



# Machine Learning based Metal Toxicity Prediction and Analysis of River Ramganga

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## Noor Fatima

Department of Computer Science,  
Aligarh Muslim University,  
Aligarh, India  
Email ID: nfatima111@myamu.ac.in

## Adnan Mohammad Siddique

Department of Physics,  
Aligarh Muslim University,  
Aligarh, India  
Email ID: adnan7ms@gmail.com

## Raza Imam

Department of Computer Science,  
Aligarh Muslim University,  
Aligarh, India  
Email ID: razaimam45@gmail.com

## Mohd Belal

Department of Computer Science,  
Aligarh Muslim University,  
Aligarh, India  
Email ID: muhammadbilalhaider10@gmail.com

## Robeena Sarah

Department of Zoology,  
Govt. Raza P.G. College,  
Rampur, India  
Email ID: sarah.sarah102@gmail.com

**Abstract** – The area of western Uttar Pradesh comes under profoundly polluted regions of the whole country. Ramganga, a grand Indian river, was repeatedly featured in reports to be highly polluted. In this paper, we focus on studying its toxicity levels in Uttar Pradesh. This work holds novelty in terms of employing six machine learning models, namely: XGBoost, Random Forest, LightGBM, SVM, Ridge, and Logistic Regression, to predict water toxicity level from six approachable sites along the shores, with data collected for 26 days continuously for both prior and posterior of the covid-19 lockdown. The samples are tested for the concentrations of six metals: As, Cd, Ni, Fe, Pb, and Zn using atomic absorption spectroscopy. By modeling, we demonstrate how the toxicity reduced after the major covid-19 lockdown due to lesser industrial dumping. However, the metal concentrations were still not found to meet the WHO standards. Further, we show the ranges of the metal concentrations in the concerned region according to our data. Lastly, we have surveyed the locals and researched implementable solutions to reduce river water pollution and combat the present condition.

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**Keywords** – River Metal Toxicity, COVID-19 Lockdown, Machine Learning, Indian Rivers, Water Pollution, Sustainability.

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