

EGU21-138

<https://doi.org/10.5194/egusphere-egu21-138>

EGU General Assembly 2021

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Changes in Water Use on the Lower Colorado River in the USA from 2000-2020

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We studied the health and water use of seven riparian reaches of the Lower Colorado River from Hoover to Morelos Dam over the last 20-years, since 2000, to evaluate trends in the riparian ecosystem. This ecosystem has been in decline based on myriad pressures related to drought, water diversions and land use changes, such as defoliation events from the tamarisk leaf beetle, *Diorhabda* spp. We provide remotely sensed measurements of vegetation index (VI), daily evapotranspiration (ET, mmd^{-1}) and annualized ET (mmyr^{-1}). We used 250m Moderate Resolution Imaging Spectroradiometer (MODIS) and 30m Landsat EVI2 time-series. We selected EVI2 to parameterize our ET algorithm and tested the ET relationship between sensors by regression approaches and found a significant correlation between $\text{EVI2}_{\text{Landsat}}$ and $\text{EVI2}_{\text{MODIS}}$. A key finding is that riparian health and its water use between Hoover and Morelos Dams has been in decline since 2000, as measured by Landsat with daily water use dropping from 4.79 mmd^{-1} to 3.18 mmd^{-1} . Our results show that over the past two decades, the average greenness ($\text{EVI2}_{\text{Landsat}}$) loss was 29% and total annual ET loss was 34% (-1.61 mmd^{-1} or -386 mmyr^{-1} ; a drop from 1163 mmyr^{-1} down to 777 mmyr^{-1}). Greenness declined on average 29%, but certain reaches declined 42% or ca. -2.28 mmd^{-1} , or -575 mmyr^{-1} (Reach 6). Reach 3 showed an ET loss of 39% (-1.94 mmd^{-1} , -410 mmyr^{-1}). Our findings are significant because riparian plant species have declined so drastically, suggesting further deterioration of biodiversity, wildlife habitat and other key ecosystem services.