Estimating Ecosystem Service Values on Public Lands in Florida

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Topics

- Florida Ecosystem Services
- Estimated cost of the Florida SWAP
- Types of Economic Benefits Valuation
- Examples of Valuation
- Resources for Benefits Estimation

Types of Florida Ecosystem Services

- Climate, water, and gas regulation
- Water supply, nutrient supply
- Soil formation, nutrient cycling
- Waste management, biological control
- Wildlife habitat, food production
- Recreation, cultural and scenic values

Benefits in Perspective

Estimated Cost of the Florida SWAP

- Acres to Protect: ~ 3.1 million acres
- Fee Simple Option: $29.2 billion
- Easement Option: $4.7 billion
- Rental Option: $2.7 billion

Methods for Quantifying Economic Benefits

Total Economic Value =

Use value

Direct use value + Indirect use value + Option value

("Ecosystem functional value")

Quantification approaches:

Direct use value	Indirect use value	Option value
Travel Cost Method	Production function approach	Contingent Valuation
Surrogate market valuation	Damage costs avoided	Conjoint Analysis
Hedonic prices	Preventive expenditures	Individual Choice models
Contingent Valuation Methods	Travel Cost Method	
	Surrogate market valuation	
	Contingent Valuation Methods	
	[Replacement cost]	

+

Passive use value

Existence value + Intrinsic value + Bequest/Stewardship value

Quantification approaches: Contingent Valuation Methods

Source: Barbier (2000)

Economic valuation of ecosystem services

Steps:

1) Identify services (human uses) provided by system



2) Quantify service flows in physical terms

- Biologists
- Ecologists
- Hydrologists
- Recreation planners

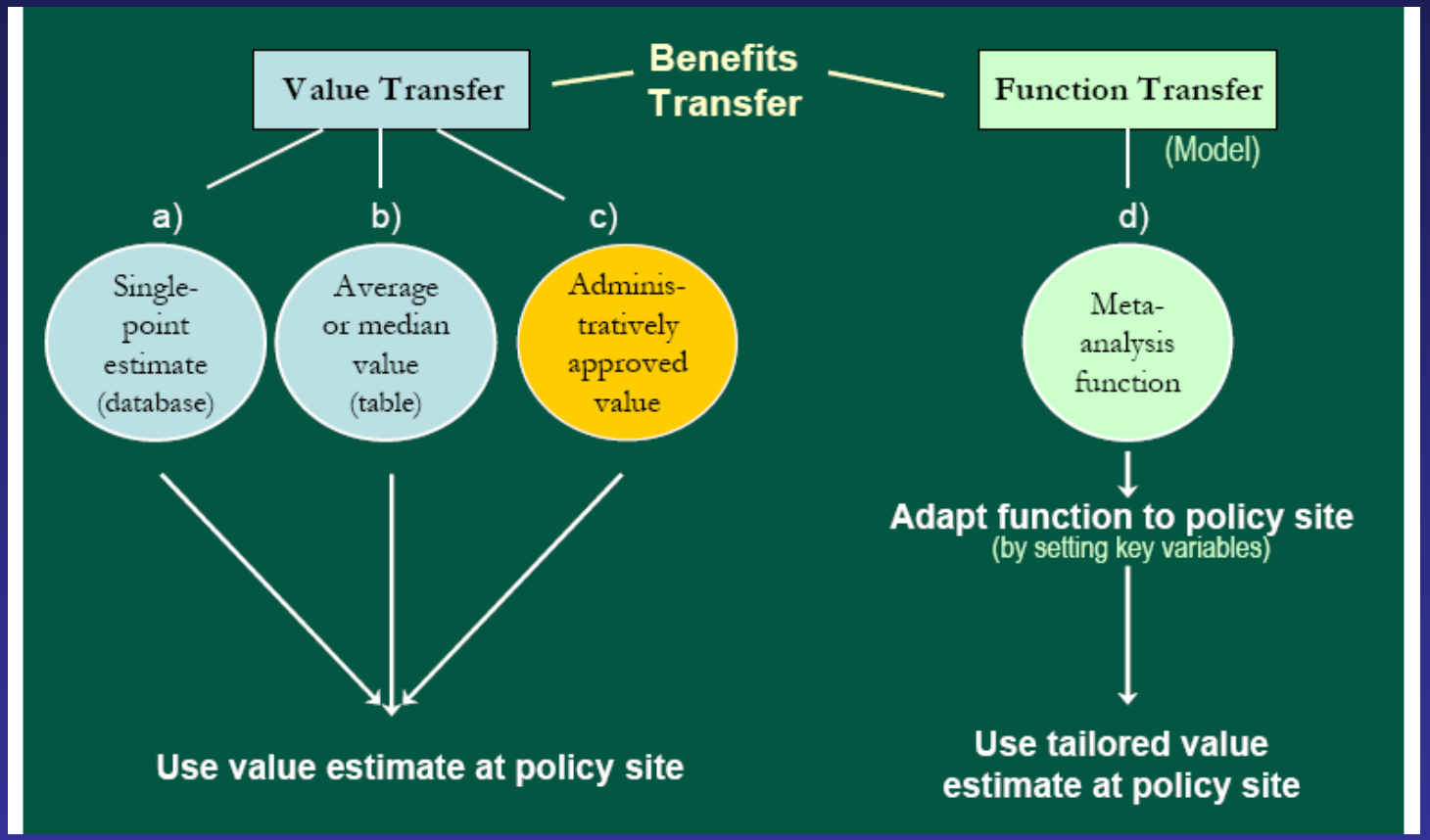
3) Identify unit values ($) for individual flows

Economic values are always context-specific!

Example: The economic value of a wetland's removal of 100 kg of nitrogen per year from surface waters depends on whether the water is used by humans, the marginal value of the removal for those uses, and on the cost of alternative removal options.

Valuation approaches:

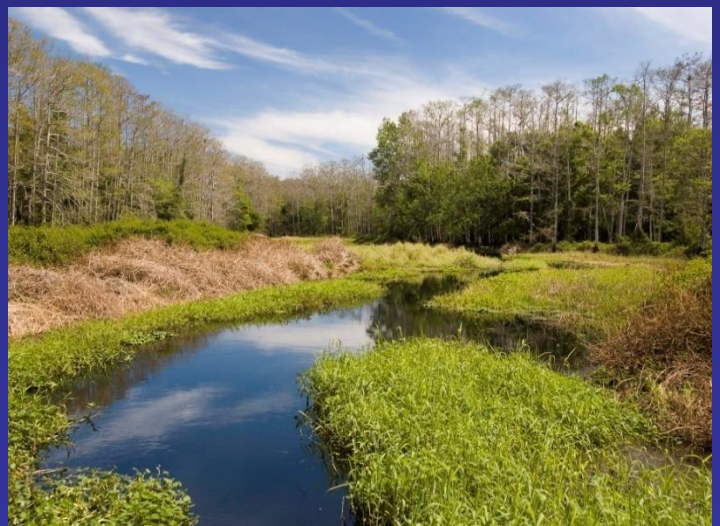
- Original valuation study
- Benefits transfer: using results from original studies for similar sites



- Preferred approach depends on cost of original research and the potential opportunity cost of using benefit transfer (Bryon and Loomis, 2008)

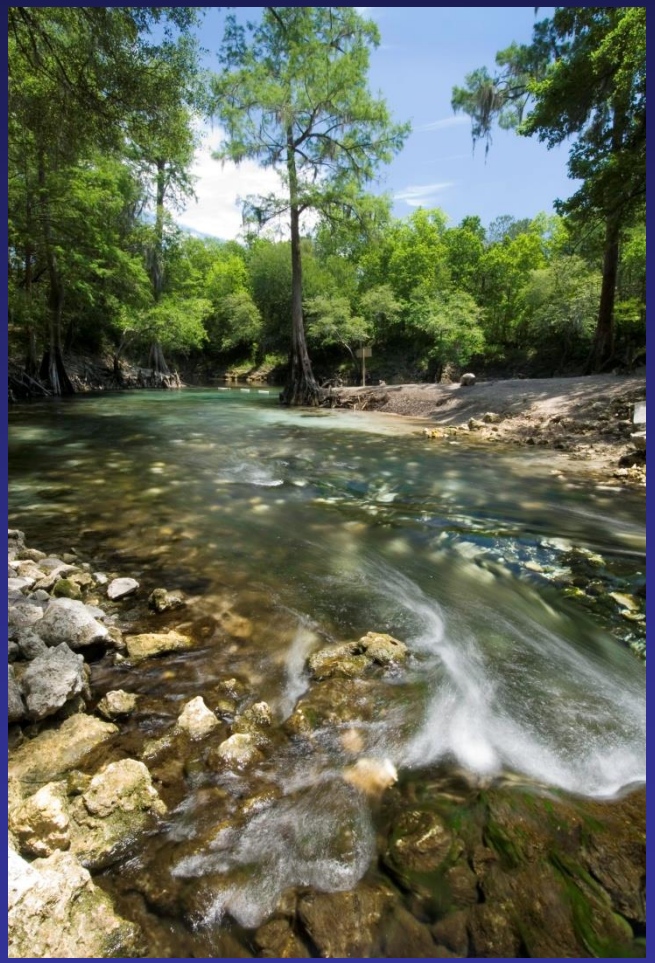
An Economic Benefits Toolbox

- Open space property values premium
- Wetland conservation
- Threatened and endangered species conservation
- Recreational use and values for hunting, fishing, and wildlife viewing



Purpose: Economic Benefits Toolbox

- **Assess** potential financial return of a conservation site
  - **For the public (ecosystem service values)**
  - **For municipalities (adjacent property tax increases)**

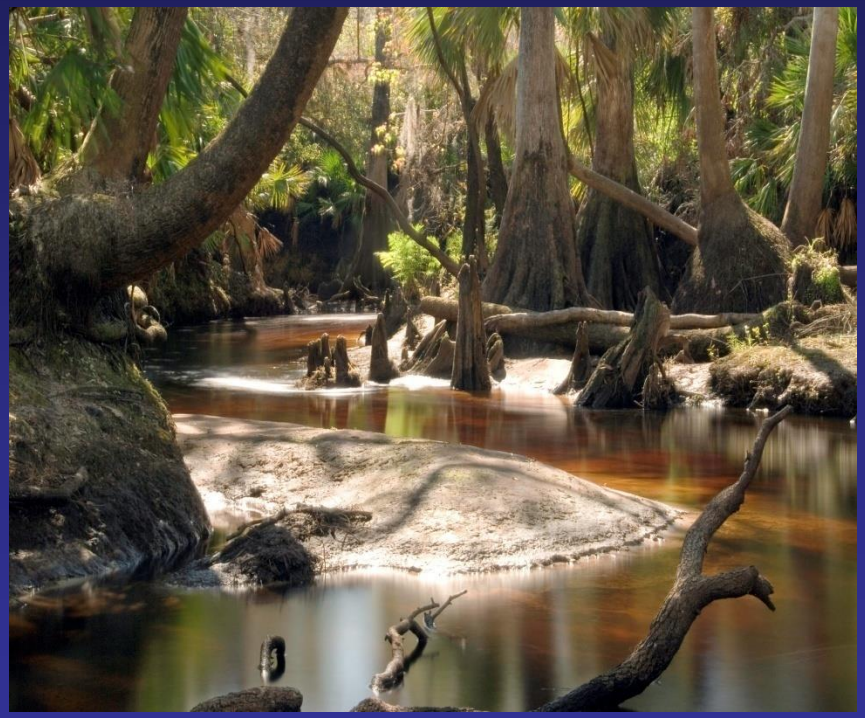


Uses of the Benefits Toolbox

- **Quantify** the public value of a conservation area (recreation; ecosystem service values; property value premiums) to:

-Strengthen the case for public cost-share

-Request increased public funds

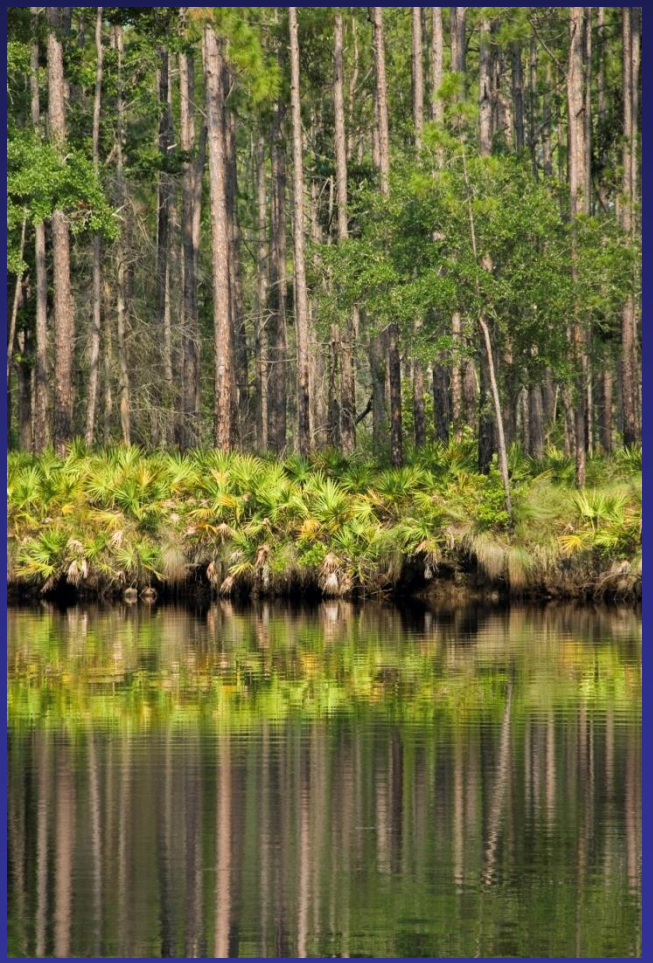


Uses of the Benefits Toolbox

Quantify the potential gains/losses from land conversion

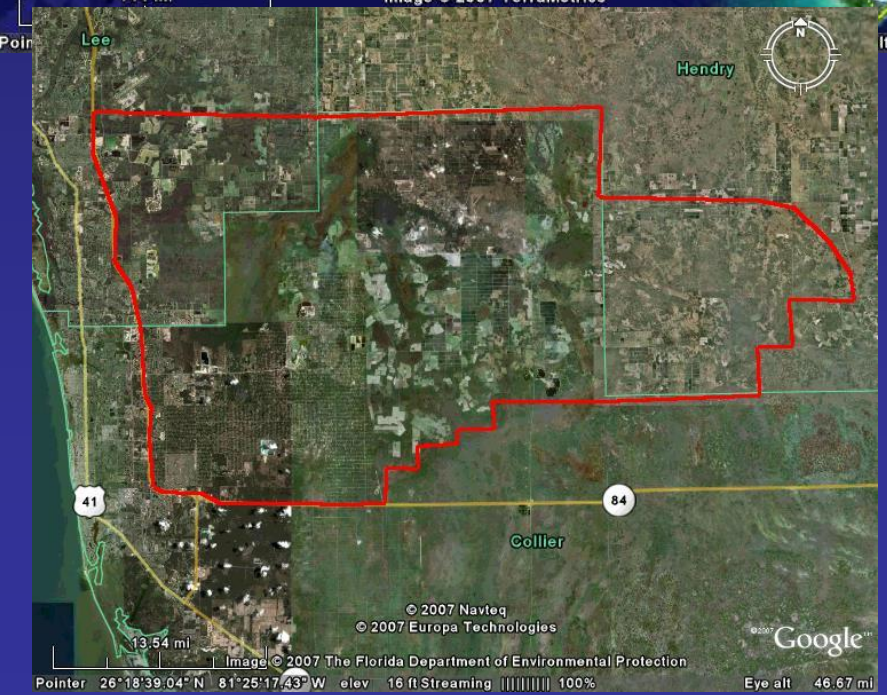
Compare value of alternative restoration and management practices

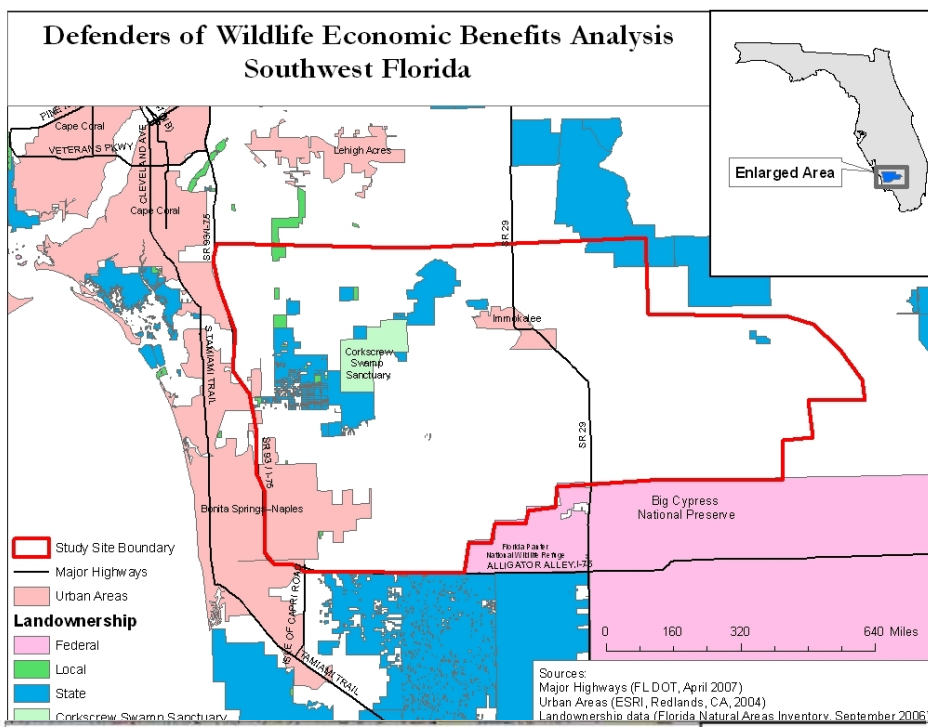
Identify conservation sites that generate the highest value per $

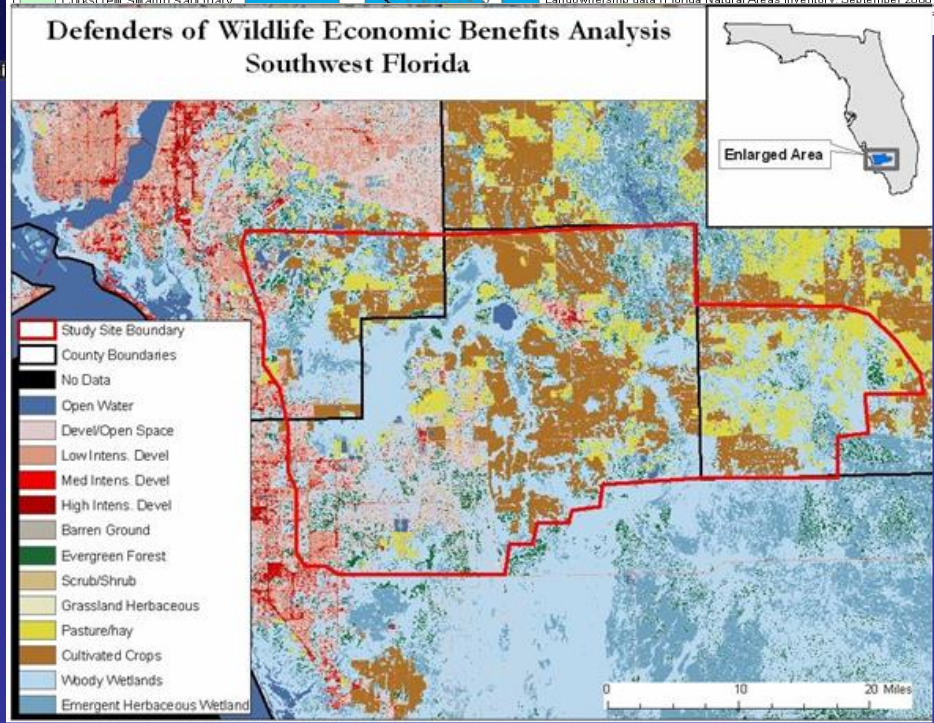


Valuation examples

- 824 mi^2 area in southwest Florida







❖ Identify individual studies for similar sites to estimate service flows;

❖ Use published estimates to value service flows

►Recreation, water provision and net carbon sequestration estimates based on published studies for southwest Florida;

❖ Apply open space property premium model (Kroeger *et al.*, 2008)

Estimated annual value of benefits provided by study area (*million 2004$*)

Still leaves out many ecosystem services provided by area

	Location: / *Ecosystem type:* / *Benefit*	Florida - wetlands/ lowlands - (825 mi²)
Direct uses	TIMBER EXTRACTION	✓
	NON-TIMBER PRODUCTS	?
	GRAZING	✓
	COMMERCIAL FISHING	-
	RECREATION	2.6 *
	- Camping	✓
	- Backpacking	✓
	- Picnicking and general relaxation	✓
	- Fishing	1.2
	- Hunting	0.03
	- Hiking	0.13
	- Wildlife watching	1.2
	- Cross-country/downhill skiing	-
	- OHV use	?
	- Mountain biking	-
	RESEARCH AND EDUCATION	✓
	PROPERTY VALUE PREMIUMS	6.5
Indirect uses	ECOSYSTEM SERVICES	135-306
	- Water supply	130-285
	- Water quality	✓
	- Species habitat provision	✓
	- Biodiversity maintenance	✓
	- Temperature modulation	✓
	- Crop pollination	✓
	- Carbon sequestration	5.1-21.2
	- Air quality	✓
Passive uses	PROVISION OF HABITAT FOR THREATENED, ENDANGERED, RARE OR "CHARISMATIC" SPECIES	✓
	TOTAL ANNUAL VALUE OF QUANTIFIED USES *(million 2004$)*	**145 - 315**

* incomplete estimate; ? not documented; - not applicable

Economic Benefits Example

- Direct Uses
  - Recreation: $2.6 million/yr
  - Open space premium: $6.5 million/yr
- Ecosystem Services
  - Water Storage/Aquifer Recharge: $130-$285 million/yr
  - Carbon Sequestration: $5-$21 million/yr
- Total: $145-$315 million/year

- 176,350 acres (1/3) of study area in wetlands

- Use wetland valuation model

Instructions: Fill in all cells marked "ENTER >".
See accompanying user manual for detailed instructions and documentation.

STEP 1: **Enter average household income for the particular state the wetland is in; can be found in 'State HH Income' Tab- column B**
These are 2006 estimates, for updated information go to: U.S. Census Bureau Fact Finder

ENTER >	$45,495

STEP 2: **Enter the total acres of the wetland to be valued**

ENTER >	176350.0

STEP 3: **Enter share of wetland acres for the particular state the wetland is in, can be found on 'Share' Tab, Column D**

ENTER >	0.23

STEP 4: **Place a 1 next to the type of wetland to be valued; 0 otherwise.**

ENTER >	1	Freshwater Marsh
ENTER >	0	Saltwater Marsh
ENTER >	0	Prarie Pothole

STEP 5: **Place a 1 next to the region the wetland is in; 0 otherwise**
Explanation of regions can be found in the 'ERS Farm Regions' Tab

ENTER >	0	Heartland
ENTER >	0	Northern Crescent
ENTER >	0	Mississippi Portal
ENTER >	1	All Other Regions

STEP 6: **Place a 1 next to the ecosystem service to be valued; 0 otherwise**

ENTER >	0	Flood Prevention
ENTER >	1	Water Quality
ENTER >	0	Water Supply
ENTER >	0	Recreational Fishing
ENTER >	0	Commercial Fishing
ENTER >	0	Birdhunting
ENTER >	0	Birdwatching
ENTER >	0	Amenity
ENTER >	1	Habitat

OUTPUT

$0	Flood prevention
$130	Water Quality
$0	Water Supply
$0	Recreational Fishing
$0	Commercial Fishing
$0	Birdhunting
$0	Birdwatching
$0	Amenity
$39	Habitat

Total for all Ecosystem Services---->	$168	**$/ Acre (2006 base year)**
	$29,704,852	**Total Annual $ Value of Wetland**

Other Examples of Florida Ecosystem Service Benefits

- Harding et al., 2003: $105-$238 million/yr in recreation across 17 conservation areas (+secondary impacts)

- Casey et al., 2008: 10 conservation areas
  - Recreation at Babcock-Webb: $100,000/yr in entrance fees alone

  - Supporting Ecosystem Services: $1.8 billion/yr

Going Forward: Information Needs

- Better geo-physical data on protected lands, ecosystem services and management costs
- Improved visitation and revenue data per area
- Update ecosystem service levels and benefits with Florida-specific data
- Annual or bi-annual collection of visitation, demographics, recreational activities, and expenditure levels
- Develop a bio-economic data base and clearinghouse for quantifying ecosystem service benefits

Resources

- Ecosystem services benefits valuation toolkit/models http://www.defenders.org/programs_and_policy/science_and_economics/conservation_economics/index.php
- Florida Ranchlands Environmental Services Project: http://www.worldwildlife.org/what/globalmarkets/agriculture/FRESP.html
- Willamette Partnership: http://www.williamettepartnership.org/tools-templates. Countingontheenvironment.pdwiki.com
- National Working Group on Ecosystem Services Valuation: atodd@fs.fed.us
- Parametrix, Inc. EcoMetrix: Environmental Services Accounting: dhess@parametrix.com
- Pinchot Institute: http://pinchot.org/current_projects/baybank

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