

Review on Environmental Impact and Water Quality Assessment by using GIS Techniques

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Abstract - In this review paper was conducted on environmental impact and water quality assessment. The Environmental Impact is a tool used to determine, forecast, assess, and, if required, prevent or correct the environmental effects of a project. All living things require water as one of their basic necessities. Water is necessary for humans in everyday activities, including drinking, washing, bathing, and cooking, etc. Water that is of poor quality cannot be used for ingesting or for other purposes. The characteristics of water's physical, chemical, and biological makeup are typically used to define its quality. Finding water that is suitable for drinking, irrigation, and industrial use becomes essential as a result. The usefulness of the water for irrigation purposes will be determined by the groundwater quality based on the sodium percentage, sodium absorption ratio, and residual sodium carbonate. Aquatic organisms are being lost due to the rapid industrialization of farmland and the use of chemical pesticides and fertilizers. The human contracts water-borne illnesses as a result of using contaminated water. A significant statistical addition to the comprehension and management of interconnected water bodies was made by the application of GIS techniques and the water quality index in the evaluation of water quality in the context of reservoir systems.

Keywords: Water Quality, Environmental Impact, GIS.

I. INTRODUCTION

Water has the chemical formula H_2O , making an inorganic substance. The primary component of the Earth's hydrosphere and the fluids of all known living things. Water is transparent, flavorless, odorless and almost colorless (in which it acts as a solvent). In spite of not providing food, energy or organic micronutrients, essential for all known forms of life. Water molecules are made up of two hydrogen atoms joined by covalent bonds and have the chemical formula H_2O . The angle at which the hydrogen atoms are joined to the oxygen atom is 104.45° . The liquid condition of H_2O at standard pressure and temperature is also referred to as "water."The global economy depends heavily on water. Agriculture uses over 70% of the freshwater that people use. Fishing, which

provides 6.5% of the world's protein, has historically been and still is a key source of sustenance for many regions of the world. Commodities (including oil, natural gas, and manufactured goods) are frequently transported across vast distances by boats over the oceans, rivers, lakes and canals. In both industry and residences, huge amounts of water, ice and steam are utilized for cooling and heating. Water is an utilized extensively in industrial processes, as well as in cooking and washing, as it is a great solvent for a wide range of compounds, both mineral and organic.

Environmental Impact

Any alteration to the environment, positive or negative, brought on by the operations, goods, or services of a facility are referred to as an environmental impact. It is, in other words, the impact that human behavior has on the environment. For instance, the result or impact of the release of volatile organic compounds into the environment is pollution in the form of smog, which is in this case detrimental. On the other hand, picking up litter can have a positive effect on the neighborhood's ecosystem. Some of the environmental impacts are listed below.

- Eutrophication
- Plastic ingestion
- Bioaccumulation
- Acidification
- Loss of entire species

Eutrophication

A dramatic imbalance in the sensitive ecosystems that live there can result when an excessive amount of nutrients are allowed to leak into water sources from agricultural run-off. Most significantly, this can result in a process known as eutrophication, where too much phosphate and ammonia encourage the rapid growth of algal blooms. These blooms deprive other aquatic species of the resources they require to exist because they block out sunlight and consume all the oxygen in their surroundings.

Plastic Ingestion

The human race's obsession with plastic contributes to a terrible problem in our seas and oceans, where much plastic waste ends up. Indeed, it's estimated that there are over five trillion tonnes of the stuff in bodies of water worldwide, with many of these breaking down into smaller micro plastics over time. Not only can marine animals become entangled in this rubbish, but they can also mistake it for food and ingest it. As well as potentially damaging their internal organs, plastic also takes up vital space in their stomachs without contributing any nutrients.

Bioaccumulation

When heavy metals, chemicals and other toxins end up in waterways, they become absorbed by the plants and animals living there. While the concentrations of these elements might begin small, they can persist in organic matter for many years and as such, are simply assimilated into the bodies of predators after the initial host is consumed. In this way, they work their way up the food chain, compromising the health of ever larger animals and potentially even finding their way onto our dinner plates.

Acidification

Water pollution is not always obvious to the naked eye. According to estimates, our seas and oceans can take up as much as 25% of the carbon dioxide that is released into the atmosphere, which lowers the pH of the water. Certain species' ability to navigate and defend themselves, as well as their capacity to develop and repair their bodies, may be badly impacted by this type of disruption to the ecosystem's chemical equilibrium. Coral bleaching, meanwhile, is a major result of acidification.

Loss of Entire Species

Last but not least, water contamination has the potential to eradicate an entire species from the planet. Laboratory investigations have shown that some species are more vulnerable to this type of hazard than others according to the makeup of their bodies and the methods in which they function. An animal may eventually go extinct if water pollution disrupts its reproductive processes and behaviors, or if it weakens its resistance to other environmental stresses.

Water Quality

Using geographic information system (GIS) technique and water quality index (WQI). Samples collected were analyzed for pH Temperature, Taste, Odour, Total alkalinity, Total hardness as CaCO₃, Nitrate as NO₃, Chloride as Cl, Fluoride, Sulphate, Turbidity, Total dissolved solids(TDS),

Conductivity, Calcium, Magnesium, Sodium, Potassium etc., The obtained values were evaluated and compared with the standard permissible limits.

II. REVIEW OF RESEARCH

Water quality assessment of Velacherry Lake using Remote Sensing and GIS techniques by Madhumathi T & et al (2014), they have discussed about the following: Geographical Information System (GIS) which is widely recognized in water quality monitoring in conjunction with remote sensing was used to map the pollution extent of various parameters. It was explicitly seen that the lack of measures for diversion of untreated domestic waste from residential areas combined with dumping of solid discharge and effluents from industries has altered the physio-chemical parameters in an alarming rate.

Water quality assessment of UPM lake and the impact of geographic information system: (2015) by Adeleke Abdul Rahman O & et al. In this study, they have concluded about the following: A study of the water quality changes of engineering lake was conducted for 3 months in March, August and September. A total of 8 water quality parameters were measured and their average monthly observations were recorded with consideration of both point source and non-point source (NPS) pollutants. The parameters measured were Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD), Ammonia-Nitrogen (NH₃-N), pH, Total Suspended Solids (TSS) and water temperature. This was done according to the guidelines of department of environment (DOE).

Assessment of water quality using GIS techniques and Water Quality Index in reservoirs affected by water diversion (2016) by Francis I. & et al. In this research, the quality of the excess water diverted from the Gurara reservoir to the Lower Usuma reservoir, with declining water resources, based on the Nigerian Standard for Drinking Water Quality (NSDWQ) and World Health Organization (WHO) permissible limits. A near-laser analysis was carried out on different samples from each of the two reservoirs both in the dry and wet season using geographic information system (GIS) technique and water quality index (WQI).

Water quality assessment of lake water (2016) by Disha jain & et al. Ever increasing population, urbanization and modernization are posing problems of sewage disposal and contamination of surface waters like lakes. Natural water gets contaminated due to weathering of rocks, leaching of soils and mining processing, etc. Various types of problems in lake which cause nutrient enrichment in lake have been reviewed. Land use change and longer growing seasons could increase the use of fertilizers with subsequent leaching to watercourses,

rivers and lakes, increasing the risk of eutrophication and loss of biodiversity.

Water quality studies in Samudram Lake (2017) by Yu Hai Bao & et al TM images in eight periods was the data source, adopted RS and GIS technology, threshold value method, deference value and other methods, Statistics the water area of Dalinor from 1995 to 2009 in past 15 years.. In this 15year , Dalinor lake's area narrowed from 246.7km² in 1995 to 218 km² in 2009, Lake area reduced 28.7km², The average decrease speed was 2.05 km² / a. The total volume narrowed from 4359821563.03 m³ in 1995 to 3889917491.37 m³ in 2009, the total volume reduced 469904071.66 m³, the average decrease speed was 33564576.55 m³ / a. Lake area and volume declined sharply.

Assessing ground water quality using GIS (2018) by C. P Devatha & et al. Groundwater is an important component of our nation's fresh water resources. It plays a key role in meeting the water needs of various user-sectors in the nation. The natural resource cannot be optimally used and sustained unless the quality of water is assessed. In the present study, the impact of mining activities on groundwater quality around the Korba coalfields covering an area of 530 sq.km which lies between latitudes 22°15' and 22°30'N and longitudes 82°15'E and 82°15'E in the state of Chhattisgarh, India was carried out. For the study, data collection includes maps, toposheets, water quality data, well locations, mining lease areas, village locations etc.

Spatial distribution analysis and mapping of ground water quality across Chennai (2018) by Thanga Gurusamy.B & et al. An attempt has been made to investigate spatial distribution of the ground water quality across Chennai district. This analysis is based on the data that has been made available to the public by Tamil Nadu Water Resources Department, Chennai. Both graphical analysis and statistical based analysis has been carried out and the result has been presented in graphical and tabular form. The ground water quality data used for this analysis had been observed and recorded during the premonsoon season of the year 2015 across Chennai district.

An introduction to water quality analysis (2019) by Mr. Ritabrata Roy. As water is required for different purposes, the suitability of it must be checked before use. Also, sources of water must be monitored regularly to determine whether they are in sound health or not. Poor condition of water bodies are not only the indicator of environmental degradation, it is also a threat to the ecosystem.

Using GIS-based projects in learning (2020) by Ali demirci & et al. In this study outlines a GIS-based project conducted in a public high school in Istanbul, Turkey with the support of the Scientific and Technological Research Council

of Turkey (TÜBİTAK) in 2010. Fifteen 9th and 10th grade students worked as a group to determine how livable their district was for disabled pedestrians. The project lasted for one and a half years and students investigated the 251 kilometers of sidewalks in the district of Sisli. The students mapped all the objects that occupied the sidewalks, measured the widths and heights of the sidewalks at more than three thousand points.

Last but not least, water contamination has the potential to eradicate an entire species from the planet. Laboratory investigations have shown that some species are more vulnerable to this type of hazard than others according to the makeup of their bodies and the methods in which they function. An animal may eventually go extinct if water pollution disrupts its reproductive processes and behaviours, or if it weakens its resistance to other environmental stresses.

III. CONCLUSION

Thus, this review analyzes the environmental impact and water quality assessment by using GIS techniques. The outcome will be benefited to Government as well as public to utilize the water scarcity problems and at the same time lake water may be under purification process for avoid water based diseases.

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