



Evaluation of water quality in the Kızılırmak River (Central Anatolian) using physicochemical parameters and process proposal for improvement in water quality – a case study

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ABSTRACT

This study investigates the pollution status of the Kızılırmak River in winter. The Kızılırmak River Basin covers a big area in Turkey. Water samples for the study were taken from two stations along the Kızılırmak River located in Kırkkale city. Physico-chemical parameters and major ions of the river water such as pH, dissolved oxygen(DO), temperature(T), electrical conductivity(EC), 5-days biochemical oxygen demand (BOD₅), suspended solids (SS), chemical oxygen demand (COD), phosphate (PO₄), color (Pt-Co), hardness (°dH, CaO), some elements (calcium (Ca²⁺), magnesium (Mg²⁺), chloride (Cl⁻)), and some compounds (sulphate (SO₄²⁻), ammonium (NH₄-N), nitrite (NO₂⁻), nitrate (NO₃⁻)) and trace metals, such as Pb, Al, Zn, Cd, Ni, and Cr (IV) were also measured to determine the overall water quality of the river. Comparative tables were used to evaluate low, medium, and high values of the parameters. Three evaluation methods were used as evaluation criteria: Turkish Water Pollution Control Regulations (WPRC), Surface Water Quality Regulation (SWQR), and Environmental Protection Agency (EPA). When the pollution parameters of the Kızılırmak River are examined, water quality can be classified as I, II, III, and IV Class (Grade) due to variations in pollution parameters. The order of concentrations of metals in Kızılırmak River from high to low was Cr(IV) < Ni < Cd < Pb < Al < Zn for Dam point and Pb < Cd < Cr (IV) < Ni < Al < Zn Hacıbalı point, respectively. The study suggests the use of absorbents to remove the pollutants such as (heavy metals) in the river sample for the improvement of water quality.

Keywords: Kızılırmak; River; Water quality class; Heavy metal; EPA

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