PHOSPHORUS SOURCE CONTRIBUTIONS UNDER CURRENT AND FUTURE CLIMATE IN A LAKE OKEECHOBEE SUBWATERSHED

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Progressing towards Lake Okeechobee environmental water quality target requires the identification of critical phosphorus sources and quantification of their contributions under current as well as future climatic conditions. While restoration plans aim at reducing the long-term average annual loads originating from Lake Okeechobee watershed, the focus has remained on quantifying the effectiveness of conservation practices and identification of water quality improvement projects. In this study, we investigated the contributions of legacy phosphorus, inorganic fertilizers, and other phosphorus sources to existing phosphorus loads from the highly impacted Taylor Creek Nubbin Slough (TCNS) sub-watershed. The Watershed Assessment Model (WAM) was developed and employed in environmental plan formulation in Lake Okeechobee watershed. For this study a pre-calibrated WAM setup (Baseline) for TCNS obtained from the Florida Department of Environmental Protection was used. Quantification of phosphorus sources' contributions was made by adopting a scenario analysis approach. The hypothetical alternative scenarios were formed by reducing legacy phosphorus and/or inorganic fertilizer application rates from the Baseline values to zero. The scenario analysis was conducted under the current climate for an 11-year period from 2003 to 2013 and for two future climate periods (a) Near Term – 2034 to 2044 and (b) Far Term – 2074 to 2084 under Representative Concentration Pathway (RCP) 8.5. The future climate scenarios (rainfall and temperature) were based on the downscaled and bias corrected 5 General Circulation Models (GCMs) that performed the best in capturing rainfall and drought characteristics in TCNS. Preliminary WAM scenario analysis phosphorus load estimates indicate that under the current and future climate projections legacy phosphorus is the most dominant contributor of phosphorus loads from the TCNS followed by all other phosphorus sources. Future work focusing on analyzing legacy phosphorus dynamics in the Lake Okeechobee watershed is warranted from the perspective of developing new strategies to curb phosphorus loads.

PRESENTER BIO: Dr. Khare received PhD from the University of Florida (2014) focusing on hydrologic and water quality modeling and uncertainty & sensitivity analysis. In his current role as a water quality scientist at the Everglades Foundation, he is engaged in Everglades water quality research and restoration planning during last 6 years.