Mohit Bahuguna., International Journal of Engineering Research and Applications
www.ijera.com
ISSN: 2248-9622, Vol. 15, Issue 6, June 2025, pp 82-90

RESEARCH ARTICLE OPEN ACCESS

Harnessing Geospatial Technologies for Strategic Planning of Maha Kumbh Mela, Haridwar

Mohit Bahuguna
District Haridwar GIS Cell Uttrakhand (GIS Analyst)
Mail id: mbmohitbahuguna@gmail.com

Abstract:
Maha Kumbh Mela Haridwar 2021 (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).
A Geographic information system (GIS) is a conceptualized framework that provides the ability to capture and analyze spatial and geographic data. GIS applications (or GIS apps) are computer-based tools that allow the user to create interactive queries (user-created searches), store and edit spatial and non-spatial data, analyze spatial information output, and visually share the results of these operations by presenting them as maps (Wikipedia).
In the 2010 Maha Kumbh Mela, around 8 crore devotees thronged Haridwar. It is estimated that around 15 crore pilgrims from India and abroad are expected to visit the four-month-long Mela in 2021. The main purpose of devotee coming to Maha Kumbh Mela 2021 is for the scared bath (http://tourismuttarakhandtourism.gov.in/)
The first approach talks about enhancing the accessibility of Ghat areas, hospital, police, parking, changing room, camping sites etc. help of GIS. Ghat areas, situated along the sacred Ganga River, are the most important as these places experience the maximum footfall during the Maha Kumbh Mela event.
The second approach discusses how geospatial approaches can be utilized to provide safety to pilgrims by police, which must be considered in future development planning, as the event is prone to stampedes, and how to decrees the number of visitors in Ghat. Approaches thus proposed in this study may be adopted by other host cities of Maha Kumbh Mela which will ultimately help conserve heritage aspects of the event.
The thirdly approach creation of GIS database for the geo portal for any plan for disaster, crowd, stamples, any incident and preparation of GIS maps and how to query along database.
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). The GIS geoportal includes visitation to unique built cultural environments (e.g. temple, holy place, historic public buildings and homes,) and to experience intangible elements of culture (festivals and events), UNESCO has listed Maha Kumbh Mela on its representative list of Intangible Cultural Heritage of Humanity in 2017.
Keywords: Maha Kumbh Mela, GIS, Geoportal, Drone image, GPS.

I. Introduction:

There has been a huge development in information technology recently. GIS has been commonly used in different fields such as tourism activities enabling people from different countries and cultures to interact with each other.

A spatial Database is a set of linear features that are interconnected in GIS. Common examples of networks include highways, railways, city streets, rivers, transportation routes (e.g., transit, school buses, garbage collection, and mail delivery), and utility distribution systems (e.g., electricity, telephone, water supply, and sewage).

Study area of Research:

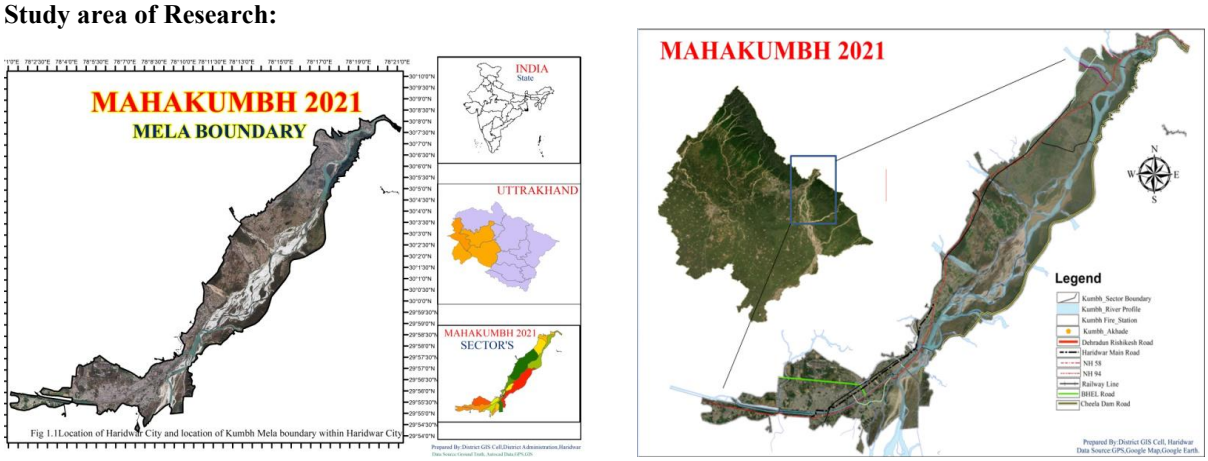

Figure-1: Study are map Kumbh Mela Area-2021 (Haridwar,Dehraun,Pauri,Tehri)

The Mahakumbh 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 (Merhotraand Vera 2015).. 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 Ganga. The study has been conducted during the recent Mahashivratri and Vaishakhi, Makar Shankranti the holy bath of Mahakumbh Mela which was held in Haridwar, Uttrakhand (see map in Fig. 1 to 22) from the 1 April to 30 April 2021.

The study explores the potential for using GIS to explore and identify sites of urban regeneration to assist planners with conserving cultural heritage tourism and facility 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 Ganga River) within Haridwar City where they experience maximum footfall during the event (this helps with spatial planning and managing high concentrations of visitors during these events).

II. Material and Methodology

Primary data collection:

The Primary data is any data digitized within the software (as point, line and polygon) or collected by hand using a GPS receiver. The potential of geospatial technique to conserve the cultural heritage of Kumbh is explored with primary data in three ways:

1. Using a route map of holy bathe in, record the amenities and facilities available during the Kumbh festival.
2. by examining place-making activities in the Maha Kumbh regions.
3. Reduce the crowds and prepare for an epidemic disaster like COVID-19 during holy bathe.
4. Utilize the Police GIS Portal to carry out your obligations as a police officer and to create a catastrophe action plan, such as the Stampede in Kumbh holy bathe.

GPS Survey:

GPS (Global Positioning System) surveying is a quick and accurate way of mapping and (Fig:1.2.3 GIS Database Collection of Threw GPS(Global Positioning System) modeling the physical world from mountainous landscapes to city skylines. This versatility and utility are why GPS surveying is the standard practice for any surveying operation. Nearly any group that needs surveying done will use GPS surveying, including government organizations, scientific groups or commercial businesses.(https://www.takeoffpros.com. Some of the benefits these groups enjoy from GPS surveying include as Flexibility, Mobility, Speed, and Accuracy. The All Mahakumbh Area geo located and geo tagged threw the GPS.

Secondary data collection:

Satellite Data:

But concerning the data used in this chapter, two satellite images acquired by Bing Map and Goggle Map which have been freely used but low resolution. One image resolution was (Satellite Data of Bing Map and Google image).

The should be getting high quality data is essential for any GIS task .But for high cost of satellite data for Research & Development purpose, free and openly licensed data is Google Map and Bing map . The database consists of streets, local data as well as building polygons. Getting access to the data in a GIS format is integrated in QGIS and ArcGIS.

Drone survey:

A drone survey refers to the use of a drone, or unmanned aerial vehicle (UAV), to capture aerial data with downward-facing sensors, such as RGB or multispectral cameras, and LIDAR payloads called secodary. During a drone survey with an RGB camera, the ground is photographed several times from different angles, and each image is tagged with coordinates.

From this data, photogrammetric software can create geo-referenced orthomosaic, elevation models or 3D models of the project area. These maps can also be used to extract information such as highly-accurate distances or volumetric measurements.

Unlike manned aircraft or satellite imagery, drones can fly at a much lower altitude, making the generation of high-resolution, high-accuracy data, much faster, less expensive and independent of atmospheric conditions such as cloud cover. (https://wingtra.com/). Sh Shailesh Bagoli, Sectary of Department Urban Planning, Govt. of Uttrakhand has order to be drone mapping the all temporary work and will be physically verification during Maha Kumbh. After finishing the temporary work during Maha Kumbh for transparent work, another drone mapping was conducted.

Geo Referencing:

The Maha Kumbh Mela Office has certain CAD maps and geographic data, but they cannot be integrated with other GIS databases. The database should be spatially referenced according to the order. In that instance, a procedure known as Geo referencing is used. The primary digitization process begins after georeferencing. A geo-referenced image created from a scanned map.

Digitization:

The GIS digitization is the process of "tracing", in a geographically correct way, information from images/maps. The process of geo referencing relies on the coordination of points on the scanned image (data to be geo referenced) with points on a geographically referenced data (data to which the image will be geo referenced) (https://dsc.gmu.edu).

The technology is rapidly changing day by day. The GIS (Geographical Information System)is a tool that Capturing, Digitization, and Analysis at will at output as a map. GIS has lot of the information of representing the GIS data as only one click and one query.

GIS Database Representation (Vector Database):

As previous point discuss about the collection of Primary and secondary data which has an important for creation of GIS Database. Compilation data is the process that the shifted, wrong or missing data, map projection, human error, unclosed polygons, gaps between polygon borders or overlapping polygon under the boundary of Maha Kumbh Mela.

A geographic information system (GIS) is a framework for gathering, managing, and analyzing data. While ArcGIS works with geographic information in numerous geographic information system (GIS) file formats, it is designed to work with and leverage the capabilities of the Geodatabase.

ID	Name	Subtype	Geomtery
1	Administrative Boundary	Maha Kumbh Boundary, Maha Kumbh Sector Boundary	Polygon
2	River	River and River Profile	Polygon
3	Police (Administration)	Police Boundary, Police Sector Boundary	Polygon
4	Police	Police Station ,Mountain Police, CPMF, PAC, Radio line and Office, Reserve Police, CISF, RPF, ITBP, BSF, CRPF, Home Guard Line, Police Check Post, Sanitary Inspector Camp, Traffic Line, GRP Line.	
5	Road	National Highway, State Highway, Link Road	Poly line
6	Administration Camp	Zonal Magistrate, Sector Magistrate, Police CO Camp	Point
7	Ghats	Bathing Ghats, Temporary Ghats	Point
7	CCTV	CCTV Location	Point

8	Medical Facility	NVBD Camp Store, Homeopathic Hospital, Ayurvedik Hospital, Hospital	Point
9	Forest	Reserve Forest	Polygon
10	Govt Official Camp	UPCL ,Civil Supplies, Nagar Nigam, Veterinary Hospital, Northern Railway, RTO Camp Post Office, Gas Agency, Dairy, Payjal, Asha & Company, Media Camp	Point
12	Fire Station	Fire Station, Fire Hydrant,	Point
11	Food Court	Food Court,Resturent	Point/Polygon
12	Shops	Shops,Vending Zone	Point/Polygon
13	Public Accommodation	Public Accomondation,	Point
14	Public Toilet	Toilet ,Bathroom, Urinal, Existing Toilet	Point
15	Sanitation	Sanitation and Sanitation Worker,	Point/Polygon
16	Parking	Temporary Parking,ISBT,Shuttle Bus ,Auto and E Rickshaw Parking,Ticket Counter	Point/Polygon
17	Changing Room	Changing Room	Point
18	Bridge	Bridge	Poly line
19	Religion Bhawan	Akhada,Ashram	Point
21	Reserve Land	Reserve land	Polygon
22	Warehouse	Contract Warehouse, Warehouse	Polygon

III. Result and Discussion:

Generally the GIS geoportal has an important role geoportal is a type of web portal used to find and access geographic information (geospatial information) and associated geographic services (display, editing, analysis, planning etc),

Figure-1: Map of Thana Jwalapur

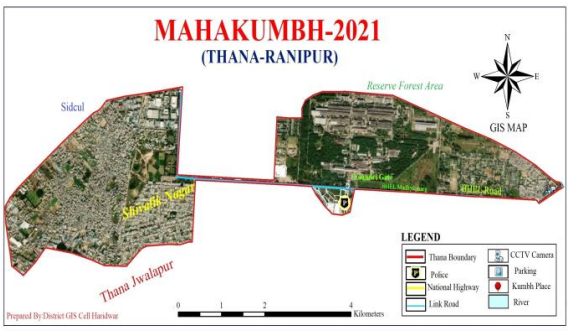

Figure-2: Map of Thana Ranipur

Figure-3: Map of Thana Kankhal

Figure-4: Map of Thana Mayapur

The Geoportal is better representing the GIS Database and online access anywhere any time. Threw the Mobile application can link and better onetime data of facility construction update view. The igismap.com is a GIS based portal can represent data as per plan. There are some facility can show as ghat, hospital, police Station, Sector Boundary, CCTV, Bridge, Existing and Temporary Toilets, Parking etc.

Figure-5: Map of Thana Mayapur

Figure-6: Map of Thana Daksh Dweep

Figure-7: Map of Thana Haridwar

Figure-8: Map of Thana Bairagi

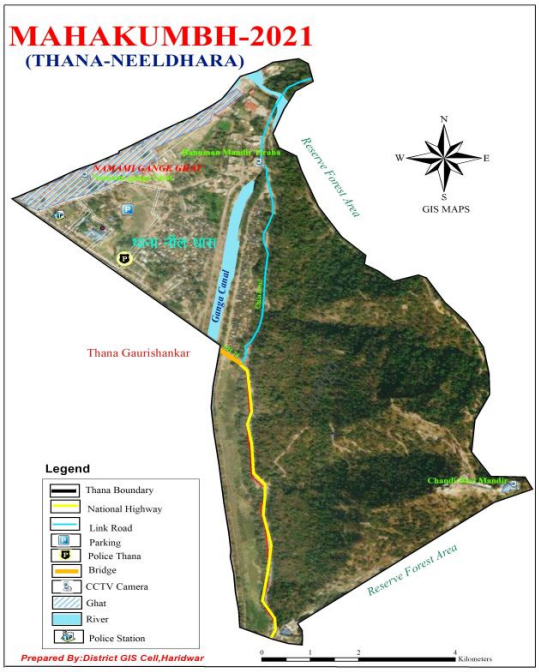

Figure-9: Map of Thana Neeldhara

Figure-10: Map of Thana Rodi

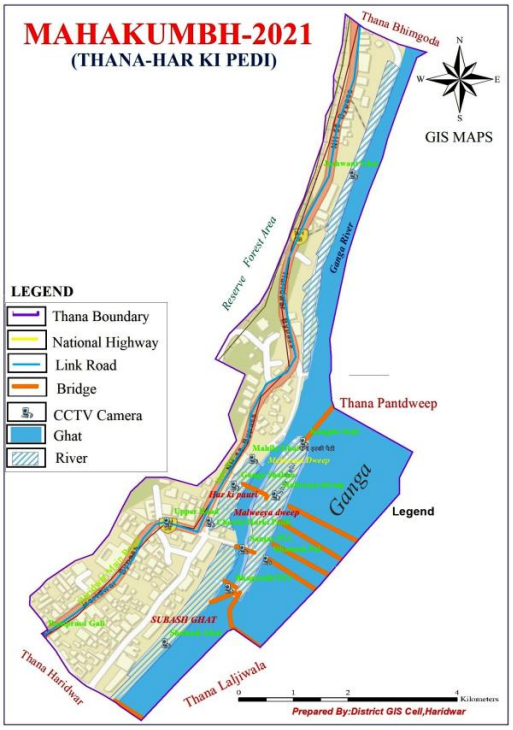

Figure-11: Map of Thana Har ki Pedi

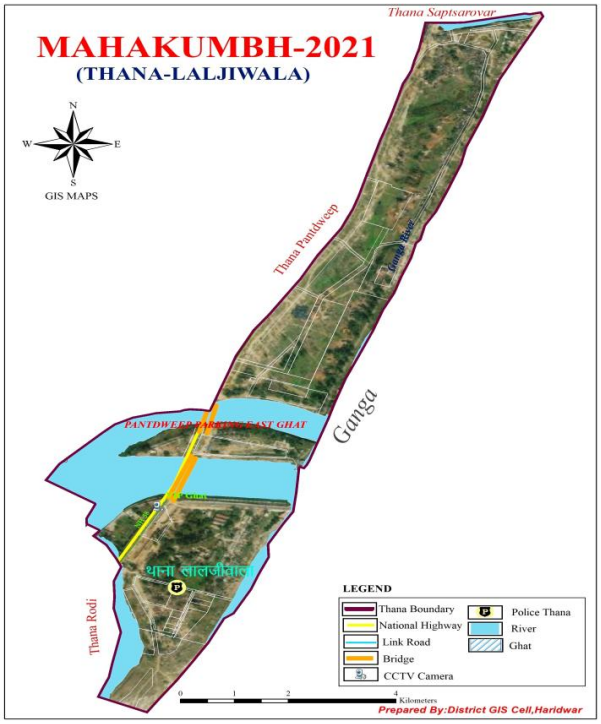

Figure-12: Map of Thana Laljiwala

Figure-13: Map of Thana Muni ki Reti

Figure-14: Map of Thana Bhimgoda

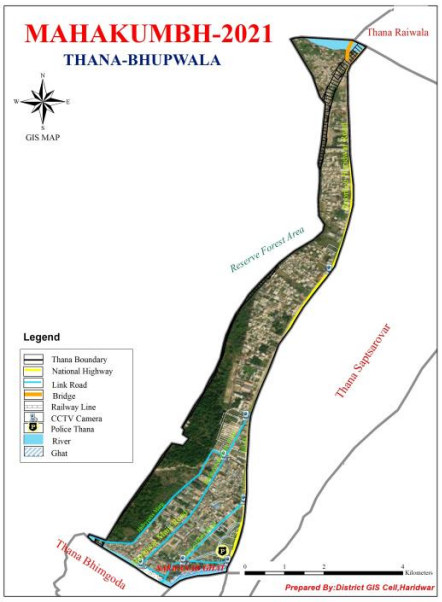

Figure-15: Map of Thana Bhupwala

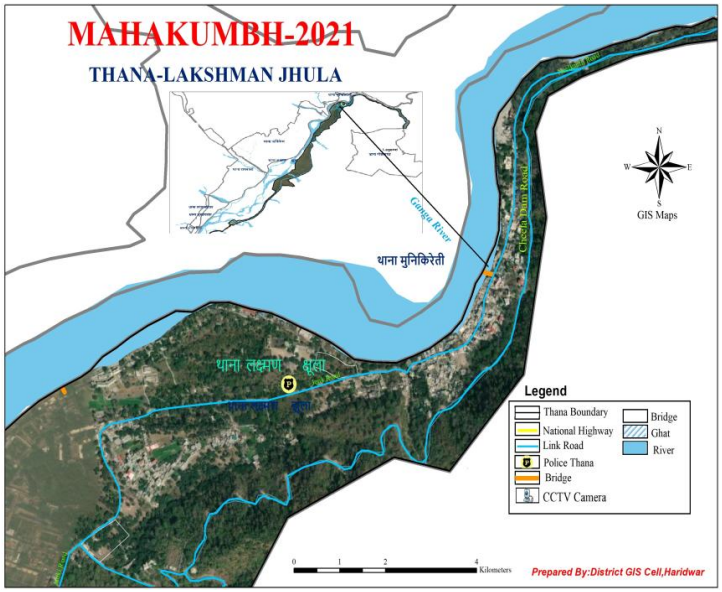

Figure-16: Map of Thana Lakshman Jhula

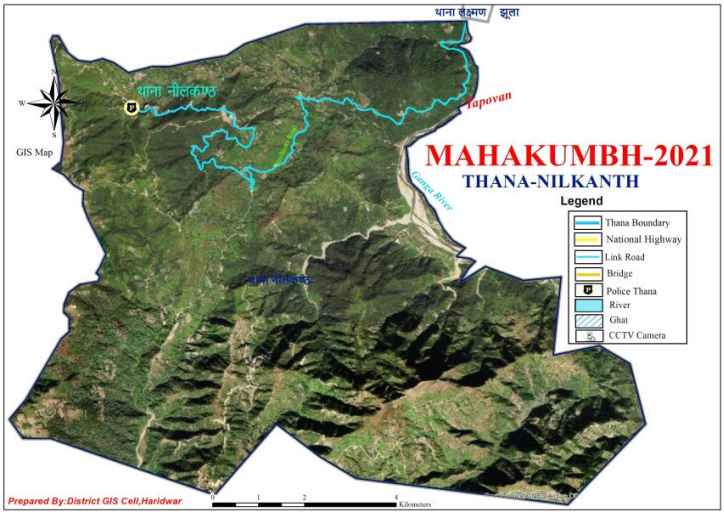

Figure-17: Map of Thana Nilkanth

Figure-18: Map of Thana Saptsarover

Figure-19: Map of Thana Gaurishankar

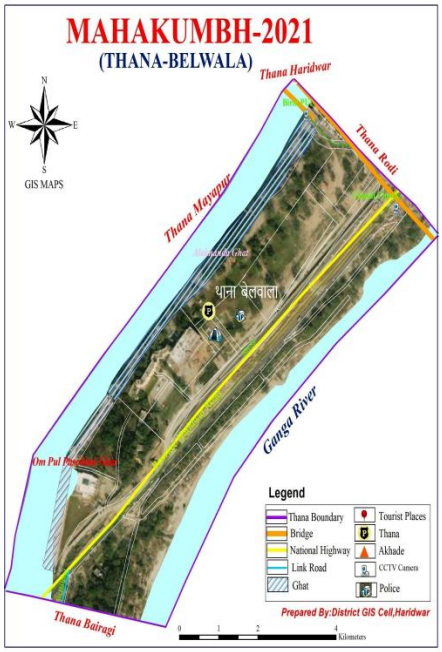

Figure-20: Map of Thana Belwala

Consider for a moment the power of GIS to deliver fresh perspectives by marrying data and geography. Hundreds of thousands of intelligence analysts rely on it to collaborate and share information. State and local governments use GIS for emergency response and preparedness, disaster management and planning and the list goes on Other challenges that were identified by survey respondents include data accuracy (32%), efficient data management (31%), and location privacy (8%).

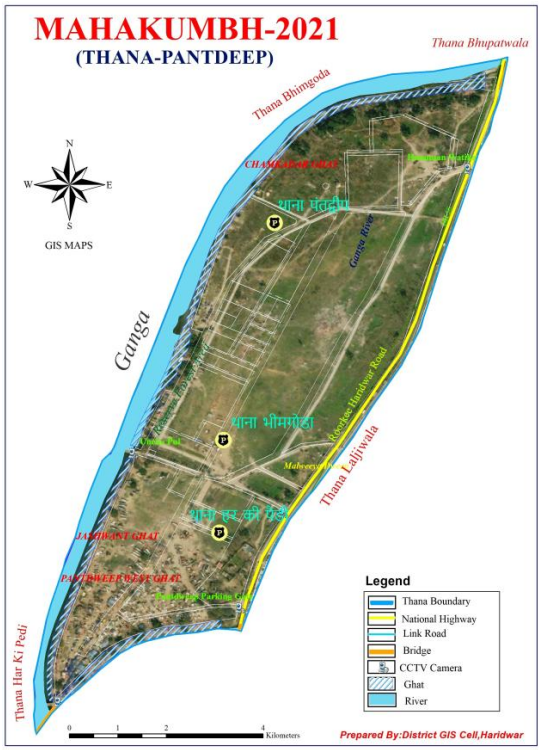

Figure-21: Map of Thana Pantdeep

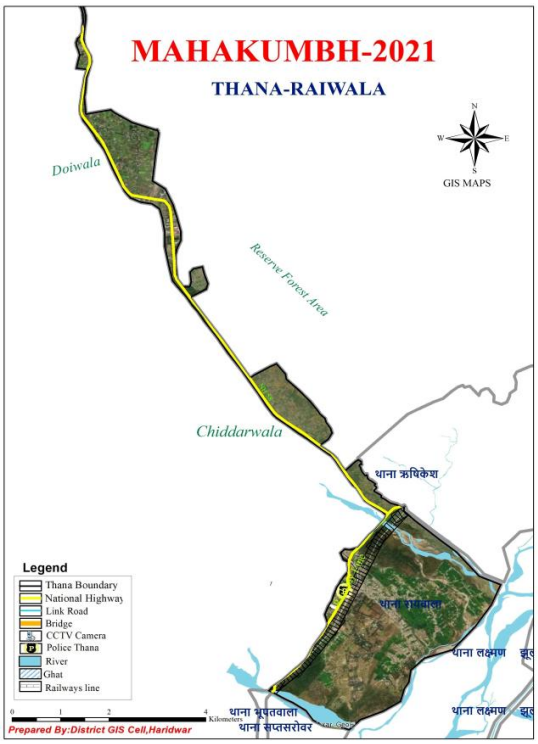

Figure-22: Map of Thana Raiwal

The most common applications of GIS today by businesses include spatial planning (31%), decision making (30%), and asset management (23%), the survey found. But when asked which technological advancements they expect to become key to their organizations in the future, respondents pointed to cloud technology, real-time data, Internet of Things (IoT), 3D GIS, mobile GIS, and UAVs.

IV. Conclusion:

Secure GIS is not a new concept but one worth noting as govt. department verify the security of their data and products and services,via program of world bank, central bank, state bank as well as other security protocols and standards. Although this is not an exhaustive list of what's to come in the world of government GIS, these trends should be top of mind for your agency if you aren't already implementing them. The future of GIS is about secure, web-based services that are accessible and put greater capabilities into the hands of everyday employees.

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