

FORENSIC MAPPING OF THE STUNNING TRANSFORMATION OF FLORIDA'S COASTAL WATERSHEDS OVER 150+ YEARS

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Though land use-land cover (LULC) change has been widely implicated in the degradation of coastal water quality, we continue to lack a nuanced understanding of how LULC change has varied in space and time because so much occurred before the advent of modern mapping standards. We have overcome this challenge using forensic mapping techniques of LULC change over the past 150+ years in the Indian River Lagoon (IRL) and Tampa Bay Watersheds (TBW), Florida. Both watersheds contribute to estuaries of national significance which have received international media attention as degraded water quality has been implicated in harmful algal blooms, seagrass loss, and marine life mortality. Our techniques comprise benchmarking historical mapping products to modern mapping standards, with historical mapping products including maps and notes from the Public Land Survey System and military campaigns from throughout the 19th century, and aerial imagery, geologic maps and soil surveys, and LULC maps from throughout the 20th and 21st centuries. Results illustrate the stunning transformation of these watersheds. In portions of the IRL, the loss of wetlands has exceeded 85% and the increase in drainage density has exceeded 300%, mostly due to agricultural conversion. Interestingly, these occurred over different time intervals, with most of the loss of wetlands occurring between the 1950s-2000s but most of the increase in drainage density occurring earlier between the 1850s-1950s. Results are similar in the TBW, where the loss of wetlands exceeded 33% between the 1950s-2000s, mostly to a mix of urban and agricultural conversion, which has been incompletely mitigated by a smaller 11% increase in artificial waterbodies between the 1950s-2000s, including stormwater ponds. These more nuanced understandings of LULC change are facilitating ongoing efforts to restore wetlands and drainage networks, including an ongoing effort to more intentionally plan water-quality restoration projects in the IRL.

PRESENTER BIO: Dr. K. Rains is an Associate Research Professor who studies ecosystem response to environmental stress, including nutrient limitation and global change. She works at both the organismal level, including root-mycorrhizal associations, and the landscape level, including the application of geospatial tools, with a focus on waters and wetlands.