Assessment of Ground Water Quality Index for Agriculture and domestic purpose of Taluka Sehwan, District Jamshoro

Athar Ali[1*], Abdul Latif Qureshi[1], Syeda Sara Hassan[1], and Zeeshan Zardari[1]

[1]*USPCAS-W MUET Jamshoro, Pakistan*

*Email:engrathar1655@gmail.com

Groundwater has become an important source of freshwater around the world, used for a variety of reasons such as home usage, agricultural irrigation, and industrial applications. The study was conducted in Taluka Sehwan, Sindh, Pakistan. Groundwater quality has decreased due to surface water intrusion from Manchar Lake into nearby groundwater. Manchar Lake poses a serious environmental risk due to regular direct influxes of contaminants. Most communities rely on groundwater for both drinking and agricultural needs. The study's purpose is to investigate groundwater quality for residential and agricultural use. Thirty samples were collected from the study area, and sixteen parameters were analyzed in the lab, including pH, electrical conductivity (EC), total dissolved salts (TDS), total hardness (TH), chloride (Cl), magnesium (Mg), calcium (Ca), potassium (K), and sodium (Na). The water quality index (WQI) and irrigation indices such as SAR, SSP, MH, and PI were calculated. The calculated values were zoned in the Geographic Information System (GIS) environment by the Kriging analysis method. The water quality index (WQI) has been applied to categorize the water quality, viz., excellent, good, poor, etc., which is quite useful to infer the quality of water to the people and policymakers in the concerned area. The WQI in the study area ranges from 35 to 213. The quality distribution within the study area WQI is only 13% deemed good, 23% poor, 7% very poor, 30% unsuitable, and 27% unfit. The overall WQI in the study area indicates that the groundwater is unsafe and non-potable, except for a few localized pockets (13%) area on the northern side. SSP was categorized as unsure (83%) or poor (13%) for irrigation. SAR: 10% excellent, 47% good, 33% allowable, and 10% unsuitable for agriculture. MH and PI are 70% excellent and 30% safe. The study area's water quality is poor, with moderate to good irrigation indices suitable for 70-75% of the area. Spatial analyses reveal low

concentrations in the north and high concentrations in the south, highlighting the area's heterogeneity. The policy should prioritize monitoring pollution, research on sources, and mitigation methods to prevent irreversible harm to the local ecosystem and communities.