

## Summary Of Master's Thesis

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My master's project was under the supervision of **Professor Ajay S. Kalamadhad** and **Professor Bimlesh Kumar (Co-advisor)** in the Environmental Engineering and Water Resource Engineering respectively in the department of Civil Engineering of the Indian Institute of Technology Guwahati (IIT G) in the area of groundwater assessment and modeling. The primary step of the project involved collecting samples of groundwater from three districts of Assam, India during the pre-monsoon (summer) and post-monsoon (winter). Taking into consideration 20 contaminants (pH, electrical conductivity (EC), turbidity, total hardness (TH), total alkalinity (TA), total dissolved solids (TDS), calcium ( $\text{Ca}^{2+}$ ), sodium ( $\text{Na}^+$ ), potassium ( $\text{K}^+$ ), fluoride ( $\text{F}^-$ ), chloride ( $\text{Cl}^-$ ), sulphate ( $\text{SO}_4^{2-}$ ), nitrate ( $\text{NO}_3^-$ ), bicarbonate ( $\text{HCO}_3^-$ ), magnesium ( $\text{Mg}^{2+}$ ), lead (Pb), iron (Fe), manganese (Mn), zinc (Zn) and arsenic (As)), the collected samples were analysed in the laboratory. After that, I used various tools for modelling, such as two scientific indices approaches (information entropy and multivariate statistical-based); bivariate and multivariate statistical analysis (factor analysis, cluster analysis, discriminant analysis); heavy metal assessment; human health risk assessment and GIS mapping. I used software, like IBM SPSS (v 20), ArcGIS (v 10.5), Grapher (v 18) for modelling. The goals of the study were: 1) What is the present condition of the groundwater in terms of the suitability for drinking and irrigation?; 2) Which are the severely affected regions?; 3) What are the major sources of contaminants?; 4) How are they interrelated?; 5) and how do they vary spatially and temporally? My research revealed the following results: 1) Degradation of groundwater quality is most severe during the pre-monsoon. 2) The influential heavy metals that affect the groundwater are iron, arsenic and manganese, and 3) Bicarbonate and sodium are dominant anions and cations respectively. The main reasons behind the degradation of water quality are geogenic factors, overexploitation, excessive irrigation, and industrial waste. In conclusion, groundwater is unsafe for drinking in the entire area and unsuitable for irrigation in several areas. I completed the project independently except taking help from people in understanding local languages during sample collection.