

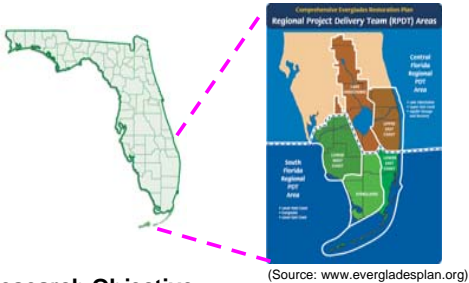


Economic Valuation of Environmental Resources

Research Overview

Statement of Problem:

- Environmental restoration projects => balance ecosystem restoration vs. economic development
- \$8 billion South Florida Ecosystem Restoration Program (Everglades Restoration)
- Economic analysis with full monetization of project benefits *has not been* conducted for any component of the Everglades restoration effort



Research Objective:

Conduct and apply appropriate economic analyses, including the monetary quantification of project benefits, to the South Florida Ecosystem Restoration effort. Analysis will be centered on the most recent advances in environmental economics applied to any one of the restoration projects with focus given to the derivation of benefits of ground water and surface water. Economic models will be developed and combined with available physical water data to calibrate, verify, and validate these models

Completed Research

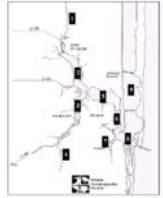
The following economic valuation methodology was developed in order to monetarily quantify the benefits resulting from the Indian River Lagoon – South (IRLS) \$995 million Everglades restoration project:

- 1) Identify the service flows (uses) of the natural resource
- 2) Estimate the baseline economic value of these service flows [Note: here, following Apogee Research (1996)]
- 3) Identify appropriate water quality and/or water quantity baseline and relate to standards
- 4) Understand how, with and without the restoration effort, the identified service flows will be changed and economically measure the impact of the change(s) to the baseline value
- 5) Assess the net benefit of the restoration effort vs. the costs in an economic analysis

Current Research

This research is conducting a hedonic property analysis in order to indirectly reveal the value of varying levels of water quality from housing sale prices for waterfront homes in Martin County from 1998 – 2004. This will improve upon the above described \$159 million annual estimate by including a property value estimate through a formal economic model.

Martin County Waterfront Home Market



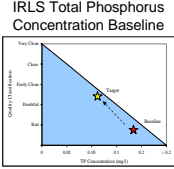
Water Quality Variables

Location	Water Temp	pH	Water Variability	Salinity	Dissolved Oxygen	Location Grade
1. Winding North Fork	84°F	7.4	Good	1.8 ppt	3.5 mg/L	100%
2. North Fork			Good			
3. South Fork	82°F	7.4	Good	1.8 ppt	3.5 mg/L	100%
4. Winding South Fork	80°F	7.4	Good	1.8 ppt	3.5 mg/L	100%
5. Middle River	80°F	7.4	Good	1.8 ppt	3.5 mg/L	100%
6. Narrows Middle River	81°F	7.4	Good	1.8 ppt	3.5 mg/L	100%

(Source: www.floridaoceanographic.org)



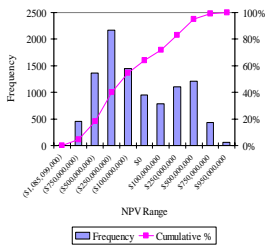
(Source: USACE/SFWM, 2002)



% of IRLS Waterbody Impaired

Waterbody Type	Total Assessed	% Good	% Not Good
Stream/Creek/River	87.7 Miles	25.82%	74.18%
Bay / Estuary	152.1 SQ Miles	61.74%	38.26%
Lake/Reservoir/Pond	100 Acres	100.00%	0.00%

Monte Carlo Results



Future Research

The following possibilities would all add to/improve the completed and current research

- Estimation of the indirect values related to the ecological functions of the IRLS waterbodies
- Option pricing models vs. cost-benefit analysis
- Incorporation of game theory

Results

Benefits accruing beyond the baseline values given the completion of the IRLS restoration were estimated via benefit transfer at a conservative level of \$159 million annually, importantly factoring in the established IRLS water quality baseline. Given these benefit results, the project was determined not to be economically feasible, i.e., Net Present Value < \$0, via a cost-benefit analysis. Given the uncertainty around the benefit parameters, a Monte Carlo analysis was further conducted. The project did have a 36% chance of becoming feasible when benefit parameters reach certain levels. This research highlights the potential significant economic value of the IRLS and the importance of properly estimating this value given the magnitude of costs.

I would especially like to thank the EPA for providing the funding for my graduate education. In addition, I would like to thank my major advisor, Walter Z. Tang, for all of his guidance and insight, as well as Mahadev G. Bhat, Grace M. Johns, and numerous other FIU faculty that have helped along the way.

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