MAPPING THE HISTORY OF DISTURBANCES IN EVERGLADES NATIONAL PARK WITH SATELLITE TIME SERIES

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Introduction

Although the State of Florida spends $45 million annually on the management of invasive plant species in conservation areas (Hiatt et al., 2019), Southern Florida has been named the World's most invaded continental ecoregion (Searcy et al., 2023). Within Southern Florida is Everglades National Park (ENP), the third-largest national park within the contiguous United States (U.S.) and home to over 750 native plant taxa and over 270 non-native, or invasive, plant species (Gann, 2015; Ruiz et al., 2021). The increasing frequency and magnitude of pulse disturbance events, such as flooding, severe storms, and wildfires, often facilitate an invasion due to increased movement of non-native species, creating resource pulses, and decreasing biotic resistance of native communities (Diez et al., 2012; Zampieri et al., 2025). Satellite remote sensing is arguably one of the few viable means to routinely monitor disturbances in ENP because it can acquire data across both spatial extents and temporal scales. Here, we develop a history of pulse disturbance events across ENP using satellite time series imagery that captures changes in surface composition.

Method

To prepare imagery, we will compile all Landsat 8/9 Analysis Ready Data imagery after April 2, 2013, using the COntinuous monitoring of Land Disturbance (COLD) algorithm. For each pixel, surface reflectance from spectral bands 2–7 is used to estimate a time-series model and to identify dates when a pixel's spectra deviate from past patterns.

Results

We were able to quantify the timing, magnitude, and frequency of pulse disturbance events in sections of the ENP. For example, an area near East Clubhouse Beach experienced significant mangrove loss due to Hurricane Irma in 2017, as captured by sharp changes in the near-infrared. The timeseries algorithm indicates that the area has not recovered, with implications for future resilience to disturbance.

Discussion and Conclusion

There is a need for long-term monitoring to compare events of varying magnitudes, durations, and frequencies across broad spatial and temporal scales to understand or predict the movement of plant invaders in the ENP (Diez et al., 2012). Documenting the spatial extent and timing of pulse disturbances will provide novel insights into invasion dynamics that will inform invasive management decisions, enabling more efficient prioritization of limited resources.

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