Redressing citizens problem over spatial extent using GIS

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ABSTRACT: In today's world there are many types of problem both at small and large scale. Sometimes solution to this problem becomes critical situation such that what method should be apply for resolving such type of condition. It has seen that problem solving using geospatial technology has very effective result and output which can be directly or indirectly apply to problem situation. For this case we are focusing on municipality level problem like redressing citizen problem or complaints related to water network and sewer system. This problem can be easily resolved if reason behind problem can be traced effectively and quickly. For this scenario representation of complaints over spatial extent will gives efficient results. If spatial distribution of complaint can be generated than tracing of reason to problem will become quick hence decision making and supports system will work in efficient manner. If problem's reason and the physical think to which problem has happened like network of water supply or sewer system has been traced than solution of problem can be stated as like achieved. For this study to be carried out we may use both type of software i.e. proprietary and open source. For this work to be done we may use Arc GIS or QGIS and server as platform so that both database handling and analysis over problem can be done effectively. It has seen that using open source technique provides solution at low cost while proprietary gives solution at some cost as required by software. But this situation is dependent over factors. For this study to be carried out we are focusing over Himmatnagar municipality from Gujrat state INDIA. To achieve this work network dataset algorithm will be used so that using this network issue can be traced. The outcome of this study involves troubleshooting of problem or complaints of citizen using spatial probabilistic approach so that citizen's issue related to water and sewer network can be effective resolved.

KEY WORDS: Municipality, Redressal System, Citizen, spatial extent, complaints/issue, GIS (Geographical information system), Network, Algorithm, Decision making, open source & proprietary, water/sewer supply, probabilistic, troubleshooting

1. Introduction

Redressal system is used to create a user-friendly online interface for citizens to communicate with administrative body and to reduce the distance and time barrier between citizens and administration, also it is used to create online platform where people can share ideas invoked discussions, issue complaints, create suggestions/petition for improvement of city administration, it will also use to encourage the citizens to actively participate in city administration to bring transparency and flexibility in system.

Principle components for Redressal System

- Network system for utility (water / sewer pipeline)
- Conceptual geometric connectivity between network
- Problem solving database
- Query tracing / solution
- Troubleshooting (using probabilistic approach)

1.1 Study Area

Himatnagar is a Municipality city in district of Sabarkantha, Gujarat INDIA. The city is divided into 12 wards for which elections are held every 5 years. The Himatnagar Municipality has population of 81,137 of which 42,259 are males while 38,878 are females as per report released by Census India 2011.

Total area of Himatnagar: 8.82km2, expected area increase in 2021: 32.49km2. First sewerage was established in year 1983 under nagarpalika in zone A, C and D under which waste water was collected. In zone B, due to rocky area and narrow roads, main pipeline work is not done yet. 3 main pumping stations are made in Himatnagar. 4 rising main is to be introduced out of which 3 is already done.

1.2 Software Used:

    • **ArcGIS/QGIS (for generating layers)**

    • **Ms Access (for Database generation)**

    • **Network Analyst (for solving net problem)**

2 Methodology:
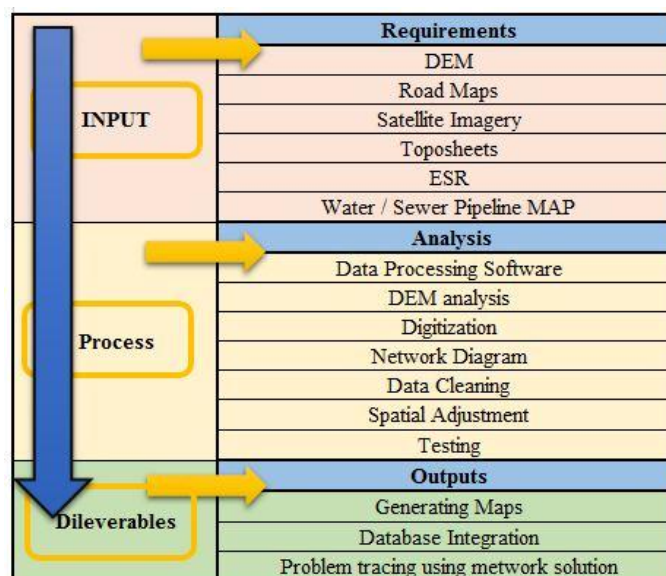
2.1 Logical Explanation:

Accuracy of this work is based on data quality and its precision. All data should take over a single platform so that projecting can be made easier. All layer should be digitise according to need well and precise using GIS.

2.2 Input:

First of all we have done an analysis on Client requirements, the problems faced by them without proper assessment system**.**

- The DEM data was downloaded in order to study terrain parameters of that specific area.
- Satellite imagery was used in order to get information about surrounding area.
- Roads Map were generated from the data obtained.
- Toposheets were analysed to get information about contours as well as proper amenities.
- Information of every ESR is collected which are serving in that specific area.

2.3 Process:

- ArcGIS software is installed in system, all the data is imported in software.

- Data was obtained in CAD file and that data was imported in ArcGIS.
- Unnecessary data was cleaned by using advanced editing too
- Spatial adjustment of data was done in order to get useful geo-coordinates.
- Network dataset was created and solved by using all processed data as obtained from previous steps.
- Problem was traced and identified from the network created by running network tool over it.
- Troubleshooting was done with probable aspects obtained.

2.4 Output:

- Maps were generated from above process and detailed analysis was done in order to know the faulty places were improvement is to be done.
- Utility maps and Decision maps were obtained.
- Database Integration was done based on information obtained from client

3. System Design and Architecture

Designing the GIS based Redressal management system will entail the design of its sub-components: database server, web services and user level categorization. Database server design is based on the requirements from the asset management system plus data attributes that will be used to generate the desired queries. A possible data model is shown in Figure
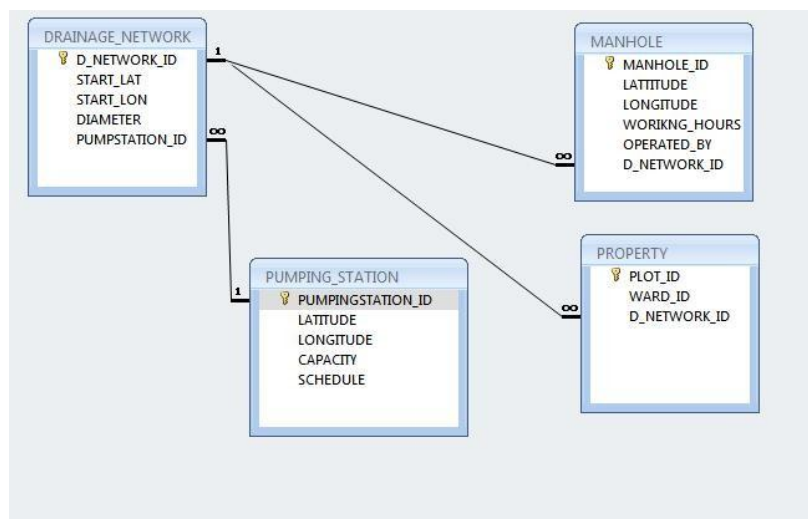
Data Structure for Asset Management System

During the analysis for the requirements of project and client, all the criteria was discussed with organization. The proposed asset management will have following categories:

- End Users: Municipal staff, clients
- Authorized GIS users: Few staff members selected for modifying system
- Web GIS Portal Administration: Web designer
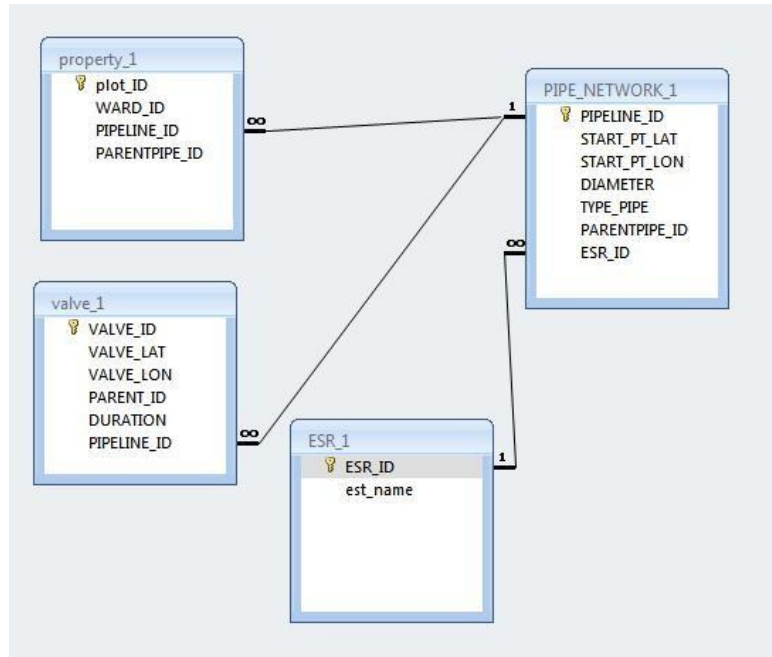
Data Structure for Customer Complaint Solution Management System

Customer Complaint is important information reflecting customers sound and is a primary measure of customer dissatisfaction. An Effective and Efficient response to these complaints is an essential index of organization's performance.

Following are steps considered for Customer Complaint Solution Management solution:

Step1: Complaint database has been created.

Step2: Relationship has been created between geodatabase complaint data base.

Step3: Spatial representation of complain has been created

Step4: Complaint is traced using network diagram

Step5: Solution of Customer Complaint has been completed by troubleshooting.

4. Results:

Below are some result of analysis over network tracing and problem solving as:

Database showing complaint, reason and probable solution to it
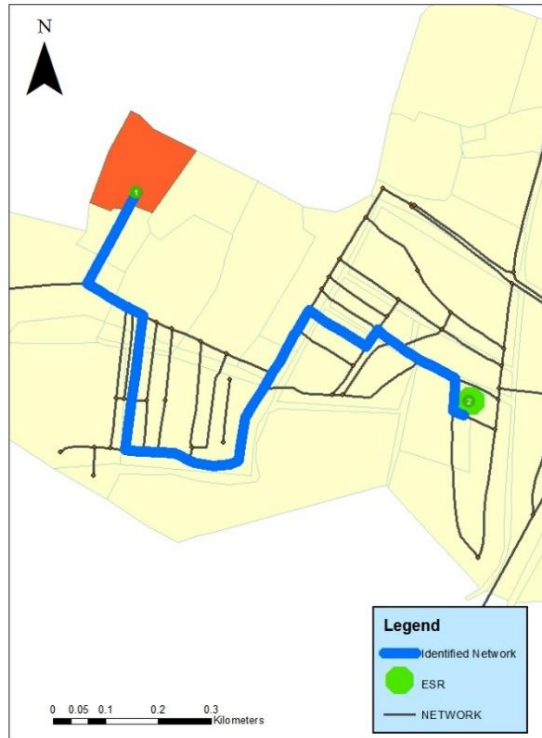
Water supply - Complaint is identified and then rectified
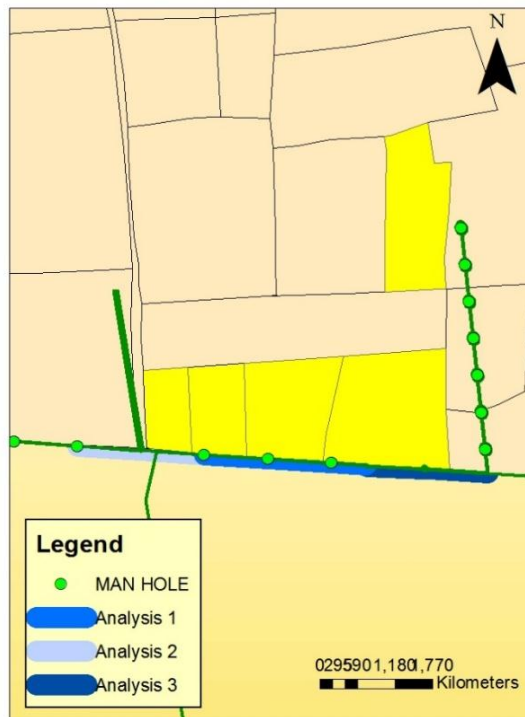
Sewer system -Complaint is identified and then rectified

5. Conclusion:

This paper presents an overview of the development and implementation of the Complaint Management System of Water Supply System as a web-service based on SOA. The results obtained from the implementation are encouraging and promising for the development of more complex systems in the future as the Complaints Management of Water Supply System is a complex and critical problem. Complaints and compliments are valuable source of information that organizations can use to improve program delivery and service. The preferred alternative is a customer-focused complaints management solution that works efficiently.

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