Chapter 9
A Geospatial Approach to Conserving Cultural Heritage Tourism at Kumbh Mela Events in India

Kakoli Saha and Rachna Khare

Abstract Kumbh Mela (the festival of the sacred Pitcher) is the largest peaceful congregation of pilgrims, held in India. During this festival, participants bathe in a sacred river (UNESCO 2017). This study explores how Geographic Information Systems (GIS) can be used to focus on sites of urban regeneration for conserving cultural heritage tourism related to Kumbh Mela. This chapter focuses on the city of Ujjain (in the state of Madhya Pradesh), one of the four Indian cities that host the festival. Ujjain is considered one of the world's oldest religious cities, with over 5000 years of history. During the last Kumbh Mela in 2016, Ujjain City registered 80 million tourist visits. This paper discusses two approaches through which Ujjain City can enhance the Kumbh experience of pilgrims while they visit and stay in the city. The first approach talks about enhancing the universal accessibility of bathing in *ghat areas* using GIS. *Ghat* areas, situated along the sacred Kshipra River, are the most important as these places experience the maximum footfall during the Kumbh Mela event. The second approach discusses how geospatial approaches can be utilized to provide safety to pilgrims, which must be considered in future development planning, as the event is prone to stampedes given the number of visitors. Approaches thus proposed in this study may be adopted by other host cities of Kumbh Mela which will ultimately help conserve heritage aspects of the event.

Keywords Kumbh Mela · GIS · Universal accessibility · Placemaking

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9.1 Introduction

The number of people visiting places of unique cultural and historical significance has been on the rise in the past decade (Timothy and Nyaupane 2009; Jimura 2019). Heritage tourism includes visitation to unique built cultural environments (e.g. monuments, historic public buildings and homes, farms and castles) and to experience intangible elements of culture (e.g. music, dance, festivals and events). Kumbh Mela (the festival of the sacred Pitcher) is one of such religious events and has been more or less continuous since the Gupta period from the fourth to the sixth centuries (Merhotra and Vera 2015). Owing to its importance to Indian culture and the culture as a whole, UNESCO has listed Kumbh Mela on its representative list of Intangible Cultural Heritage of Humanity in 2017. This month-long event is the largest peaceful congregation of Hindu pilgrims on earth, where participants bathe (or take a dip) in a sacred river. Prayagraj (Allahabad), Haridwar, Ujjain and Nasik Cities are the four locations for Kumbh Mela. While Haridwar, Ujjain and Nasik Cities are located at the bank of sacred rivers like the Ganges, Kshipra and Godavari, respectively, Prayagraj lies at the sangam (confluence) of the Ganga, Yamuna and mythical Saraswati Rivers.

The study has been conducted during the recent *Purna* (full) Kumbh Mela which was held in Ujjain, Madhya Pradesh (see map in Fig. 9.1) from the 22 April to 22 May 2016. Home to one of the twelve Jyotirlinga shrines to the god 'Shiva' (Mahakaleshwar), Ujjain (also historically known as Ujjayini) is one of the seven sacred cities of the Hinduism (Sapta Puri—seven holy pilgrimage centres in India). About 3 million annual tourist visits, Ujjain is a prominent pilgrimage destination in India. The footfall of pilgrims increases many fold during the occasion of the Kumbh Mela. Since bathing/taking a holy dip is the most important ritual of Kumbh pilgrimage, the study is concentrated along main bathing *ghats* of Kshipra River.

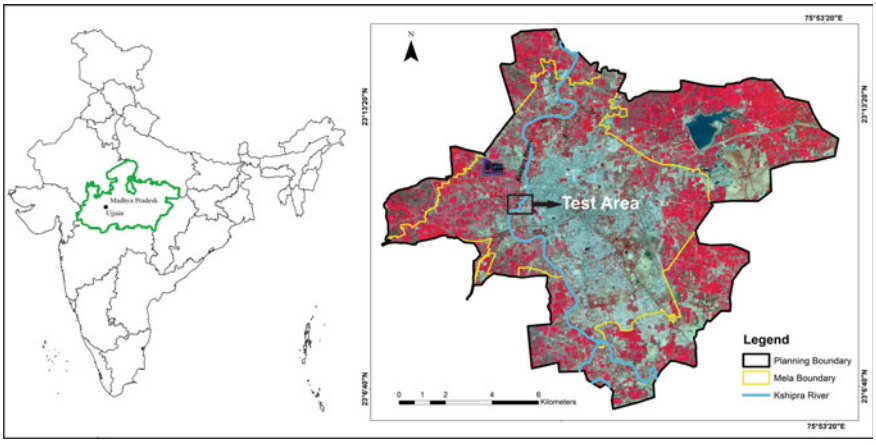

Fig. 9.1 Location of Ujjain City and location of Mela boundary within Ujjain City

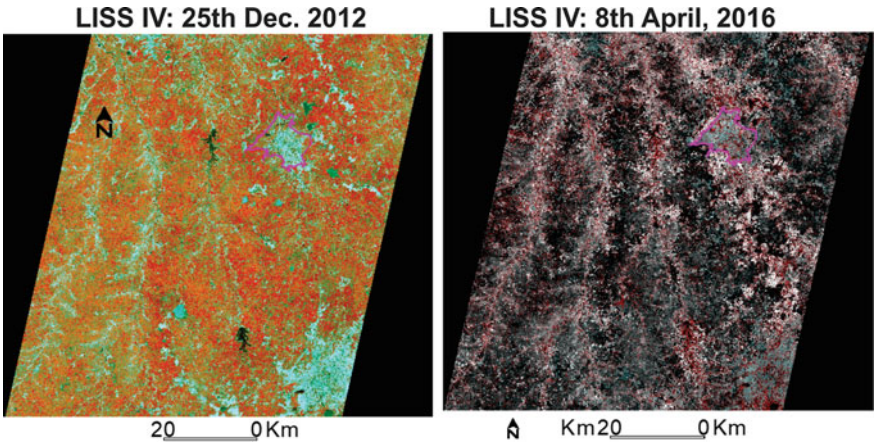

Fig. 9.2 LISS IV data of temporal resolution (Data details, Coordinate System: UTM, Datum-WGS1984; Satellite ID: IRS-R2; Spatial resolution: 5.8 m; Lower left corner: 23.402000N, 75.223000E; Upper right corner: 22.639000N, 76.045000E; Spectral Bands [band width] B2: Green [520–590 μm], B3: Red [620–680 μm], B4: Near-Infrared or NIR [770–860 μm])

Concerning the data used in this chapter, two satellite images acquired by Linear Imaging Self-Scanning (LISS) IV sensor have been used in this research. One image was acquired on 25 December 2012 and another was acquired on 8 April 2016 (see Fig. 9.2, specific information about the data is provided). The potential of geospatial technique to conserve the cultural heritage of Kumbh is explored in three ways: 1. by performing universal accessibility assessment of *ghat* areas, 2. by documenting facilities and amenities during the Kumbh event and 3. by analysing placemaking exercises around *ghat* areas.

Intangible cultural heritage refers to practices, representations, expressions, knowledge and skills, as well as instruments, objects, artefacts and cultural spaces associated with communities, groups and in some cases, individuals (Jimura 2019). Moreover, intangible cultural heritage is transmitted from generation to generation and is constantly recreated by communities and groups in response to their environment, their interaction with nature and changing history, providing people and associated places with a sense of identity and continuity—thus promoting respect for cultural diversity and human creativity. The domain of cultural heritage includes oral traditions and expressions, language, performing arts, social practices, rituals, festive events, knowledge and practices concerning nature and the universe as well as traditional craftsmanship (Stefano et al. 2014).

There are three versions of Kumbh Mela held in India. Maha (great) Kumbh Mela happens once every 144 years and is only held in Pragraaj (Allahabad). It is a once in a lifetime event for those who are able to attend during their lifetime. Purna (full) Kumbh Mela happens once every 12 years, and the event rotates among the four host cities in India mentioned above. Ardh (half) Kumbh is held every 6 years in India and is held in 2 places: Haridwar and Prayagraj. The most recent *Purna* Kumbh Mela

took place from 22 April to 21 May 2016 in Ujjain, with an estimated attendance of 80 million people. The pilgrimage is completely funded by the central and state government, and the 2016 Kumbh had a budget of $428 million (Ujjain Smart City Proposal 2016). The money was mostly spent on infrastructure to facilitate the above-mentioned footfall during this month-long event, and thus the government investing heavily in tourism-led regeneration of that will receive high amounts of footfall, so to accommodate the pilgrims.

This paper explores the potential for using GIS to explore and identify sites of urban regeneration to assist planners with conserving cultural heritage tourism related to Kumbh Mela. Since universal accessibility and safety are two important factors associated with Kumbh, GIS techniques are proposed to optimize both parameters. Universal accessibility and safety will enhance tourism aspect of the Kumbh Mela event, ultimately helping regenerate sites (e.g. bathing in *ghat* areas along Kshipra River) within Ujjain City where they experience maximum footfall during the event (this helps with spatial planning and managing high concentrations of visitors during these events).

9.2 Understanding Kumbh Mela

Scholars have studied the origin of the Kumbh Mela and found its mention in the *Skanda Purana* (Bonazzoli 1977; Dubey 2001; Lochtefeld 2004). Puranas mean 'old stories' passed down and amplified in one version after another. According to scholars, puranas also mention auspicious occasions of ritual bathing that liberate human from the circle of life (Hindus believe in rebirth). Due to this belief, a holy dip in rivers during Kumbh has the most spiritual value. The pilgrims dip fully into the water thrice and take the waters in their cupped hands to pour it again into the river as an offering to the gods and to the ancestors. They make offerings of flowers and oil lamps, floating them into the current of mother waters (Merhotra and Vera 2015).

Apart from bathing in the sacred waters, pilgrims flock to Kumbh Mela to receive blessings of the ascetics. Those who engage in ascetic practices in a difficult environment devote their life to Hindu deities and are believed to have a supernatural power. As these ascetics live in remote mountainous areas, there are limited opportunities for common people to see these ascetics. Kumbh Mela is one of such rare opportunities and characterized by the massive presence of the orders of the ascetics. These orders are referred to as Akharas and there are 13 represented at the Kumbh Mela, both Shaivite (worshiper of Lord Shiva) and Vaishnavite (worshiper of lord Vishnu). As the dates of the Kumbh Mela approach, each of the Akharas receives a formal invitation to the mela from the government authorities in charge. The Akharas was allotted a land within Kumbh Mela grounds, nearly adjacent to the riverbank where they reside in a camp set by authorities. Each camp raises a huge flagpole to symbolize the deity of the Akhara. To transform the space for the event and surplus of visitors, great gateways are built along one of the main roads to mark the entryway into the

Akhara. In their mela conclaves, the Akharas initiate members, discuss policies and elect officers. *Shahi Snan* (the Royal Bathing Days) are astrologically auspicious, each of these Akharas take out Royal Procession. The head of Akharas, the monastic orders of renunciants ride atop elephants, tractors or flatbed trucks, elaborately decorated with flowers and surmounted by the umbrella of royalty. Behind them follow the members of the Akhara, carrying the insignia of their order, their scantily clad or completely naked bodies besmeared with ash for the sacred bathing (Merhotra and Vera 2015).

The great Kumbh Mela is a pop-up megacity of roads, bridges and shelters temporarily regenerated for the event and pilgrims. In addition, temporary hospitals, markets, police stations and social centres are put in place, each replicating the functions of a permanent city. The accumulation of units converges in an endless texture of textiles, plastic, plywood and several other materials, each organized in a smart infrastructural grid that articulates roads, electricity and waste. The pavilions constructed along the main street of the Kumbh City have colourful gateways, decorated with flags, flashing lights and spinning fluorescent pinwheels. Halls are provided where hundreds of pilgrims may sit for the discourses of a famous teacher. Gurus sit with their disciples and interpret sacred texts. Yogis demonstrate their spiritual accomplishments. Popular singers and musical artists are invited to perform. Some of the great pavilions are built especially to house the theatre troupes that perform the religious plays (*lilas*) in which actors enact favourite scenes from the major epic of ancient India, typically Ramayana or the life of Hindu deities such as Krishna. These performances occur twice a day, in the morning and evening, and conclude with worship times, religious songs and a ceremonial lamp and flower offering to the principal actors who portray the deities. Pilgrims can also buy their daily necessities and various wares and trinkets of religious life from the shops laid on Mela grounds or mobile shops on the cart. Thus, Kumbh Mela combines the festivity of a festival and a fair with the intention and devotion of a pilgrimage (Merhotra and Vera 2015).

9.3 Kumbh Mela and Cultural Heritage Tourism

Cultural tourism is recognized as a form of special-interest tourism, where culture forms the basis of either attracting tourists or motivating people to travel (Stebbins 1996; McKercher and Du Cros 2002). Cultural tourism can be experienced in purpose-built facilities (such as museums, art galleries or heritage theme parks) or purpose-designed cultural settings (such as dance shows or indigenous ritual performances). When cultural heritage is used by tourism as an asset, it is called cultural heritage tourism (McKercher and Du Cros 2002). The event of Kumbh encapsulates the science of astronomy, astrology, spirituality, ritualistic traditions and socio-cultural customs/practices, making it extremely meaningful to those involved and rich in knowledge production and consumption for those attending as onlookers. In India, its primary bearers, however, belong to Akhadas and ashrams, which are the religious organizations. The teacher–student relationship of the sadhus in the ashrams

and Akhadas remains the most important method of imparting and safeguarding knowledge and skills relating to Kumbh Mela (UNESCO 2017).

Several scholars have studied Kumbh in different perspectives. Maclean (2009) found Kumbh pilgrims have always incorporated an element of tourism into their religious journey, highlighting that while Indian pilgrims seem to cross the boundary into tourism rather seamlessly, the transition from Indian tourist to pilgrim is perhaps not so fluid. Mela managers in the 1940s, under pressure from conservative religious interests, including the Sadhu Akharas, responded to this by positioning the non-religious elements on the fringes of the mela area (where the attendant fair can still be found today). Maclean (2009) further argues that the distinctions between pilgrim and tourist are not always easy to discern and that it is possible to experience an event like the Kumbh across both modalities. Since 2001 the mela administration encouraged tourism to the Kumbh Mela, advertising it in such a way to make it appeal to the alternative tourist. It is now listed as one of the 100 Things to Do Before You Die, a guidebook of 'must-have' experiences for serious adventurers. Lonely Planet recommends that the intrepid traveller hires a boat at the sangam 'with Indians on pilgrimage'. This way, while on board the boat, the tourist can experience the mela as authentically as possible (Maclean 2009).

There has been a significant increase in foreign tourist activities offered during the event. To accommodate visitors and maximize the economic benefits, the city has found ways to prepare. Kumbh Mela is now widely advertised in a number of tourist publications. To facilitate tourists, the Mela launched an official website which contains information about travel packages and guided tours, as well as a list of trained tour guides and the different languages offered (with fees and charges set by the tourism department). New developments were also observed along these very transit lines as well as in the heart of the city. There were about 467 hotels, lodges and guest houses to accommodate the concentrations of pilgrimages who utilize local and tourism offers and opportunities in and around the city. According to the 2011 census, there were 22 non-star hotels, 25 hostels (Dharamshalas) and one hotel with star ranking before Kumbh Mela in 2016. Most of these hotels have been upgraded and a range of accommodations have been built using investment made under Kumbh 2016. Out of which, two 3-star hotels were built by the Madhya Pradesh State Tourism Development Co-operation Ltd., and four others were constructed by private parties. The state tourism department also registered eight homestays. Other than hotels, out of total 563 km of city roads, 279.55 kms of existing roads were redeveloped (with road user facilities) to ease the movement of people and traffic during Kumbh (Ujjain Smart City Proposal 2016). There were nearly 34,000 toilets made available during Kumbh for sanitation purposes. Widespread arrangements were made to collect nearly 2,000 metric tonnes of litter during the Kumbh event.

Given the extensive regeneration efforts to prepare Ujjain for the event and the high concentrations of tourists, a challenge that cultural tourism destinations face is finding the best balance between catering to and accommodating tourism/tourists and cultural heritage management. Regenerating spaces and places is complex given the need to accommodate social and environmental demands while focusing on the economic impact of the event (Wise 2016). This concerns that balance between the

consumption of extrinsic values by tourists and conservation of the intrinsic values of cultural heritage (see Jimura 2019). Tourists, as interested and legitimate users of an area, in many destinations today make the conservation of cultural heritage resource a demanding process, and a necessary priority as visitors and eventgoers seek a unique experience (see also Wise and Mulec 2015).

To meet this demand, Information and Communication Technology has long been used for the protection and enhancement of cultural heritage particularly when dealing with significant monumental complexes and especially tourist yields. Apollonio et al. (2017) list projects implemented in Italy to document and assist with the management of cultural monument restorations. Hadjimitsis et al. (2013) used remote sensing and GIS to explore natural and anthropogenic risk of cultural heritage in Cyprus. Brovelli et al. (2013) explained how NASA World Wind virtual globe can be shaped to increase awareness of cultural history and in turn enhances the touristic experience. With these examples, we get a sense of how web-based GIS has been used to build large archives. GIS can make use of 2D geometric information (vector data), alphanumeric ones (text documents, hypertext and semi-structured text in different categories, external data attached to system forms) and raster images as the reference background. Such storing of data is ideal for documenting spaces, as noted, and likewise helps to identify spaces where planners need to concentrate regeneration efforts.

So far, geospatial technology has never been applied to Kumbh Mela to assess and conserve cultural heritage tourism. To do so, the first approach discusses to use GIS technique to assess universal accessibility of *ghat* areas of Ujjain City. Since pilgrimage in Hindu tradition is always seen as a form of penance and indeed even today imposed as punishment or relief for offenses, persons with disability and aged are a significant part of the pilgrims at Kumbh Mela. In this context, universal accessibility of host cities of the Kumbh Mela needs to be reviewed. In this research, GIS is used to assess the accessibility status of bathing *ghats* of Ujjain City which experience maximum footfall during the event.

Because of influx of millions of pilgrims, Kumbh Mela is always prone to man-made disasters. Merhotra and Vera (2015) have listed disaster risks at Kumbh in their book '*Kumbh Mela: Mapping the Ephemeral Megacity*'. They note that wet and slippery bathing *ghats* pose risk of disaster. If there is a tragedy on a *ghat*, there is a chain reaction and people slip in. There is also a risk of stampedes at bottlenecks where the input end is much smaller than the output end. The 1954 Kumbh Mela stampede has been the deadliest since India's independence, with an estimated 1,000 deaths. The 2003 Kumbh Mela stampede killed 39 people in the city of Nashik, and seven were killed during the 2010 Kumbh Mela in Haridwar. Most recently, in 2013 Kumbh of Allahabad, 42 people were killed and 45 people were injured due to stampede. To safeguard pilgrims and tourists from the stampede, the meticulous attention to detail, from layout and geospatial distribution of facilities and resources need to be mapped on a dynamic basis in response to ground-level clientele feedback. In this context, the second approach discusses how geospatial technology can be used to map geospatial distribution of facilities and resources provided at Kumbh to avoid man-made disaster like a stampede.

9.4 Universal Accessibility Assessment of *Ghat* Areas

The concept and framework of universal accessibility in context of tourism is a neglected area in India (Mullick 2011). As a result, very little information and knowledge is available in this context. At the government level (especially), hardly any credible documentations are available to provide a clear understanding of the subject (Problems and Prospects of Accessible Tourism in India 2010). The methodology for assessing universal accessibility of *ghat* area for pilgrims with disability is comprised of four steps: 1. selecting road stretches around *ghat* area, 2. preparation of an audit checklist (audit checklists were prepared to assess universal accessibility of selected road stretches), 3. performing the universal accessibility audit (accessibility audit was performed using purpose-made checklists) and 4. GIS analysis (performed to prepare maps showing hierarchy of accessible zones around the *ghat* area within Ujjain City). To select road stretches around the *ghat* area, three bathing *ghats* were identified (Site 1. Ramghat to Chakrateerth *ghat*, Site 2. Ramghat to Mahakaal Temple and Site 3. Narsingh *ghat* area) as shown in Fig. 9.3.

To prepare the audit checklist, a National Council of Applied Economic Research study helped to reveal the socio-economic and touring behaviour of Indian households (but it was short of specific information on persons with reduced mobility and the disadvantaged groups). The Indian Institute of Tourism and Travel Management published a report on Problems and Prospects of Accessible Tourism in India (2010). The main objectives of the study were set to examine various socio-economic and travel-related attributes of the tourists with reduced mobility, including their major issues and constraints during different stages of travel and the potential of developing inclusive tourism market as special-interest visitor segment. Six attractions within

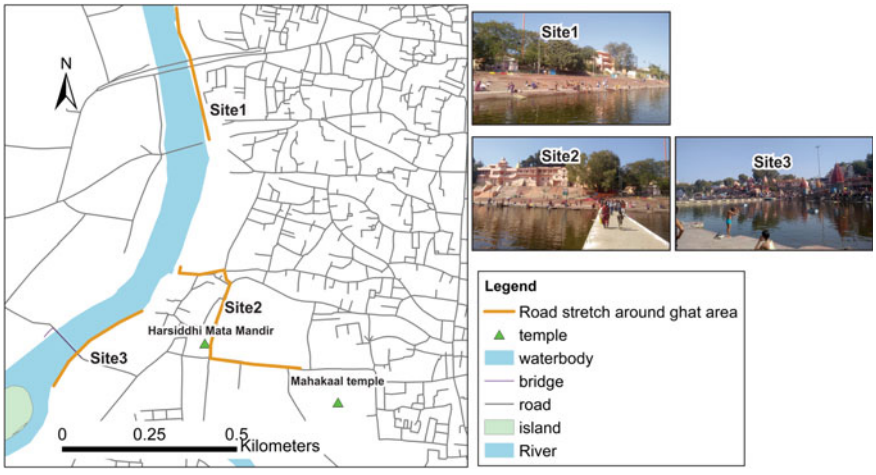

Fig. 9.3 Location of selected road stretches around *ghat* area for universal accessibility assessment (Photographs by authors)

India were selected and a total of 1,205 tourists with reduced mobility were surveyed as part of the study. The study found that disabled tourists have to face many barriers at booking stage itself (Problems and Prospects of Accessible Tourism in India 2010). Besides this report focusing on India, other relevant guidelines and checklists were also referred such as Access—improving the accessibility of historic buildings and places (2011), Code of practice on improving access to heritage buildings (Martin 1999), Accessible routes in heritage cities (Ambrose et al. 2013) and Ministry of Urban Development (2016).

Using the above-mentioned references, 10 parameters, such as signages, kerb ramps, tactile guiding and warning blocks, traffic signals, parking space, approach to building, planned pedestrian routes, subways and foot overbridges, barriers and hazards and planned pedestrian routes included in the checklist. While making the checklists, disabilities considered were cognitive impaired, complete and partial blindness, elderly, hearing impaired, persons with missing limbs, speech impaired and persons in wheelchairs.

To assist with performing the universal accessibility survey using the checklists, a group of students helped to conduct the survey (they were each trained on universal accessibility and universal access audits). Student assistants were then sent to cover road stretches of the *ghat* area with the checklist. The checklist had three columns. First contained the main parameter and associated sub-parameters. The second column contained standards according to Ministry of Urban Development (2016) published by Govt. of India. In the third column, students recorded information against each sub-parameter in terms of 'Yes' or 'No'. Each 'Yes' is counted as one, and the ones are added up to give the total score for each parameter, for example, parameter like 'subways and foot overbridge' has five sub-parameters. As a result, the maximum score for that parameter is then five. If the particular road stretch around the *ghat* area has two of those five sub-parameters, then the score will be two for that parameter. In this way, scores were given under each parameter for entire stretch and total accessibility score was calculated for each stretch. After calculating the total accessibility score, relative percentage score was calculated (see Table 9.1). Then, on the basis of the relative accessibility score in percentage, parameter-wise ranking was done for each site. In case of similar scores, same ranks were assigned and next ranks were skipped (Table 9.1). These rankings were then further used in GIS analysis to look at targeting spaces to regeneration to improve accessibility.

Finally, the GIS analysis was performed in three steps. First, the parameter-wise accessibility rankings within the stretch were incorporated in a GIS platform. Second, raster maps were prepared for each accessibility parameter. Third, separate weights were given to each accessibility parameter and overlay analysis was performed. The final output of overlay analysis shows the hierarchy of accessible zones around the *ghat* area. For the purpose of the GIS analysis, first the road network around selected sites was digitized in ArcGIS platform. Using the fishnet tool in ArcGIS, the *ghat* area was divided into 50 m $\times$ 50 m grids. Each grid has a central point or centroid. Grids which were overlapping road stretches of City Entry Points were selected and saved as separate layer. Parameter-wise ranking within stretches was then added in the attribute table of centroids of selected grids.

Table 9.1 Relative accessibility score and parameter-wise accessibility ranking

Relative accessibility score (based on percentage)

Site	Subways and foot overbridges	Traffic signals	Kerb ramps	Tactile guiding and warning blocks	Barriers and hazards	Parking space	Approach to building	Planned pedestrian routes	Signages	Sidewalks/Footpaths	Total score
Site 1	7.69	0	3.85	0	7.69	15.38	0	3.84	50	11.54	100%
Site 2	5.00	5.00	7.50	0	12.50	12.50	0	7.50	42.50	7.50	100%
Site 3	6.52	2.17	15.21	6.52	6.52	10.87	4.35	6.52	34.78	6.62	100%

Parameter-wise accessibility ranking

Site	Subways and foot overbridges	Traffic signals	Kerb ramps	Tactile guiding and warning blocks	Barriers and hazards	Parking space	Approach to building	Planned pedestrian routes	Signages	Sidewalks/Footpaths
Site 1	12	1	2	1	3	8	1	5	10	9
Site 2	6	12	6	1	10	6	1	12	8	6
Site 3	11	7	10	12	2	5	4	10	3	3

Since there were 10 parameters to assess universal accessibility, thematic maps were generated using the Inverse Distance Weighted (IDW) tool in ArcGIS to interpolate a surface from points (ArcGIS Desktop Help). The weight is a function of inverse distance. Thus, nearby data will have the most influence, and the surface will have more detail. Ten classified maps containing high, medium and low accessibility zones were further added to the weighted sum tool, which is an ArcGIS geoprocessing tool that overlays several rasters, multiplying each by their given weight and summing them together. Weights were assigned to the individual layers of accessibility parameter on the basis of expert opinions. The group of experts consisted of academicians and stakeholders. As there were 10 parameters, weights were given in the order of 10 to 1. 'Planned Pedestrian routes' got the maximum weightage of 10, while 'accessible parking lot' got the minimum weightage of 1. The weighted sum tool multiplied each raster layer by their given weight and summed them together. This helped us to identify zones of high, medium and low accessibility around the *ghat* area (see Fig. 9.4).

From the map in Fig. 9.4, it can be concluded that Site 1 belongs to low accessibility, while Sites 2 and 3 fall within the zone of medium accessibility. Site 1 scored zeros in three accessibility parameters, including traffic signals, tactile guiding and warning blocks, approach to building. Improvement in these parameters is necessary as this site often experiences mass gatherings of pilgrims. Site 2 scored zero in tactile guiding and warning blocks and approach to building parameter. Although Site 3 did not see any zero scores in any parameter, it scored the lowest in barrier and hazards and signages among three stretches (refer back to Table 9.1 concerning these mentioned parameter scores for the three sites). During Kumbh Mela, these three stretches along the *ghat* area are most important to pilgrims as they take a holy dip in the Kshipra River and then visit the temples. Improvement in identified parameters is necessary to enhance both pilgrimage and Kumbh Mela tourism experiences.

9.5 Documentation of Facilities and Amenities During Kumbh Mela

Besides making the *ghat* area accessible, the cultural tourism experience of Kumbh can also be enhanced by making it safe. Safety is an important part of tourism regeneration and planning. As mentioned earlier, Kumbh Mela is prone to disasters like stampedes with the high concentrations of pilgrims and visitors in the *ghat* areas (especially during the days of *Shahi Snan*). Disasters can be avoided if the pilgrims are informed about the facilities and services available around the *ghat* area during the Kumbh Mela. Since facilities including emergency services are temporary structures, they do not appear on geospatial maps that are available online. Also, Kumbh Mela authorities provide maps showing proposed locations of amenities and services around *ghat* areas. Those proposed locations often differ from the actual location, and thus these maps may not be useful to prevent disasters. In this research,

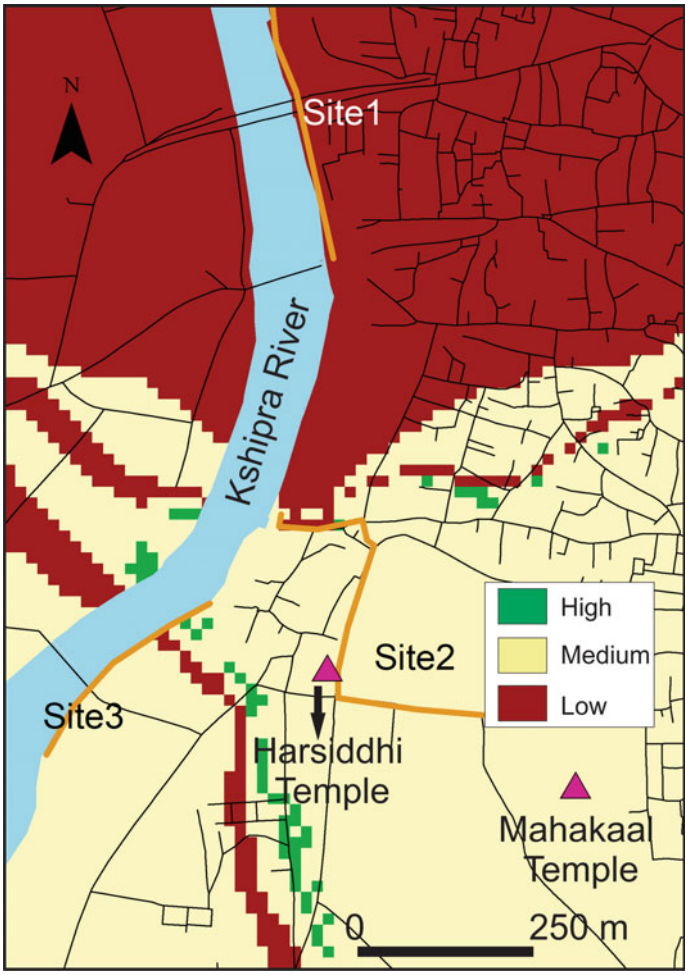

Fig. 9.4 Map produced in GIS showing zones of high, medium and low accessibility around the *ghat* area

existing temporary structures around *ghat* areas were marked using the geospatial tool. To understand the amenities and services used by pilgrims and tourists around the *ghat* area during the Kumbh Mela, an activity flow shows the use and designation of spaces. Given the high concentrations of tourists, insight from this case is transferrable because it can be adapted and applied to other cases hosting (very) crowded events, as it can be a challenge for destinations that accommodate high numbers of pilgrims and tourists. Then these destinations can adapt a similar approach to managing spaces and targeting key spaces that need to be regenerated or changed.

To address the spatial configurations and changes that need to be addressed, the Kumbh Mela activity flow begins with pilgrims and tourists reaching the *ghat* area,

approaching the steps to walk down to take a holy dip in the Kshipra River before climbing up to the changing rooms (temporarily built on the top of steps or at the beginning of steps). After changing clothes, they then visit the temple to offer Puja (worship). Pilgrims often require facilities such as toilets, drinking water, tea stalls and open areas. In the event of an emergency, they look for services like police stations, help desks, fire stations and shelters, so it is important that these are clearly identified as key attributes in the maps. After understanding this behaviour, or routine of each pilgrim, a group of professors from School of Planning and Architecture, Bhopal, India, then visited the Kumbh Mela held in Ujjain City in 2016 to document facilities and amenities using GPS devices. The location of these temporary structures was then imported on the LISS IV images of the site (see again Fig. 9.2).

Figure 9.5 shows location of major landmarks, exits, changing rooms and amenities along with corresponding photographs. A map showing location of the *ghat*, changing rooms, exits and temples will facilitate a pilgrim with or without disabilities to plan his/her visit. On the other hand, location of necessary amenities like toilet and drinking water on a map will help the pilgrims to understand their proximity from those amenities. Figure 9.5 also shows location of major landmarks and services along with corresponding photographs. Location of public parking area near the *ghats* shows access towards the *ghats*. Location of police stations, help desk and fire stations will help pilgrims with disabilities to understand the proximity of emergency services. On the other hand, location of *shivirs* (shelter) and open space will

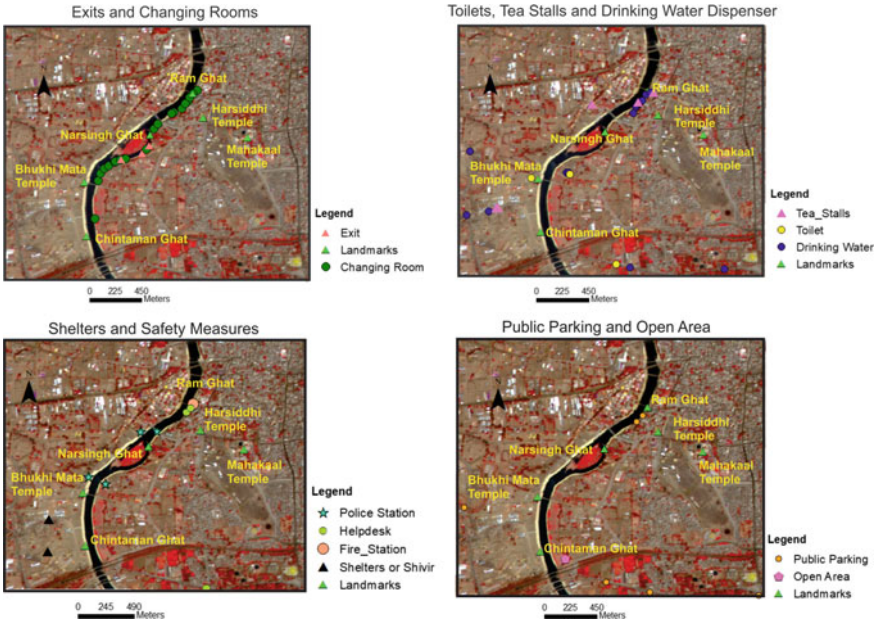

Fig. 9.5 Location of exits from *ghat* and amenities around the *ghat* area (top two images) and location of facilities around the test area (bottom two images)

provide the information on place to take a rest or refuge during the stampede like emergency. The main advantage of geospatial technique is that it can provide a platform where detailed layout and geospatial distribution of amenities and services can be mapped on a dynamic basis. Empowering pilgrims about the exact location of amenities and services can make their Kumbh experience safer.

9.6 Discussion and Conclusion

The Kumbh Mela is the largest religious gathering on earth (Merhotra and Vera 2015). For more than a month every 12 years, this sacred tradition brings tens of millions of people to the banks of sacred rivers in four host cities in India. Kumbh Mela plays a central spiritual role in the country, exerting a mesmeric influence on ordinary Indians. During more recent events, western travellers have been attracted to seek and experience spiritual India. Owing to its importance to Indian culture, UNESCO has designated Kumbh Mela on the Representative List of Intangible Cultural Heritage of Humanity. In spite of growing interest in Kumbh Mela, there is a dearth of consolidated research on the dynamics of cultural heritage tourism in the Kumbh Mela. This knowledge is vital for the conservation of cultural heritage and the longevity of tourism concerning this event, especially when it comes to spatial planning, regeneration and universal accessibility. This paper details the potential of using GIS to conserve cultural heritage tourism of Kumbh Mela. For the purpose of the study and to show how this can be used, we focused on Ujjain, Madhya Pradesh as a case study.

The geospatial approaches discussed in this paper are proposed in the context of Ujjain City. The approaches can be adopted by other host cities of Kumbh Mela mentioned above which will ultimately help to conserve cultural heritage aspect of Kumbh, and in other cases. As a method to conserve cultural heritage tourism using GIS, this paper talks about two approaches. The first approach deals with GIS technique to assess universal accessibility of *ghat* areas of Ujjain City. The final output of the analysis was a map showing the hierarchy of accessible zones ranging from high to low. The extracted zones will help the Kumbh authorities to identify and prioritize areas that are needed to be improved to enhance both pilgrimage and cultural heritage tourism experience of the Kumbh Mela. The analysis also identifies accessibility parameters which need immediate attention to improve the accessibility status of *ghat* area, which is important to consider in studies assessing tourism, cultural heritage and urban regeneration. The second approach talks about making Kumbh safer by using geospatial technology to map those temporary structures which provide facilities including emergency services. The final output of this analysis also maps showing location of exits from *ghat* area and location of emergency services which pilgrims can avail in case of emergency. If these types of maps with corresponding photographs are prepared during Kumbh it will not only facilitate both tourists and pilgrims, but also help the local authorities for smooth organization of the event.

The Kumbh Mela has evoked endless fascination and scrutiny by observers dating back to the Chinese and Arab itinerant scholars from centuries past, to contemporary academics now making use of geospatial technologies. This multi-century old cultural heritage needs to be conserved, which is a demanding process given the high concentrations of pilgrims and cultural tourists. While GIS has been used to address the conservation of heritage, its application is minimal when attempting to assess cases focusing on intangible cultural heritage (like the Kumbh Mela). Therefore, this chapter explores and discusses the potential of using GIS as a tool to conserve cultural heritage tourism. The approaches proposed for Ujjain City can be adopted in other host cities. If all host cities of the Kumbh better attempt to make the Kumbh Mela universally accessible and safe it will ultimately help to conserve the intangible cultural heritage value and experiences gained by attending the event.

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