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# *List of Abbreviations/Symbols*

| | |
|---|---|
| AMD | Acid Mine Drainage |
| APHA | American Public Health Association |
| ASTER | Advanced Spaceborne Thermal Emission and Reflection Radiometer |
| BCM | Billion cubic meter |
| BIS | Bureau of Indian Standards |
| CCME | Canadian Council of Ministers of the Environment |
| CGWB | Central Ground Water Board |
| CMPDI | Central Mine Planning and Design Institute |
| CPCB | Central Pollution Control Board |
| $D_d$ | Drainage density |
| DEM | Digital Elevation Model |
| DW | Dug-Well |
| EC | Electrical Conductivity |
| EDTA | Ethylene Diamine Tetra Acetic Acid |
| FCC | False Colour Composite |
| GEC | Groundwater Estimation Committee |
| GIS | Geographic Information System |
| GPS | Global Positioning System |
| GSI | Geological Survey of India |
| GW | Groundwater |
| GWPZ | Groundwater Potential Zone |
| HCA | Hierarchical Cluster Analysis |
| IC | Ion Chromatography |
| ICP | Inductively Couple Plasma |
| IDW | Inverse Distance Weighting |
| IMD | India Meteorological Department |
| IS | Indian Standards |
| KR | Kelly's Ratio |
| $L_d$ | Lineament density |
| LISS | Linear Imaging Self Scanner sensor |
| LULC | Land Use/ Land Cover |

| | |
|---|---|
| mbgl | Meter below ground level |
| mg/l | Milligram per litre |
| MH | Magnesium Hazard |
| MIF | Multi-Influencing Factor Technique. |
| MSL | Mean Sea Level |
| NCL | Northern Coalfield Limited |
| NTPC | National Power Thermal Corporation |
| OLI | Operational Land Imager |
| PM | Particulate Matter |
| RWHS | Rainwater Harvesting Structure |
| SAR | Sodium Adsorption Ratio |
| TDS | Total Dissolved Solids |
| TH | Total Hardness |
| TM | Thematic Mapper |
| USGS | United States Geological Survey |
| WHO | World Health Organisation |
| WLF | Water Level Fluctuation |
| WQI | Water Quality Index |

# Abstract

Water is essential for the survival of all forms of life and the livelihood of the human population. Water trapped in ice caps, glaciers and lakes providing fresh water for life on earth. Among them, groundwater preserved as freshwater is the source of supply for almost all places. Groundwater has steadily emerged as the backbone of India's agriculture and drinking water security. Groundwater has made significant contributions to the growth of India's Economy. Increasing population, growing urbanization and rapid industrialization combined with the need for raising agricultural production generate competing water demands. Both quality and quantity of groundwater are at risk due to rapid industrialization and urbanization.

Opencast coal mining activities have caused major environmental impacts throughout the world in the last few decades. The mining activities may cause changes in aquifer potential, change in topography and land disturbance. Impacts of open cast coal mining on groundwater generally comprise two phenomena occurring simultaneously viz., water contamination and declination in the groundwater level.

The present research work has been carried out in the Singrauli coalfields situated in central India under Northern Coalfields Ltd, (NCL). The Singrauli coalfield has been divided into ten active mining blocks viz. Kakri, Bina, Krishnashila, Khadia, Dudhichua, Jayant, Nigahi, Amlohri, Block-B and Jhingurdah. These mines were contributed 101.50 MT in 2018-19, approx. 14% of the total coal production through large scale mechanized opencast mining. Several pollutions producing industries such as Singrauli super thermal power plant, Vindhyachal super thermal power plant, Northern coal limited, Sasan coal of Reliance, Kanoria chemicals and many others are regularly increasing the amount of pollution via disposing of different nature of the material in the nearby environment, which affects groundwater resources of the area.