Mapping and Management of Water Pipeline in Aurangabad City

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ABSTRACT: Geographic information systems (GIS) play a distinguished role in water utility management like the asset creation and management, infrastructure capital improvement, planning and analysis, Optimizing field operations, water conservation etc. Increasing public awareness, stricter measures and promulgation of latest laws in the area of water resources have created the utilization of advanced technologies indispensable. Geographic Information Systems (GIS) are an effective tool for storing, managing, and displaying spatial data typically encountered in water resources management. A study was taken for Aurangabad city to demonstrate the role of remote sensing and GIS in water utility management. This study explains the mapping of Water pipeline in Aurangabad city ,and management using distance measure function from various sources such as utility surveys, scanned maps, CSV files etc. The existing water supply system of Aurangabad was analyzed at both city and ward level with the help of GIS and geospatial water utility database.

KEYWORDS: Comma Separated File, Geographic Information System, Information and communication Technology, QGIS

I. INTRODUCTION

Water is a necessary a part of the majority human activities: it's needed in homes furthermore as in industries. Water is changing into a scarcer resource with every passing year, due to improper water allocation, inefficient use, unmonitored wastage and lack of overall water management [1].So as to conserve and reduce wastage of water, many people plan and regulate the distribution of water. Water resource management involves activities like planning, developing, distributing and managing the optimum use of water resources. Ideally, it should allocate water in such a way, so as to satisfy all demands for water without wastage.

The application of GIS in water resources is consistently on the increase. So as to worry the importance of GIS in water resources management, applications associated with this area are addressed and evaluated for economical and efficient future research and development. It was expected that until 2050, seventieth of population can leave in city and town of India. With shrinking of water reservoir, low rainfall, etc is difficult to feed and supply resources like water, electricity to such high population. Using sensor, Information and communication Technology (ICT) water resources may be managed and be saved for future use. Smart water system provides reduced water non-renewable water losses and reduced water consumption in field of agriculture [2].

Report on Water in India

India is associate agricultural land. Here seventieth of water is being used for the agricultural purpose. It had been expected that water demand goes to rise by 50% and one can't ignoring the actual fact that India is already under high stress level. Solely in India and China 2.7 billion citizens leave in water stress level. In India enough water resources are available but water is not evenly distributed that water demand goes to rise by 50% and one can't ignoring the actual fact that India is already under high stress level. Solely in India and China 2.7 billion citizens leave in water stress level. There is case in which just one tap is installed for 100s of slum people and one tap for one house. Water Infrastructure present in several cites was quite aging. This aging pipeline suffers from erosion those ultimately causing water leakages. General awareness in individuals regarding water saving was also not found. Causing water waster so results in extra water usages Countries like India physical and commercial loss are major area to figure out and that may be reduced [3].

GIS for Water Utilities

All water utilities are created of assets. The physical assets of a water distribution system embrace pipelines, storage reservoirs, pump stations, hydrants, valves, meters, manholes, and any different elements that form up the system. Assets are often categorized as either horizontal or vertical. Vertical assets are those that are primarily on the top of the ground, such as pumps, reservoirs, and treatment facilities. The horizontal assets are usually the buried assets like the water mains that form the backbone of the water distribution and wastewater collection systems (New Mexico Environmental Finance Center, 2006) [4]. Assets will contain different assets. As an example, a pump station will house necessary assets like motors and an electrical system that support the pumps (Zhao and Stevens, 2011) [5].

II. RELATED WORK

A.M. Pindiga, M.J. Sani, Garba T worked on Water Distribution Network of Bauchi Metropolis,Nigeria. The study recommends the employment of GIS as a decision making tool for municipal water system authorizes or agencies to correct management and analysis of their installations.They study increase in Population moreever demand for portable pipe-borne water in most of the cities of developing countries and therefore the activities of the individuals greatly have an effect on the pipes networks quietly laid beneath the ground. Locating such pipes and the features installed in them has been a task to tackle. Therefore to confirm correct surveillance and monitoring and watching of laid down pipe round the metropolis got to be properly guided with modern technology just like the use of Geographic Information Technology. Hence, to solve these issues analogue information was acquired from the Bauchi State Water Board (BSWB) and convert into digital map (Raster format). (GPS) coordinate was used to find pipes inside the network, the nodes, valves, water hydrants, and busters). Finally, the position of every of the known features within the network was obtained and recorded within the events table. Digital map of water distribution network of the metropolis was made and queries were raised whereas the node valves or pipes underground were simply located using GPS coordinates by navigating from the surface [7].

Manisha R. Mundhe based the increasing citizens' quality of life, and up the effeciency and quality of the ground and surface-water modeling will give a basis for predictive simulation of the results of future water demand for ground- and surface-water resources. Some areas of the city facing ground-water problems haven't been studied in sufficient detail to develop ground-water models, that might be wont to give insight into the results of water management. long observance knowledge will give a basis to judge the effectiveness of water management practices, and provide very important info for the event of recent, and update of existing, ground-water models[8].
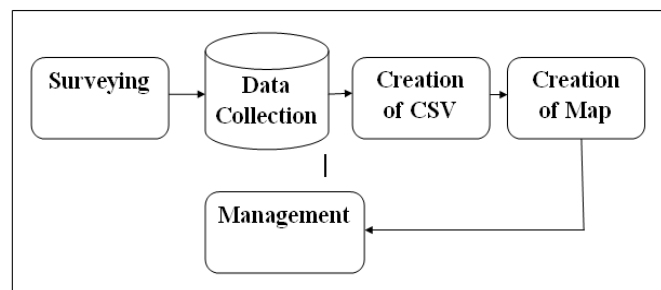
III. METHODOLOGY

Proposed System:

Fig.1. Proposed System

Geospatial Techniques and Remote Sensing data can be used for mapping water pipeline in city. The method used to accomplish the task includes the following:

- Obtained a plan showing the water distribution network of university area in Aurangabad
- Using a Coordinates i.e latitude and longitude of Water pipeline Create CSV file of data

- Creation of Map
- Management

It involves first to obtain a plan showing the water distribution network of university area in Aurangabad. Then by using a GPS acquire geographical co-ordinates that are latitude and longitude of both ends of pipes which are clearly identified both on the map and on the ground. After that Creation of CSV file using data, Creation of Map and Management.

IV. RESULT AND DISCUSSION

Implementation Process
Below Figure shows the overall working in the project. First Stage is to create CSV File.CSV is a Comma Separated File which contains Latitude and Longitude of The pipe Location. After that these CSV Files can be used as an input file in QGIS to Work with Collected Data. With the help of CSV Mapping is performed. To create WebMap Certain Plugins are required which are used During Process. To perform Management Function Source Code can be edited which is created during WebMap Creation.
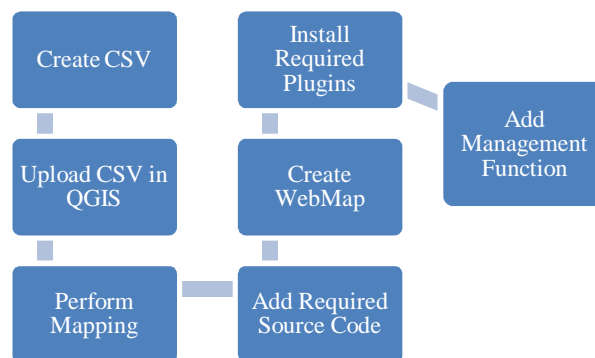

Fig.2. Implementation Process

Municipal Corporation of Aurangabad Provide a printed map which is most helpful for the mapping purpose..
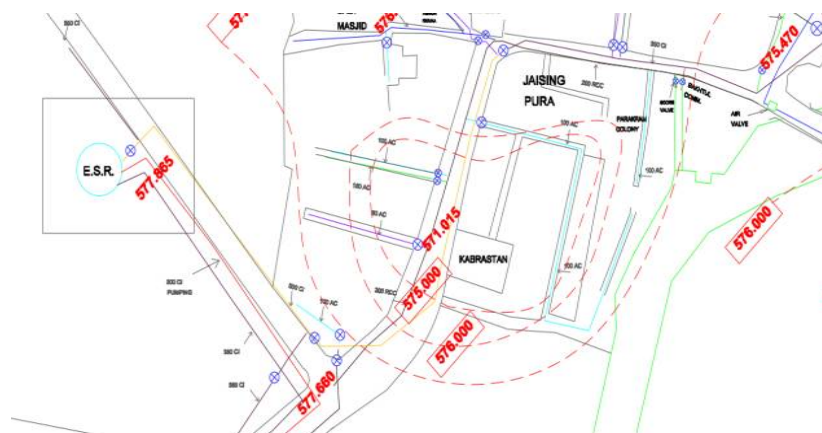

Fig.3.Map of Aurangabad Water Pipeline

Due to that it is very easy to find exact location of pipeline. There is one screenshot of printed map showing pipeline map in university area. It also gives the information about type of pipe And Size of pipe. Database contains this information

Creation of CSV File and Mapping

CSV files are files where each line has the same structure, consisting of a number of values called "fields" separated by some specified character or sequence of characters, typically a comma hence the name "comma separated values". The character or characters that separate the fields is called a "delimiter". In project all the collected values are stored in CSV file using LINESTRING function. I have used the CSV file containing the coordinates of the end points water pipeline in Aurangabad City. The file has three columns: Id, Latitude and Longitude, Type And size.
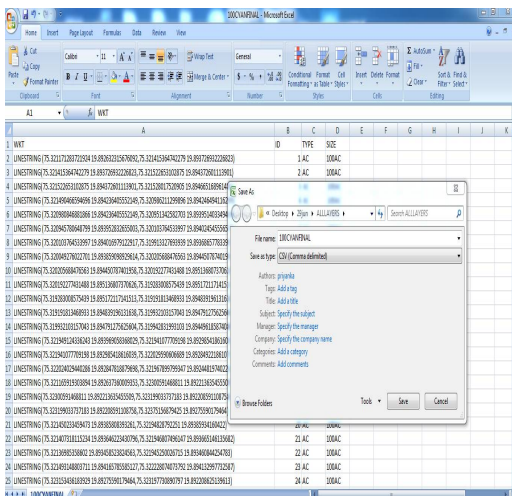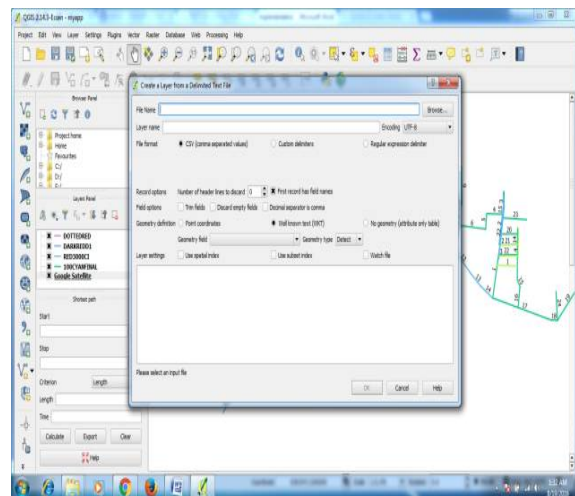

Fig. 4. CSV Creation

Fig. 5. Layer Creaton From CSV

Mapping

After creating a CSV file it is uploaded in QGIS for making a map using QGIS Plug in.
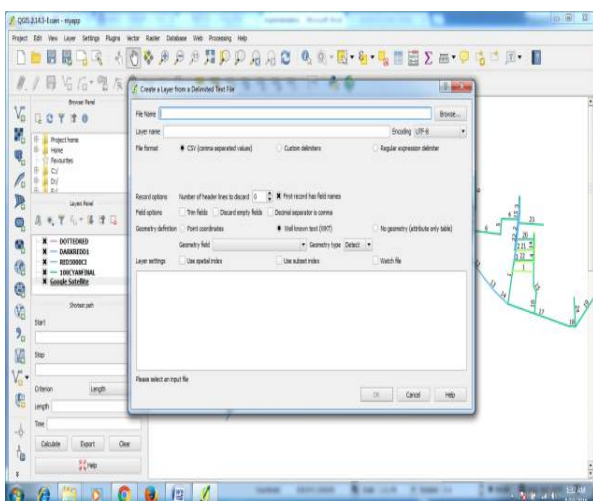

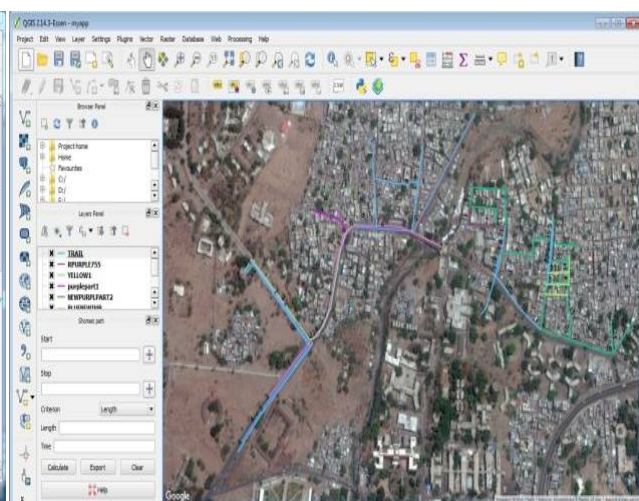
Fig. 6. CSV Upload in QGIS

Fig. 7. Making a Map

The information created is used to form layers of map using QGIS. The information is within the kind of CSV that is added as layer to QGIS. This may offer precise information concerning water pipeline network along with details. QGIS offer different choices to form layer like styling, labeling, attribute edit, visible layer selection and also allow

adding layer from web map servers. These details can useful for construction workers and other people to acquire locations of underground infrastructure.

Creation of Webmap

After Installation of Plugin webmap is created using input data i.e all CSV files which contains latitude and longitude. These Values are real time location of both ends of water pipeline in university area Aurangabad. Webmap is inde. html file which contains CSS and JS files. The color lines in Given map Shows the Mapping of water pipeline in region.
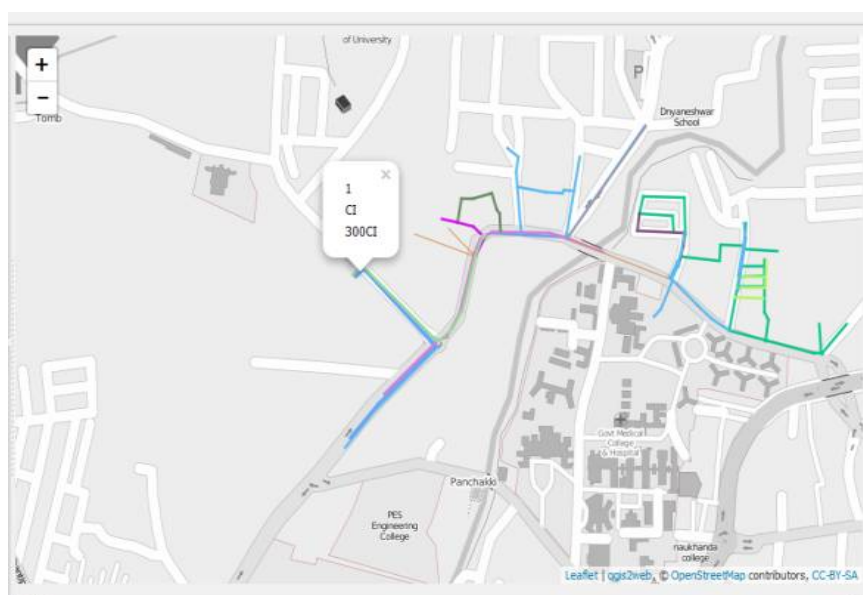

Fig. 8. WebMap Showing Pipeline Data

Management

In Management Different kinds of Functions are added to increase the value of created map. As the Map created is of actual data it will be used for management by municipality people. So that it is very important to add some kind of functionality in it for proper use.In project a Distance measurement function is added so that it will help that people in different ways. Figure 4.10 shows the exported map with distance measure function. It also shows the layer list. Layers are created from the CSV file which contains location of pipeline. Also by using arrowhead data about individual pipeline is visible.
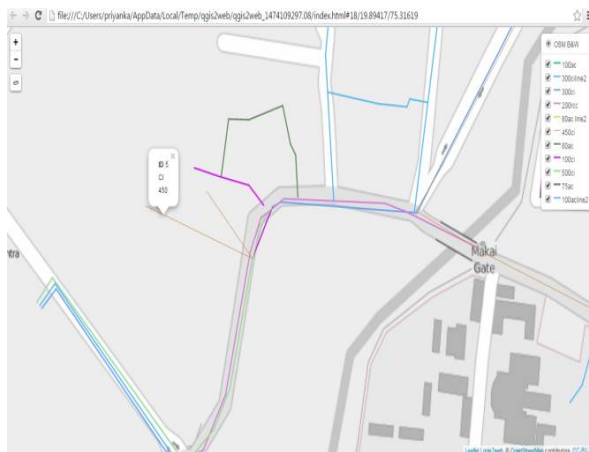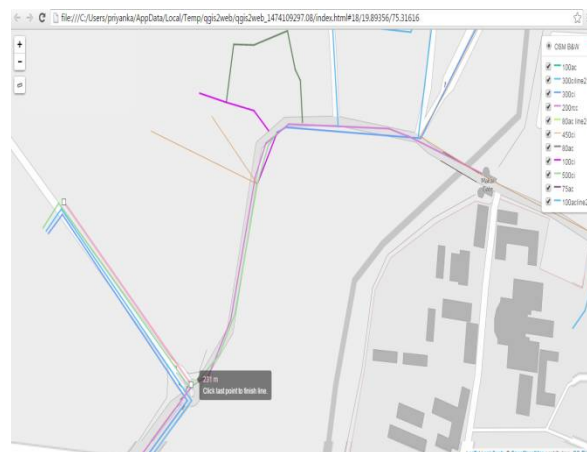
Fig. 9. Layer List in Webmap

Fig. 10. Distance Measurement

V. CONCLUSION AND FUTURE SCOPE

Water is one of the most important basic needs for all living beings. But unfortunately a huge amount of water is being wasted by uncontrolled use. Other water management systems do exist but lack functionality in terms of being able to monitor and manage multiple sources of water. Therefore it is important to create some effective work to manage water systems. This work has concluded that geospatial technologies like remote sensing, mobile mapping are very useful in the creation of geo spatial water utility database and GIS is helpful in various stages of water utility network management especially in asset management, identifying the risk of assets and sub-surface 3D modeling of the utility networks. The new insight in this project is mapping of data using CSV file .It also highlights WebMap creation using QGIS tool and Management using different Function like Distance Measurement, layer Visibility for FurtherStudy by municipality people.

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