

Hydrocarbon Pollution Management in the Vjosa River (Albania) through Assimilative Capacity Analysis

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Abstract

The Vjosa River, shared between Albania and Greece, is the last large wild river in Europe and a protected area. Despite outstanding hydromorphological and ecological values, the lower basin is under pressure from oil exploitation and related activities. This study examines dissolved hydrocarbon (DHC) pollution, quantifying the river's assimilative capacity (AC) and assimilative length (AL) under contrasting hydrological and pollution scenarios, and applying hazard-quotient (HQ) assessment. Results show that hydrogen sulfide (H_2S) and ammonium (NH_4) are limiting for AC in the warm season, and NH_4^+ also in the cold season; their concentrations exceed standards and the AL required for attenuation is long. Phenols, COD, and dissolved petroleum hydrocarbons (DPHC) generally meet standards. These findings provide a quantitative basis to align control measures for the AC-limiting constituents with the river's capacity and to guide prioritization. Strengthening the monitoring of petroleum- and bitumen-derived compounds (including heavy metals and naphthenic acids) and clarifying the legal framework for rehabilitating legacy hydrocarbon wastes are also essential measures to preserve the ecological integrity of the Vjosa River.

Keywords

Vjosa River, assimilative capacity, hydrocarbon pollution, water quality management, ecological integrity.