSP, DST SEED etc. for skill development activities, in place. 316 activities conducted so far independently by Ganga Praharis. - Participation in state and national level programmes and recognition from dignitaries. Sh. Darshan Nishad, Ganga Prahari from Varanasi briefed Hon. PM Ganga Prahari program, (April 2019) - Ganga Prahari recognized for their efforts by: → Print media- 225 → Electronic media-35 - In the Kumbh 2019, 149 Ganga Praharis conducted cleanliness drives, awareness campaigns, rescued distressed animals, guided visitors to shelter and health camps. 89 Ganga Praharis assisted National Geographic Society teams during pre and post monsoon "Sea to Source Expedition" on plastic waste - Motivated and trained Ganga Praharis holding key positions in their communities, and other institutions such as Gram Pradhan, District Coordinator of NYKS and member of NMCG-WII team at WII. 1514 Ganga Praharis engaged with SFDs, District Administration, BDOs, state governments, in activities on Ganga conservation, plantation and cleanliness & awareness.

Remark: 100% target achieved

Objective 3: Assess the monetary contribution of ecosystem services provided by River Ganga to different stakeholders

Proposed	Achieved	Outcomes
- Identification and evaluation of key ecosystem services provided by Ganga River system. Proposed output: - Facilitate the integration of ecosystem service values in the decision making process for conservation development planning along the Ganga	- Literature review and visits to various national, state and district level departments conducted for identified of ecosystem services. 503 questionnaire surveys conducted with various stakeholders. - Designed a framework for evaluation ecosystem services of Ganga River. 22 key ecosystem services identified of which 8 have been evaluated in detail.	- Reports on: → site and stretch wise assessment of ecosystem services → dependence pattern and resource use - Monitory value of 8 evaluated ecosystem services: → Water Urban surface water supply- ₹ 51.79 million Urban ground water supply- ₹ 33.19 million → Agriculture Revenue from water intensive crops i.e. paddy, wheat and sugarcane- ₹ 107,614.34 million (±14,766.95 million), ₹ 82,736.06 million (±19,120.29 million) and ₹ 29,241.54 million (±5,018.29 million), respectively. → Power Generation: Annual reduced emissions of nine HEPs and one nuclear power plant is an estimated 9.93 million tCO₂ and 3.22 (±0.18) million tCO₂, respectively. → Water for transportation Comparative intermodal cost advantage of transporting freight on National Waterway 1 is ₹605.93/tonne versus roads and (-) ₹352.03/tonne versus railways. → Riverbed material Lease holders in UP Ganga districts earned revenue of ₹547,263,143.80/- by dispatching 1,716,849 m³ quantity of sand. → Provision of fish Fish vendors in Varanasi (n= 53) and Narora (n=30) reported an estimated average annual income of ₹172,471.7/- (± 317,230.5) and ₹355,200 (± 162,017.78), respectively.

Proposed	Achieved	Outcomes
		→ Cultural services In Varanasi, 44.71% of local businessmen (n=110) reported an average income between ₹35,000/- and ₹134,999/- during tourist season. Vendors (n=136) at Ardh Kumbh Mela 2019 in Prayagraj reported a 210.07% (± 238) increase in daily income during Kumbh. A policy document based on PES model developed to facilitate integration of ecosystem values in decision making process for conservation planning.
Remark: 100% target achieved		

Objective 4: Develop site specific strategies for aligning local people's livelihoods with conservation priorities

Proposed	Achieved	Outcomes
- Skill development workshops for local community. - Regular surveys and assessment of village institutions and Ganga Prahari' cadre by concerned government institutions. - A system of incentives in terms of financial transfers, technology transfer and capacity building of local people, village level councils and Ganga Prahari cadre on a merit basis. Proposed output: - Sustainable Livelihood strategies for the people dependent on the Ganga River system. - Incentive-based conservation tool developed to reward efficient village level institutions and 'Ganga Prahari' cadre.	- Need and resource availability assessed - Market demands and availability assessed. - Site-based livelihood trainings and marketing strategies developed. 35 livelihood trainings conducted in collaboration with USHA, PNB RSETI, HESCO, ENVIS- MoEF&CC 713 Ganga Praharis trained in livelihood activities 6 livelihood manuals developed 19 mobile and 2 permanent livelihood centers established - A floating livelihood centre "Jalaj" established at Varanasi - Periodic review of Ganga Prahari cadre being done by NMCG and other agencies.	- Site based livelihood framework developed 16 youth groups and 18 Self-Help Group (SHGs) strengthened - Trained Ganga Praharis linked to the market and other institutions in activities that enhance their livelihoods. - Household income of trained Ganga Praharis increased by ₹ 200-4500 per month. - Ganga Praharis recognized locally and nationally

Remark: 100% target achieved

Objective 5: Suggest institutional mechanisms for the sustainability of project initiatives in the demonstration sites.

Proposed	Achieved	Outcomes
- Developing a performance matrix having a set of decision criteria to assess the performance, progress and demonstrate achievement of objectives and overall goals. Proposed output: - A performance evaluation "guide" to evaluate effectiveness of community conservation program. - Self-sustaining institutions to manage the equitable and sustainable distribution of benefits from the Ganga River system.	- Performance matrix developed - Microplanning guidelines prepared - Focus Group Discussions and Participatory Rural Appraisals (PRAs) conducted with local communities and other stakeholders and 12 village level conservation sensitive microplans developed on digital platform	12 Letter of consent signed by Gram Pradhans of Gram Panchayats for implementation of the microplans 54 citizens from 17 different countries have registered Pravasi Ganga Prahari - A business model in collaboration with Pravasi Ganga Prahari (IBM-USA) was developed for Jalaj - Ganga Prahari Mentor Platform created and 107 members registered 64 Bal Ganga Prahari schools identified.

Remark: 100% target achieved

Annexure 6

LOGICAL FRAMEWORK FOR PERFORMANCE ASSESSMENT

'Component 5: Community Based Conservation Programmes for Species Restoration in Ganga River of Biodiversity Conservation and Ganga Rejuvenation' of 'Biodiversity Conservation and Ganga Rejuvenation'

1. Introduction

Biodiversity contributes to the cultural and socio-economic development of human society; however, it is being degraded at a record rate due to unplanned developmental activities, uninformed planning and decision making, lack of alternatives (Tilker et al., 2019). Conservation initiatives have been established to recover the natural state of the critical ecosystems and it is being realized that conservation of biodiversity is the responsibility of all people from all sectors i.e. from highest authorities to the local people living in the vicinity of natural systems. The awareness about conservation is growing and; hence the conservation organizations are required to be more responsible to funding agencies and other stakeholders, and should adopt more resource efficient conservation actions (Tucker, 2005).

Project-based approach has become a central activity in the field of biodiversity conservation; however, existing studies indicated that most projects do not meet their objectives (Humaidi and Said, 2011). Biodiversity conservation projects are designed on the hypothesis that they will lead to conservation of key ecosystems and species, however they struggle to achieve the objectives and exhibit the impacts (Stephenson, 2019). Monitoring and evaluation are the primary means to evaluate the effectiveness of the activities to achieve the objectives. To achieve the goals and to ensure the resource efficiency of the project, it is essential to have a framework with a set of indicators that can be used to assess the progress and outcomes.

2. Aim

Develop a logical framework to assess the progress and outcome of 'Component 5- Community Based Conservation Programmes for Species Restoration in Ganga River' of the project undertaken by Wildlife Institute of India and funded by National Mission for Clean Ganga.

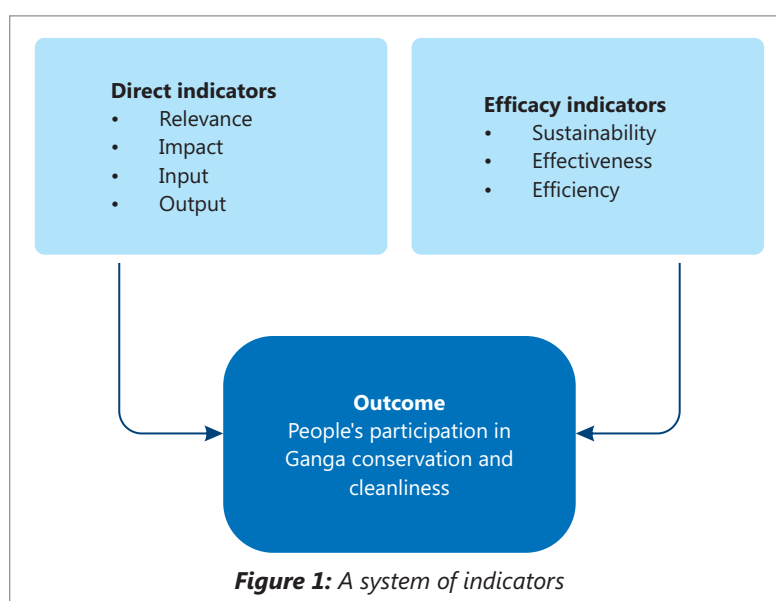
3. Methodological approach

Performance indicators are the most applied

methods, tools or approaches to monitor progress of a project or initiative. To assess the progress and outcomes of the project, performance evaluation framework was developed (United Nations, 2009). The framework has two sets of indicators: (a) direct indicators, which evaluate the relevance and outcomes of the project activities, and (b) efficacy indicators, which indicate the efficiency of the efforts (Figure 1). Indicators were developed for input activities, and outputs and outcomes of the project, based on which project activities and their outputs and outcomes were evaluated (Figure 2). The indicators were developed after review of existing peer-reviewed literature and discussion with experts (Pitz et al., 2016).

4. Results

A logical framework with input indicators depicting activities conducted to achieve the objectives of component 5 was developed. Similarly, indicators assessing outputs of each activity were developed. All the input and output indicators have means of verification to assess if enough activities have been done to achieve the objectives. Four efficacy indicators have also been developed with their independent means of verification to assess the effectiveness of the activities (Table 1).



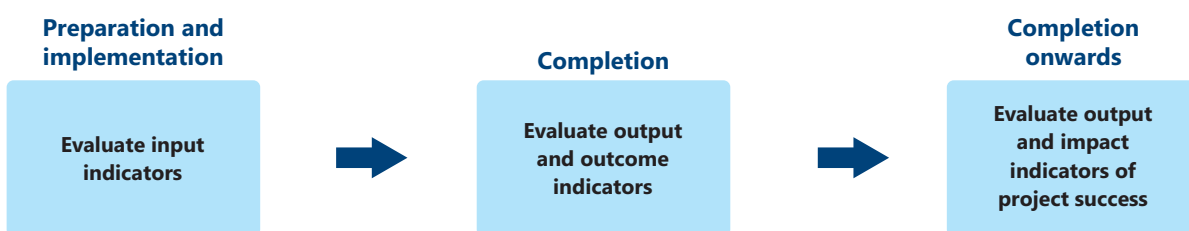


Figure 2: Performance indicators and the project cycle

Table 1: Logical framework for performance assessment of "Community Based Conservation Programmes for Species Restoration in Ganga River"

Activity	Input indicator	Means of verification	Output indicator	Means of verification
Reconnaissance survey Extensive literature review	Reconnaissance survey completed	No. of blocks and villages surveyed in different stretches	Identification of stakeholders	List of stakeholders Stakeholder map for Ganga River
<i>Pad-yatra</i> conducted in Uttarakhnad Slogans, wall painting in villages, towns and along the <i>ghats</i> Songs and dances performed at various platforms Meetings, consultations, formal and informal interactions conducted with local communities, Gram <i>Panchayats</i> , officials of government and non-government departments	Interactions with local people and government and non-government departments Interactions with village <i>Panchayat</i> members Mobilization of local communities in conservation activities	No. of interaction with stakeholders No. of interactions with <i>Panchayat</i> members	Stakeholder analysis No. of activities conducted in various <i>Panchayats</i> No. of participants in various activities	No. of <i>Panchayats</i> willing to participate in biodiversity and Ganga conservation
Regular sensitization and awareness activities on Ganga biodiversity and socio-cultural values conducted	Sensitization and awareness workshops conducted with stakeholders	No. of sensitization workshop and other awareness activities No. of people sensitized	Activities conducted by local people, <i>Panchayat</i> and members	No. of activities conducted by other stakeholders sensitized by local people
Key stakeholders and their roles identified	Interaction with identified stakeholders	No. of interaction with different groups of stakeholders	Alliances developed with stakeholders at village, district, state and national level	No. of stakeholders participated in project activities No. of stakeholders involved in conservation

Activity	Input indicator	Means of verification	Output indicator	Means of verification
Coordinated with Village Panchayats for cleanliness and conservation of Ganga biodiversity	Meeting with Gram Pradhans and other Panchayat members	MoAs signed with the Gram Pradhans	Involvement of Panchayats in activities pertaining to cleanliness and conservation of Ganga biodiversity	No. of MoAs No. of Panchayats conducting cleanliness and conservation activities in their areas
Coordinated with national, state, district and village level agencies <i>Ganga Praharis</i> from five states identified and trained	Interaction meetings and awareness workshops conducted No. of Ganga Praharis identified No. of trainings conducted for Ganga Praharis	No. of interaction with different governmental, non-governmental departments and other line agencies No. of Ganga Praharis trained in conservation activities	Convergence with various line agencies including State Forest Departments, State Project Management Group, National Rural Livelihood Mission Enhanced skills of Ganga Praharis to conduct conservation activities such as awareness, cleanliness, plantation, ecological monitoring Registration of Ganga Praharis on the NMCG-WII database	No. and types of activities in which various departments are involved in Ganga Prahari database hosted on the official web page of NMCG Structure of Ganga Praharis developed Activities conducted by Ganga Praharis. Ganga Praharis involved in panchayat level meetings and planning.
Regular on-site and off-site interaction and training of local communities (including women and youth)	Awareness and sensitization among various stakeholders, including local communities	No. of awareness activities with different stakeholder groups	Aware stakeholder about Ganga biodiversity conservation and cleanliness	Biodiversity sensitive activities by stakeholders
Coordination meetings among members of institutions and management team of concerned departments to promote partnerships among them.	Meetings with participation from various stakeholders	Platform in place for regular discussion and inputs	Liaison with government and non-government organizations established and institutionalized in village microplans Active participation and regular inputs from members of concerned institutions and departments	Improved participation of sensitized and motivated stakeholders

Objective 2:
Elicit the participation of stakeholders at different levels to achieve the biodiversity conservation goal of National Mission for Clean Ganga (NMCG)

	Activity	Input indicator	Means of verification	Output indicator	Means of verification
	<i>Ganga Praharis</i> trained	Regular interactions with <i>Ganga Praharis</i>	Site, state and national level workshops and training programmes conducted	Increase in participation in terms of number and level (more active and self-mobilized) of <i>Ganga Praharis</i> and local people in conservation activities	Skill of local people and <i>Ganga Praharis</i> developed and assisting governmental, non-governmental organisations in conservation and habitat restoration activities.
	Mobilization of local communities and Identified <i>Ganga Praharis</i> in <i>Ganga</i> conservation	Capacity building of <i>Ganga Praharis</i> and local people to conduct cleanliness drives Capacity building of <i>Ganga Praharis</i> and local people to conduct awareness campaigns Capacity building of <i>Ganga Praharis</i> to conduct to assist experts in rescue of aquatic animal in stress	Participation of local communities and <i>Ganga Praharis</i> in cleanliness of <i>Ganga</i> River, rescue & rehabilitation of distressed <i>Ganga</i> aqualife	Increased grass roots level participation in biodiversity conservation and cleanliness activities Awareness about benefits of local level institutions Trained <i>Ganga Praharis</i> organising on-site activities	Trained <i>Ganga Praharis</i> supporting the local institutions in conservation and monitoring of aqualife of <i>Ganga</i> Regular cleanliness activities conducted by local people Cleaner Ghats and villages
	Coordinated with governmental and non-governmental organizations working on rural development, education, gender, cleanliness and livelihood development	Strengthening of skills and capacities of existing staff of concerned departments	No. of training workshops conducted and participation from the concerned department	Inputs from the concerned department	Synergetic alliance with governmental and nongovernmental agencies to conduct training and skill development activities.
Objective 3: Assess the monetary contribution of ecosystem services provided by River <i>Ganga</i> to different stakeholders	Literature review Reconnaissance survey Questionnaire Survey Field visit for secondary data collection	Questionnaire based interviews with various stakeholders for their views about benefits from <i>Ganga</i>	No. of interviews with various stakeholders Values assigned by stakeholders to various ecosystem services	Ecosystem services identified Assessment framework developed Ecosystem services selected for assessment	Select ecosystem service evaluated

Activity	Input indicator	Means of verification	Output indicator	Means of verification	
Objective 4: Develop site specific strategies for aligning local people's livelihoods with conservation priorities	Regular meetings and interactions with local people including women and youth	Assessment of local needs and resources availability	Increased participation from local communities (especially women and youth) in livelihood training centers	Local people trained in sustainable livelihood activities	
	Livelihood consultation workshop held				
	Developed manuals for livelihood trainings	Identification of site based sustainable livelihood strategies	Increased mobility of rural women	Improved economic condition of local people	
	Livelihood trainings conducted	No. of livelihood trainings conducted			Increased participation and self-mobilized activities
Objective 5: Suggest institutional mechanisms for the sustainability of project initiatives in the demonstration sites	Alliances with institutions working on livelihood and skill development established	No. interactions with organization working on livelihood development issues	No. of stakeholders and organization joining hands for improvement of local economy	Women and youth SHGs strengthened	
	Assessment of demands from the market	Linkage with existing women and youth self-help groups	Increased awareness about livelihood development schemes and biodiversity conservation	No. of livelihood centres established	
	Surveyed for availability of raw material				
	Linkages with existing markets were established				
Developed Village level microplans to mainstream conservation in village level development	Development of site-based livelihood strategies	No. of linkages established with existing market	Local people engaged in sustainable livelihood activities in which they have been trained	Strengthened local economy	
Objective 5: Suggest institutional mechanisms for the sustainability of project initiatives in the demonstration sites	Developed Village level microplans to mainstream conservation in village level development	No. of market surveys conducted	Market for products prepared by the trained <i>Ganga Prahari</i> developed (<i>Jalaj</i> - a floating market at Varanasi <i>Ghat</i> , Uttar Pradesh)	Increased household income	
		Interactions and consultation with various stakeholders	Linkages between conservation goals and local livelihoods	Forum in place for continuous dialogue	
					Microplanning guidelines developed
					Created a digital platform for village level microplans
Objective 5: Suggest institutional mechanisms for the sustainability of project initiatives in the demonstration sites	Developed Village level microplans to mainstream conservation in village level development	No. of village level microplans developed	Forum in place for continuous dialogue	Agreement with 12 village Panchayats for implementation of these microplans	
		Interactions and consultation with various stakeholders	Linkages between conservation goals and local livelihoods	Forum in place for continuous dialogue	
					Microplanning guidelines developed
					Created a digital platform for village level microplans

Activity	Input indicator	Means of verification	Output indicator	Means of verification
Platforms created to enhance the participation of a larger audience	<i>Bal Ganga Praharis, Pravasi Ganga Prahari and Ganga Prahari Mentor platform created</i> Regular interactions with school children and teachers at <i>Bal Ganga Prahari</i> schools	On line registration portal for <i>Pravasi Ganga Prahari, Ganga Prahari Mentor</i> created Online database for <i>Pravasi Ganga Praharis</i> developed 64 <i>Bal Ganga Prahari</i> schools identified	Forum in place for continuous dialogue	Frequency of participation of maximum stakeholders in various activities

Efficacy Indicators	Means of verification
1. Involvement of all social and economic sectors 2. Convergence with of Government departments and schemes 3. Biodiversity-based sustainable livelihood 4. Village level microplans for biodiversity sensitive development	1. Established a cadre of Ganga Praharis– local community members belonging to a diverse socio-economic background contributing to Ganga conservation and cleanliness. 2. Ganga biodiversity conservation activities being conducted with active participation of various stakeholders such as State Forest Departments, district administration, veterinarians and other line agencies. Participation of members through the Ganga Prahari Mentor and Pravasi Ganga Prahari Platform 3. Ganga Praharis trained in green entrepreneurship through various skill development programmes such as livelihood trainings in coordination with various agencies such as MoEF&CC, USHA, PNB-RSETI. Trained Praharis have been formalized into SHGs with bank linkages and further linked to the existing market. 4. Microplanning guidelines prepared and conservation sensitive village development digital village level microplan platform developed

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