


Accounting for ecosystem services in decision-making

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 Presentation to CSS 235, Fall 2013

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What are ecosystem services?

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Ecosystem Services

Ecosystems provide a wide array of goods and services *of value to people*



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Ecosystem Services

Ecosystem services defined as:

- “the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life” (Daily, 1997)
- “the benefits human populations derive, directly or indirectly, from ecosystem functions” (Costanza et al., 1997)



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Ecosystem Services

Brainstorming exercise:

What are some ecosystem services provided by Moscow Mountain?

- Timber
- Non-timber forest products – berries, mushrooms
- Recreation
- Wildlife habitat
- Carbon sequestration
- Water regulation
- Erosion control



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Ecosystem Services


One way to classify ecosystem services:

Provisioning services	Regulating services	Cultural services
<i>Products obtained from ecosystems</i> <ul style="list-style-type: none"> • Timber • Food 	<i>Benefits obtained from regulation of ecosystem processes</i> <ul style="list-style-type: none"> • Climate regulation 	<i>Nonmaterial benefits obtained from ecosystems</i> <ul style="list-style-type: none"> • Recreation • Aesthetic
Supporting services <i>Services necessary for the production of all other ecosystem services</i> <ul style="list-style-type: none"> • Soil formation, nutrient cycling 		

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Ecosystem Services

- Millennium Ecosystem Assessment (2005) – reported on the state of the world's ecosystems
- Found that we are rapidly losing regulating and cultural services at the expense of provisioning services

Decision-making for ecosystem services

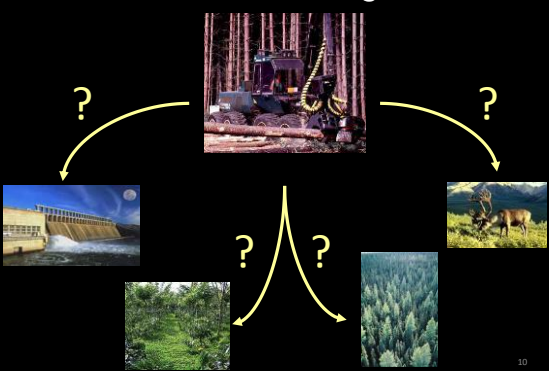
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Decision-making

- Should a wetland be converted to an agricultural field?
- Should urban development be limited to protect watershed services?
- Should logging be banned to protect wildlife habitat?

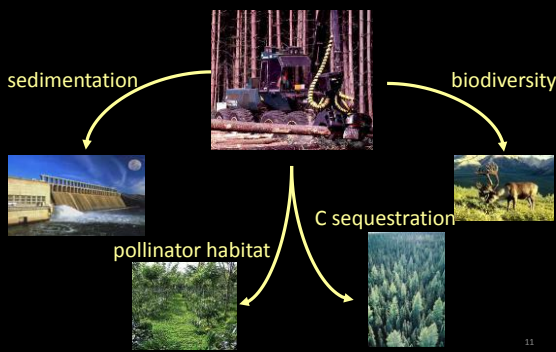


Current decision-making




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Informed decision-making



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Ecosystem Service Decision-Making




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How do we bring ALL TYPES of ecosystem services into decision-making?


- 1) Measure the provision of ecosystem services from ecosystems ("ecological production functions")
- 2) Measure the linkages between ecosystem services and human well-being ("valuation")
- 3) Design policies that protect and conserve important ecosystem services ("incentives")

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Valuation of ecosystem services

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Ecosystem Service Valuation

- Ecosystem service outcomes could be compared in physical units (e.g., cubic meters)
- However, putting outcomes in a common metric often facilitates decision-making
 - Money is often used since this is a common metric in society (economic valuation methods)

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Table 1: A typology of values

Value type	Value sub-type	Meaning
Use values	Direct use value	Results from direct human use of biodiversity (consumptive or non consumptive).
	Indirect use value	Derived from the regulation services provided by species and ecosystems
	Option value	Relates to the importance that people give to the future availability of ecosystem services for personal benefit (option value in a strict sense).
Non-use values	Bequest value	Value attached by individuals to the fact that future generations will also have access to the benefits from species and ecosystems (intergenerational equity concerns).
	Altruist value	Value attached by individuals to the fact that other people of the present generation have access to the benefits provided by species and ecosystems (intragenerational equity concerns).
	Existence value	Value related to the satisfaction that individuals derive from the mere knowledge that species and ecosystems continue to exist.


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Economic Valuation Methods

- Revealed preference methods
- People's decisions (e.g., to buy something, to travel to a national forest) reveal something about their value for ecosystem services
- Use existing information to measure the value of an ecosystem service

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Economic Valuation Methods

- Stated preference methods
- People's decisions do not directly reveal their value for ecosystem services
- Use surveys to elicit a value for an ecosystem service

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Economic Valuation and Provisioning Services

- Many of the provisioning ecosystem services (e.g., timber, food, etc.) are already traded in markets, so we can use the "market price" of these services





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Economic Valuation and Regulating Services

- Some of the regulating ecosystem services (e.g., pollination) are inputs into goods traded in markets (e.g., agriculture), so we can use the change in "market price" with and without these services



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Economic Valuation and Regulating Services

- Some of the regulating ecosystem services (e.g., sediment flows) directly affect economic productivity, so we can measure the impact with and without these services



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Economic Valuation and Cultural Services

- The value of many recreation services (e.g., hunting, fishing, backpacking) can be captured by expenditures or costs to travel to the site




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Economic Valuation and Cultural Services

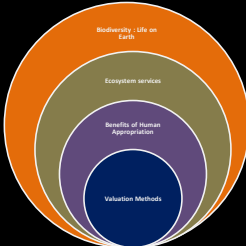

- The spiritual and aesthetic values of nature are probably not conducive to dollar metrics, will have to assess qualitatively



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Valuation Methods & Decision-Making

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