

Impact of Municipal Wastewater and Sulfur Springs on The Physicochemical Properties of The Euphrates River, Western Iraq

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Abstract

In this study, the environmental damage of Euphrates water caused by the three main sources of wastewater (municipal wastewater and tar spring water) in the Hit sector was investigated. Surface water monitoring was performed by selecting four sampling points to describe the upstream, mixing zone and downstream water systems of Euphrates River. The physicochemical properties of water at wastewater confluence sites indicated a hydrochemical uni-intrusion vortex behavior that was detected and confirmed by spatial variation of important indicators related to environmental applications, including (K, Na, Ca, Mg, HCO₃, SO₄, Cl, NO₃, PO₄, Temp, DO, BOD₅, NH₄, Turb., EC, pH, HT, and TDS). The distribution of DO in the Euphrates River was governed by a spatial enrichment gradient of 0.04 to 0.06 mg/l/meter. The distribution behavior of the DO plumes depends on the re-aeration process (K₂) at a rate ranging from 0.4 sec⁻¹ to 1.416 sec⁻¹ associated with the re-oxygenation process (K₁) ranging from 0.172 sec⁻¹ to 0.82 sec⁻¹. Wastewater is considered to be a source of spot contamination with brackish water and emits chemical pollutants with a total dissolved discharge of 18190 tons/year, which is the source of salinization in river water. The hydrochemical classification revealed the succession of different water facies developed by the intruding water of the Na-SO₄-Chloride type in the freshening phases. According to the Canadian Water Quality Index, water in the Euphrates River has categorized as good water for aquatic life.