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Assessment & Improvement of Urban Water Quality with Web-based MIS

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Abstract

Urbanization is perhaps one of the most important instances of the twenty-first century, affecting global financial development, energy use, basic resource use, and human success on a global scale; 3.6 billion people live in urban areas. With 2.6 billion additional urban dwellers predicted by 2050, the following few years will be the fastest season of urban development in humanity's history of contacts. All of these extra city dwellers will need water, but surprisingly little is thought about where large metropolitan networks receive their water or the implications of this paradigm for the global hydrologic cycle. According to previous studies, when urban areas grow in population, the amount of water required for a sufficient common reserve climbs as well. This increase in inside and outside metropolitan water demand is driven by an increase in urban people, as well as a desire for monetary advancement to expand the irrelevant segment of the urban population that relies on city supply rather than alternative sources such as neighbourhood wells or private water merchants. Growing access to city water for the world's poor is undoubtedly one of the Thousand Year Improvement Objectives, as city water is generally considered to be cleaner and safer than alternative water sources. Furthermore, the financial progress that compel urbanisation increases per-capita water use, since new innovations such as showers, garment washers, and dishwashers boost private water use. The total growth of metropolitan water demand drives urban areas to seek for new appropriate, reasonably clean water sources, resulting in the creation of a vastly impressive urban water infrastructure.

Keywords: Web Based MIS, Quality Water Supply, Urban Development

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1. Introduction

The tendency of urban districts spatially concentrates the water demands of hundreds or millions of people into a small area, which, without aid from anybody else, would put further strain on limited supplies of open freshwater near the midtown territory. In any case, urban zones also deal with a mingling of monetary and political power that urban territories utilise to collect urban water framework in order to meet their needs. This framework routinely assists metropolitan networks with shifting away from water pressure because it can travel far beyond the midtown territory and experience fresh wellsprings of surface water, groundwater, or desalination. In this research, we used a theoretical method to separate these two marvels (water income centralization and power combination), to see when urban foundation is adequate to shift away from water pressure and when it is insufficient. We hypothesised that geological barriers to water openness would have an impact on cases of urban water scarcity — a few urban zones are simply in very dry conditions, or are located far from large water sources, and hence may have difficulty acquiring enough water. We also concluded that financial constraints in the improvement of infrastructure will have an impact on cases of water scarcity, as more expansive urban networks with more resources will be able to construct more stable urban water foundations and so move away from water scarcity. We oversaw a critical global investigation of the water wellsprings of massive urban territories (population >750,000), inspecting the 50 most important urban networks and doing a representative trial of more than 100 other massive urban areas. 1.5 billion People live in massive urban networks, accounting for one out of every three city dwellers. We use our audit to conduct accurate water pressure assessments for all of the world's massive urban networks.

Water plays an essential role in human nutrition and is an important predictor of health, as 80% of diseases in non-industrial countries are due to lack of adequate water quality. Poor water quality continues to pose a serious threat to human health. Diarrhea infections account for an estimated 4.1% of the world's total disease burden due to disability-adjusted life years (DALYs), killing 1.8 million people each year. As a result, water-borne diseases such as cholera and typhoid fever are widespread, especially during the dry season.The usage of unsafe water and unsanitary practises may contribute to the high prevalence of the runs among children and babies. Various infectious infections are transmitted by water through faecal oral tainting in this way. Sicknesses caused

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by drinking contaminated water claim the lives of 5,000,000 children each year, affecting one-sixth of the world's population.

1.1 Water Resources Using GIS

Water is a finite resource, without which humans cannot survive. Water comes from a variety of sources, including rain, wells, springs, mountains, and ice. It is composed of oxygen and hydrogen and is synthetically assembled. Along these lines, living things such as people should do everything possible to ensure the management of this valuable asset. Governments have issued rules for the use of water resources for quite some time. It is essential to the point where life cannot survive without it. GIS is used for a variety of tasks, including water management. GIS-based water management is important for observing water assets.

1.2 Management Information System

A clear relationship between management tasks such as planning, organisation, selection, and training of employees, as well as coordination, direction, and control of the agency's responsibilities, is critical to the agency's efficient and successful performance. The agency's effectiveness is dependent on the interaction between personnel at various management levels, as well as the usage of information in the decision-making process. Each level of management has its own decision-making centre, which is supported by an information system. Management Information Systems MIS is accurate, timely and sufficient to facilitate decision making and enable organizations to perform specific functions effectively and efficiently according to their purpose. A formal system for providing relevant information to management. Within an organization, there are many information systems that offer different levels and functions. Initially, internal data is supplied to the MIS, but data from other agencies such as municipalities may also be supplied. Before any institution develops its own procedures for proper data collection, measurement, recording, storage, and retrieval, it must first determine if the data is meaningful. MISs can be created using either human data acquisition or software.

2. List of Uses of GIS in Water Resources

- **Storage and management of geospatial data:** Data and records about water sources are stored in Geographic Information Systems (GIS).

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Information about the collected water resources is stored on servers around the world. Often, some of the information is obtained via GIS data processing. GIS can store large amounts of water resources data for shared access. Large, externally launched geosatellite constantly moves and rotates near the Earth's atmosphere, integrates with GIS, and is used to support the transmission of intercontinental data and information. Any base station that requests geospatial data can receive radio data from satellites. Cloud-based platforms are available in most geographic information systems. This means that the data stored on your GIS server can be accessed from geospatial data centers in any part of the world. Applications or uses of GIS include explosive growth and flexibility in data and information access.

- **Hydrologic management:** According to water studies, water moves most of the time, or its state and pressure change over time. Geographic Information Systems & # 40; GIS & # 41; Monitoring these water conditions is becoming increasingly important. Therefore, hydrologists are one of the most important users of geographic information systems. A variety of water quality surveys can be performed using mature GIS. For example, hydrogeology is a field of science that studies groundwater storage, generation, and migration. The nature and properties of groundwater or surface water, whether stationary or mobile, can be recorded as data in GIS and stored and retrieved for future processing by geographic information systems.
- **Modeling of groundwater:** Hydrologists use groundwater modeling to better understand the behavior and properties of groundwater. Given the lack of water, much research can be done to protect the basin. GIS also helps create models and designs to support groundwater management. For groundwater, it is natural to use GIS to study soil quality and other geographic factors. For example, you can use a magnetic field to take digital pictures of groundwater in surveys and case studies.

- **Quality analysis of water**: Not all water on earth is suitable for human and animal consumption. Drinking improper water can cause health problems. With GIS, you can look at slopes, drainage channel characteristics, and land-use patterns to determine if water is safe in a particular location. Sample data can be managed with large datasets and

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can be analyzed, stored, and reported using GIS. These reports can be used by relevant groups or even governments to conduct future water surveys and restrictions and assess whether water is safe to drink.

- **Water supply management:** As we have seen, rain is a valuable resource that countries and individuals cannot afford to waste. The water supply pipe is laid underground and can be monitored in real time. The integration of utility systems and GIS also enables real-time detection and repair of leak system components.

- **Sewer system management:** Manure is processed in most parts of the world and discharged into water bodies. Sewer pipes, on the other hand, need to be carefully and accurately monitored on a regular basis. Improperly managed sewers can lead to epidemics of diseases that can affect the country's economy. GIS has also been demonstrated in the management of wastewater systems. You can also use GIS to perform wastewater treatment. The mapping technology of these sewer information systems is especially important because it protects sewer pipes from damage during the construction of structures such as buildings, highways and railroads.
- **Stormwater control and Floods disaster management:** During floods and storms, water is most likely to collect in the inhabited areas. Entering rescue operations with minimal information about flooded areas can be difficult for rescue personnel. Geographic Information Systems & # 40; GIS & # 41; Need to support emergency personnel in providing safe and professional services. Therefore, in the event of a flood or stormy weather, GIS can be used to provide information about the affected areas, assist government evacuation plans, and combine with weather forecasting systems to make accurate forecasts and decisions. .. You can also provide aerial photography and flood simulations using special system components and technologies that use geographic information systems.

3. Literature Review

Madan KumarJha, et al (2020) -Groundwater is a vital source of freshwater in both urban and rural areas around the world. Nonetheless, its irresponsible abstraction and rapidly spreading pollution pose a serious threat to the world's manageable water supply. Groundwater quality assessment using a Geographical Information System (GIS) and the Groundwater Quality Index (GQI) has proven

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to be a useful tool for assessing groundwater quality and variability on a larger scale. Nonetheless, the typical GQI technique is unable to address the vulnerabilities that come with assessing natural disasters.

Kansara, Surendra (2019) Whether the item is obvious and theoretical, such as administrations, the concept of quality is seen as a critical tool in reaching operational proficiency and extreme execution. Several challenges relating to the technique for measuring the help quality surfaced during the implementation process.

Rashid, Muhammad and Manzoor (2018) In non-industrial countries, urbanization often worsens the environment and harms human well-being. This study focuses on the rapidly increasing impact of urban life and the impact of Muzaffarabad on water resources. The information in this article was obtained from 20 in-depth interviews with local government members, policy experts and city residents in 2015 on how growth in urban life affects water quality in the region. I have a better understanding of what you are doing. The results show that both the Geram and Neilam rivers are frequently polluted by locals, leading to water shortages and various viral infections.

Chhillar, Krishan (2018) Geographic Information Systems (GIS) are computerized systems that allow users to collect, store, measure, analyze, and present spatial data. It provides an electronic representation of information known as spatial data about the natural and man-made features of the Earth. These actual spatial data components are linked to an organized system via GIS.

Hoekstra, Arjen and Buurman (2018) We take a look at the growing body of studies on urban water security. To begin, we'll look at the four different aspects of writing about water security: government support, value, maintainability, and water-related threats. Second, we take stock of the various perspectives on urban water security: disciplinary perspectives (such as design, ecology, public policy, and general well-being), issue-focused perspectives (such as water scarcity, flooding, and contamination), goal-oriented perspectives (such as improved water supply and disinfection, improved sewerage and wastewater treatment, flood protection, and appropriate urban seepage), and incorporated water verification.

Chaudhary, Sanjay (2017) The goal of this article is to gain a better understanding of the extent to which e-Government administrations deliver

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administration quality. For the examination of resident customer insights and assumptions for administration quality, a model instance of the Smart City ULB e-Government administrations is used. SERVQUAL is a tool that MCD uses to measure the level of service they provide to their clients (ULB at Delhi, India and shortlisted for Smart City advancement by MoUD, India). The report captures clients' expectations for high-quality e-Government administrations and contrasts them with their perceptions of the assistance provided.

4. Methodology

The Water Quality Index (WQI) is a numerical representation used to assess the quality of water in a particular body of water and is intended to be easily understood by managers in many countries.

Interval (%)	Quality Status
80-100	Outstanding
60-80	Better
40-60	Medium
20-40	Bad
0-20	Very bad

Table.1: Index value intervals and the corresponding quality category.

For the first time, this indicator was utilised to emphasise the physical-chemical changes in flowing water quality that may occur throughout the year.

To score this index, seven factors were chosen; each is more essential than the others, hence the values of these factors were combined using a weighted mean.

Factor selection was made according to the global quality class created by the criteria for classifying surface water quality to determine the ecological state of the body of water to determine the WQI value.

As a result, some of the most important parameters of the water quality index were considered, but two of these parameters (total coliforms and turbidity) could not be considered for two reasons. The water was only monitored in the section intended for drinking and then the turbidity was not taken into account by the analyzed sampling station.

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The findings were further examined using current Romanian legislation that complies with WFD 2000 (Revised and supplemented Water Law No. 107/1996, Law No. 310/2004 and Law No. 161/2006 approving criteria for classifying surface water quality to determine the ecological state of water bodies. issue).

Another step in determining the values of the water quality index from each of the studied sampling sections is to align all of the measurement units on the same scale.

The degree of participation of the parameters was determined according to the established methodology. This methodology takes into account the role of each of the investigated parameters in determining the state of water bodies and aquatic ecosystems. According to the book Water Quality Monitoring Field Manual, the final phase was completed using the online calculator for the water quality index proposed by Brian Oram in 2010.

WQI of the two most important rivers in Banat (Timişoara and Vega) is the six measurement stations of the Timis river (Sadbabesh, Potok, Lugoj, Hitias, S ag and Graniceri) and the four measurement stations of the Vega river (Luncanii de Jos). , Balint, Timisoara, Otelec).

5. Data Sheet

Every specific arrangement will be subjected to a techo-economic analysis in order to offer the most appropriate innovative configuration. Standard Operating Procedures for a variety of water testing in all Municipalities and Municipal Corporations will be proposed, based on recommendations from CPHEEO, MoUD, and BIS, and tailored to Gujarat urban areas.

In larger civil organisations, an expert data sheet is also put up to allow adding, revising, or eliminating existing ULBs or water zones. The work of the data division will be shared with all authorities in Gujarat's ULBs. In addition, to provide citizens with information on water quality in their own city's water zone, an Android-based mobile app called "Urban Water" will be released and made freely available on the Google Play Store.

6. Development of MIS & App

Water quality testing data at the ULB level will be created and recorded on the web site www.gtureserchonwater.com to provide MIS on a daily and time-to-

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time basis. In larger municipal corporations, an expert data sheet will be set up to allow adding, altering, or deleting existing ULBs or water zones. To ensure consistency, the data section's work would be shared with all authorities from all Gujarat ULBs.

Furthermore, an android-based adaptable App called "Urban Water" will be produced and made freely available on the Google Play Store to provide information on water quality provided to individuals in their own city's water zone area. The MIS and the web site will be linked to this app.

7. Conclusion

Data collection from all 167 ULBs in Gujarat, conversation with the majority of boss officials, all things being equal, and city engineers (water works) of all city enterprises, conversation with state authorities, advisors who planned the water supply projects, Gujarat Water Supply and Sewerage Board, Gujarat Pollution Control Boards, UMC and CEPT college authorities drew in with PAS projects, and so on, will prompt a report. Furthermore, drinking water quality pressure planning on AutoCAD, as well as the development of MIS and an Android-based App, will be transformed into useful tools for end users to determine the quality of water. Examining appropriate approaches and innovation to improve the quality of drinking water would also benefit from an in-depth review of the literature.

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