

**Drinking and Irrigation Water Quality Assessment and its Effects
on Public Health of the Kandia River Basin, Upper Kohistan
District, Northern Pakistan**

Izhar Ul Haq¹, Said Muhammad^{*1}, Wajid Ali¹, Faheem Ahmed¹

¹ National Centre of Excellence in Geology University of Peshawar, Peshawar,
Pakistan

**Email: saidmuhammad1@gmail.com*

Water is a necessary source for the sustainability of life. Pure water is inevitable for a healthy lifestyle and is a fundamental human right. The current study shows the surface water quality of four different valleys: Barthoot, Gabriel, Kandia, and Kangal Valley, in the Kandia River basin in the district of Upper Kohistan, Upper Indus Basin, Pakistan, for drinking and irrigation purposes. Samples were taken from these four valleys upstream (n=41) at considerable distances and analyzed for physicochemical parameters (n=18) including pH, EC, TDS, TS, TSS, Turbidity, ORP, T, NO₃, Cl, and F, TH, and TA, SO₄, Na, K, Ca, and Mg. Most of the results are within the WHO permissible threshold for drinking purposes excluding turbidity which is higher in Kandia Valley and falls within the WHO range in other valleys similarly, TSS is slightly higher in Gabriel Valley all other sixteen parameters are in the range which shows the suitability of water is good for drinking. The water quality index (WQI) was characterized and calculated as Good to poor. The quality of water was assessed for irrigation as a sodium hazard which includes sodium adsorption ratio (SAR) and sodium percentage (Na%). SAR values and the Riverside diagram show that the water is 94% deemed fit for irrigation except few sampling sites. The Piper and Gibbs diagrams show that the water is sodium chloride (Na-Cl) type which indicates that the water is initially influenced by atmospheric precipitation. The Doneen diagram was used for the total concentration and permeability index which shows that the maximum samples (36-41) fall within the high permeability range (80-100%) which is class-1 showing that the water is good and suitable for irrigation purposes. The statistical analysis shows that the geogenic activities primarily atmospheric precipitation and secondly rock weathering regulate the chemistry of the Kandia River Basin water.

Keywords: Drinking Water Quality; Irrigation Water Quality; Kandia River Basin; Upper Kohistan

***Acknowledgements:** Financial support from the Higher Education Commission, Pakistan is highly acknowledged for project # 20-17208/NRPU/R&D/HEC/2021.