Analyzing Agricultural Phosphorus Flow in the Florida Everglades

Brionna Findley[1], Dr. Natalie Nelson[2], Dr. Elise Morrison[3]

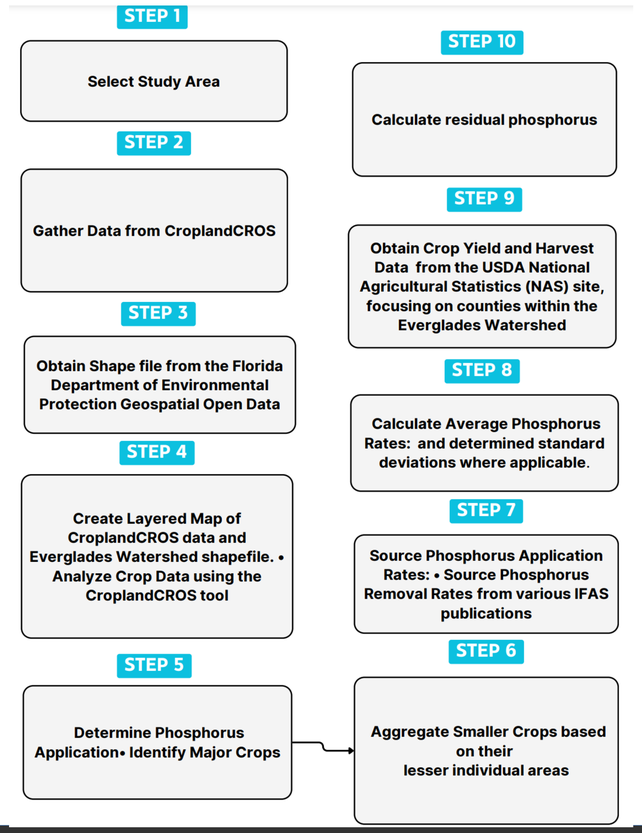
1 North Carolina Agricultural and Technical University, Biological Engineering
2 North Carolina State University, Biological and Agricultural Engineering
3 University of Florida, Environmental Engineering Sciences

Introduction

Agriculture serves as a significant source of phosphorus (P) pollution, with runoff posing substantial risks to downstream watersheds. Due to the limited availability of P in agricultural soils, fertilizers and livestock manure are essential for promoting plant growth. Scientists are actively exploring strategies to manage P more effectively, pinpoint its sources, and mitigate its impact on watersheds.

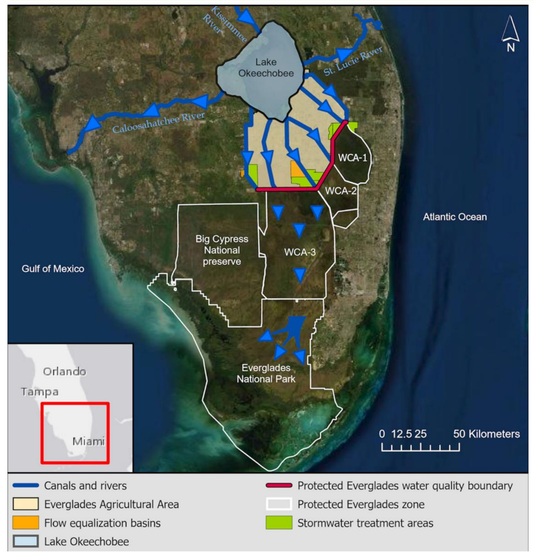
This study focuses on assessing agricultural P sources in the Florida Everglades watershed from 2017-2022. Drawing from methods in a recent study of the Kendrick Creek Watershed in Washington County, North Carolina, this research estimates P contributions from dominant crops in the watershed. Using data mining and a literature review, the study aims to construct a detailed P flow diagram for the Everglades watershed. These methods not only support local watershed management but also provide a framework for estimating P dynamics in other regions, offering visual insights that can inform sustainable solutions for the Everglades watershed and beyond.

Methods



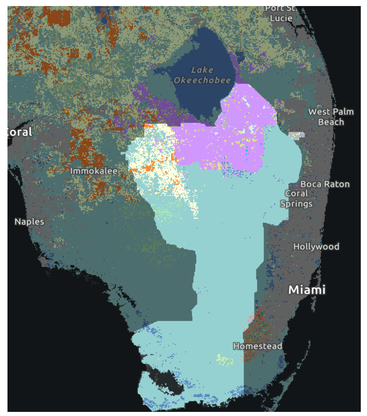
Results & Discussion

Figure 1: Map of Everglades Watershed with Crop Distribution



Map of the greater South Florida watershed and surface water network, highlighting estuaries, rivers, lakes, reservoirs, canals, protected lands, stormwater treatment areas (STAs), water conservation areas (WCAs), and flow equalization basins (FEBs). Water flows are illustrated with blue arrows. The base map is sourced from National Agricultural Imagery.

Figure 2. Map of the Everglades Watershed with Crop Distribution.



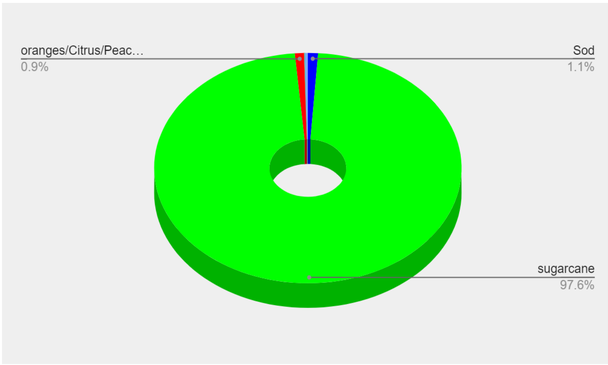
This figure shows the crop distribution from CroplandCROS within the Florida Everglades watershed for 2023. The Everglades is the leading provider in sugarcane. The runoff from agricultural land is one of the main sources of phosphorus pollution. Figure from CroplandCROS.

Table 1: Area of the Crops in the Everglades Watershed

Crop Category:	Area of Crop (acre)
Sugarcane	428687
Oranges	18008
Sod/Grass Seed	6376
Tree Crops	2765
Citrus	1198
Misc Veggie	915
Rice	798

The areas of land used for the top 7 crops in the Everglades watershed.

Figure 3: Total Application of P in the Everglades Watershed



- The total composition of applied P in the Everglades Watershed. The 3 main crop categories were tree crops, sod, and sugarcane.
- Sugarcane had the highest total application of P, due to the high area of sugarcane cultivated in the watershed.

Key Points

- Sugarcane production plays a critical role in influencing P inputs in the Everglades watershed. The intensive use of P-rich fertilizers disrupt the delicate balance of the Everglades' unique ecosystem.
- The STEPS Center can provide innovative methods to reduce the P application of sugarcane in the Everglades watershed

Future Works

- Calculate the removal of P from crops in watershed
- Calculate the amount P from manure, human waste, and other sources of the watershed
- Visualize the P flow diagram for the Everglades watershed

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