NATIONAL CONSORTIUM FOR REMOTE SENSING EDUCATION, RESEARCH, AND APPLICATIONS

IndianaView
PROJECT FACT SHEET
http://www.indianaview.org

Potential streamflow response to policy-induced wetland change in the White River Watershed, Indiana

Tusher Mohanta, Ball State University (tmohanta@bsu.edu)

Introduction: Wetlands are substantial for their crucial functions to human and ecological well-being. About 85% (4.7 million acres) of Indiana's wetlands have been lost due to several factors, e.g., agricultural activities and urbanization. However, a recent state legislation SB 389 (2021) has passed in Indiana which will minimize the protection plan for the remaining state protected wetlands. Geographically isolated wetlands have a strong relationship with streamflow in watersheds.

This study is intended to simulate the streamflow variation through a hydrologic model in the White River Watershed with SWAT+ (Soil and Water Assessment Tool), and analyze the spatial and temporal differences of streamflow using GIS techniques and remote sensing products.

Background: Indiana Department of Environmental Management (IDEM) developed the Indiana Wetland Program Plan (IWPP) to promote advance understanding of the functions and conservation & protection of the remaining wetlands.

Geographically Isolated wetlands provide ample benefits, e.g., reduce flood impact, protect water quality, provide habitat, Filter out pollutants, Store carbon in the landscape, Recreation. SB 389, has the potential to impact 50% of wetlands, protected by Isolated wetlands Law.

Objectives: The primary objective of this research work is to establish an illustration of the wetland hydrology in the study area through the streamflow simulation with Soil and Water Assessment Tool (SWAT+). The objective will be reached along with these following aspects- (1) Determining Isolated wetlands distribution throughout the White River Watershed (2) Determining the impact of the policy change in the wetland protection plan and land use change on the isolated wetlands in Indiana (3) Comparing streamflow change in the future in response to wetland changes under SB 389 (4) Illustration of future scenarios for the wetlands such potential land use and land cover change based on the recent development and past conditions in the White River watershed.

FOR FURTHER READING:

Ahiablame, Laurent, Tushar Sinha, Manashi Paul, Jae-Hyung Ji, and Adnan Rajib. "Streamflow response to potential land use and climate changes in the James River watershed, Upper Midwest United States." (2017)

Golden, Heather E., Heather A. Sander, Charles R. Lane, Chang Zhao, Katie Price, Ellen D'Amico, and Jay R. Christensen. "Relative effects of geographically isolated wetlands on streamflow: a watershed-scale analysis." Ecohydrology 9, no. 1 (2016): 21-38.

Preliminary Results:

Geographic isolation was defined where wetland Euclidean distance exceeded 10 m from line or polygon elements in the National Hydrography Dataset (NHD).

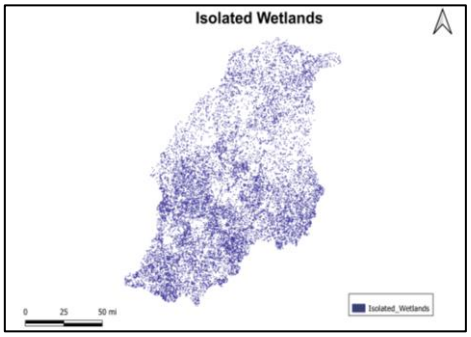

Figure 1. Geographically Isolated Wetlands processed from National Wetland Inventory & NHDPlus Database

Wetland Type	Quantity	Area (Square miles)	Percentage (Quantity %)	Decrease in Quantity (%)
Freshwater Emergent Wetland	3405	6772977.94	23.29	76.84
Freshwater Forested/Shrub Wetland	2294	20006614.32	15.69	88.44
Freshwater Pond	8695	9034770.52	59.48	85.98
Lake	3	4495.01	0.02	99.29
Riverine	222	243389.13	1.52	98.84

Table 1: Attributes for the Isolated wetlands respective to their classes & changes based on the total wetlands in Indiana State

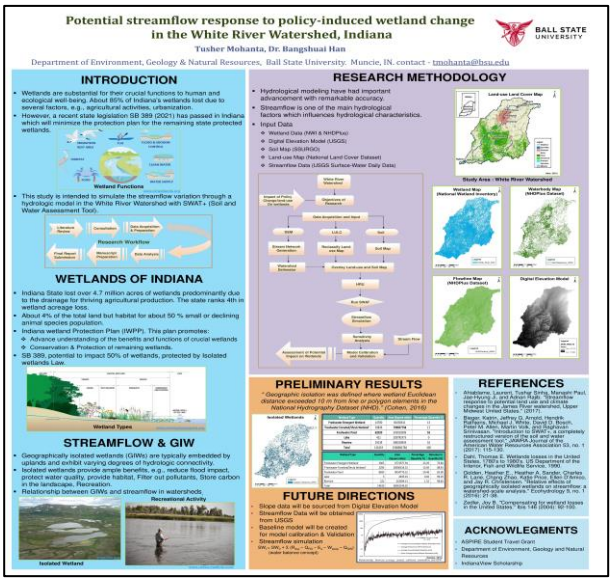

Figure 2. The preliminary results of this study were presented at the American Water Resources Association Spring conference in April 2022, as well as the Ball State University Symposium poster competition