

# Impact of Mansour Eddahbi Dam Releases on Raw Water Conductivity Variations in the Oued Drâa and Implications for Brackish Water Desalination in Zagora, Morocco

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## ABSTRACT

The Drâa Valley, located in southeastern Morocco, is characterized by a semi-arid climate, high evaporation rates, and increasing pressure on water resources. The drinking water supply of Zagora city relies partially on surface water originating from the Mansour Eddahbi Dam and conveyed through the Oued Drâa. However, the physicochemical quality of this resource exhibits significant temporal variability, particularly in terms of electrical conductivity, which directly affects the performance and operational costs of desalination systems.

This study investigates the influence of dam releases on the conductivity dynamics of raw water used as feedwater for the Zagora demineralization plant. Historical operational data, field measurements, and water quality records were analyzed to evaluate the relationship between release events, hydrological conditions, and conductivity fluctuations along the Oued Drâa.

The results indicate that conductivity values vary considerably according to the volume and frequency of dam releases, seasonal hydrological conditions, and evaporation effects. Periods of sustained releases generally lead to a significant reduction in salinity levels through dilution processes, while prolonged low-flow periods result in increased mineralization and conductivity. These variations have a direct impact on reverse osmosis operation, specific energy consumption, membrane fouling potential, and overall treatment efficiency.

The study highlights the importance of integrating hydrological monitoring and reservoir management into water treatment planning in arid regions. The findings provide useful insights for optimizing desalination operations and improving water resource management strategies under increasing climate and water scarcity pressures in southern Morocco.

**Keywords:** Oued Drâa; Mansour Eddahbi Dam; Conductivity; Water Quality; Hydrological Variability; Desalination; Zagora; Morocco.