



## **Robust environmental flow release strategies in arid and semi-arid regions to rehabilitate endangered saline lakes**

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Saline lakes despite their extreme importance for critical habitat, are often threatened by desiccation due to irrigation and land development. For many closed lakes, the lake's level and salinity is highly controlled by hydrology of the basin and the balance between inflows and evaporation. In arid and semi-arid regions overexploitation of water for agricultural use in upstream has imbalance the natural inflow to the lake and the evaporation from surface. Due to the high irrigation water demand in these regions, environmental flow release has led to greater water withdrawals in irrigation seasons. Considering farmers attitude in irrigation along with hydrological and climatic condition, could be an important criteria to design proper environmental flow release plan to maximise lakes' inflow.

This study employs a new methodology to define environmental flow strategy in arid and semi-arid regions with intensive agricultural lands adjacent to a terminal lake. The method analyzes farmers' water-use behaviour and natural flow regime in the upstream to design the environmental flow release strategy from a reservoir. We have applied the methodology to water resources systems in Lake Urmia Basin, a highly endangered saline lake in Iran. The spatial analysis show that the lake basin's hydrology is controlled by many upstream reservoirs and intensive agricultural water demand in downstream. Cropland has increased rapidly in the lake basin during last decades through construction of dams and diversion. The released environmental flow was exploited by farmers in lowlands and inflow to the lake in some rivers has been decreased even by 80%. The new environmental flow release has showed water should be released in the shortest possible time (according to reservoir outlet capacity) during the lowest irrigation demand period.