Research Paper Engineering

Content-based Image Retrieval Using Gabor Texture Features

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ABSTRACT

Indore, the industrial capital of Madhya Pradesh is getting water supply from Prestigious Water Supply Project namely Narmada Project. A Network of reservoirs exists in the city which are controlled and monitored from the control room. All the reservoirs are fed through the branches of gravity main. From the service reservoirs, the distribution network carries the water to the consumers.For the command area of Yashwant Overhead Tank is concerned, there is not only a sharp increase in the population but there is also a change in the type of population. There has been a significant shift of population from residential to commercial. It was found that the pre existing bungalow was broken up to four parts or the bungalows were converted to huge multi-storied building. Also the illegal, cross connections rates are increasing day by day due to significant change of population from residential to commercial. This distribution network comprising of old and new pipelines has developed many leakage spots. Due to this, the water quality gets deteriorated and in many of the areas, there is always a threat to the public. Looking to the fact stated in the foregoing discussion, it is planned to assess the water quality at various locations in the network to establish proper functioning of the network. Samples for water quality analysis are taken. Monitoring and analysis of water quality in laboratory was done. This data may further be used for water quality modeling using commercially available software like EPANET 2.0.

Keywords: Water quality, Water distribution network, Residual chlorine, pH, Turbidity, Conductivity etc.

3.0 Introduction:

A water distribution system is an interconnected collection (typically called as a network) of sources, pipes and hydraulic control elements (e.g. pumps, valves, regulators, tanks etc.) delivering the consumers prescribed water quantities at the desired pressures and qualities (Ostfeld, 2005). These pipes and storage facilities of a distribution system constitute a complex network of uncontrolled chemical and biological reactors that produce significant variation in water quality in both space and time.

It is clear from the foregoing discussion that the main objective for a Drinking Water Distribution System (DWDS) is to meet demands for water of required quality for all the consumers. The water quality may vary with location and time within a network. The monitoring process of water quality has to be accomplished by taking intermittent samples at different locations. Water quality models are used to predict the spatial and temporal variation of water quality throughout water systems. Thus it is very important to examine water quality at selected location of the distribution Network to ensure safe water to be delivered to end users .Water quality in water distribution system needs to be sampled at location which, are representative of whole network.

4.0 Study Area:

The estimated population of Indore is around 2 Millions and according to the standards of water requirement (IS 1172 (1993)), 200 l/person per day the gross demand for water comes out to be 400 MLD. The total water supplied to Indore city is less than 180 MLD. The details of which are provided in Table 1.1. This indicates that there is a deficit of around 220 MLD in the supply to the city. Looking into the current scenario the per capita per day available water is only 90litres that could have been 127 litres. This is exclusively due to mismanagement at resource level and at water distribution system.

5.0 Data Base Collection.

5.1 YESHWANT CLUB TANK

The Yashwant Club Overhead tank has a total capacity of 3410 Cubic Metres with height of staging as 20meters, container height 6.8 metres including freeboard of 0.8 metres and the diameter of the tank is 20metres. The coordinates of the tank are 22 o43'21.53" N and 75 o52'34.76" E and its top RL of the tank is 576.8 metres. The diameter of inlet pipe is 500 mm. The tank has four outlet pipes out of which two carry water to its bulk consumers Yashwant Club and IDA building and do not participate in supply to

5.2 YESHWANT CLUB TANK COMMAND AREA

The command area of Yashwant Club Overhead Reservoir spans from Malwa Mill square (22°44'2.85" N and 75 °52'31.29" E) stretches along both the ends of Y.N. Road to Madhumillan Square (22°42'50.84" N and 75 °52'28.72" E) in North South direction. Along the East-West direction, it starts from A.B. Road up to the Railway line. The area was basically a residential district with lot of effluent people of the Holkar Raj residing in it. However, today the area is getting converted in to a Commercial Business District of Indore with lots of Malls, shopping complexes, office complexes, hotels and restaurants have come up and are still getting developed on erstwhile residential land. Moreover, the area has 5 big sports facilities as 3 stadiums and 3 clubs are situated close to the water reservoir. The High Court of M.P., Divisional headquarters of LIC of India, Head office of The State Bank of Indore, leading Technical Institute of M.P., and The S.G.S.I.T.S etc are also situated in the same area. The area has mixed residential pattern ranging fro elite villas to biggest slums of Indore. Figure 3.1 shows the Distribution Map of Yashwant Club Tank (Zone E).

5.3 DEVELOPMENT OF DATA-BASE

Data collection and analysis is one of the major parts of the database. The data was collected under the following heads

1) Physical Data Regarding Tank and Distribution System
2) Data Regarding Operation of the Water Tank and Network
3) Data Regarding Land-use Land Cover Pattern
4) Data Regarding Population
5) Field Survey
6) GIS of the Study Area

5.3.1. Physical Data Regarding Tank and Distribution System

The physical data for the tank was procured from the Narmada Water Supply Project of Indore Municipal Corporation, Indore. Similarly the data regarding the pipe network was also collected from the same agency. The data was then updated because during data collection it was found out that the database regarding the distribution system was not up to date. The levels of the nodes were unavailable; the pipe network drawing was not updated for the regular changes made over it. The complete details of the network were available only with the field workers of the tank. The whole data was renewed and an AutoCAD Drawing of the distribution network was prepared and digitised for further use. Other important features of the networks were noted. There were no meters in the distribution system so as to record the flow through the network. The prepared drawing with position of tank, Valves and junctions etc. is shown in Fig. 4.1. This drawing was further used as main input as abase map to the EPANET – 2 Software for the network analysis Data regarding house wise connection was also collected from the IT department of Indore Municipal Corporation office. However, the data is quite old and does not show any concurrence with the present day projected demand. According to the data there are about 7000 connections in the command area.

5.3.2 Data Regarding Operation of the Water Tank and Network

To analyse and correct any system, it is quite necessary to have knowledge of present day operation of that system. For this the data was collected from the Indore Municipal Corporation Officials on the tank. In the city of Indore presently there is a practice that the water delivery to each tank is on alternate day basis. The Yeshwant Club Tank gets filled in early morning hours (i.e. from 4:00 AM to 6:30 AM) and late in the evening (i.e. from 8:00 PM to 9:30 PM). Due to overall scarcity situation in Indore, it was found that the tank usually gets filled up only up to an extent of 50% to 75% of its full capacity. In general the supply is in the morning hours. The supply is started soon after the tank gets filled both during the morning and the evening hours. The supply depends upon the availability of water. In a small segment parallel to the railway line there is an evening water supply which is based on the direct trunk mains supply plus the stored water in the tank to a section of the network viz. S.G.S.I.T.S., Vallabh Nagar, Rani Sati Colony, Dubey Ka Bagiha and extends up to Malwa Mill Square. There exists a lot of difficulty at the operation level of the tank and the water supply is not sufficient.

5.3.3. Data Regarding Land-use Land Cover Pattern

The most important aspect of the water supply system is the land use land cover pattern since it is an indirect measure of the demand in that area. In the present scenario, a detailed survey of this was not possible and there is no such availability from any agency. For this purpose Google Map Satellite Image was captured and the land-use was ascertained. This was also supplemented by field reconnaissance survey. Further, it was also used to prepare the GIS for demand evaluation. It was found the land use pattern of the area is fast changing from residential to commercial.

5.3.4 .Data regarding Population

The data collected for land use land cover was imposed on the AutoCAD Map and on the basis of that house to house survey was carried out to estimate the population in each building, office etc. The data is posted on GIS Plate-form and demand for water was also calculated based on the demand data.

5.3.5 Field Survey

A field survey was carried out on the Northern side of M.G. road i.e. from Malwa Mill square to MG road on both sides of YN road to obtain the data of population and their source of water. The same was tallied with the available data obtained connection details data obtained from the Indore Municipal Corporation. However to link the data each and every data of population with the available data of connections was not feasible, but still some sample information tallied is presented in Table 4.1.

5.3.6 GIS OF THE STUDY AREA

As part of this project's activities and at the beginning of the process of a development of comprehensive information and management system, existing information was converted into a GIS database (using Map Info-8 softwere) and integrated to generate an information base. The greatest advantage of such a system is that the data and information are geographically referenced that supports accurate measurement based on map and the facility of location based search. GIS was used to create a spatial database, for the study area. GIS greatly assisted in various modelling applications like estimation of demand, placing of meters, and finding out land use of the command area and helped in maintaining reliable hydraulic network models of water distribution systems. The GIS mapping of study area has been shown in Fig. 4.2.

5.4 WATER AUDIT, BALANCING AND NETWORK MODELLING

The water auditing in the network is not that important as there is a limited water supply to the tank through the trunk mains. However, the water that can be supplied to the network is the water stored in the Tank. If the water supply is maintained at the level of availability then there is complete exhaustion of the available water and still the demands are unsatisfied. As is stated earlier that the tank filling levels vary on daily basis and there is no certainty of the levels, the level of demand that can be fulfilled also varies. Table 4.2 indicates the level of demand satisfaction corresponding to various levels of the filling of water tank.

Selection of sampling sites was such that it provides the greatest amount of information and sites that are most amenable to sampling. Sampling sites was spread throughout the study area and should reflect a variety of situations of interest, areas served directly from a source, and

6.2 Water Quality monitering program.

Monitoring of distribution system is a mechanism for identifying variations in water quality over time and space. The resulting database is used to understand the transformations that are occurring in the distribution system. Here the monitoring is done under following heads

6.3 Sampling method

Grab samples are collected manually in the field and analyzed in the laboratory. Grab

6.3.1. Sample Collection Procedure

The sampling plan should include specific procedures to be followed during the sampling program. Topics to be discussed include, the filling and sealing of the sampling containers, preservation of samples and required reagents, labeling of sampling containers, data recording, and delivery of samples to laboratories.

6.3.2. Sampling parameters

The parameters to be chosen are pH, Turbidity, conductivity, Residual chlorine, chlorides The above parameters are selected for discussion because of their overall importance to source drinking water quality. Measurement of these parameters in water distribution system is due to following specific reasons:

1. pH: The measurement of pH in water is one of the oldest and most useful measurements. Changes in measured

pH give an indication of changes in the ionic constitution of the water. The EPA considers pH to be a secondary "contaminant," with an acceptable range of 6.5 to 8.5. Although pH usually has no direct impact on water consumers, it is one of the most important operational water quality parameters. This is a non-enforceable standard set primarily for aesthetic reasons rather than health-related reasons. pH is to be determined to know the corrosiveness of water.

2. CONDUCTIVITY: Conductivity (specific conductance) is a measure of the ability of water to conduct an electrical current. It is related to the amount of dissolved substances (or ions) in water, but it does not give an indication of which minerals are present. Changes in conductivity over time may indicate changing water quality. This is a test for overall water quality, there is no health standard associated with conductivity. Total Dissolved Solids can be measured in the field using an electronic pen.

7.0 Results and Discussion

pH : It is one of the most important operational water quality parameter. The pH of water entering the distribution system is in the range of 7.5 to 8.5,which is within the permissible limit as compared to standards of drinking water which is between 6.5-8.5.

Turbidity: Turbidity is a principal physical characteristic of water and is caused by suspended matter or impurities that interfere with the clarity of the water. Here in the Yashwant club distribution network it was observed that turbidity is highest in malwa mill, vallabh nagar and Rani sati gate areas which crosses the limit of standards i.e 5 NTU.

Conductivity: It is the numerical expression of an aqueous solution to carry out electric current. Water is a good solvent and picks up the impurities easily. Total Dissolved Solids (TDS) in drinking water originate from natural sources, sewage, urban run-off and chemicals used in water treatment and nature of piping. It is measured in micro mhos/cm. In the distribution network conductivity is within the permissible limits

Conclusions

From the present study, following conclusions are drawn:

1. The Present day network of water supply needs proper improvement.
2. The losses due to leakages are prominent in the some areas of the network which are situated at farthest end like Malwa mill, Dubey ka baghicha are suffering badly.
3. Multiple connection and illegal connection exists which also effects the water quality in the network

Water quality in the network as whole is considered satisfactory except at some critical zones around Malwa Mill. The pipelines in the region are needed to be replaced and water quality monitoring should be done in order to take quick action.

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