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Greater Everglades Research Initiative White Paper

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Introduction

Environmental Sciences faculty at several institutions in South Florida are heavily involved in the large scale restoration and management of the ecosystem. Through an applied multi-disciplinary approach that focuses on water and human-caused problems, their expertise is sharpened by working in a setting where urban panning must be conducive to large-scale restoration and management of natural areas. South Florida's vast sensitive wetlands are directly adjacent to a large and burgeoning human population that is dependent on the same resources. Thus, South Florida is encountering sooner than most other areas in the U.S., unprecedented challenges in balancing human and environmental water needs.

Vision

The vision for restoring the Everglades from the Greater Everglades Research Initiative prospective is to develop the tools and provide the expertise to guide sustainable human activities in South Florida, and to recover a natural system with the ecological functions, and a diversity and abundance of species that characterized the historical greater Everglades region. The restored ecosystem should be in an altered form and smaller than the pre-drainage system yet still retain the essential characteristics of the historic "River of Grass." Successful restoration will be achieved when the new system no longer acts like a set of managed, disconnected wetlands but rather reestablishes the defining characteristics and connectivity of a natural Everglades system.

Emerging Issues

Anthropogenic Stressors

The Greater Everglades Initiative is organized around four human-caused stressors to the environment – wetland destruction, hydrologic/climate changes, contaminant increases and invasive species issues. In our model, humans are viewed as an integral part of ecosystems rather than as separate from them. Humans use ecosystems in different ways and for different purposes. Our decisions are guided by ethics, culture and economics. Research aimed at understanding these factors can help to resolve environmental conflicts and lead to a more effective and efficient implementation of conservation projects and resource management decisions.

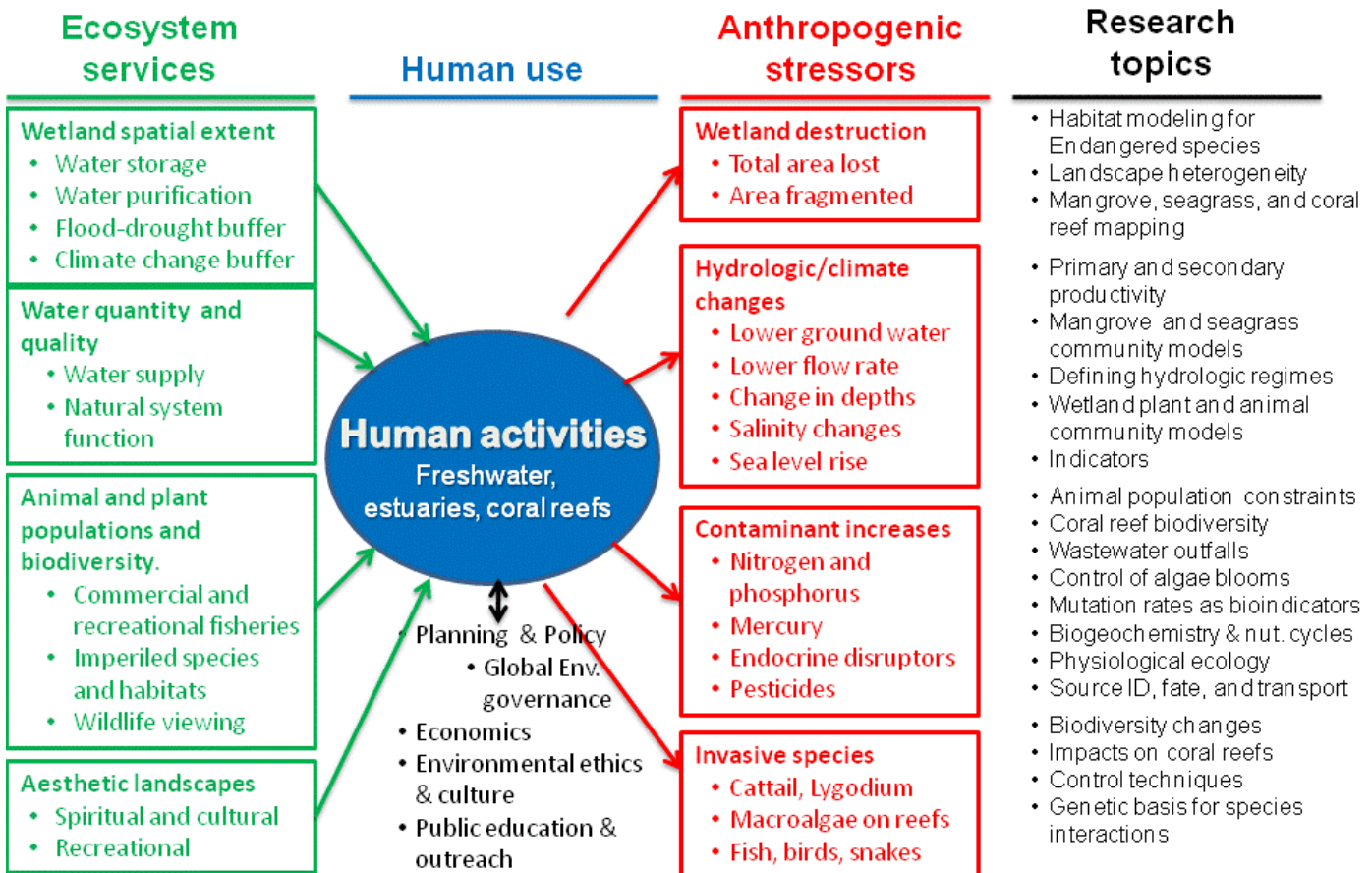
Ecosystem Services

Reversing the decline of the Everglades is important to Florida Atlantic University, its partners, the entire South Florida population, and the nation. Defining values relative to humans leads to good management decision and the long-term stability of the Greater Everglades. The ecosystem services include:

- Wetland spatial extent (water storage, water purification, flood-drought buffer, climate change buffer)
- Water quantity and quality
- Animal and plant populations and biodiversity
- Aesthetic landscapes (spiritual, cultural and recreational)

Greater Everglades Research Initiative

Florida Atlantic University Environmental Sciences Program



Key Faculty Areas of Expertise

Environmental Sciences Faculty are drawn from a wide range of academic units at FAU including all departments in the Charles E. Schmidt College of Science, the School of Urban and Regional Planning, and the FAU Center for Environmental Studies. Faculty have strong research expertise with: (1) aquatic animals, like sea turtles, wading birds, fish, and crayfish, (2) aquatic systems like freshwater marshes, mangroves, sea grass, and coral reefs, and (3) wetland ecosystem restoration techniques. A few of the specific research topics include:

- Habitat modeling for Endangered species
- Landscape changes
- Mangrove, seagrass, and coral reef mapping
- Primary and secondary productivity
- Mangrove and seagrass community models
- Defining hydrologic regimes
- Wetland plant and animal community models
- Indicators
- Animal population constraints
- Coral reef biodiversity
- Wastewater outfalls
- Control of algae blooms

- Mutation rates as bioindicators
- Biogeochemistry and nutrient cycles
- Physiological ecology
- Biodiversity changes
- Impacts on coral reefs

In addition to the research questions above faculty are also engaged in studies involving planning and policy, economics, environmental ethics and culture, and public education & outreach.

Key FAU Facilities

- Botanical research and teaching Green House (Davie Campus)
- Joint-Use Facility Davie Campus (under construction)
- Harbor Branch Oceanographic Institution at FAU
- Gumbo Limbo Environmental Complex
- Riverwoods Field Laboratory
- Pine Jog Environmental Education Center

Other Collaborations

FAU Faculty work closely with colleagues at the University of Florida and the U. S. Geological Survey that is co-located on FAU's Davie campus. Faculty also enjoy partnerships with their colleagues at Florida International University, the National Audubon Society and the Smithsonian Institute.

Key Agency Partners

Everglades National Park
 The A.R.M. Loxahatchee National Wildlife Refuge
 South Florida Water Management District
 U.S. Geological Survey (Davie, Florida)
 U.S. Army Corps of Engineers
 Florida Fish and Wildlife Conservation Commission

Projects under the Greater Everglades Research Initiative

FAU Everglades Fellowship Initiative

The Environmental Sciences Program and Everglades National Park have recently initiative the FAU Everglades Fellowship Program. The partnership is designed to create a pool of new scientists that can potentially move into the U.S. Department of Interior workforce in South Florida while also supporting short projects that address specific science and management questions related to Everglades restoration. This program will also foster stronger collaborations between FAU faculty and National Park Service staff that will likely lead to more scientific discoveries in the future.

South Florida Water Management District Internship Program

Two internship opportunities at South Florida Water Management District are being offered to FAU students on a rotational basis through the FAU Environmental Sciences Program. These positions provide students with valuable experience in environmental sciences, conservation, ecology, and resource management in South Florida while the students earn academic credits. In some cases an internship may lead to a job. In other cases it may spark a new interest and lead to further academic studies. The Environmental Sciences Program

promotes internships for its students because internships are a form of experiential learning, where students learn by doing an activity. South Florida is rich in institutions involved in resource management and research so it is an ideal place to have students engaged as part of their academic studies, in experiential learning.

Scientific facilitation and education

The Environmental Sciences Program in cooperation with the U.S. Geological Survey and the South Florida Water Management District, the Charles E. Schmidt College of Science, FAU Department of Biological Sciences, FAU Department of Geosciences, and the FAU Center for Environmental Studies hosted a series of science collaboration workshops, technical training workshops and educational seminars that were open to entire the scientific community of South Florida. The collaboration workshops brought together teams of Everglades scientists from a variety of agencies and universities to work together to solve management conflicts related to climate change, biologically sensitive tree islands, and progress on the overall restoration effort. Technical training workshops provided intensive training in the latest statistical techniques that so that the strongest science can be applied to management decisions. The educational seminar series occurs during one semester per year and exposes the audience to cutting edge research and management from around the country. Collectively, these efforts have greatly enriched the flow of reliable knowledge to the scientific community of South Florida.

Sample of Research Projects

- Distilling Complex Ecological Research into Simple Habitat Models: Predictive tools for Wetland Ecosystem Restoration and Management. Funded by the U.S. Geological Survey and U.S. Fish and Wildlife Service.
- The Linkage Among Hydrology, Prey Populations, and Wading Bird Populations in the Florida Everglades. Funded by the South Florida Water Management District 2004-2009.
- The Potential Effect of Regional-scale Hydrological Changes on Tree Island Spatial Extent and Plant Species Composition in the Florida Everglades, USA: Implications for Restoration., Funded by SFWMD
- Validation and Ecosystem Applications of the EDEN Water-surface Model for the Florida Everglades. . Funded by USGS.
- Landscape Model of Ridge and Slough Topography: Integration of Hydrology and Biological Processes. Funded by National Park Service.
- The Rapid Spread of *Lygodium microphyllum* in the Central Everglades. Funded by the Florida Fish and Wildlife Conservation Commission.
- The Effect of Hydrology on the Growth of the Crayfish Species *Procambarus alleni* and *P. fallax*: Two Keystone Species in the Florida Everglades. Funded by the South Florida Water Management District.
- Bioindicators of Hydropattern and Nutrient Levels in Forested Wetlands of the Big Cypress region. Funded by Seminole Tribe.

- Photosynthetic Pigment Analysis Core for Monitoring Microalgal Community Dynamics in Response to Water Quality.

Conclusion

As an academic institution it is our responsibility to prepare students for a professional career or advance degrees in Environmental Sciences. As a South Florida institution situated directly adjacent to the fragile Everglades ecosystem, it is also important to provide our students and community with sound information and informed views of the environmental situations and challenges facing the South Florida region. It is particularly important for the University to prepare the next workforce for our key partners in environmental science. Our key partners will require students who possess a robust foundation of environmental knowledge and are well rounded enough to enter the workforce as researchers, managers, regulators and to head non-governmental organizations.