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004 EPA STAR Graduate Fellowship Conference *Next Generation Scientists—Next Opportunities*

Economic Valuation of Environmental Resources

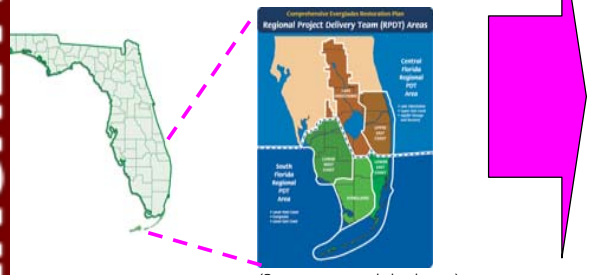
Research Overview

tement of Problem:

nvironmental restoration projects => balance osystem restoration vs. economic development

billion South Florida Ecosystem Restoration Program verglades Restoration)

onomic analysis with full monetization of project nefits *has not been* conducted for any component of e Everglades restoration effort



(Source: www.evergladesplan.org)

search Objective:

nduct and apply appropriate economic analyses, uding the monetary quantification of project benefits, the South Florida Ecosystem Restoration effort. alysis will be centered on the most recent advances in ironmental economics applied to any one of the toration projects with focus given to the derivation of efits of ground water and surface water. Economic dels will be developed and combined with available sical water data to calibrate, verify, and validate these dels

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

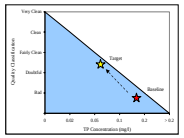
4) Understand how, with and without the restoration effort, the identified service flows will be changed and economically measure the impact of the change(s) to the baseline value

5) Assess the net benefit of the restoration effort vs. the costs in an economic analysis

IRLS Area of Study

(Source: USACE/SFWMD, 2002)

IRLS Total Phosphorus Concentration Baseline



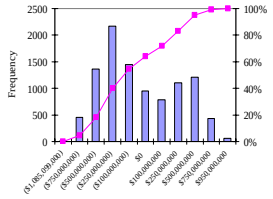
% of IRLS Waterbody Impaired

Waterbody Type	Total Assessed	% Good	% Not Good
Stream/Creek/River	57.7 Miles	25.82%	74.18%
Bay / Estuary	152.1 SQ Miles	61.74%	38.26%
Lake/Reservoir/Pond	9664 Acres	100.00%	0.00%

Annual Net Benefits of IRLS Restoration ($ millions)

Use Value	Resident	Non-Resident	Total
Market Direct	$ 30.3	$ 48.1	$ 78.4
Nonmarket Passive	$ 42.5	$ 18.6	$ 61.1
Nonmarket Direct	$ 3.5	$ 15.8	$ 19.3
Total	$ 76.3	$ 82.5	$ 158.8

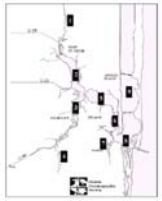
Monte Carlo Results



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 Visibility	Salinity	Dissolved Oxygen	Location Grade
1. Winding North Fork	84° F	7.4 Good	70% Good	3.6 ppt Good	1.9 mg/L Fair	50%
2. North Fork	Not Reporting					
3. South Fork	82° F	7.9 Good	83.2% Good	18 ppt Good	6.2 mg/L Good	100%
4. Winding South Fork	86° F	7.6 Good	47.4% Fair	6.3 ppt Good	3.1 mg/L Fair	75%
5. Wide Middle River	86° F	8.1 Good	84.0% Good	15.2 ppt Below Range	8.6 mg/L Good	75%
6. Narrow Middle River	81° F	8.1 Good	77.5% Good	26 ppt Good	7.3 mg/L Good	100%

(Source: www.floridaoceanographic.org)

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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This fellow is sponsored by EPA's STAR or Greater Research Opportunities (GRO) Program.