SPATIAL AND SEASONAL VARIATIONS OF THE MESOPOTAMIAN MARSHES HYDRO-PATTERN UNDER NATURAL AND REGULATED FLOW CONDITIONS

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The Mesopotamian Marshlands are the largest wetland system in the Middle East. Historically, these marshes served as the floodplains of the Tigris and Euphrates rivers, and they are currently connected to these rivers through direct surface water connection via feeder canals. Historically, the Mesopotamian marshes received consistent flood pulses during the spring season from March to May, which represents the natural flow regime for the Tigris and Euphrates in this location. In recent decades, several large dams have been constructed in the Tigris and Euphrates basins for irrigation purposes and power generation, severely altering the flow regime and, along with other anthropogenic activities, degrading the marsh ecosystem. This work quantifies changes in the riverine flow regime and how they have affected the hydro-pattern of the western Mesopotamian marshes (focusing on the western Al-Hammar marsh) and describes the role of others potential hydrological drivers (direct precipitation and groundwater) that may be important to sustain the marshes. Statistical analysis of hydro-climatological data from 1901 to 2018 showed a reduction in surface flow of 16.3% and 34.6% in the Tigris and Euphrates rivers, respectively, with a steadily negative trend since 1974. Consequently, the total area of the marsh has been reduced from an average of 2800 km^2 in the historic period (before 1974) to a minimum of 120 km^2 in recent decades, concomitant with flow reductions from an average of 29.41 to 9.3 billion cubic meters per year. This analysis quantifies the central role between precipitation and the annual flow variability, and the flow variability with the wetland area under pre-dam and post-dam, with cascading effects on vegetation cover, productivity, and soil biogeochemistry. A focus on river-marsh connections will help to create predictive models and scenarios for the restoration of the water budget and hydroperiod of these important marshes.

PRESENTER BIO: Al-Quraishi is a 4th year PhD student in Environmental Engineering at University of Florida, and his PhD project addresses the ecohydrological restoration of the Mesopotamian marshes. He got two master's degrees in Environmental Engineering that concentrated in the restoration issues of the Mesopotamian marshes.