

WATER CONSERVATION, WETLAND RESTORATION AND AGRICULTURE IN THE COLORADO RIVER DELTA, MEXICO

YAMILETT CARRILLO-GUERRERO

ABSTRACT

In arid lands, wetland loss is the result not only of the scarcity of water itself, but of the management of water to maximize off-stream uses. The Colorado River, which sustains its southernmost wetland ecosystem in its delta in Mexico, is a clear example of this. The allocation of water rights beyond the river's diversion capacity was exacerbated by the non-existing water surplus declared at the onset of the current 9-year drought. As a result, the delta of this fully-diverted, over-allocated, drought-prone Colorado River ecosystem lacks instream flows. Now, water use efficiency (WUE) is touted as the panacea for water shortages and farmers are expected to improve their WUE.

I analyzed the spatial variation of water use and the potential for improving WUE in the Mexicali Irrigation District. The GIS analysis was complemented with stakeholders' surveys to create a spatial distribution of agronomic and socio-economic factors influencing WUE rates. Results show that the US-to-Mexico deliveries of Colorado River flows determine 69% of the water availability in the district, the operational releases into the river floodplain, and aquifer withdrawals. On average, farmers apply 10,496 m³/ha/yr; 4% higher than the legal allotment. Nearly 22% of Mexicali's soils are salt-affected ($EC_e > 16 \text{ dS/m}$) and 19% are sodic soils ($ESP > 50\%$). As 39% of the salt load in irrigation water accumulates in Mexicali soils, farmers apply more water than plants need to maintain the sustainability of these soils. Increasing WUE may be feasible in 80% of the parcels. However, high costs and lack of technical knowledge limit farmers' options to either continue using as much water as they do now or rent/sell their water rights to larger farming operations or urban developments.

The current patterns in water use in Mexicali's Irrigation District 014-Rio Colorado provide 87 million m³ to the delta's marshes. The "inefficiencies" in water conveyance and use in the district fields are the main source of water for the delta wetlands when surface flows are fully diverted.

The Mexicali Irrigation District is an integral part of the Colorado River delta ecosystem. Protecting wetlands is not enough when their water supply is not secured. Water availability for the Colorado River delta ecosystem is still a dependant of river flows not fully diverted and the aquifer not over-drafted. The restoration of wetlands of international rivers like the Colorado requires that the US-Mexico collaboration extends beyond memorandums of understanding into bi-national treaties where environmental flows are permanently allocated.