

WATER LEVEL VARIABILITY CONTROL OF INVASIVE PLANT COVER AND WATER BIRD POPULATIONS IN PALO VERDE, COSTA RICA: IMPLICATIONS FOR WETLAND RESTORATION

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Rapid human development is one of the most important factors affecting the degradation of wetlands around the world. The Palo Verde Wetland in Guanacaste, Northwestern Costa Rica, is a site representing the unintended and cascading consequences resulting from development. Located in the Tempisque-Bebedero watershed, Palo Verde Wetland has faced severe ecological degradation during the past four decades due to water transfer for hydropower generation and irrigation infrastructure systems. The basin outlet forms Palo Verde coastal wetland, part of the Palo Verde National Park, and has been designated under the Ramsar Convention as a wetland of international importance, especially as waterfowl habitat. While the different stakeholders in the sectors in the area (hydropower generation, agricultural irrigation, urban/rural water abstraction) successfully operate according to their initial objectives (clean power, food production and water supply), the local ecosystem has progressively degraded. A greater understanding of causal drivers leading to such degradation is critical to inform improved management of the area leading to environmental restoration.

A substantial data collection effort was conducted using a unique database of baseline and hydrologic, meteorological, and land use data from public repositories, private institutions, remote sensing databases, and a high spatio-temporal resolution instrumentation network in the downstream Palo Verde National Park wetland. The management of the wetland was focused on the ecological degradation it has experienced, and its location in the downstream portion of the watershed, which makes it particularly vulnerable to the upstream pressure that propagates down the catchment with water fluxes. Therefore, we consider this wetland as an integrative indicator that reflects on the water-management practices.