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## Long-term hydrological and hydrodynamic modeling of a complex Ramsar site using HEC-RAS 5.0.7 2D – The Taim Wetland

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Wetlands are ecosystems recognized as one of the most valuable natural resources in the world. Although this importance, several wetlands around the world have lost areas due to anthropic threats. One example of a wetland with international importance is the Taim Wetland. This Ramsar Site number 2298, is a fresh-water wetland with 330 km<sup>2</sup> located in the Southern part of Brazil, close to the border with Uruguay. The primary threat to this wetland is related to water demand conflicts on its watershed. Extensive rice fields occur around Taim Wetland and large yearly volumes of water from its main tributary Mangueira Lake are withdrawn, leading to changes in the hydrodynamics within the wetland. Thus, by one side, there is the regional economic dependence of rice cultivation and, on the other hand, conditions related to water availability are vital for maintaining the ecosystem as a whole. Different human-made infrastructures also impact local hydrodynamics as road, gates, fauna tunnels, natural effects as backwater and climate factors. Due to its importance, the Taim Wetland has been the object of different studies aiming to evaluate strategies for an integrated water management policy, allowing it to reach both environmental and economic benefits. The local complexity leads to the need for applying hydrological-hydrodynamic models able to represent the behavior accurately. Paz, 2003 and Villanueva, 1997 already applied hydrological and 2D-hydrodynamic modeling in the area; however, in the light of information available at that time and computational constraints, these studies needed to adopt several simplifications. In this study, the 2D HEC-RAS 5.0.7 was used to represent the system based on new terrain information obtained from the combination of different sources such as satellite, drone images and local measurement allowing the acquisition of information such as flooding areas, velocities, and flow patterns. New insights of local features such as internal channels, lakes, dunes, road and vegetation such as emergent macrophytes permitted new understandings of hydrodynamics. Nevertheless, hydraulic structures as a set of gates and fauna tunnels were also included in the representation, allowing the analysis of different operational scenarios during the modeling. These results also provide critical information for the environmental evaluation of habitats and points towards better management policies.