Building Adaptive Foundational Resilience for Coastal Wetlands: An Everglades Experiment

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Sea level rise (SLR) is expected to affect natural and urban areas by shifting habitats and inundating coastal developments in South Florida. Given this challenge of SLR, building resilience within South Florida's natural communities is imperative, not only to protect the natural habitat where fish and wildlife species thrive, including important recreational and commercial fisheries, but also as a means of reducing risk to the built environment from coastal storm hazards and saltwater intrusion. For coastal wetlands to exist into the future, soil accretion must match or outpace SLR. Adaptive Foundational Resilience (AFR) is the ability of the foundational vegetation (freshwater marshes and mangroves) to adapt to SLR by building elevation as a function of water depth and hydroperiod, porewater salinity, water quality and flow. It is based upon some 20 years of understanding the process of peat collapse, subsidence and coastal accretion. As the goal of an "active adaptive management" experiment and as an implementation of AFR, an Everglades Mangrove Mitigation Assessment (EMMA) program has been designed to enhance scrub mangrove productivity and transgression into fresh and brackish marsh habitats as an adaptive mechanism for SLR and saltwater intrusion. The EMMA project is both a large- and small-scale, field manipulation of freshwater flow, phosphorus addition, and sediment increase to enhance the resilience of coastal mangroves, increase land elevations, and evaluate the ability of coastal plant communities to shift to communities that are resilient to SLR. This scientific experiment will primarily evaluate the ability of Thin Layer Placement (TLP), an innovative nature-based management measure that spreads "clean" dredge/spoil sediments across a scrub mangrove community, to enhance net primary productivity and increase sediment accretion rates within coastal wetlands of Miami-Dade County, Florida.

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