

## **Nitrogen Compounds Distribution in Diyala River Opposite Al-Rustimiyah Sewage Treatment Plants**

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### **ABSTRACT**

The reach of Diyala River just before its confluence with Tigris River south of the capital city Baghdad was taken as a case-study. This segment of Diyala River is exposed to multiple points of treated and raw municipal wastewater discharges of Al-Rustimiyah wastewater treatment plants. Its pollution status was assessed with regard to nitrogen compounds levels.

The aquatic parameters: DO, TN, TKN,  $\text{NH}_4\text{-N}$ ,  $\text{NH}_3\text{-N}$ ,  $\text{NO}_3\text{-N}$ ,  $\text{NO}_2\text{-N}$ , pH, and temperature were monitored and measured at nine sites along the river reach for a period of one year to assess seasonal variations. The first and last sites were chosen at the downstream and upstream of the points of pollution flowing into Diyala River, while the second to eighth sites were located at the effluents of the WWTPs of Al-Rustimiyah. It was found that water at sites two, seven, and four, respectively, were the most polluted points among all due to the presence of the bypasses from the WWTPs at these sites.

With regard to  $\text{NH}_4\text{-N}$ ,  $\text{NH}_3\text{-N}$ , and TN concentrations, the river was found to be heavily polluted with untreated wastewater at site two and between low to medium strength at other sites, except for site one. On the other hand,  $\text{NO}_3\text{-N}$  and  $\text{NO}_2\text{-N}$  concentrations categorized the river water as an effluent rather than a stream according to Iraqi standard classification.

Reversed relations were found between the DO concentrations and some of the nitrogen compounds and temperature. A statistical model relating TN concentration to DO,  $\text{NH}_3\text{-N}$ , and temperature was derived. It was proved to be accurate.

**Keywords:** Diyala River, TN,  $\text{NO}_3\text{-N}$ ,  $\text{NH}_3\text{-N}$ , DO, Temperature