Treatment wetlands for on-site domestic wastewater: a modelling approach using the SINDy algorithm

Mario A. Salinas-Toledano [1]

Treatment wetlands (TWs) have been identified as promising small-scale decentralized technologies for domestic wastewater treatment and on-site water reclamation. This is due to their high efficiencies, relatively low operational costs, and ease of operation. However, due to the physical, chemical, and biological processes that simultaneously occur in TWs as well as the lack of system-based theoretical frameworks, it is challenging to describe pollutant removal mechanisms from first principles via mathematical equations. This issue limits operational and design optimizations.

In this talk, I will discuss the limitations of studying TWs' for on-site domestic wastewater treatment. I will describe the interdisciplinary/conceptual approach currently being developed as part of the Water and Sanitation Holistic Technologies (WASHT) research group. This holistic approach aims to study TWs in a more interdisciplinary manner, which merges the visions of biology, engineering, mathematics, and computer science. I will also review using the Sparse Identification of Non-linear Dynamic Systems (SINDy), a machine learning algorithm, to elucidate the governing equations for pollutants removal in TWs. Finally, I will present the results obtained so far from experimental systems and future steps.

---

[1]School of Engineering, University of Northern British Columbia, Prince George, B.C., V2N 4Z9, Canada.