

## Efficacy of natural wetlands along Wadi Zomer as a sustainable phytoremediation alternative for industrial effluents from Nablus West, Palestine

Odai A. Attili<sup>a</sup>, Rashed M. Al-Sa'ed<sup>b,\*</sup>

<sup>a</sup>Institute of Environmental and Water Studies, Birzeit University, P.O. Box 14, Birzeit, Palestine, email: odai-attili@hotmail.com

<sup>b</sup>Faculty of Graduate Studies, Birzeit University, P.O. Box 14, Birzeit, Palestine, Mobile No. +972-599 999 820; email: rsaed@birzeit.edu

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### ABSTRACT

This paper investigated the effectiveness of natural wetlands (*Phragmites australis*) along Wadi Zomer in reducing the organic and inorganic pollution loads from diverse industrial discharges including occasional emergency discharges from Nablus West Sewage Treatment Plant (NWSTP), Palestine. A spatial variation of physicochemical parameters was monitored at four sampling stations (S1–S4) along Wadi Zomer downstream of NWSTP to evaluate the removal of some heavy metals (Fe, Cu, Zn, Cr, Ni) in water and sediment samples. In addition, an assessment of *P. australis* in heavy metals phytoremediation (leaves, stem, and root) was determined. The results showed that S2 (0 + 0.5 km) and S3 (0 + 3.0 km) reflected an increase in pollution loads due to illicit industrial discharge and sewer overflow discharge from NWSTP during emergency conditions. Biochemical oxygen demand (BOD) values varied significantly along the sampling sites from 6.64 mg/L (S1) to 437.10 mg/L (S3). The BOD at S1 and S2 in water samples were below the Palestinian Water Standard (PWS) compared to S3 and S4 with 437.1 and 333.9 mg/L, respectively. Water samples from all sites (S1–S4) showed a decreasing tendency in heavy metals concentrations (Fe > Cu > Zn > Cr > Ni) and were below the PWS limits, sediment samples followed the same decrease pattern for Zn, Cr and Ni content with Wadi Zomer flow course. The concentration of Fe (6,687 mg/kg) and Cu (1,384.7 mg/kg) were highest in the sediment samples (S1–S4); this might be due to non-point sources of pollution. The research demonstrated that phytoremediation, is a sustainable nature-based technology for the restoration of heavily polluted surface water bodies in Palestine.

**Keywords:** Heavy metals; Industrial wastewater; Natural wetlands; Phytoremediation; Wadi Zomer restoration; Water quality

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\* Corresponding author.

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