Title: Planning for Sustainable Religious Tourism: A Case of Prayagraj

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Planning for Sustainable Religious Tourism: A Case of Prayagraj

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Abstract:
The study's major goal is to examine the environmental effect of religious mass gatherings and plan for long-term religious tourism. Various water quality measures are considered before, during, and after the Mela dates in this study. The pilgrimage event operates as an external source of human disturbance, rendering the floodplain lively. As a result, a resilience method is adopted for the environment to adapt to its changing character. This method is critical for preserving the floodplains' ecological functions as well as local livelihoods and cultural values such as festivals and pilgrimages.

As a result, the study aims to give the greatest service to pilgrims while minimizing environmental impact. Create long-term opportunities for river-dependent communities to sustain the river's landscape and people's livelihoods by developing a river zone that has a lower environmental impact and encourages river-based tourism. To increase tourist pleasure in the city by ensuring cleanliness, safety, and security. The goal of the study is to increase Prayagraj's universal accessibility for religious travellers with impairments.

Keyword:
Magh Mela, Prayagraj, Pilgrims, Floodplain, Mass Bathing

Introduction:
In India, the travel and tourism sector are expected to generate 78 employments for every million rupees invested, compared to 45 jobs in the industrial sector for the same amount. Along with construction, it is one of India's main service industries. Aside from offering employment to a diverse range of job seekers, from unskilled to specialist, women gain more from tourism. Furthermore, more focus would be placed on organizing additional short-term courses for the unskilled workers, as well as jobless youth, along the lines of service providers. Furthermore, tactics implemented during the 11th Plan may need to be re-calibrated to address the issues.

Tourism in India is a booming industry that has received significant government support in recent years. Tourism growth and expansion helps a country's soft power and image projection. Tourism must be integrated into any nation's sustainable development strategy, which involves assessing tourist potential, raising awareness, and exploiting specialty segments such as historical tourism, rural tourism, spiritual tourism, culinary tourism, and so on.

Religious Tourism
Religious tourism has existed since ancient times and has both economic and cultural significance. It "satisfies religious and spiritual requirements as well as related artistic, cultural, historical, and other qualities" (Dimitrov 2019). It has allowed "regions to thrive, inhabitants to increase their living standards, and social bonds in communities to strengthen." It is important in emerging countries with a diverse cultural and religious background, such as India. Religious tourism must be encouraged in accordance with India's strategy for achieving the SDGs. In general, religious tourism's environmental impact has been seen adversely by the local population. According to a 2017 estimate, 300 to 330 million tourists visit the world's major religious sites each year. Around the world, 600 million national and international religious excursions are conducted, producing around US$18 billion in worldwide income.

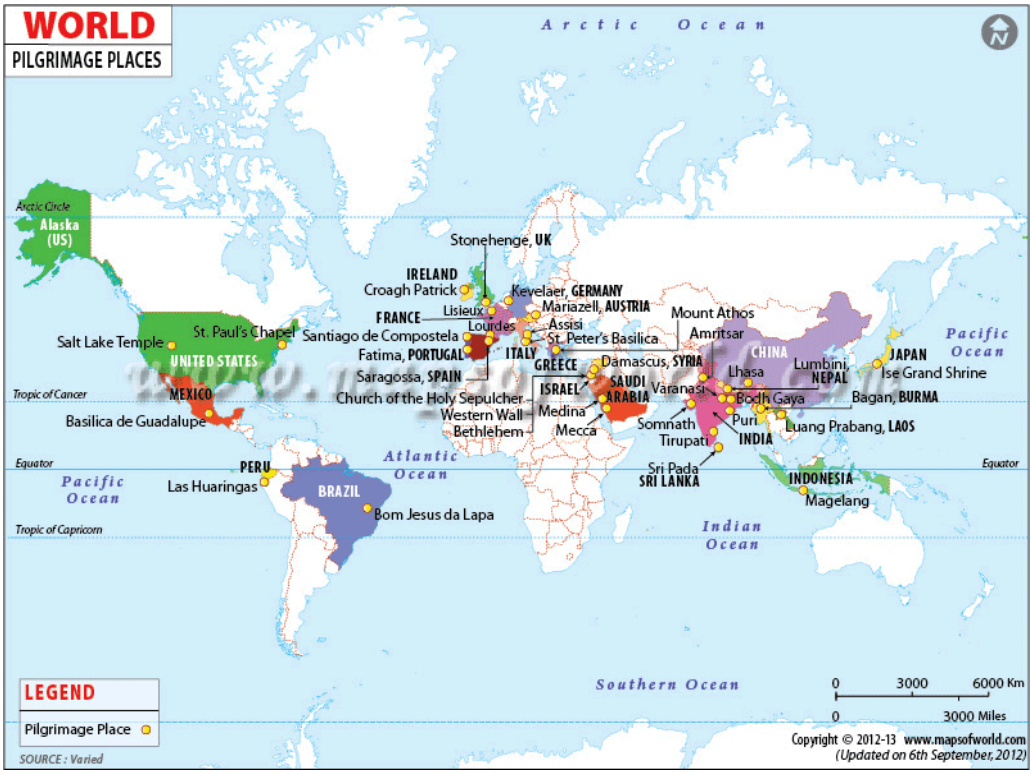


Figure 1: World's main religious places for pilgrims' tourism

(Source: www.mapsofworld.com)

The Asia-Pacific region is recognized as the world's religious hub, with the greatest number of pilgrims and tourists for both international and local religious events. Over 600 million national and international religious and spiritual journeys are expected to take place throughout the world, with Europe accounting for 40% and Asia accounting for more than half. According to UNESCO, religion is practiced by 60% of the world's population, and these believers provide the demographic foundation of religious tourism.

Unregulated expansion in tourism and visitor numbers across locations has had a negative impact in terms of unchecked urbanization and pollution (air, land, water, noise). For example, the Ganga, although being one of the holiest rivers in the world, is also one of India's most polluted river. "Because bathing in the Ganga is supposed to purify the soul, tens of millions of Hindus bathe in its waters and also immerse the remains of their loved ones" (Sachdeva 2016). Local demographics have also shifted dramatically. Safety and health have been top priorities, as have disaster management and preparedness. Induced catastrophes have occurred in the past.

Sustainable Tourism

The United Nations World Tourism Organization defines sustainable tourism as a tourism industry that meets current needs without compromising the ability of future generations to meet their needs. It is not a product, but a spirit that supports all tourism activities and meets the needs of tourists and host regions. (UNWTO, 2005). In addition, maintaining the economic and social advantages of tourism development while reducing or mitigating any adverse effects on the natural, historical, cultural or social environment remains the focus of sustainable tourism development (Brundtland, 1987).

According to the United Nations World Tourist Organization, sustainable tourism is defined as a tourist industry that meets current needs without affecting future generations' ability to meet their own. Furthermore, sustainable tourism development aims to maintain the economic and social benefits of tourism

while minimizing or reducing any detrimental effects on the natural, historical, cultural, or social environment. (1987, Brundtland).

Special types of tourism present a challenge for tourism sites, forcing them to justify their strategies, decrease the negative impact of mass tourism, and attract high-quality visitors. Sustainable tourism has the potential to address concerns such as inclusive growth. Furthermore, increasing access to information, increased interest in heritage and culture, enhanced accessibility, and climate change concerns are all tied to tourism's "return to roots" approach.

Mass Gathering (MG)

According to WHO, mass gathering is “a planned or spontaneous event where attending people could strain the planning and response resources of the community or country hosting the event”. Sporting events, political rallies, concerts, fairs and festivals, conferences, and other large gatherings are examples of mass gatherings. Mass gatherings include the Olympic Games, the Hajj, the Kumbh Mela, and other events. Major Mass Gatherings are expected to bring together people from all over the world. Health systems that must handle a surge in capacity; barriers to current health treatments; introduction and transmission of non-endemic illnesses during and after MGs; issues related to risk communication to participants from diverse cultures; and threats that arise as a result of the high profile of particular events, such as security risks, are all common threats associated with MGs.

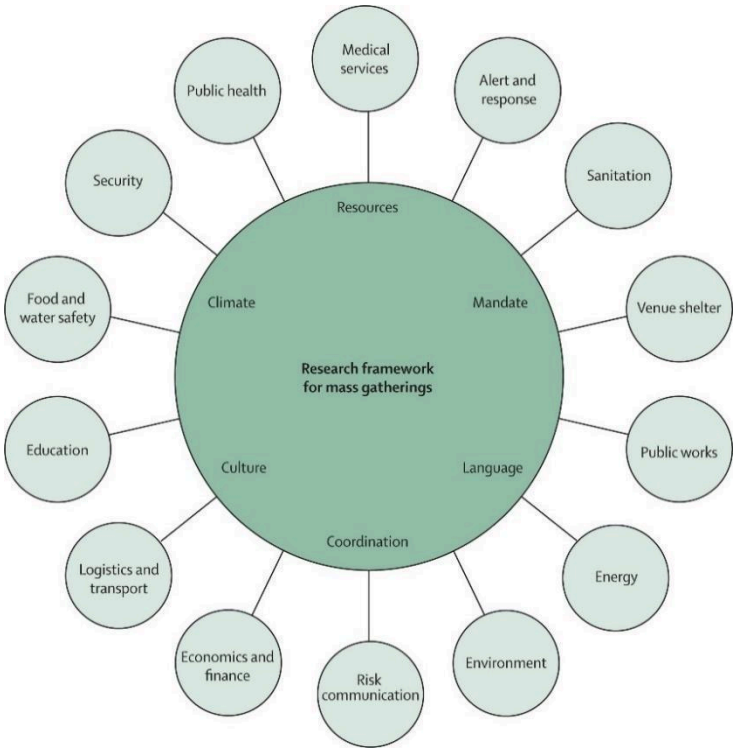


Figure 2: Research framework for mas gathering (Source: Tam et al., 2012)

Religious Mass Gathering

Religious gatherings attract a significantly larger crowd than entertainment and political gatherings. In India, large religious gatherings are very common. A religious mass gathering is often a planned event or occasion associated with a particular religion or spiritual belief. A religious mass gathering may take place on a certain day or over a period. Durga Puja, Ganesh Chaturthi, Kumbh Mela, Magh Mela, and other religious mass gathering festivals are prevalent in India, necessitating the proper development of temporary towns to accommodate the people.

Holiness of the Sacred River

In India, all rivers are sacred, but the Ganga is particularly revered as a physical manifestation of Goddess Ganga. Ganga was said to have descended from the heavens through Lord Shiva's hair. Pilgrims wash, drink, leave sacrifices, and donate their physical remains to river waters because they have self-purifying characteristics. It is thought to cleanse the soul of bad karma. Pilgrims descend into the Ganga before daybreak to drink its water, bathe in it, and execute rites in which they submerge their entire bodies in the river.

Religious Mass Gatherings and Environment

The temporary city is planned for this religious fair where all the infrastructure and services are provided to visitors on the riverbank. This temporary city has impacted in many ways to the urban environment. The challenges faced by the dynamic floodplains of holy river Ganga at Prayagraj. The challenges arise due to the inability of floodplains to transition efficiently from different phases it acquires due to its constantly changing nature. Furthermore, future trends with respect to climate change, urban growth and increasing pilgrimage are intensifying these challenges which threaten the identity of this dynamic floodplain landscape. Since the river is seen as holy, it is necessary to raise awareness among people about the surrounding dynamic nature of the holy floodplain landscape for a constructive future. The idea of intervening with this floodplain landscape will be challenging keeping in mind it represents constant change which forms the genius loci of the site. The project will also aim to create opportunity for local and seasonal workers to engage with this dynamic, constantly changing floodplain landscape of holy river Ganga at Prayagraj in India.

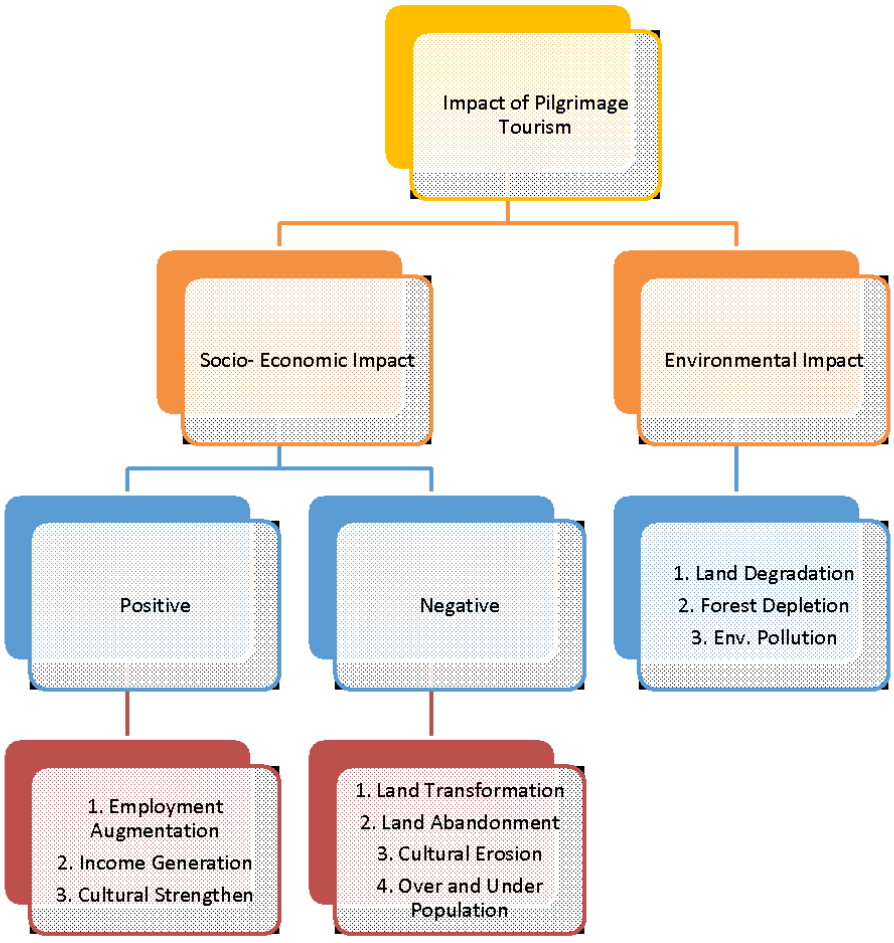


Figure 3: Impact of Pilgrimage Tourism (Source: Sati, 2000)

Need of the Study

A substantial portion of the demographic data suggests that Prayagraj has a daily float population of around 65,633 pilgrims and visitors. Even on occasions like Mauni Amawasya, Basant Panchmi, and Maghi Poornima, the peak population on this Mela Ground might reach crores. Inadequate boarding and lodging facilities for different economic strata are also a problem. Religious Mass gathering periods are consistent throughout the year in many tourist sites, resulting in severe environmental consequences as well as negative effects on city citizens and resources. Because of the cultural and religious significance of such events, they cannot be abolished, but mitigation measures may be implemented to ensure that they have a minimal impact on the city's environment and do not exceed its ecological carrying capacity. There is no check on such measures in any religious city for these concerns, so it is necessary to assess the level of impact those activities have on the destination's environment and to implement mitigation measures so that the destination becomes sustainable while also providing maximum visitor satisfaction. However, unlawful encroachment, deterioration of flood plains, contamination of watersheds, exploitation of natural resources, lack of social awareness, and mismanagement by responsible government agencies have all resulted from the persistent strain of urban growth and rising religious tourism on this precious terrain.

Research Framework

Aim

The aim of the study is to access the impact of religious mass gathering on environment and plan for sustainable religious tourism.

Objectives

- To identify the locational attributes of religious mass gatherings.
- To analyse potential and carrying capacity where mass gathering is happening.
- To study the impact of mass gathering on urban areas.
- To formulate the planning strategies for sustainable religious tourism.

Scope

To promote sustainable river-based tourism for temporary city.

Literature Review

Significance of Pilgrimage Tourism to Sustainable Development

Pilgrimage tourism has grown in popularity and attention in India as a result of its substantial deliverables, such as employment, national integration, and foreign exchange revenues. Although the government has made enormous efforts in strengthening national infrastructure, the impact of pilgrimage tourism on the environment has not been expressly studied. This requires long-term planning to save the natural as well as man-made treasures like religious temples and shrines. The suggested research looked at the concerns and challenges of pilgrimage tourism in India and offered possible options for reducing the country's long-term detrimental effect (Pawar, 2019).

To get qualitative data, the suggested study's research technique included an inductive design using case study or journal analysis. Previous studies have identified a significant gap in the literature by focusing on the relevance of sustainable development in tourism but not on pilgrimage tourism, which this study has addressed to a large extent. Furthermore, previous research studies on pilgrimage tourism have had extremely limited results. According to the study's conclusions, increased lodging facilities, garbage dumping in aquatic bodies, and landfills pose considerable environmental hazards. As a result, it is suggested that both federal and municipal organizations synchronize their goals in order to establish sustainable practices.

Mass Bathing and Pollution

The results of research on mass bathing producing water pollution in the Ganga during three kumbha melas held in Haridwar and Prayagraj between 1980 and 1986 at 12 year and six-year intervals were released in 1988 by the Central Pollution Control Board (C.P.C.B.) in New Delhi. On occasions, it has been given special attention, and a considerable number of people bathe in specific portions of rivers, lakes, tanks, and coasts for a short length of time. During the Kumbh and Ardh-Kumbh, millions of people bathe in sacred spots.

Bathing in large groups has a negative impact on water quality. The health of those who take a dip in the river, as well as the downstream populace who use the river for drinking and bathing, might be jeopardized if the river's water quality deteriorates. During the Ardh-Kumbha and Kumbh melas, the number of faecal coliform organisms grew up to 200 times the usual quantity, even at parts where the water current was quite rapid, according to C.P.C.B. investigations.

The river receives many organic materials because of this. Infections in bathers transmitted to water during a dip produce water-borne illnesses such as typhoid, cholera, bacterial dysentery, and jaundice. 10-15 kilometers downstream, the water is similarly unsafe for bathing. According to studies, each pilgrim contributes over 33 grammes of organic matter to the river. Even a million pilgrims every day would add 33 tons of organic materials to the water body every day. During melas, the number of people increases to several million.

Environmental Impacts

All types of tourism- natural, adventurer and pilgrimage – have severe impact on the environment and ecology. It is not only the tourists who degrade environment but the construction of infrastructural facilities has also negative impact on the environment. Natural, adventure, and pilgrimage tourism all have a negative influence on the environment and ecosystem. Tourists are not the only ones that pollute the environment; the installation of infrastructure facilities has a detrimental influence as well. The service giving centers are heavily affected by natural catastrophes since they are placed along the path of these rivers and streams. Furthermore, many communities are situated on debris produced by rivers and streams, which poses a risk. The presence of pilgrims and visitors adds to the scale of the disasters. Pollution levels are high. The dumping of garbage in open places and aquatic bodies during mountain pilgrimages pollutes the air and water. The problem is exacerbated by land deterioration caused by long pilgrimage trips.

Dynamic nature of the floodplain

A floodplain is described as a region that is inundated by a flood that happens once in every year, often once per hundred years for large rivers. In an ideal world, cities' Development Plans/Master Plans would include some or all of the following laws for land use and legal activities in river flood zones (if not the entire flood plain, then at least part of it). However, in numerous places, these spaces have been encroached upon by illegal colonies or exploited for illegal operations like as agriculture, sand mining, and so on.

It is critical for the river's health to ensure that only approved activities and constructions are permitted in the floodplains. The fundamental task of landscape architecture is to manage the complex interrelationships between cultural and natural systems.

Mela area of Prayagraj region supports various sectors of the economy - religious tourism, crop cultivation, animal husbandry and fishery directly dependent on the holy river. Floodplains are the most active portion of the system, changing dramatically every year, every six years, and every twelve years. These changes bring with them a new set of difficulties, making floodplains more fragile and unstable, impeding natural processes and functions. The significance of this graduation project is also to investigate the ability of landscape design to create ways for generating stable circumstances for dynamic floodplains, which can aid in the preservation of the landscape's sacred character in harmony with its physical context and use (Gupta, 2020).

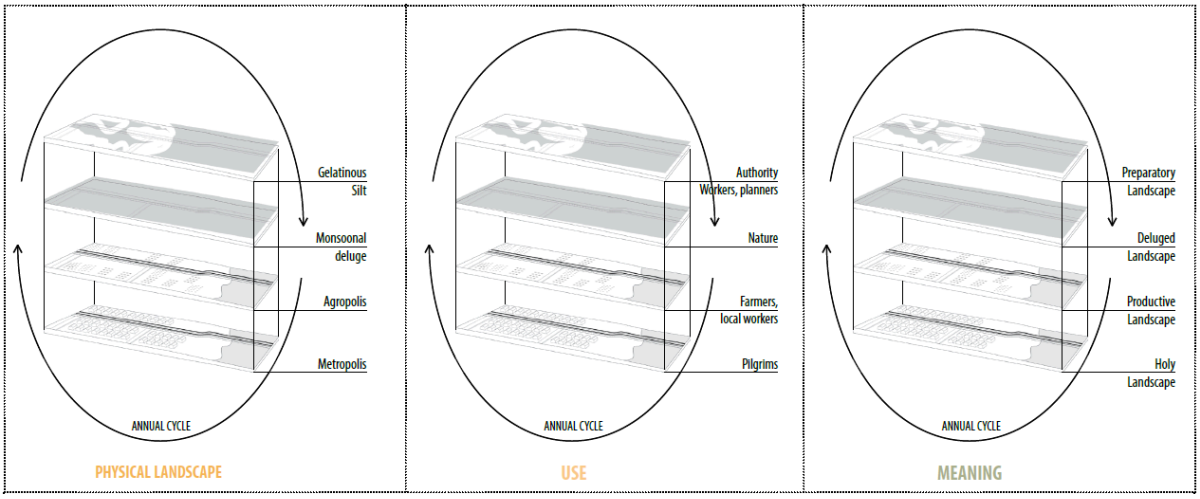


Figure 4:Dynamic nature of floodplain at Prayagraj (Gupta, 2020)

Within a year, the floodplains of the Ganga at Prayagraj represent shifting stages in the landscape, as they transition from celebration to cultivation to deluged to preparation landscape. The external impact or human intrusion of the 'Kumbh mela' celebration is the fundamental cause of this alteration. Apart from these shifting stages, it's important to remember that this landscape is also subject to ecological, cultural, and functional changes. These shifts are defined by the changing interaction between the floodplain's physical location, use, and meaning. These variables combine to generate a structure with varied levels of activity and influence on the floodplain landscape.

Carrying Capacity:

Tourism Carrying Capacity (TCC) is defined by the United Nations World Tourism Organization (WTO) as "the maximum number of people who can visit a tourist location at the same time without destroying the physical, economic, socio-cultural environment or lowering the level of visitors' enjoyment." Tourism operations in protected regions must be properly planned and monitored on a regular basis to ensure their long-term viability. Otherwise, such activities will have negative implications, and tourism will worsen the situation in these locations. Many protected areas have encouraged tourism as a means of enhancing populations' social, economic, and livelihood chances (Kostopoulou, 2006).

Because of the rise in population both inside and beyond the region, Prayagraj's carrying capacity is critical. During the Magh Mela festival, there was a significant increase in visitors and pilgrims. Although there has been a significant expansion in infrastructure amenities, it is still insufficient to suit the needs of tourists. Tourist centres and pilgrimages are either positioned in river valleys or on the delicate slopes of the highlands, emphasising the landscape's fragility and susceptibility. The ability of these sites to carry visitors and pilgrims in terms of infrastructural amenities (primarily transportation and lodging) is insufficient, and growth of these centres has stalled, resulting in environmental and ecological difficulties throughout the region.

Accessibility in Religious sites– do disabled and non-disabled travellers behave differently?

Most of the elderly, disabled people, and children in India now live in an unplanned or undeveloped physical environment. Every person's sense of self evolves as a result of his interactions with his surroundings, and he is educated, encouraged, and inspired as a result of those encounters. His self-image is negatively impacted if his access to the environment is restricted. Because religion reflects our history, culture, and identity, it is critical that religious structures and sites be accessible to all members of society, including people with disabilities (Gassiot, 2016).

This research has theoretical as well as managerial implications. To begin with, it will aid in the understanding of consumer behavior patterns in religious destinations, particularly those of people with special access needs. Second, it's useful to look at how disabled and non-disabled tourists perceive accessibility, and then

compare the results in terms of satisfaction and loyalty. Third, knowing more about visitor behavior in these sites can aid in improving accessibility standards and adapting tourism products to the needs of disabled visitors from an operational standpoint. It's also important when promoting the destination as being accessible and ready for them (Israeli, 2002).

Accessibility Assessment of Religious Spots

Temple complexes, ancient monuments, lakes, bathing steps (ghats) along the river Kshipra, pilgrim routes, historic urban squares, and townscapes are among the sacred sites of Ujjain City. At some of these pilgrimage sites, there are long stretches of road. Within Ujjain city, locations for disembarking from intercity vehicular/railway travel and pilgrim routes were chosen. GIS platform was used to map the data. A road accessibility audit was conducted using a mobile device along the selected road stretches/locations. The checklist was created specifically for the Indian context and spatially represented. Furthermore, there is a hierarchy. To identify dominating factors and prioritize actions, a list of accessibility issues has been developed (Eichhorn, 2010).

Research Gap

In terms of the literature, it has been shown that most research papers have emphasized the importance of sustainable tourism development. However, none of them particularly mentioned the necessity for such development in pilgrimage tourism. On the other hand, there is little information in the literature about the challenges linked with pilgrimage tourism, particularly in terms of environmental concerns. In this context, the current study examined the difficulties surrounding pilgrimage tourism and proposed important options for incorporating sustainable development measures. Furthermore, the relationship between pilgrimage tourism and sustainable development has not been examined in depth in previous research studies, particularly in India, which is another possible gap in the literature.

Introduction to Study Area

The selection of study area is done based on dominance of religious practices and significant pilgrim inflow at pilgrimage sites. Based on that, Prayagraj, Uttar Pradesh is selected for this study. Prayagraj (formerly known as Allahabad) is a magnificent confluence of history, mythology, and devotion. Every year, millions of devotees go for the Magh Mela, and notably for the Kumbh Mela, where one percent of India's population congregates in one area. This implies that thirteen million people in Prayagraj are celebrating this incredible convergence of religion, culture, and tradition. As a result, Prayagraj is not only the sacred confluence of the Ganga, Yamuna, and Saraswati rivers, but also a sea of pilgrims and visitors. It is located at the fork of the Ganga and Yamuna rivers, whereas Haridwar, Nashik, and Ujjain have linear organizations that run down one side of their rivers. Cities have spilled over to the opposing bank in a few cases, with foot and automobile bridges connecting the two sides. From the first day of the nahaan to the last, the region transforms into a massive celebration of life, faith, and divinity. Magh Mela is a once-in-a-lifetime event that is exciting, pulsing, dramatic, and magnificent.

Historical Background

Lord Brahma, the Creator of the Universe, required a location that was particularly ideal for the sacred ceremonies of Yajna, or ceremonial offerings to fire. The holy snake Sheshnag, on whose coils Lord Vishnu sleeps, recommended Prayagraj as the best location. Lord Brahma successfully performed numerous yajnas at this location, and because His work went beyond the scope of a ceremonial yajna and resulted in the creation of a field of profound spiritual awareness, the location was dubbed Pra-yag, where superlative and transcendental yagyas were done. "Pratishthanpur," or "the city of establishment," was the name given to this area at first. It is now known as the Jhunsi area of Prayagraj. Lord Brahma then bestowed the title "Tirthraj," which means "King of Pilgrimages," on Prayagraj. The Brahma Yoop, also known as the Yoop Stambh, is the heart of Prayagraj, where Lord Brahma performed his yajna, according to mythology.

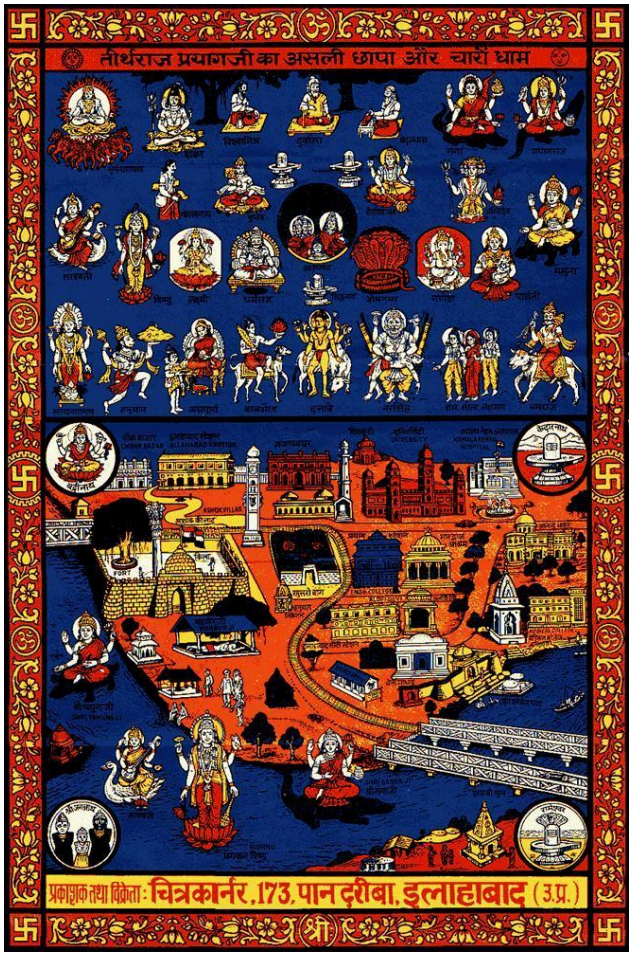


Figure 5: Map showing religious significance of Thirthraj (Source: Rajan Punhani)

Demographics Profile

With a population of 19.98 crores, Uttar Pradesh is India's most populated state (Census 2011). According to the 2011 census, the city's population was 1142751, with a total number of homes (HH) of 195259. It was distributed across 142 square kilometers, split into 80 administrative wards, which have recently been enlarged to 100 wards. According to ULB data, the city's population was 13,12,662 in 2018, with a total number of homes (HH) of 226542. It is distributed across 164 square kilometers, split into 80 administrative wards. When floating population of the tourist is calculated, it is found to be 5% of the total population of Prayagraj.

Because of the presence of the Sangam, the high court, health services, and employment prospects, Prayagraj is one of the most significant metropolitan centres. For the population growth trend, census data from 1971 to 2011 was used to examine the city's growth rate as well as the fluctuation over time. The city of Prayagraj is home to 20% of the district's population and around 80% of the district's urban population. Migration inflow owing to work opportunities, education, tourism, and the city's cultural significance is one of the key factors for the city's population growth. Another reason is that Prayagraj is a significant urban center because of the presence of the Sangam, the High Court, health infrastructure, and employment prospects.

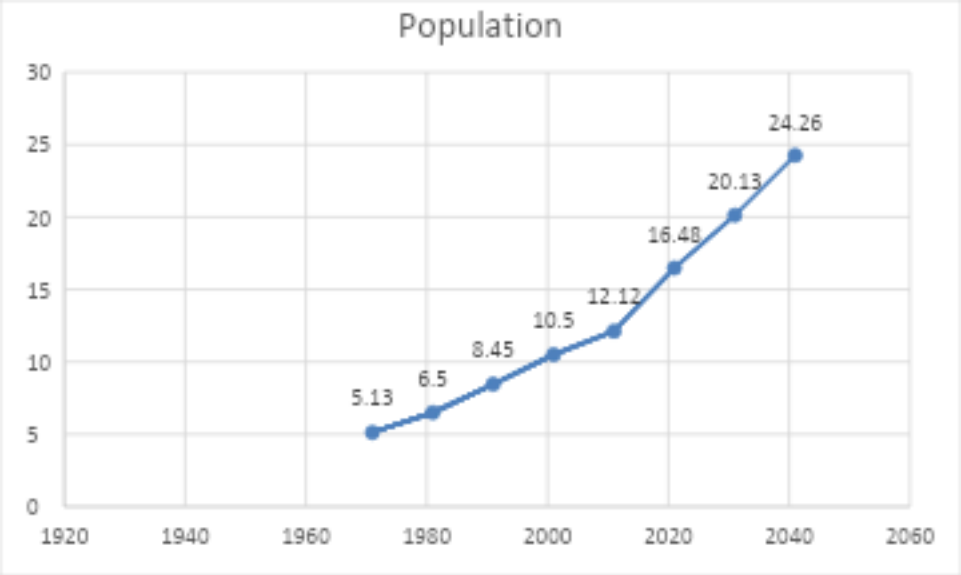


Figure 6:Population trend and projection 1971 to 2041 (Source: City Development Plan 2041, 2015)

Connectivity

Prayagraj has a good rail and road network that connects it to the rest of the country. The present NH-2 (Grand Trunk Road) divides the city into two halves: the Civil Lines sector and the Old City area. The Prayagraj Bypass, which connects NH-2 and NH-3, is part of the National Highway Development Program (NHDP). Prayagraj airport, which was opened in February 1966, serves the city. The city center is 10 kilometers from the airport. From this airport, daily flights to Delhi are available. The city is located on the Eastern Railways' Delhi-Calcutta train route and provides direct rail connections to major cities like as Patna, Bhopal, Guwahati, Meerut, Lucknow, Kanpur, Kolkata, Delhi, Chennai, Mumbai, Gwalior and Varanasi. The map below depicts Allahabad's regional connectivity.

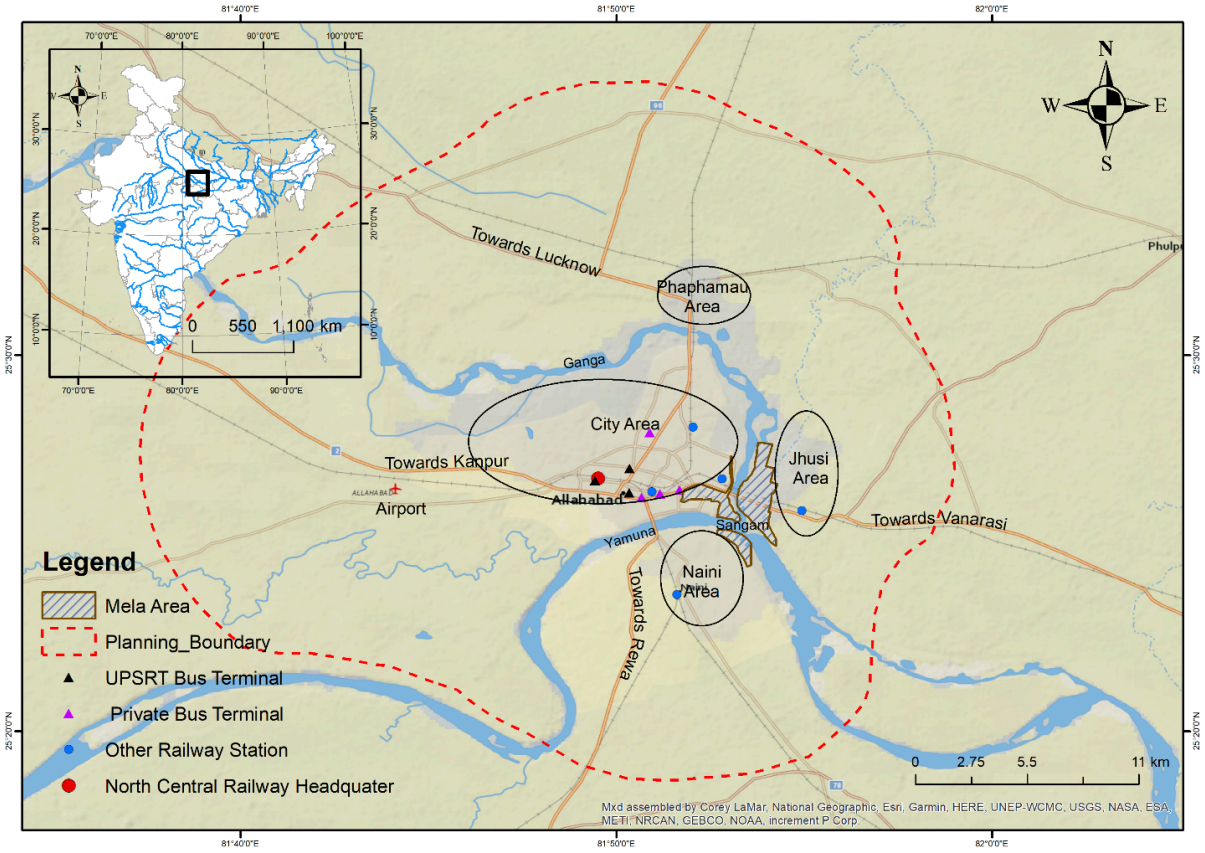


Figure 7: Connectivity to the Study Area (Source: Author)

Tourism

Prayagraj is known for its rich heritage and spiritual tourism. Known as the Prayag city, it is one of the four places that holds Kumbh mela once in every 12 years. Within Uttar Pradesh, Prayagraj is the 1st top visited city by domestic travelers and 6th top visited city by foreign travelers. The tourist attractions present in the city, can be classified into four layers: (i) Religious heritage: These places are visited by pilgrims to perform devotional activities, rituals or experience the religious culture. (ii) Pre-colonial heritage: These sites consist of the monuments built during the pre - colonial era, such as the Ashoka pillar, King Samudragupta's castle, Allahabad fort, Khusro Bagh etc. which are protected under Archeology Survey of India (ASI). (iii) Colonial heritage: Colonial heritage consists of British architecture that is reflected in structures like all saints' cathedral church, high court, Queen Victoria memorial, etc and the legacy of the Nehru family in Anand and Swaraj Bhawan. These sites are visited to witness the story and grandeur of Allahabad before independence. (iv) Post-colonial attractions: These sites are often visited by local citizens for leisure and recreational purposes. Chandra Shekhar Azad Park, Naini Bridge, civil line market are some examples.

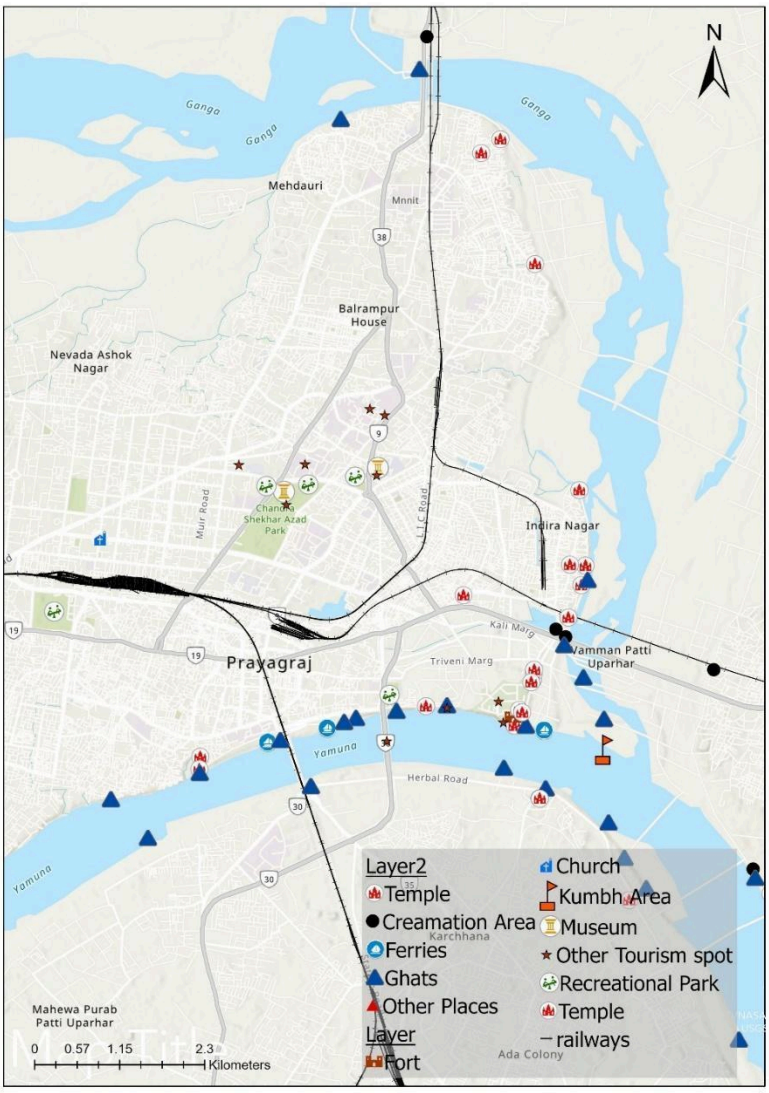


Figure 8: Prayagraj Tourist Map (Source: Author)

Tourism in Prayagraj can be unfolded into different layers to understand its characteristics and type of tourism and activities associated with it. The first layer that determines the base of the city and defines the city is its religious aspect. Prayagraj lies at the convergence of the rivers Yamuna, Ganga, and mythological river Saraswathi whose water is worshipped by the followers of Hindu religion. Most pilgrimage or religiously important spots are located along the bank of the river and near Triveni Sangam as shown in the above map. The confluence of Ganga with Yamuna and mythological river Saraswathi is the holiest location along the river's entire course. Most of the religious activities are concentrated along the bank of the river which helps in establishing a relationship between people and the holy water by giving them direct access to it.

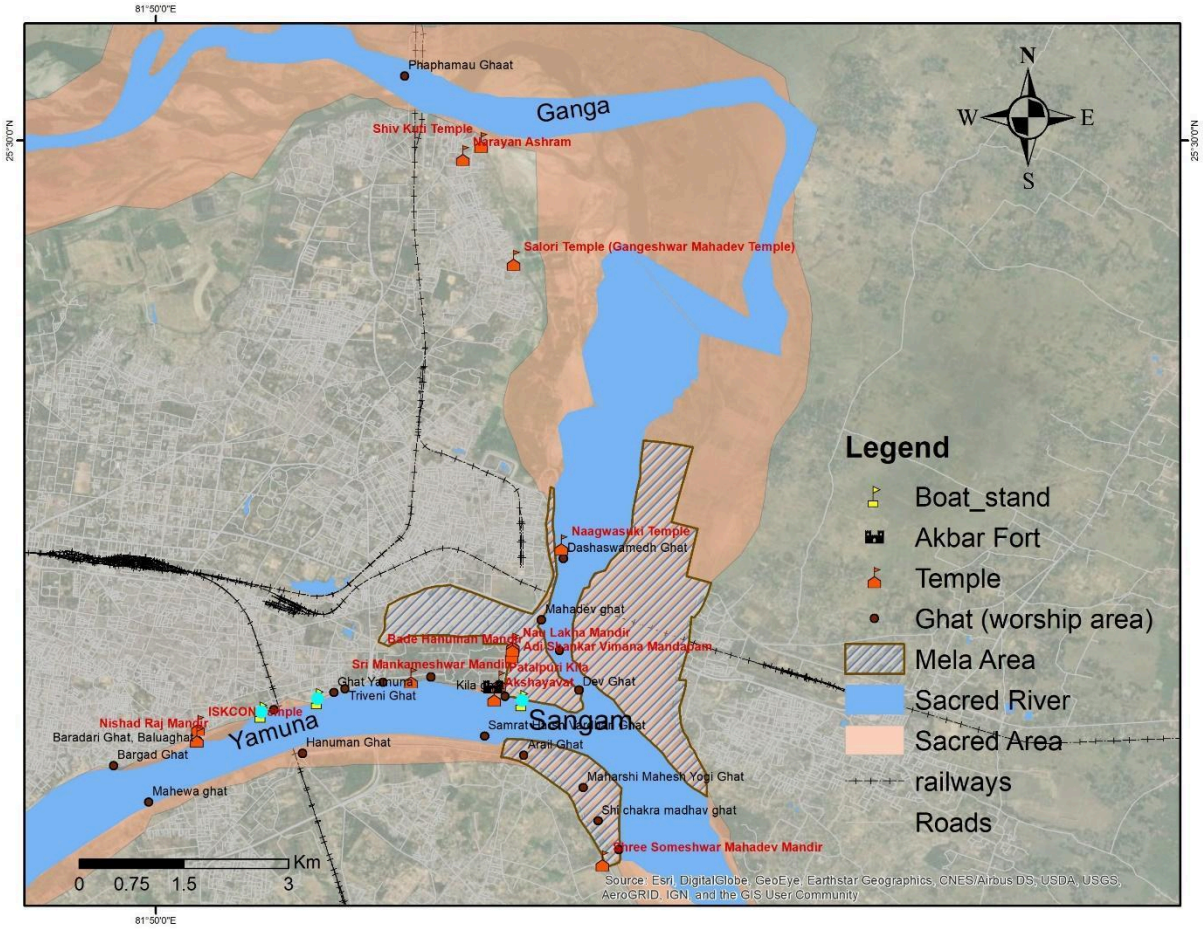


Figure 9: Important Religious Landmarks along the river

Magh Mela

For Hindus, the Magh Mela is one of the most important yearly religious events. The Magh Mela is a scaled-down replica of the Kumbh Mela, one of the world's largest people gatherings. Hence, it is also known as the "small Kumbh Mela," even though it attracts millions of tourists each year. The world's biggest pilgrimage (i.e. Kumbh) takes place at four distinct locations in India (Prayagraj, Haridwar, Nasik, and Ujjain). There are four types of mela (i) The Maha Kumbh Mela which is held every 144 years, (ii) The Purna Kumbh Mela every 12 years, (iii) The Ardh Kumbh mela every 6 years, and (iv) The Magh mela which held on an annual basis.

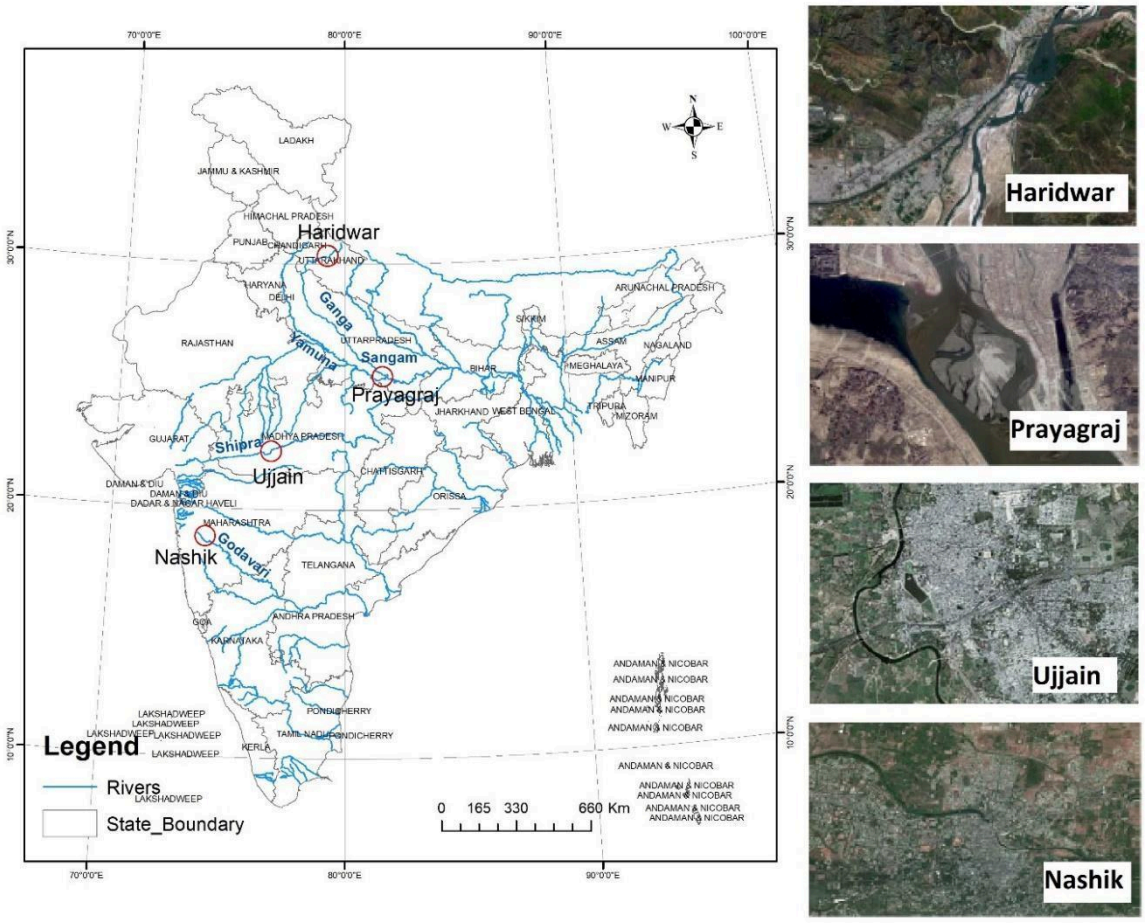


Figure 10:Study Area Location (Source: Author)

Every year, the baths begin on January 14th, Makar Sankranti, the 11th day of Paush month in the Hindu calendar, and endure for around 45 days, culminating with Maha Shivratri. According to India's ancient astrological system, the dates are decided by Jupiter's transits through Aries and Taurus, as well as the transits of the Sun and Moon through Capricorn. This month is also known as Kalpvas, and the devotees who live here are known as Kalpvasis. The Kumbh Mela is held every 12th Magh Mela.

Origin of Magh Mela

Famous fairs are held in India to commemorate all significant religious events. These can range in size and scope from a few days of joyous frolic around a small deity's shrine to massive gatherings of millions that endure a few months at major religious locations. Magh Mela and Kumbh Mela are two instances of such festivities. Even though the Kumbh Mela has become a worldwide phenomenon, the Magh Mela receives far less attention. According to legend, the Magh Mela began when Lord Brahma, the creator of the universe, performed a sacred yajna at Sangam in Prayagraj, where the three holy rivers Ganga, Yamuna, and Sarawati meet.

One of the most remarkable parts of the Magh Mela is its arrangement. Even as the government prepares for a month of celebration and dedication, only a few weeks before the festival, a city rises on the ghats. Authorities erect tents, cottages, roads, businesses, banks, ATMs, and even markets; extra buses and trains are arranged to assist pilgrims in reaching the city; and increased security measures are implemented. The region changes into a vast celebration of life, faith, and divinity from the first day of the nahaan to the last. The Magh Mela is a once-in-a-lifetime event that is thrilling, throbbing, dramatic, and spectacular.

Magh Mela during British Period

During the British era, the British government used to charge a fee for bathing in the month of Magh. The fee income was matched with the money spent, there was a system of audit of expenses. According to the documents found, the British government used to get the Kumbh expenses audited, and a team of officers was appointed to keep an eye on the expenditure. This team used to report directly to the Secretary of Northwest Province.

Believes

Pilgrims come to bathe in the hallowed waters and wash away their sins in the hopes of achieving moksha—liberation from the cycle of rebirth. Many were drawn to attend even if the epidemic occurs. During the survey, more than 70% of persons were found to be without a mask. History backs him up when he says, "Here, fate is more essential than health. The Kumbh Mela of 1918 occurred during the deadliest pandemic in human history, the so-called "Spanish" flu, and the British colonial authorities attempted to deter pilgrims by canceling passenger trains. Even back then, "three million [devotees] traversed the journey on foot and in bullock carts" attended the event.

During this fair in magh month, water is shallow near Sangam. Many individuals shave their heads before taking the Holy Dip, as is customary in Hindu culture. The Magh Mela has a lot of religious importance, but it's also a great occasion to celebrate community trade. There includes entertainment, education, charity, free lunches for saints and monks, product sales and purchases, religious speeches by saints, and more. The following are the main features of the Magh Mela.

Sacred Bath

On the most favourable days of this 45-day period, people bathe in the holy waters. The following are some significant days when soaking in the holy waters might bring abundant good fortune and cleanse sins:

- Makar Sankranti,
- Purnima, Amavasya,
- Basant Panchami,
- Maghi Purnima, and
- Maha Shivratri.

Shayya Daan

People also offer prayers and yajnas to the Sun God during Kalpavas. To receive the heavenly energies, a devotee who has observed 12 Kalpavas must surrender his bed and other valuables in a rite known as Shayya Daan..

Havan

Saints and monks perform yajnas or havans to summon deities and satisfy them through religious chantings and gifts of samidha, fruits, sweets, flowers, and other offerings.

Arghya

Dedicated devotees provide free meals to others, such as saints, monks, and the needy. A sesame and grain giving ceremony is also performed for the impoverished and needy after taking bath in the river.

Ann daan

Free food is distributed by ardent devotees to other people like saints, monks, poor people, etc. There is also a ritual of sesame and grain offerings to the poor and needy.

Mela Preparation

Administrations are engaged in the Mela's planning. The Authority's officials and personnel are appointed with the permission of the State Government. The Authority's office will be staffed with both permanent and temporary employees. The personnel is subject to the Chairperson's disciplinary authority, however they perform tasks under the direct supervision of the Mela Adhikari.

Departmental Implementation and Protection

- Public Works Department
- Irrigation Department
- Health Department
- U.P. Vidyut Nigam Ltd.
- Ganga Pollution Control Unit
- UP Jal Nigam
- Police management
- Sanitation management
- Security management

Administration involved

- Administrative Office
- Prayagraj Fair Authority
- Integrated command and Control centre
- Covid Control Centre

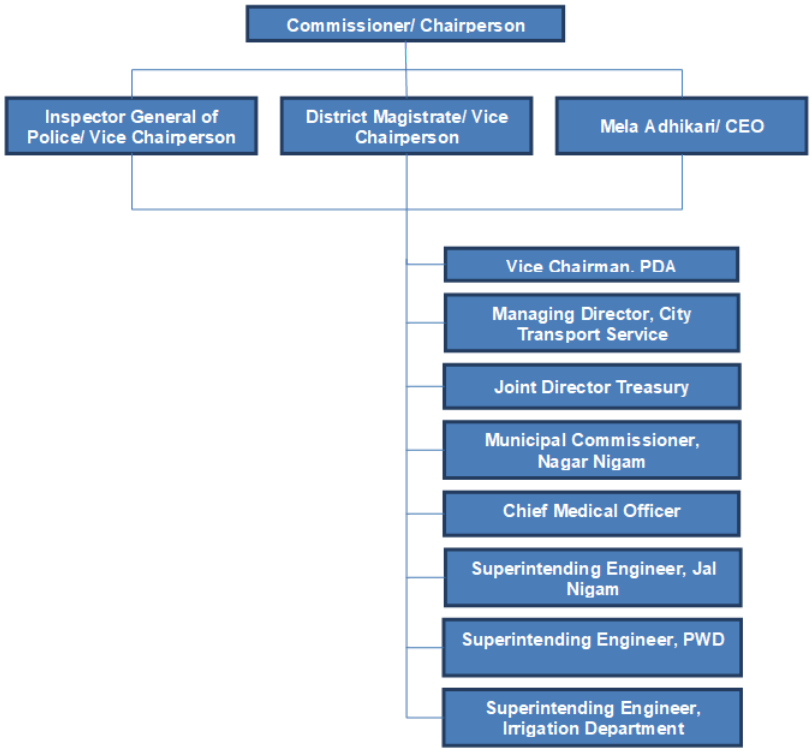


Figure 11: Administrative Hierarchy Chart (Source: Author)

Mela is divided into a six sector; each sector has its different land use characteristics shown in fig 12.

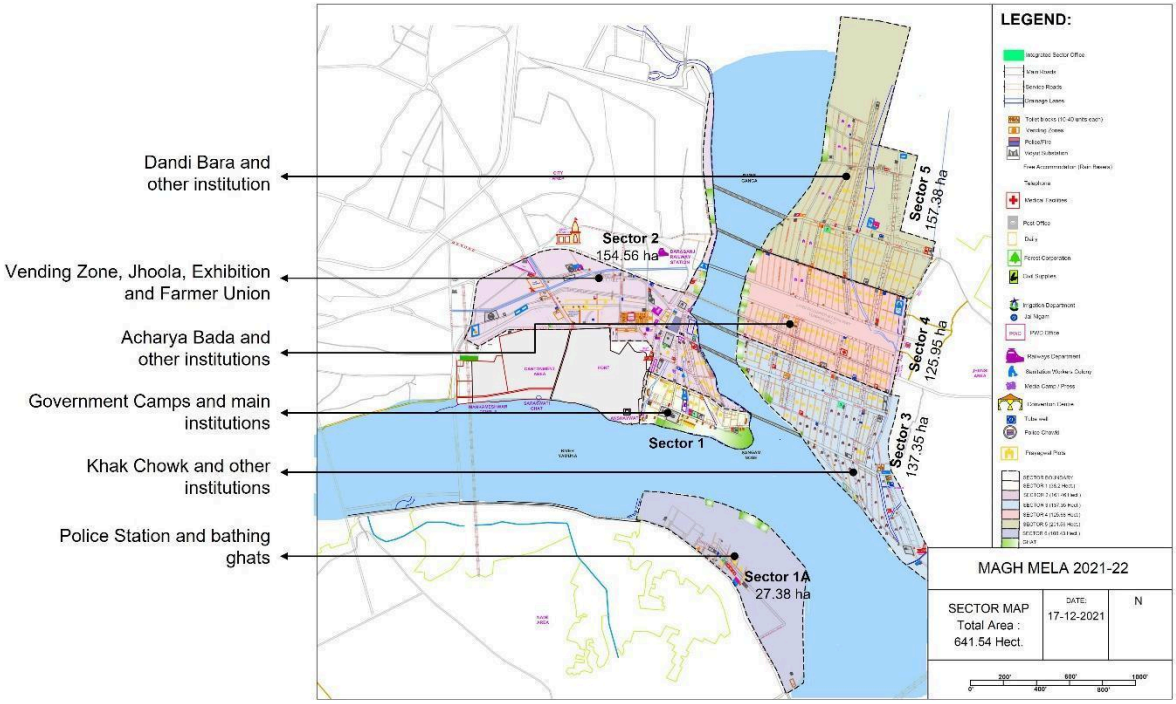


Figure 12: Sector plan of Magh Mela 2022

Table 1: Facilities provided by the different departments (Source: Mela Authority)

Departments	Facilities Provided	Challenges	Gap/ Field observations
Public Works Department (PWD)	•5 pontoon bridges •21 main roads and 137 Gata roads by putting checkered plates	Due to the fluctuating water level of river Ganga, many routes have been regularly maintained at proper level.	
Irrigation Department	•Construction of 4 jetties	Protection of ghats from fluctuating water level	
Health Department	•Hospital established in Mela area: 2 •Total Medical Posts in Mela Area: 10 •No. of Medical Beds in Mela Area: 50 •Number of reserve beds for pilgrims in main hospital in Prayagraj city - 100 •Number of Medical Staff: 415 (Doctor-89, Paramedical Staff-326) •Covid centre point in every entry point •Distribution of mask in every ghat	•Covid-19 •Transmittive disease •Change in whether	No distribution of mask were seen Extra beds require during main bathing days
U.P. Vidyut Nigam Ltd.	•23 power substations were constructed •42 km. of overhead 11 kv electrical line was constructed •17500 nos. of different capacity LED streetlights were installed •102000 no. connections including camps, toilets, rooms, conduit wiring to be set up in the Mela area		
Ganga Pollution Control Unit	•One temporary sewage treatment plant of 0.5 MLD has been set up in the Mela area. •Sewage treatment of about 1.45 MLD has been done.		
UP Jal Nigam	•24/7 water supply through 1985 km drinking water pipeline, 1300 stand post, 12500 drinking water connection and 15 tube wells. •Water sprinkling regularly on all main roads through water tankers		
Sanitation management	•2160 sanitation workers •30 trippers and 10 compactors •Dustbins are placed in every 20m •1400 FRP toilets, 9000 institutional toilets and 3000 PTC toilets have been constructed in the Mela area	Transportation of Waste during the main bath.	No Segregation of waste at the source level Many toilets were not connected with water
Police management	•Fire station 14 •Fire Watch Tower 14 •Central Control tower 1 •Watch Tower 3 •Wireless Grid 3 •bathing ghat 24 •Deep water barricading 6 kms	Crowd Management during Main Bathing days Disaster Management	

The 'pilgrims' celebration begins in 14 January and lasts for around 44 days or more according to the lunar calendar. For this sacred occasion, the Ganga's floodplains are transformed into a makeshift metropolis.

During the period of March to June, local employees use the floodplains for agricultural cultivation and livestock grazing when the event is done. The temporary city is demolished to make way for an acropolis, and the city grid is utilized to divide agricultural plots for farmers.

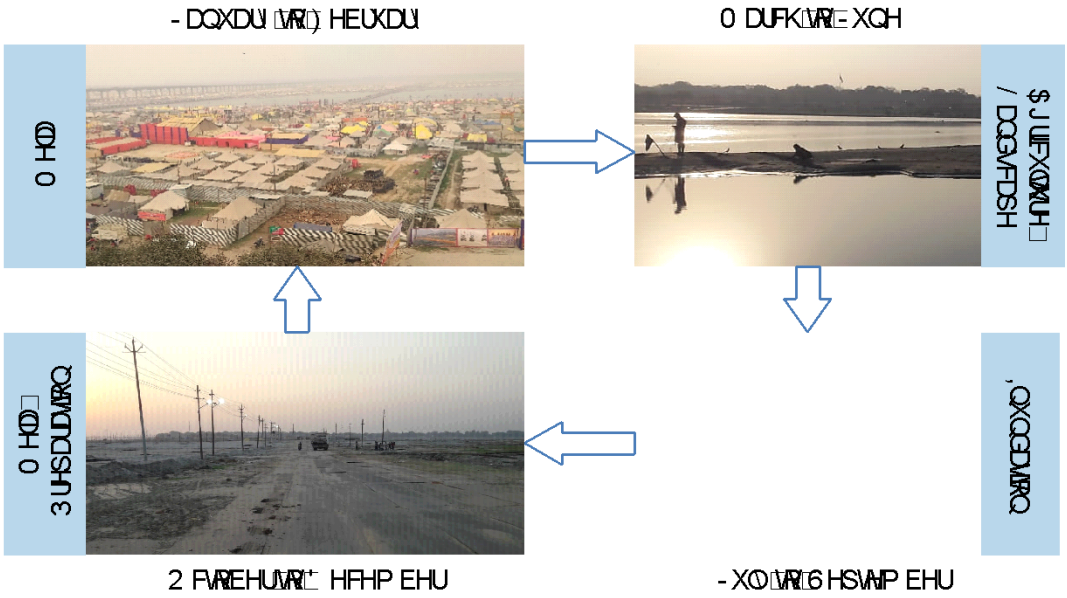


Figure 13: Transforming nature of land

*The river surges d*uring the monsoon season between July to September, the inundation on low-lying nearby communities. During this time, local and seasonal laborers relocate to a new area until the monsoon passes, and the Ganga's waters begin to recede.

From October, the water level of the Ganga begins to decrease after the monsoon season, exposing the previously submerged floodplains. The terrain of the floodplain is currently swampy, and authorities are waiting for the earth to firm before beginning preparations for the Magh Mela celebration.

Selected Road Stretch for Universal Accessibility

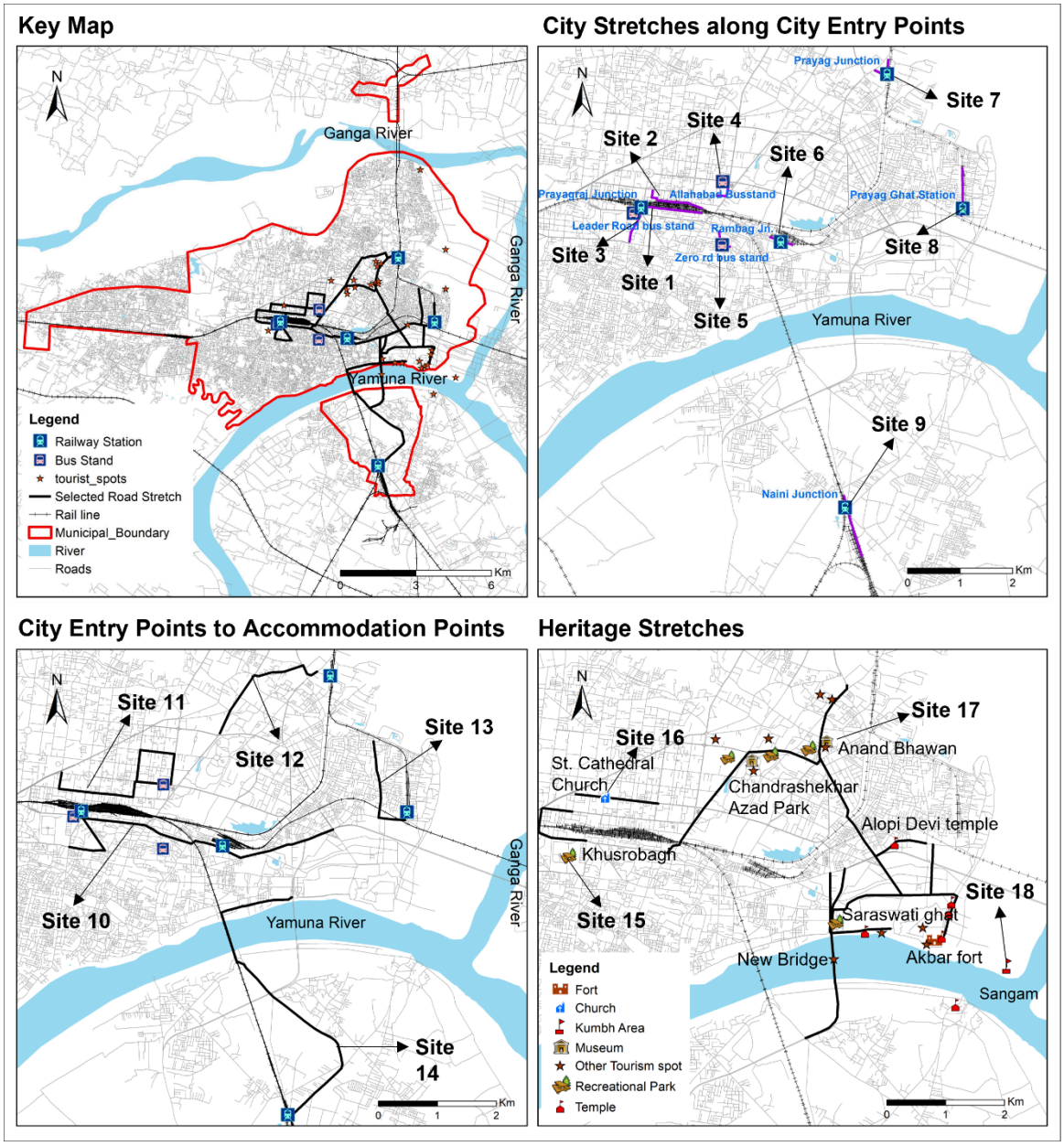


Figure 14: Location of three categories of selected road stretches within Prayagraj city

Table 2: Selected Road Stretch

City Entry			
Site 1	Prayagraj Junction (PF 1)	**Site 6**	Rambagh Station
Site 2	Prayagraj Junction (PF 10)	**Site 7**	Prayag Junction
Site 3	Leader Road Bus Stand	**Site 8**	Prayag Ghat Station
Site 4	Civil Lines Bus Stand	**Site 9**	Naini Junction
Site 5	Zero road Bus Stand		
Accommodation			
Site 10	Prayagraj Jn. (PF 1) To Alopi bagh	**Site 13**	Prayag ghat station to Allahpur sabzi mandi Rd.
Site 11	Prayagraj Jn. (PF 10) to Patrika Chauraha	**Site 14**	Naini jn. To Mankameshwar Rd.
Site 12	Prayag Jn. To Hathi park chauraha		
Heritage			
Site 15	Khusrobagh to Nawab Yusuf Rd.	**Site 17**	Johnston ganj to Anand Bhawan
Site 16	Church to Subhash Chauraha	**Site 18**	Bairahana Chauraha to Kumbh area

The roadways of Prayagraj city played a crucial part in this study, which attempted to analyze universal accessibility and make the city accessible. The actions of pilgrims were observed to identify road segments. The major road segments were grouped into three groups based on activities:

Category 1: Road stretches along city access points (bus stops, train stations),

Category 2: Road stretches along city entry points to lodging places, and

Category 3: Road stretches along historical sites.

Road stretches along airport is not selected as the major mode of transportation in Prayagraj city is bus and rail. As illustrated in the fig 14, nine road segments were chosen for the first category, five for the second category, and four for the third category. The decision was made based on the number of religious visitors that visited the area (.

The findings of the Prayagraj city geospatial research aided in the selection of elements for inclusion in the Universal Accessibility Assessment of Prayagraj city audit checklist. The following impairments were taken into account when creating the checklists: cognitive impairment, complete blindness, the elderly, hearing impairment, limb, partial blindness, speech impairment, and wheelchair users. There were two sorts of checklists created:

1. Checklist for City Entry Points-category 1 road stretches was audited using this checklist.

2. Checklist for Public Realms-category 2 &3 road stretches were audited using this checklist.

Signage, Kerb Ramps, and Tactile Guiding & Warning Blocks are all similar parameters for both checklists. The checklist for city access points comprised parameters such as Reservation and Information Counters, Toilet Facility, Platforms (train), Seating Area, Ramps, Walks and Paths, Stairs, and Lifts. Parameters such as Traffic Signals, Parking Space, and Approach to Building, as well as Planned Pedestrian Routes, Subways, and Foot Over Bridges, have been included to the Public Realms checklist. There are five to thirty sub parameters for each parameter.

Study Design

Methodology

During the Mela, information is gathered for long-term and short-term growth. Primary and secondary sources are used to collect data on carrying capacity, such as transportation, lodging, and boarding. In addition, 120 persons (purposive-random sampling) involved in business, local self-government, and locals who provide services to tourists/pilgrims were questioned and answered questions concerning infrastructure aspects. A participatory observation method was also used to monitor the tourist/pilgrims' centers.

Data analysis includes activity mapping to capture activities and their impact on the environment, water quality index to determine the quality of surface water, tourist carrying capacity, and changes in land use.

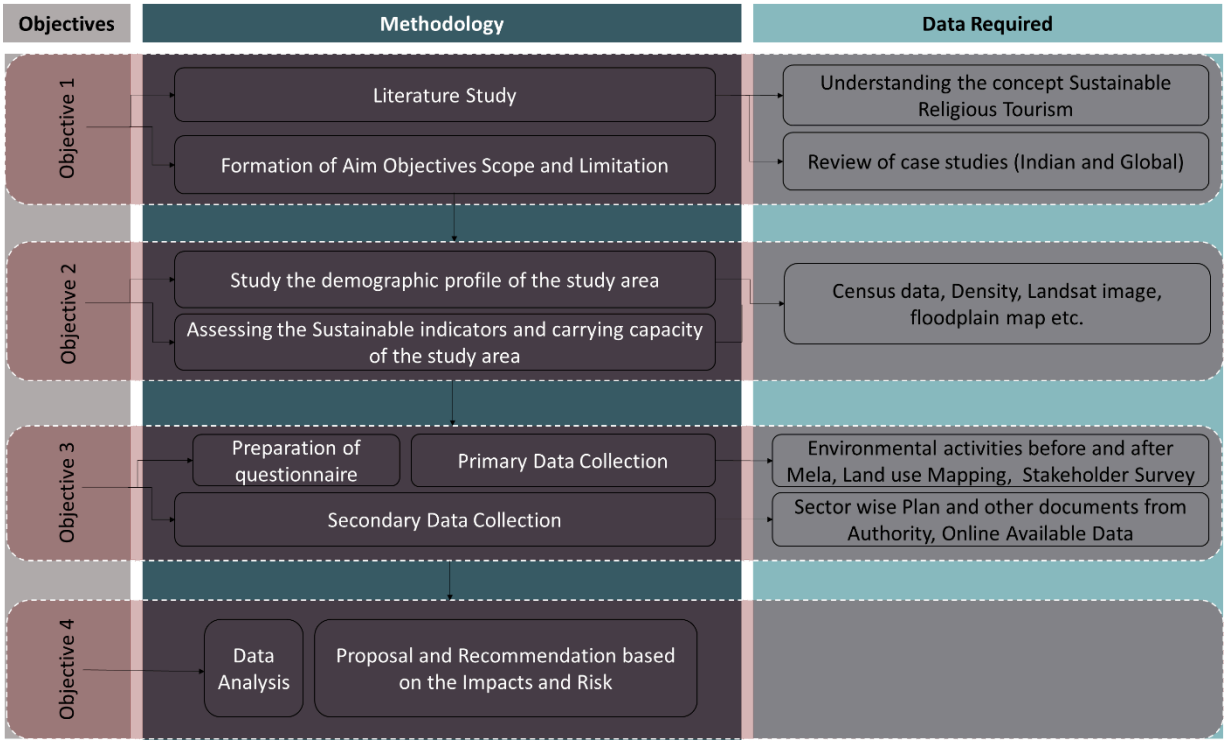


Figure 15: Methodology (Source: Author)

Figure 16: Sustainable Religious Parameters

The city of Prayagraj can be studied in two layers due to its unique geography: the permanent city, which includes both new and old sections of the city, and the temporal city, which has an impact on the city's formation due to its pilgrimage aspect and the complex psychological needs of people in each era.

Three parameters which play an important role in shaping the landscape of the region are – Social, economic, and environmental which constitute the three parameters of research methodology adopted. Therefore, the threefold research approach offers three essential parameters which are used to understand all aspects of the dynamic floodplain landscape and then used to formulate a vision to establish a landscape framework for the floodplains of river Ganga at Prayagraj.

Social

The features of pilgrims and their pathways are determined under pilgrimage, and then an accessibility evaluation is done using a universal access audit checklist.

Calculation of Accessibility Indicator

Cognitive disability, full blindness, the elderly, hearing impairment, limb, partial blindness, speech impediment, and wheelchair users were all considered when establishing the checklists. There were two different types of checklists made:

1. Checklist for City Entry Points- category 1 road stretches were audited using this checklist.
2. Checklist for Public Realms- category 2 &3 road stretches were audited using this checklist.

Individual layers of the accessibility parameter were given different weights. Because checklist 1 has eleven parameters, weights were assigned in the sequence of 11 to 1. 'Platforms' had the highest weighting of 11, while 'Stairs' received the lowest.

Table 3: City entry points weightage

S.no.	Indicators	Weightage
1	Platforms (train)	11
2	Ramps	10
3	Reservation and information counters	9
4	Kerb ramps	8
5	Signages	7
6	Seating Area	6
7	Toilet Facility	5
8	Lifts	4
9	Walks and paths	3
10	Tactile Guiding & warning blocks	2
11	Stairs	1

Similarly, weightage was assigned to checklist 2. As there were ten parameters in checklist 2, weights were given in the order of 10 to 1. ‘'Planned Pedestrian Routes' had the highest weightage of 11, while 'Parking Space' received the lowest.

Table 4: Public realm weightage

S.no.	Indicators	Weightage
1	Planned Pedestrian routes	10
2	Subways and Foot Over Bridges	9
3	Signages	8
4	Barriers and hazards	7
5	Traffic signals	6
6	Sidewalks and footpaths	5
7	Approach to building	4
8	Kerb Ramps	3
9	Tactile Guiding & warning blocks	2
10	Parking Space	1

Economic

Constantly increasing of pilgrims also aims to create opportunity for local and seasonal workers to engage with this dynamic, changing floodplain landscape of holy river Ganga at Prayagraj. After the festival is over, land is used for agricultural production.

Environment

Every change in a landscape's physical, biological, and cognitive assets is referred to as "dynamic landscapes." Natural, adventure, and pilgrimage tourism all have a negative influence on the environment and ecosystem. Tourists are not the only ones that pollute the environment; the installation of infrastructure facilities has a detrimental influence as well.

Data Collection and Analysis

To understand the perspective through people secondary data from Prayagraj Mela Authority, Prayagraj Ganga Pollution Control Board, Prayagraj Development Authority, Sanitation and Management Department, Jal Nigam, Police Department, Health Department, Irrigation Department, and other government department. Primary data where collection was done through structured questionnaire, from tourists, residents, and volunteers. A total of 120 tourists survey, focus group discussion, interview from various stakeholders were done.

Floating Population

Prayagraj attracts an enormous number of tourists every day. A substantial portion of the demographic analysis indicates that Prayagraj has a daily floating population of roughly 65,633 visitors, accounting for 5% of the total population. As per CDP 2041, floating population was 8% of the total population of Prayagraj during the period of 2011-12. Floating population i.e., tourist arrived in the last eight years is shown in the below section.

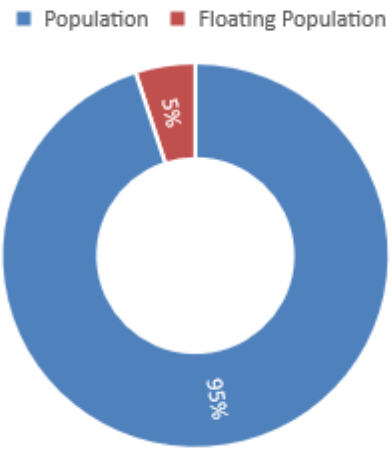


Figure 17: Percentage of floating population to the total population (Source: Author)

Domestic and Foreign Tourist Statistics

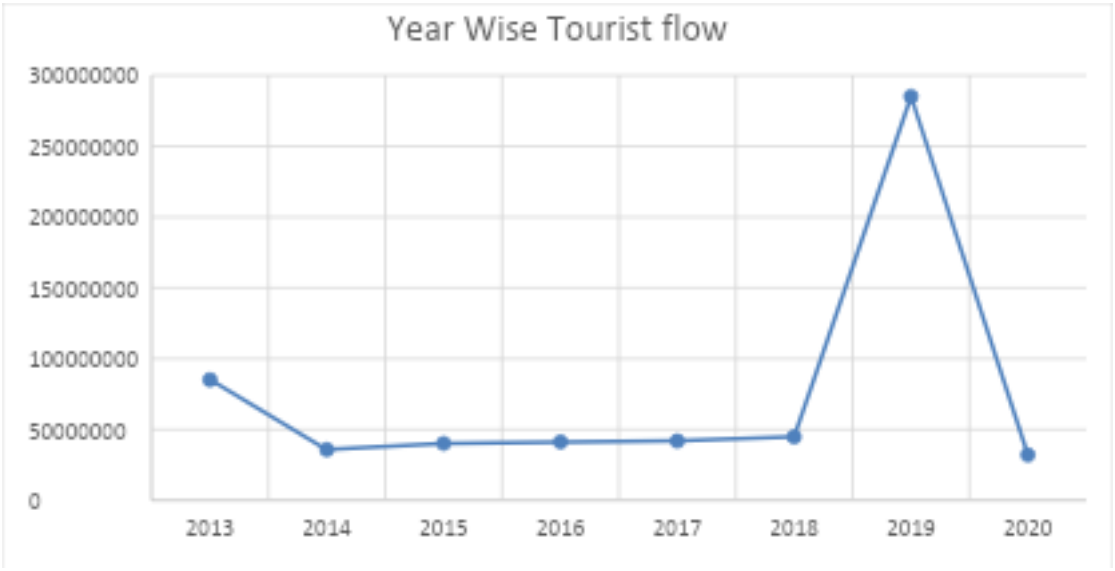


Figure 18: Annual Tourist flow in Prayagraj (Source: Author)

The city attracts many domestic visitors as it is a major pilgrim centre and a commercially important city and small number of foreign tourists because of a relatively small industry base. 2013 and 2019 shows a larger number of visitors for tourism purposes because of the Maha Kumbh Mela that was held in 2013 and Ardh Kumbh Mela in 2019. Prayagraj receives an average of 1,11,595 tourists per day.

Table 5: Year wise domestic and foreigner visitors

Year	Indian (in lakhs)	Foreigner (in lakhs)	Total (in lakhs)
2013	847.17964	3.87719	851.05683
2014	356.05966	1.07141	357.13107

2015	400.0167	1.09281	401.10951
2016	411.46674	1.09571	412.56245
2017	417.64987	1.09675	418.74662
2018	446.68662	1.46805	448.15467
2019	2840.5701	11.71696	2852.2871
2020	318.67069	0.66689	319.33758

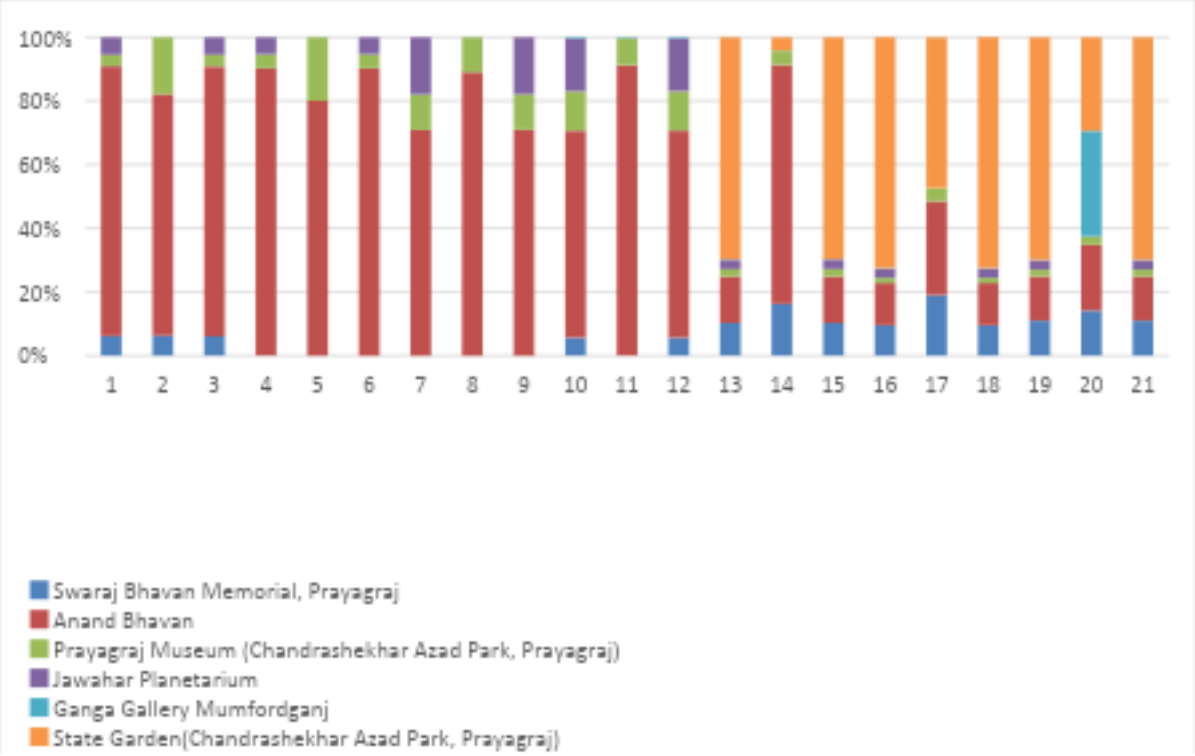


Figure 19: Domestic and Foreigner visitors on the Prayagraj monuments

Month wise Tourist Flow

The below graph shows the monthly variation in tourist footfall in the city of Prayagraj. The highest footfall of the tourist is in the month of January and February, with peak season being March, August, and December. The high influx of tourist is during January and February is due to mass gathering on pilgrimage festival, Magh Mela.

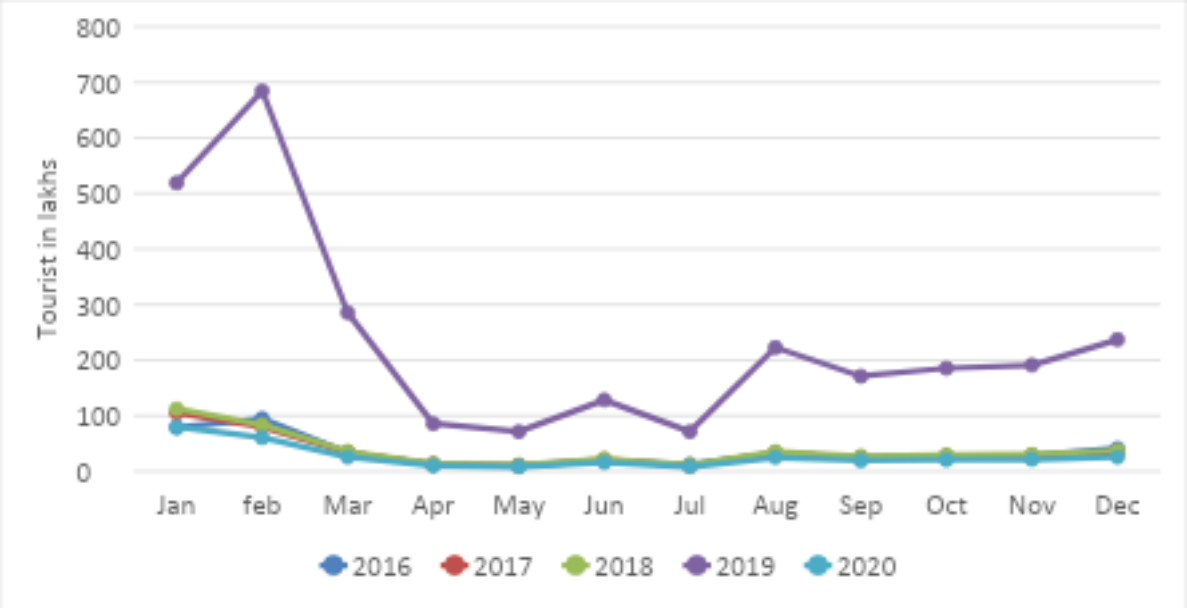


Figure 20: Month wise tourist flow

Data Analysis: Social Indicators

Based on the survey data relevant graphs and charts have been prepared. Cross tabulation has been done to see the impact of one factor to another. Responses have been grouped together and accordingly analysis has been done.

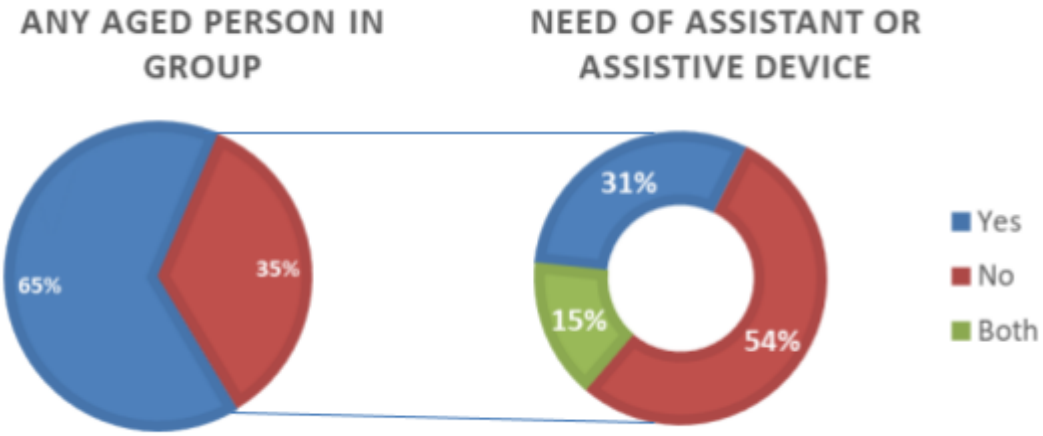


Figure 21: Primary Data analysis of the elderly people

Fig 18 shows that all the data which was have collected out of which 35% of groups were having aged people with them. Most of them were Kalpwasis. Out of which 46% of aged people require any means of assistant device with them. 10% of differently abled people were found.

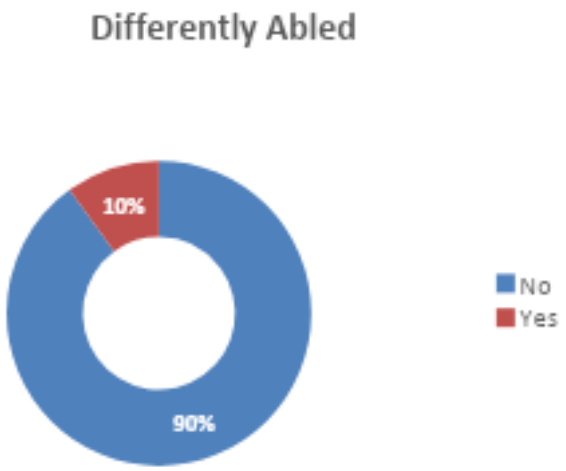


Figure 22: Percentage of differently abled people

Facility for elderly and disabled person were required to be emphasized as it ranks lowest among other services. Universal Accessibility analysis were performed to check the facility for differently abled people.

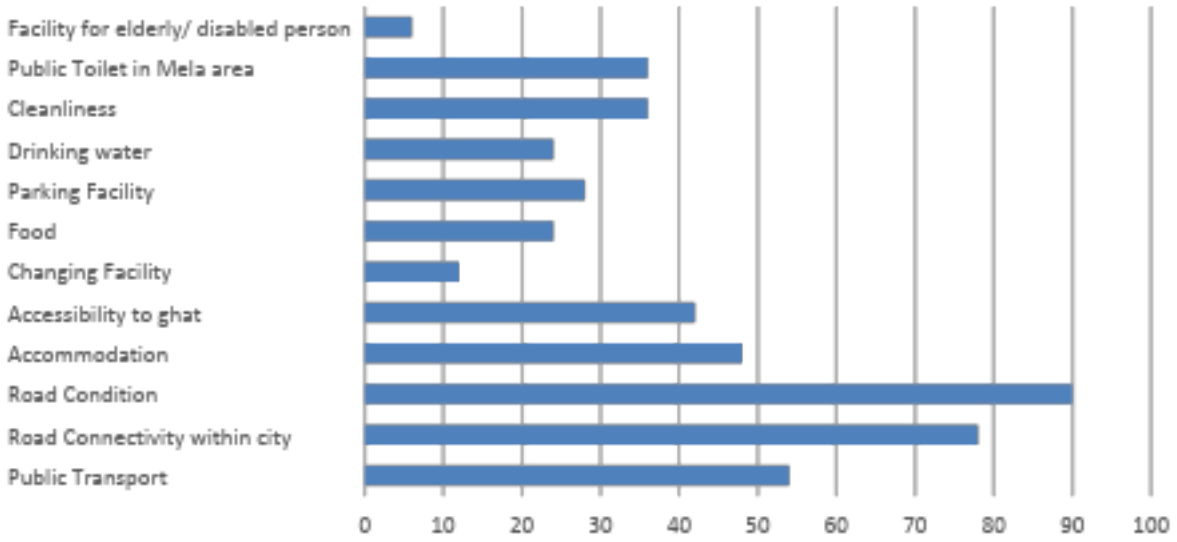


Figure 23: Tourist Satisfaction data analysis

Activity Mapping

Pilgrims begin their journey by arriving at the ghat region, approaching the steps, and then walking down to have a holy bathe in Sangam by boating before going up to the changing facilities erected alongside the bathing ghats. After changing clothes, they worship to river Ganga, Yamuna, and Saraswati by offerings flowers, petals, coconut, milk etc. Dedicated devotees provide free meals to others, such as saints, monks, and the needy. A sesame and grain giving ceremony is also performed for the impoverished and needy after taking bath in the river. They buy flowers, sweets, clothes, and other items as offerings from businesses located near temples on their route to the temple. The road segments between bathing ghats and temples provide the most spatial and social connection with the built environment.

Figure 24: Activities along the bathing ghats

For most pilgrims, a plunge in the holy river has spiritual significance since they think it will bring them to salvation. The pilgrims begin walking towards the Sangam with their offerings at 6 a.m., fully immersing themselves in the waters once, twice, or three times, and then pouring the water from their cupped hands back into the river as an offering to the deity and ancestors, as depicted in figure 21. Flowers and oil lamps are floated into the currents of the sacred river Ganga as gifts. We observe pilgrims mass bathing in the Ganga and putting their donations into the river in image. Taking a plunge in the river is a regular activity along the floodplains beginning before dawn on any given day during the festival. Sandbags are used to stabilize the unstable floodplain borders, allowing for safe footing. To safeguard pilgrims from crowds that would force them farther into the river currents, bamboo guardrails and railings have been anchored in the river in several areas. Many pilgrims ride a boat into the river, where they may bathe in the real waters where the rivers meet, thanks to an improvised platform.

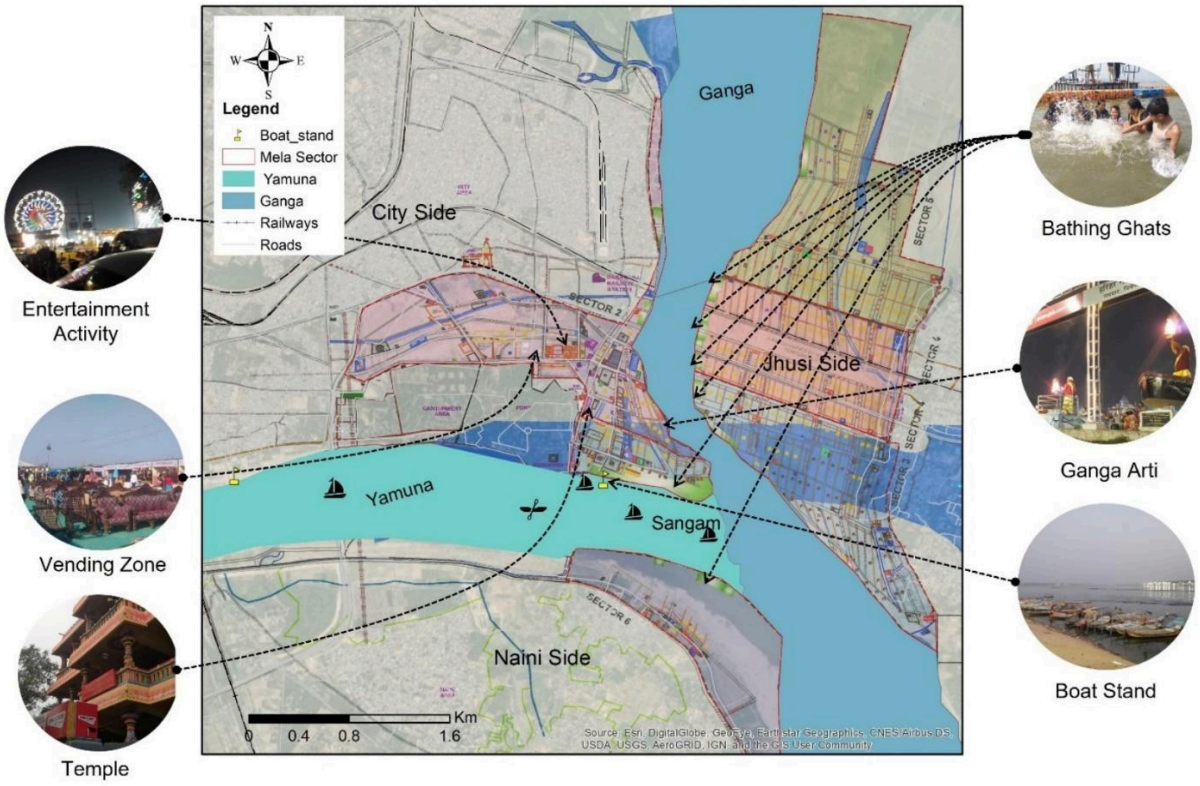


Figure 25: Activity mapping

Analyzing the Infrastructure for Universal Accessibility

Based on the information gathered through the audit checklist GIS analysis was performed on the selected road of three categories (category 1: Road stretches along city access points, category 2: Road stretches

along city entry points to lodging places, and category 3: Road stretches along historical sites). The GIS analysis shows that bus station (site 3 and site 4) was coming under the low accessibility zone.

Figure 26: Map showing different accessibility zone of category 1 road stretch

In comparison to bus stops, railway stations are more accessible, as shown in above fig. Sites 1, 2 (platform numbers 1 & 10 of Prayagraj railway station, respectively), Site 6 (Rambagh Station), Site 8 (Prayag Ghat Station), and Site 9 (Naini Junction) are all high-access zones. Because trains connect Prayagraj with many regions of India and are the preferred form of transportation for Indian pilgrims, accessibility at railway stations will expand Prayagraj's potential as a religious tourism destination for pilgrims with disabilities.

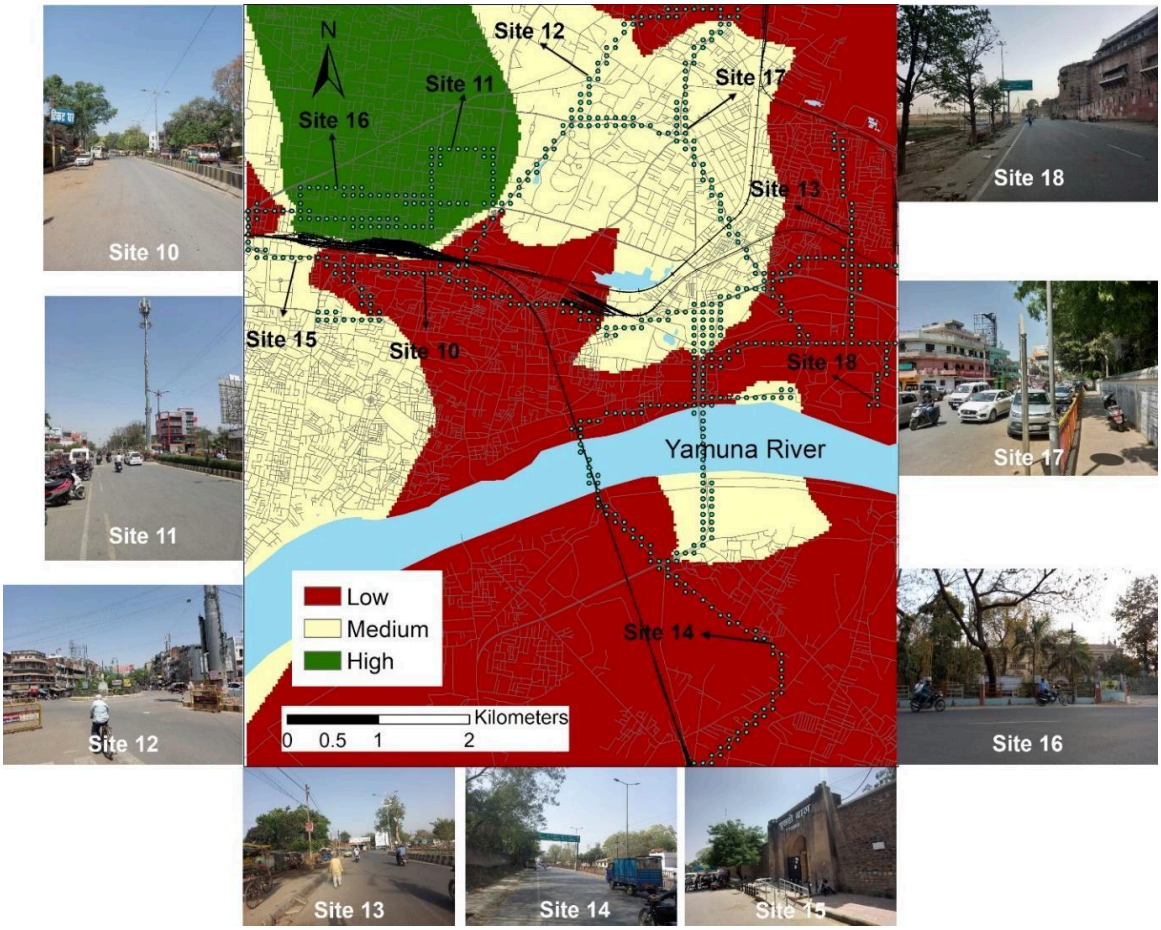


Figure 27: Map showing different accessibility zone of category 2 & 3 road stretch

According to fig 27, infrastructure around Mela area is least accessible by the differently abled person as compared to other tourist places.

Data Analysis: Economic Indicator

Pilgrims Growth

During that five weeks of Magh Mela, six days has been considered as the holiest day when high influx of day bathers are seen. Those numbers are increasing on annual basis.

The said Melas is organised under the relevant provisions of the United Provinces Melas Act, 1938. Essential Facilities are being provided to the pilgrims in the Sangam region from the months of January to March every year. For this purpose, budget provisions are made by the State Government. The Mela Administration is responsible to provide essential facilities to the pilgrims. Besides the said Melas thousands of pilgrims come to the Sangam region every day for holy dip in the remaining period. The said number of pilgrims reaches in lakhs on Amavasya days. In the said period, essential facilities could not be made available to the pilgrims.

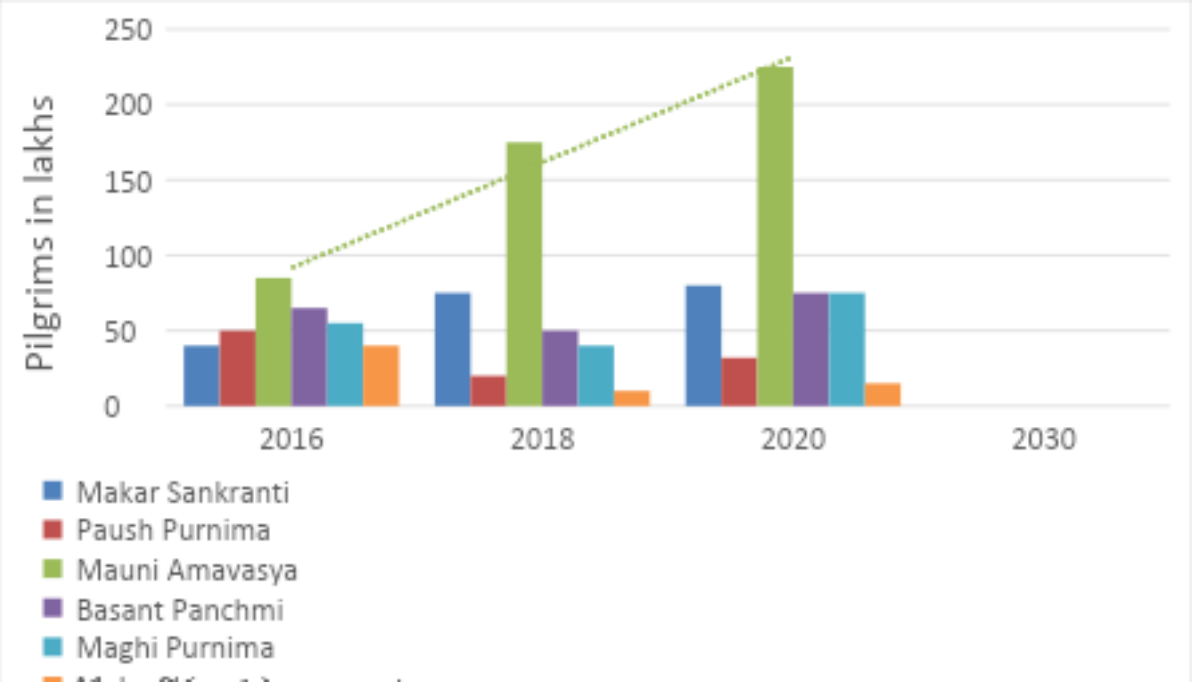


Figure 28: Estimated Pilgrims Flow during Magh Mela

These increased visitor flows have put a strain on the destination's environmental, social, and economic features, resulting in extensive and sometimes unregulated land and natural resource exploitation, as well as a low level of tolerance among the local people for tourists during the pilgrimage season.

Table 6: Growth rate of estimated tourist flow during main bathing days

Imp Bathing Days/ Year	**2018**	**2021**	**Growth Rate**
Makar Sankranti	75	80	7%
Paush Purnima	20	32	60%
Mauni Amavasya	175	225	29%
Basant Panchmi	50	75	50%
Maghi Purnima	40	75	88%
Maha Shivratri	10	15	50%
Total	**370**	**502**	**36%**

Table 7: Growth rate of estimated tourist flow during mela

Year	**Total Visitor**	**Growth Rate**	**Annual growth rate**

2016	500		
2018	620	24%	7%
2020	700	13%	4%

Pilgrims Projection

Table 8 shows several population projections for the next three decades based on various techniques. Now if we compare the projected population of various population projection methods, then it appears that the results of the geometric approach method are the closest to the 2021 actual estimated visitor trend.

Table 8: Projection for visitor during magh mela

Projection Year	Arithmetic Method (in lakhs)	Geometric Increase Method (in lakhs)
2016	500	500
2018	620	620
2021	800	758
2026	1100	1063
2031	1400	1864

Table 9: Gap in different methods of projection

	Actual visitor as of 2021 (in lakhs)	Projected (in lakhs)	Gap (in lakhs)
Arithmetic	700	800	100
Geometric	700	758	58

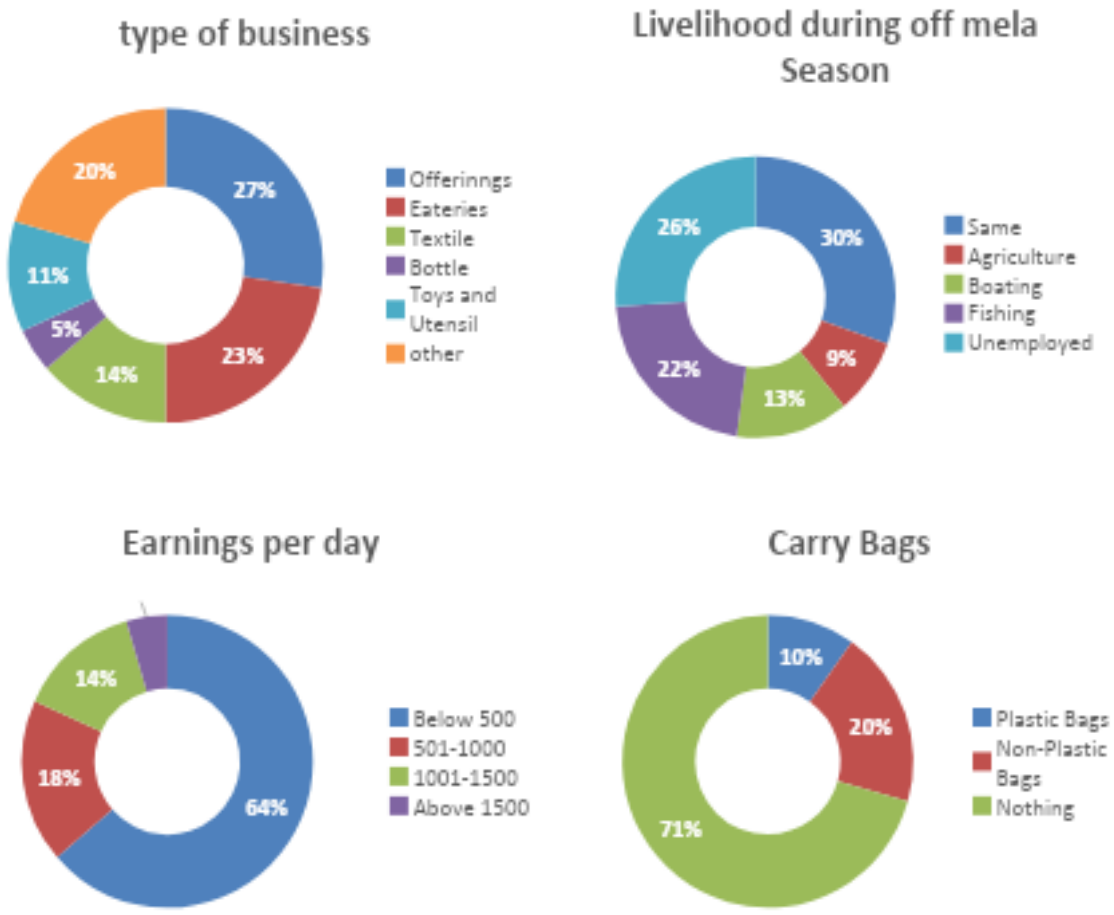


Figure 29: Primary Data Representation of Commercial activity

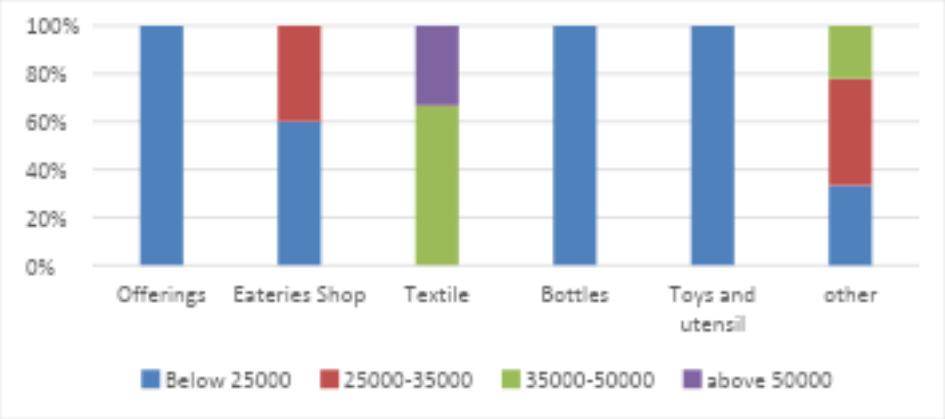


Figure 30: Earnings of different business

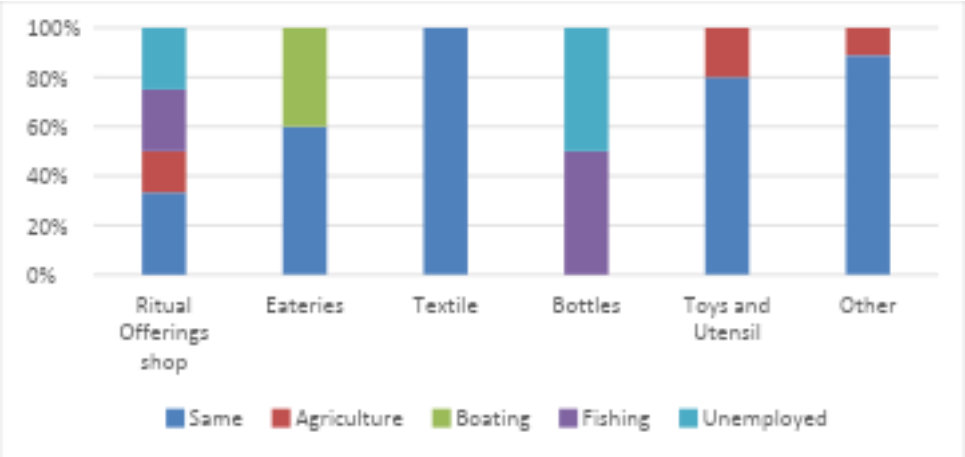


Figure 31: Change in occupation after mela

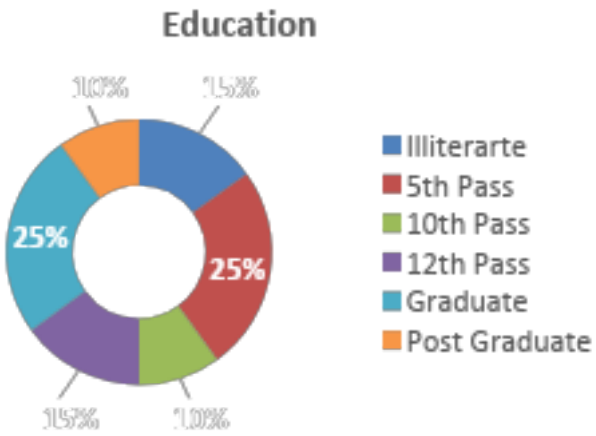
The region supports a variety of economic sectors, including religious tourism, agricultural farming, animal husbandry, and fishing, all of which are directly reliant on the holy river. After the mela is over, these temporary mela activities on ground get involved in other livelihood activities. 26% of which were unemployed after the mela festival. Others were either engaged in fishing or agriculture after the mela is over.

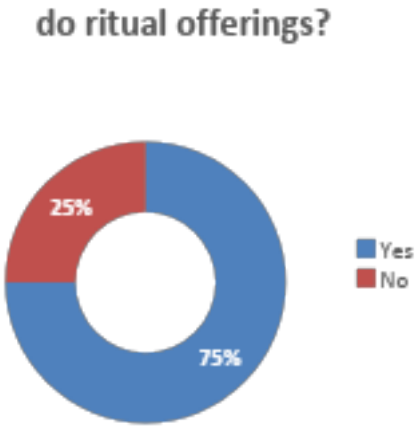
Figure 32: Making Garland a day before mega bath

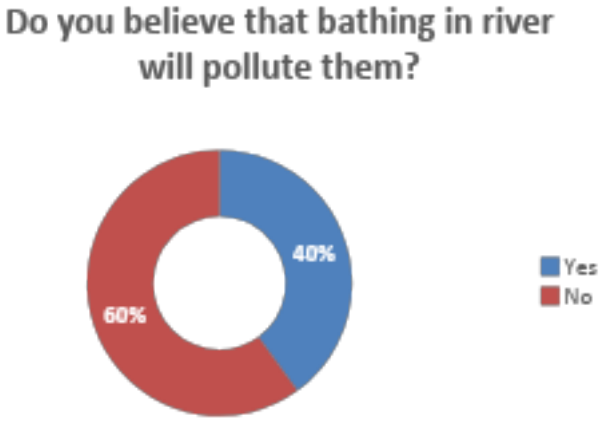
Data Analysis: Environment Indicators

Pilgrim opinion survey

During bath, pilgrims do ritual by offerings flowers, petals, coconut, milk etc. on the bank of the river Ganga, Yamuna, and Saraswati. From below analysis, people will never change their attitude and belief toward any rituals. Very less percentage that is only 25 % of pilgrims are aware of environmental degradation due to these practices. Yet they perform those activities polluting the river. Many people believe that ritual bathing (holy dip) is meant to be done in river only, they are less concern about the pollution. According to them river have power to clean the sins of human being so these activities can't harm the quality and purity of river.







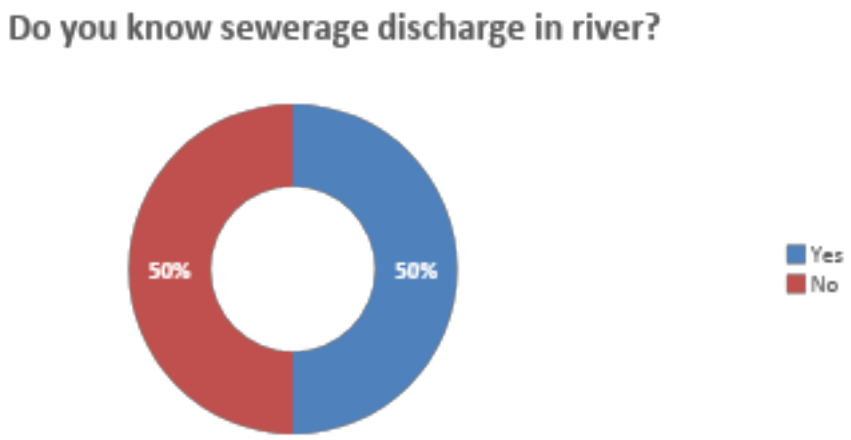


Figure 33: Pilgrims Behaviours

There is need of creating awareness among these people. And this awareness cannot be created by any NGO or politician or environmentalist. People will listen to the word of religious leaders, Pujaris and rishis. Their word matters a lot and can change the attitude of people toward environment.

Waste Generation

The main rituals are ritual bathing, lampstand, offerings during puja. Due to increase in number of pilgrims and inefficiency in management of crowd and waste disposal, these rituals have impact on environment.

Figure 28 shows the approx. waste generation due to ritual performed within temple and ghats premises during festive days. Organic matter waste generation is approx. 43% during festive day. Textile waste is 12%. Textile waste is because of belief of devotees leaving their clothes on ghats after taking bath in Sangam.

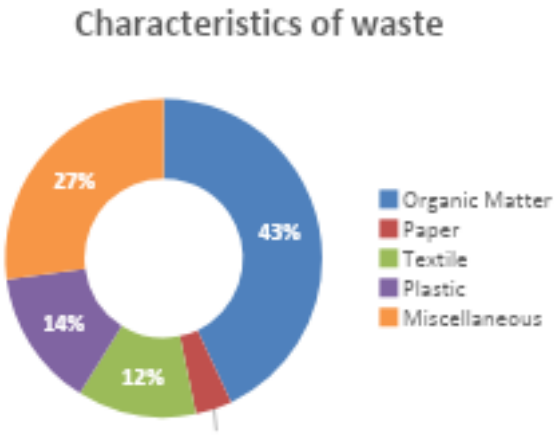


Figure 34: Characteristics of waste (Source: Prayagraj Mela Authority)

Figure 35: Waste Generation

From the primary survey, it was observed that 62% pilgrim leave their clothes on Ghats and 24 % pilgrim take their clothes with them. The above survey shows the awareness of people towards environmental pollution. Very few people were aware of impact of textile waste on river and on land. These waste clothes are dumped on trenching ground and some percent of clothes flows in the river, polluting land and river.

On an average 15-30 tons of waste is collected. This figure goes up to 80 tons during the main bathing day. During night the waste is collected and dumped into the Baswar dumping zone where segregation of waste takes place. The site is located at the distance of 14 km. During main bathing day, waste is kept at the mela ground due to traffic congestion.

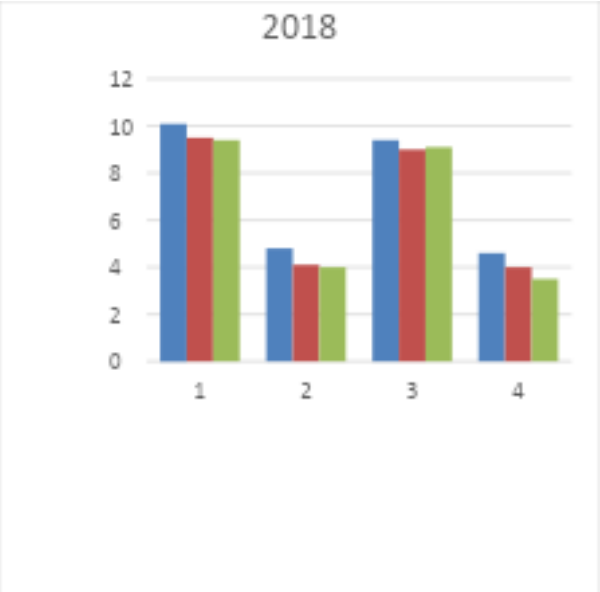
Figure 36: Scenario After Gathering

After the festival, whole land is converted into the trash, straw was being burned which is impacting the environment. The sandbags are left over the ghats.

River Water Quality Index at Prayagraj During Mela

BOD has passed 3 times its Permissible Limit, with highest at Sangam. Thus, such Activities are happening on the banks of the river causing BOD increase. BOD is the measure of organic pollution, hence a large amount of organic wastes are dumped in the river, especially the religious Pooja items, like flowers, coconut waste, etc. While taking a holly bath people still using soaps and washing clothes in river.

These activities increase with the Tourist inflow in the city. According to the survey, around 500-1000 packets of milk are dumped into the river on a normal day. Milk can be as much as 400 times more polluting than untreated domestic sewage.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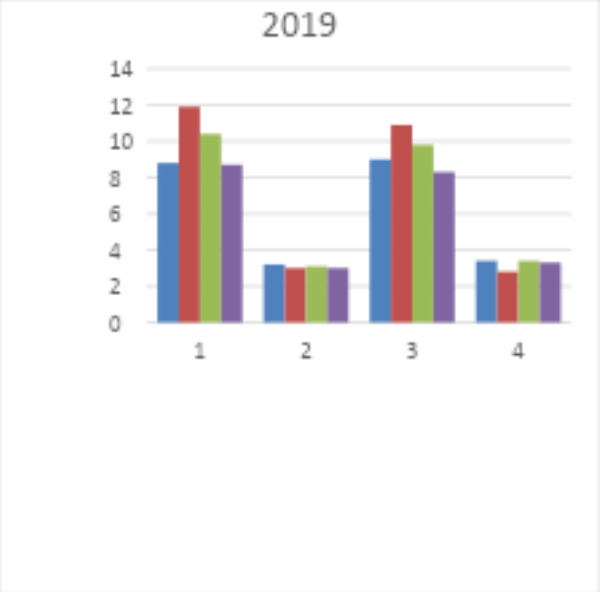
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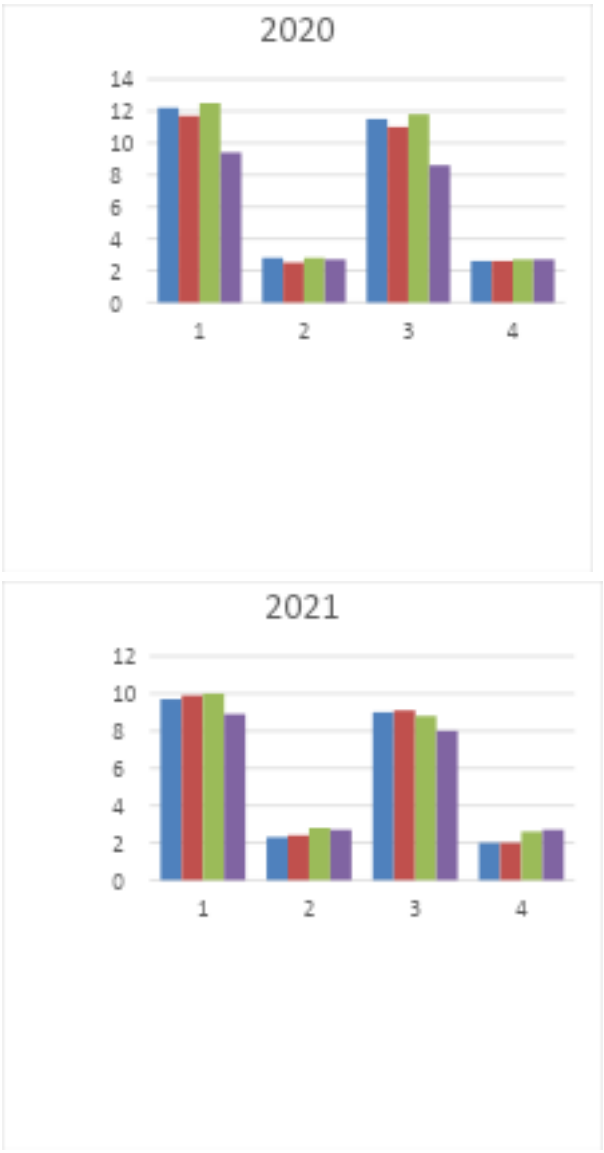

Figure 37: BOD and DO of upstream and downstream river

The quality of water was not sufficient prior to the commencement of the Mela, as seen in the Fig. Total Coliform (MPN/100ml) and Faecal Coliform (MPN/100ml) were decreasing towards the downstream of the region in December, showing that actions had been done to enhance the quality of the Prayag River. According to the CPCB, river water that has a DO of more than 5 mg/l and a BOD of less than 3 mg/l is safe for bathing. Because of key bathing occasions such as Mauni Amavaysa, Basant Panchami, Maghi Purnima, and Maha Shivratri, the BOD level for the month of January was relatively good for bathing, but for the months of February and March, the B.O.D levels were surpassing the allowed limits.


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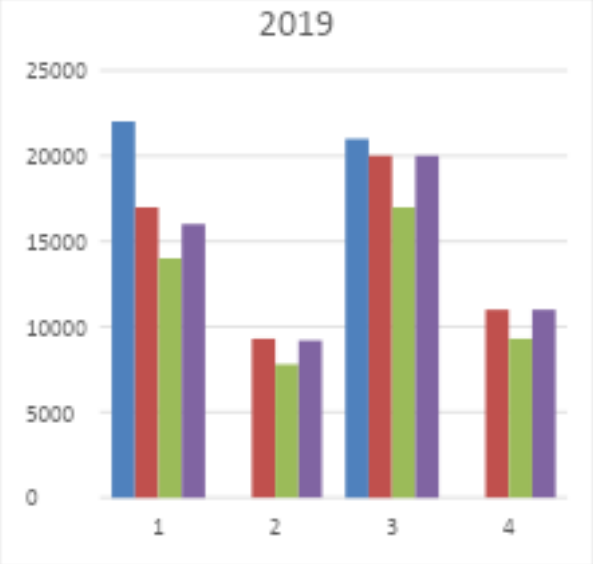
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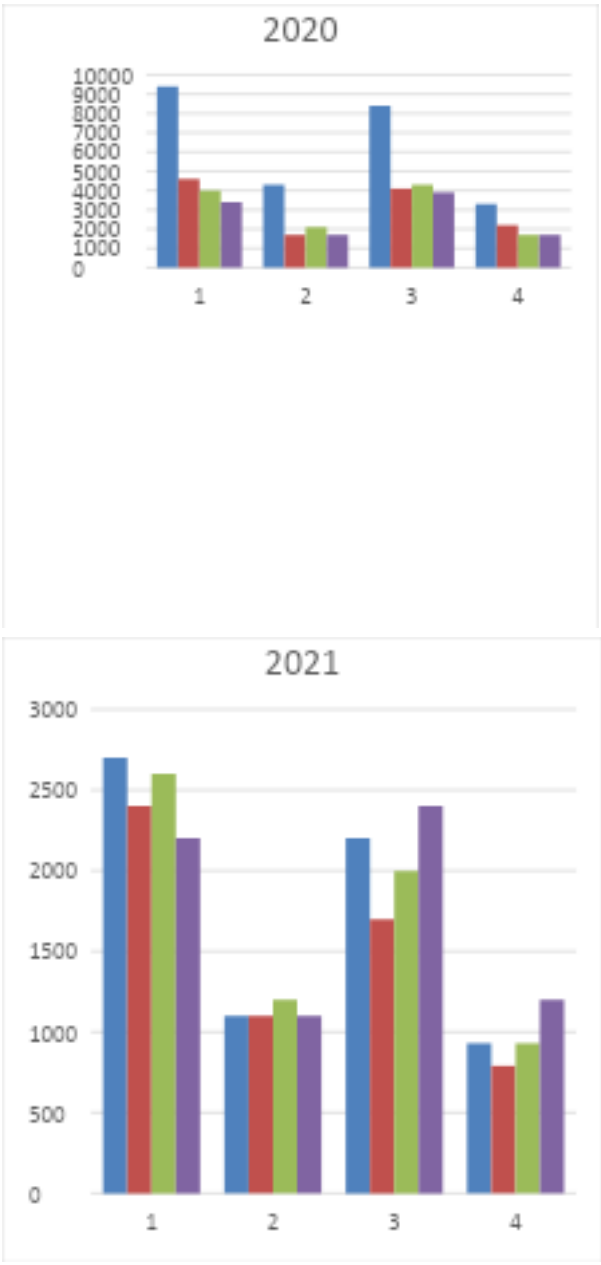


Figure 38: Total coliform and faecal coliform of upstream and downstream river

But for each month, during Mela (January-March), total coliform and faecal coliform (MPN/100ml) levels increased downstream of the area for each month. It demonstrates that the river's condition deteriorated during the Kumbh.

Carrying Capacity

The Table 10 shows the carrying capacity by identification of scale of impact on various natural resources by the practices on the Mela ground. The study employs a qualitative research design.

Table 10: Qualitative Carrying Capacity

Indicators	Parameters	Impacting Feature	Carrying Capacity
Social	Pilgrimage	Old Age Person	High
	Accessibility	Infrastructure	Low
Economic	Pilgrims Growth	Environment	Medium
	Livelihood	Economy	Medium
Environmental	Water Quality Index	Water, Human, Species	Low
	Waste Generation	Land, Water	Low
	Waste Separation	Land, Water	Low

Summary

Social: There is large volume of vulnerable people (differently abled) are getting affected by the physical infrastructure. Disobeying of the covid protocols during mass gathering can affect the health of vulnerable people.

Economic: From the above analysis it shows that pilgrim's growth increases the economic activity during the mela for local people. After the mela period, many were unemployed.

Environmental: Mass bathing and ritual offerings in the river impacting the river species and water quality of the river which affecting the pilgrim's health. Large gatherings of pilgrims also generating large amount of waste which are not being segregated at the source level.

Proposal

Proposal is divided into two phase first at institute level, second at Planning level, then lastly at implementation phase.

Institute Framework:

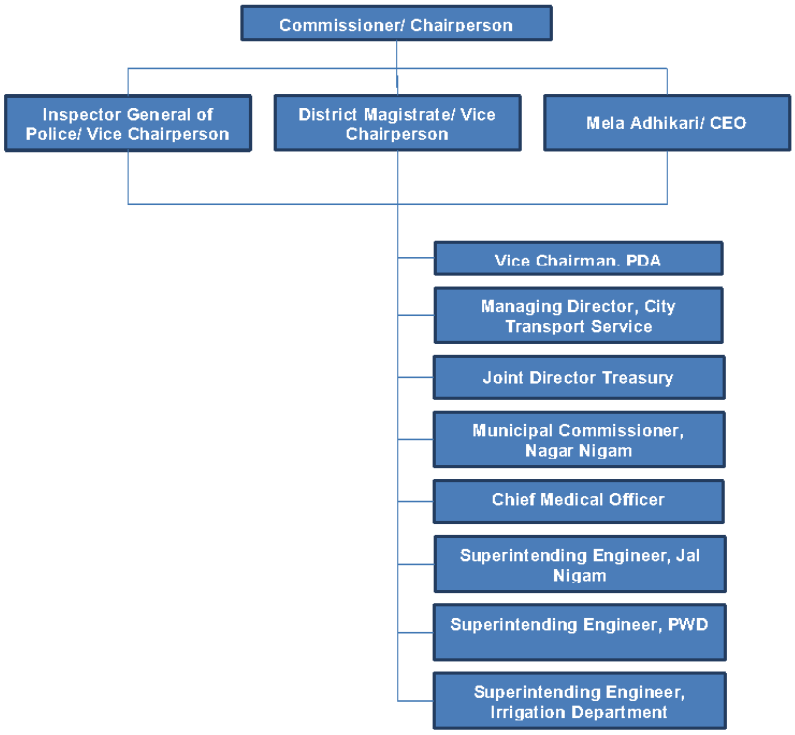


Figure 39: Institutional level Planning

Geomorphologist: Geomorphologists study Earth's landforms and landscapes in relation to the geologic and climatic processes and human activities, which form them.

Environmentalist: An environmentalist is a person who is concerned with and/or advocates for the protection of the environment.

Planning Level

Carrying Capacity of River and its Floodplain

Each tourist destination has unique priorities, and each region's carrying capacity varies depending on the local environment. As a result, it requires sustainable programming and administration that is tailored to tourism's carrying requirements and endurance capacity.

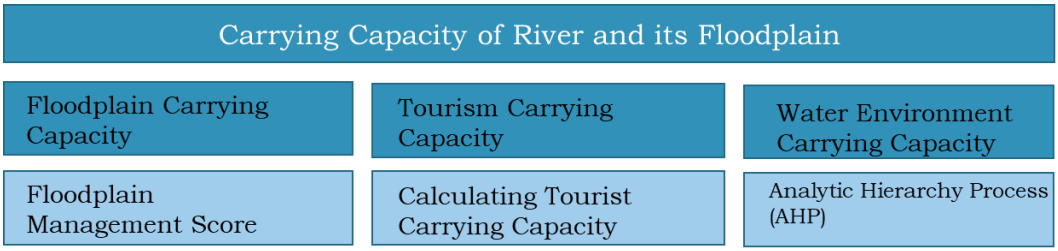


Figure 40: Carrying Capacity of River and its Floodplain

Floodplain Carrying Capacity:

Floodplain management is a community-based effort to prevent or reduce the risk of flooding and impact on the environment, resulting in a more resilient community. The river's capability to release rainwater is expressed using the current carrying capacity concept connected to floods. The flood plain might be used as a

temporary reservoir and channel in the flood season in a time return period of 50 years or more, according to a technique for calculating the carrying capacity of the flood plain.

Tourism Carrying Capacity:

1. Identify the tourism sub-systems of a destination, especially regarding tourism facilities and services;
2. Classify the type of users are often utilizing those sub-systems;
3. Determine the level of usage of these sub-systems by user profile;
4. Quantitative analysis to maximize the revenue of the destination through understanding the daily expenditure per each profile.

Water Environment Carrying Capacity:

Calculating water Environment Carrying Capacity through AHP. When evaluating many indices, the analytical hierarchy process (AHP) has a distinct advantage, and spatial analysis is a strength of the geographic information system (GIS). An efficient method for studies of regional environmental carrying capacity (ECC) evaluation is to combine AHP with GIS.

Resource supply, pollution containment, and social effect indicators are three categories of environmental carrying capacity indicators. The key factors are broken down in this article into five categories: prospective competition, technical innovation, environmental support, and development assurance. About 50% of it is accounted for by its indications, with an average of more than 40%. This demonstrates that the system has a certain degree of viability and dependability and can clearly exhibit the key influences and assessment indicators that have an impact on the urban tourist carrying capacity.

Implementation Level

Government agencies should prioritize infrastructure issues to provide visitors with holistic, comfortable, and safe experiences (Shinde 2018). For pilgrims, visiting the holy confluence is as important as bathing at the confluence of the Ganga and Yamuna rivers in Prayagraj. This journey is improved by reorienting their connectivity and accessibility to the Ganga by improving the spatial and visual experience of these holy religious routes designed along the dynamic floodplain landscape. These routes function as dynamic features, much like the landscape in which they are embedded. They are elevated, providing views of the holy Ganga.

Improving Accessibility Infrastructure:

Improve the accessibility along the selected route stretches throw providing proper guideline for footpath.

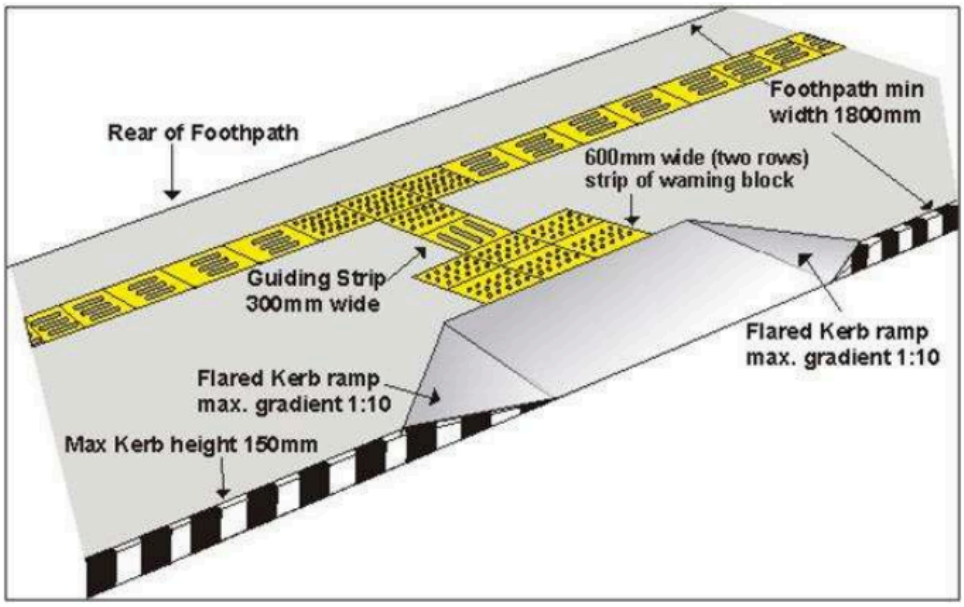


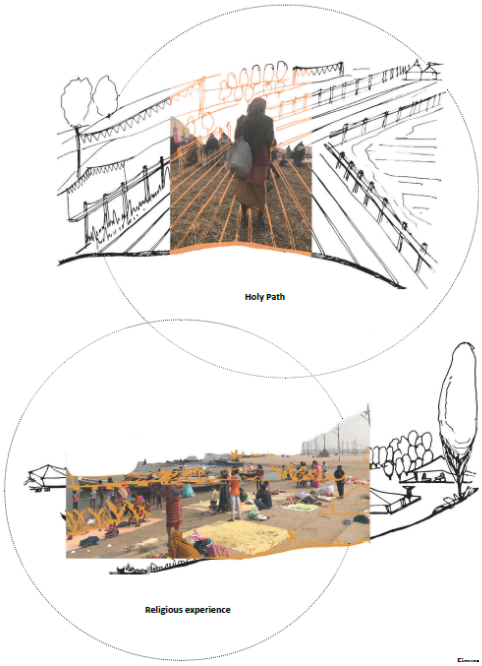
Figure 41: Kerb ramp and tactile pavers

A footpath should:

- Be along the entire length of the road;
- Have the height of a standard public step riser, i.e. 150 mm maximum; • Be at least 2 m wide, with a spacing of 1 m maintained where there are trees on the footpath.
- Have a non-slip surface
- Provide tactile paving for people with visual impairments.
- Using different colors and textures to define the edges of paths and routes is preferable.
- Grating gaps should be less than 10 mm wide and oriented perpendicular to the path centerline.
- There should be no obstacles or projections along the path. If this is unavoidable, there should be at least 2200 mm of clear headroom from the floor level.
- Install tactile warning pavers at all entry and exit points from the footpath.

Connection and Accessibility to Holy Path

Pilgrims can access the water of holy river Ganga all year round using these elevated routes shown in fig 42. The routings are defined as primary, secondary and tertiary routes in line with their elevation and thus ease of access after the festival. The hierarchal routes are inter-connected and make the waters of Ganga more accessible as opposed to the current situation of just one single primary procession route which leads towards the confluence and providing universal accessible guidelines along these routes for better accessibility for vulnerable groups.



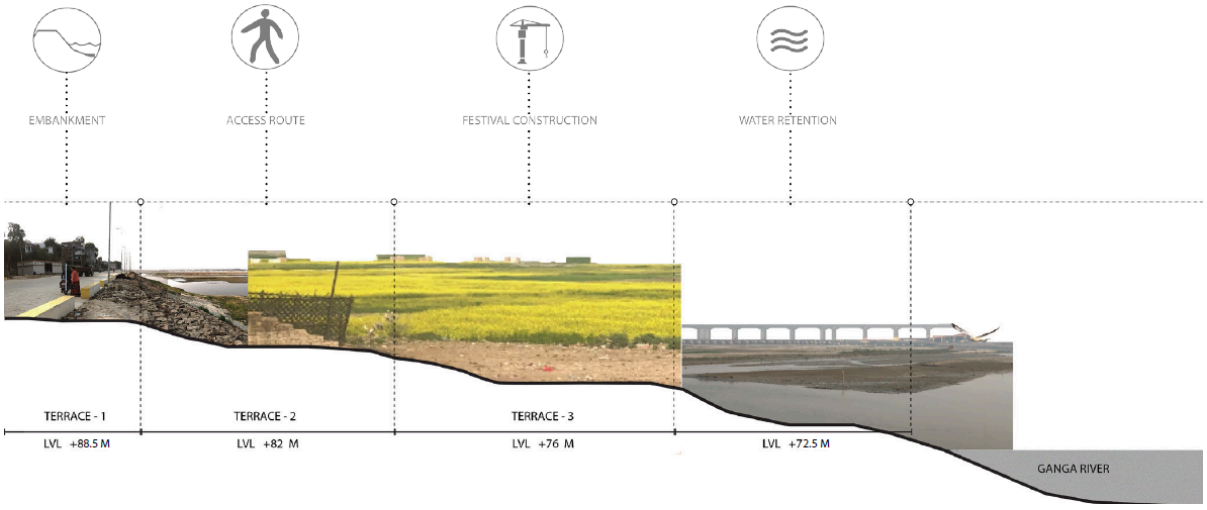


Figure 42: Level of slope

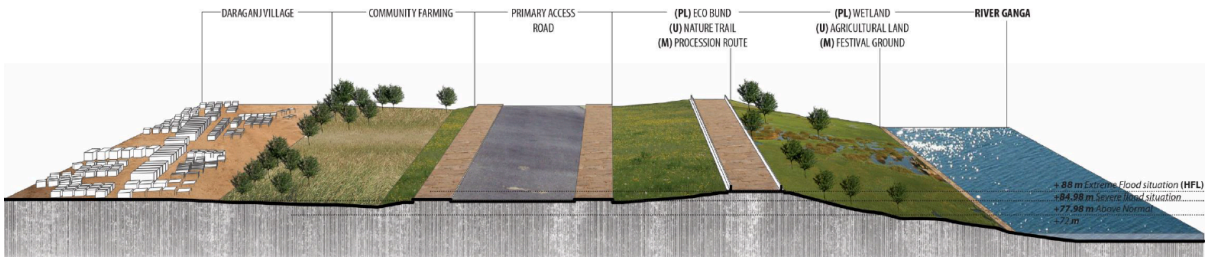


Figure 43: Proposal for floodplain before Mela

Figure 44: Proposal for floodplain during Mela

Figure 45: A designed route for access ghat area during festival (Source: Tanvi Gupta, 2020)

Construction of a holy pond

Large amounts of holy material are regularly dumped into the river (i.e. pooja samagree). These materials are not allowed to be thrown anywhere along with the other type of solid waste according to religious belief. It is certainly not easy to dump such sacred material in the river through laws, fines, etc. If the holy lagoons were built and filled with Ganga water only, the holy material could be immersed into the lagoons where the materials sink into the lagoon's crib. These materials then will be removed timely are water should be filtered. Then the clarified water of the pond could be released back into the river, if necessary, after primary treatment. This type of pond filling and draining would be re-filled with the river water following the removal of the sediments which can be used as a manure. In this pond, lotus plants can also be grown to absorb heavy metals.

Training local community and skill development:

It is necessary to promote a positive attitude and local community involvement. While promoting technology and techniques, "landscape fragility and vulnerability must be kept in mind" (Sati 2015). Adverse effects can be mitigated if local stakeholders follow prescribed norms and rules. "Educational campaigns to raise public awareness about the proper use of water bodies without compromising water quality are also required" (Bhatnagar et al, 2016). "Educational institutions and professional bodies" should be at the forefront of raising awareness and engaging in community service.

Water Tourism

Water tourism has great potential for Prayagraj. Many religious spots are located along the river which can be promoted through water tourism. Each state actively promotes tourism; however, restrictions at some religious sites make them less appealing to visitors of other faiths; thus, alternate tourist attractions should be promoted. The Ganga and Yamuna rivers are two of India's most sacred rivers, and their water is revered by Hindus. The area where these rivers meet is extremely religious and spiritually significant. The festival of 'mela' is held in Prayagraj on the floodplains of the Ganga, which render its landscape dynamic due to its constantly changing nature, because of this confluence. Most religious activities are concentrated along floodplains, which aid in establishing a relationship between people and holy water by providing direct access to it.

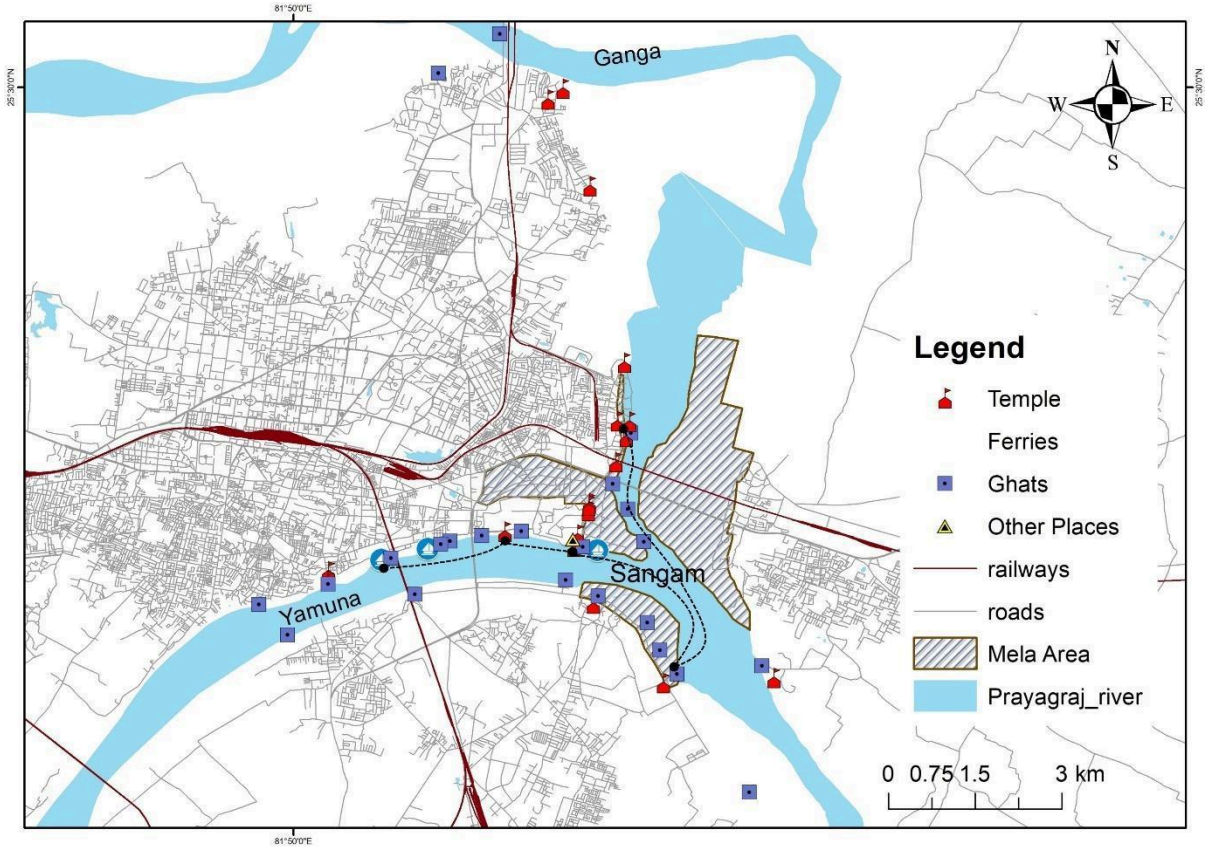


Figure 46: Potential route

(Source: Author

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Conflict of Interest
Authors has no conflict of interest to declare.

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