Defining Ecosystem Services and Designing Mechanisms for their Conservation



Ecological Society of America Annual Meeting

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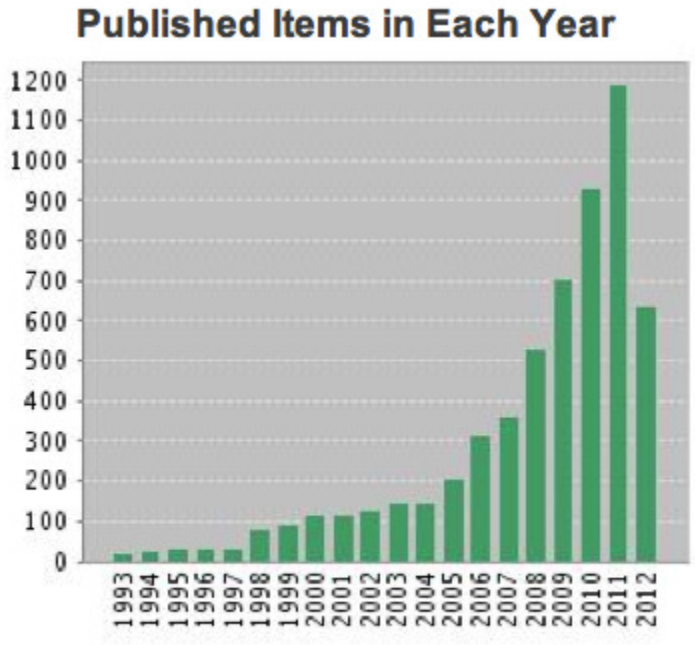
Background

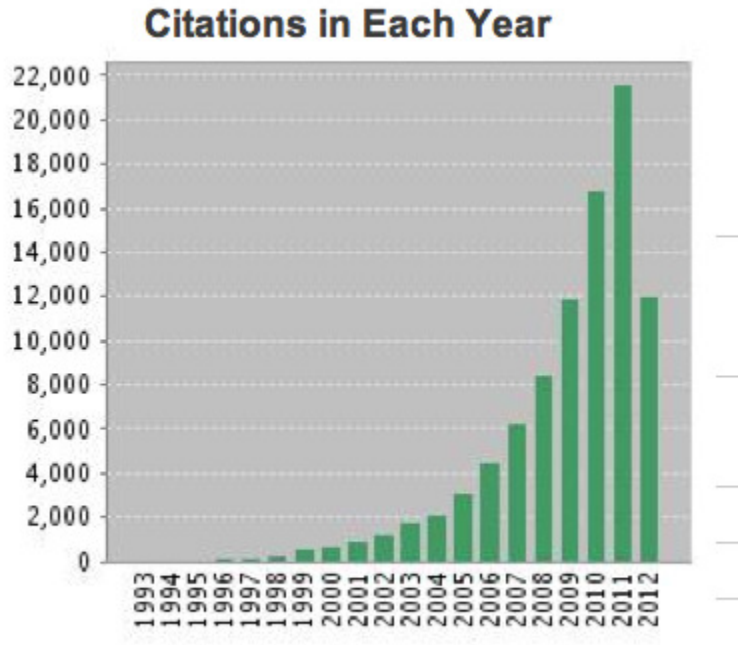
Interest in "ecosystem services" is growing rapidly among ecologists, government agencies, conservation organizations, and international development donors.

Exponential Growth in Publications & Citations 1993-2012

Source: Web of Science



The latest 20 years are displayed.
View a graph with all years.



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This concept has the potential to contribute something new to sustainable economic development and to the conservation of nature and biodiversity.

However…

- There is considerable confusion about the concept and definition of ecosystem services.
- There is a real danger that this confusion could impede the development of effective incentives and mechanisms for conserving them.

The Concept of Ecosystem Services: Its Definition & History

For approximately 35 years (1970 – 2005), the concept of "ecosystem services" was used by most ecologists to refer to **the benefits humans derive from ecological functions and processes.**

- This definition of the concept began with the 1970 Study of Critical Environmental Problems (SCEP), and its report *Man's Impact on the Global Environment.*

- The SCEP discussed environmental services that would decline if there were a "decline in ecosystem function."

Benefits humans derive from ecological functions and processes include:

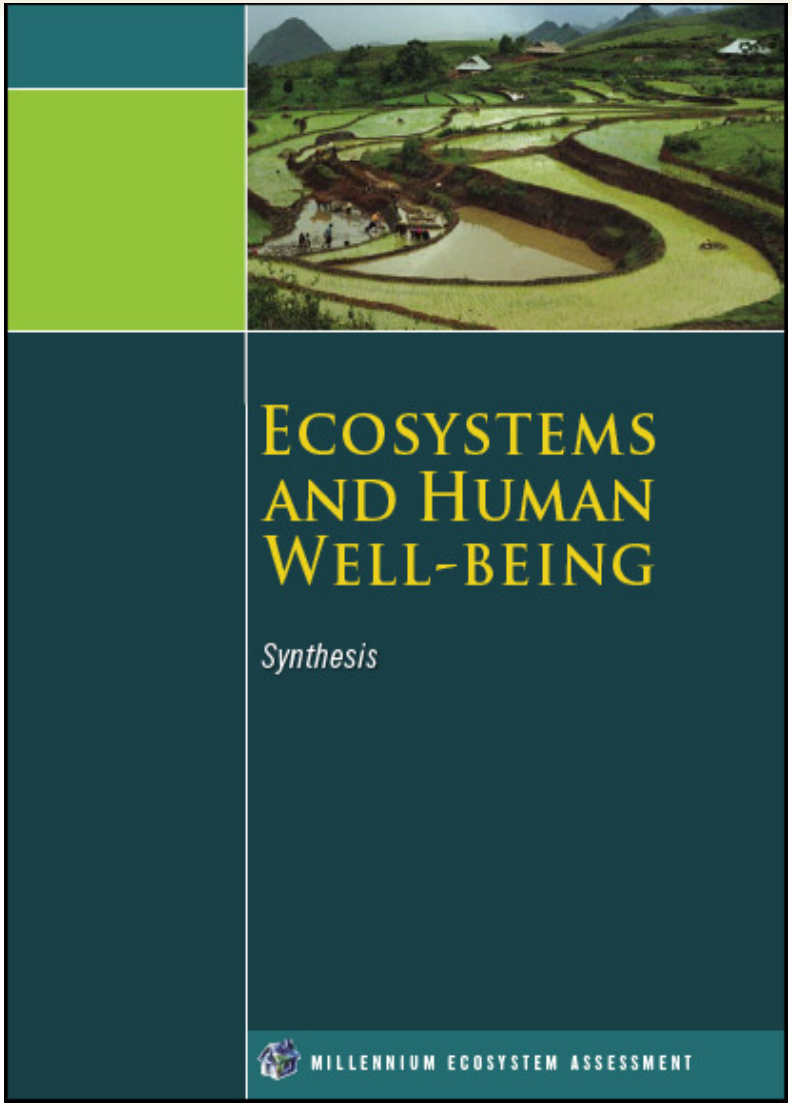
- Major biogeochemical and nutrient cycles (water, carbon, nitrogen, phosphorus)
- Natural pest control by predators in food webs
- Pollination by insects, bats, birds
- Decomposition of biomass, wastes, and pollution
- Soil formation, retention, and maintenance of soil fertility
- Climate regulation

According to the current ESA "Fact Sheet on Ecosystem Services," such services:

- cycle and move nutrients
- detoxify and decompose wastes
- control agricultural pests
- generate and preserve soils and renew their fertility
- contribute to climate stability
- purify the air and water
- regulate disease carrying organisms
- pollinate crops and natural vegetation
- etcetera

http://www.esa.org/ecoservices/

This original definition of the concept is much more focused than that used by the Millennium Ecosystem Assessment (2005), which called ALL benefits from nature and ecosystems "ecosystem services."


ECOSYSTEMS AND HUMAN WELL-BEING
Synthesis
MILLENNIUM ECOSYSTEM ASSESSMENT

Three Types of Benefits from Nature

- Ecosystem Products: direct material uses of wild species
- Ecosystem Services: material benefits from ecological processes
- Non-Material Benefits: psychological & emotional values of wild species and ecosystems

The Millennium Ecosystem Assessment (MA) used the term "ecosystem services" as an umbrella term, lumping together the three different types of benefits of nature listed above:

Type of Benefit	MA Terminology
Ecosystem Products	"Provisioning Services"
Ecosystem Services	"Regulating Services"
Non-Material Benefits	"Cultural Services"

However… "lumping" the three distinct types of benefits – which have quite different ecological, governance, and economic characteristics – confuses people, and impedes the development of mechanisms for the sustainable use and conservation of each type of benefit.

SYMP 18 - Grappling with Intangibles: Bringing Cultural Ecosystem Services Into Decision-Making

Thursday, August 9, 2012: 8:00 AM-11:30 AM
Portland Blrm 253, Oregon Convention Center

Organizer:
Kai Ming A. Chan
Co-organizers:
Anne Guerry and Rachelle Gould

Ecological Characteristics by Type of Benefit

Type of Benefit	Ecological Characteristics
Ecosystem Products	Properties of single species
Ecosystem Services	System-level ("emergent") properties
Non-Material Benefits	Human psychological & emotional responses; no direct ecological properties

A similar comparison of the differences among the three types of benefits of ecosystems could be made for their governance and economic characteristics.

Returning to the original, more focused definition of ecosystem services will emphasize their unique ecological, governance, and economic characteristics, and help us develop practical tools and mechanisms for their conservation.

Six Steps Toward Developing Mechanisms for Conserving Ecosystem Services

1. Categorizing the benefits potentially available in an ecological landscape
2. Selecting one or more ecosystem services (or other types of benefits) for attention
3. Understanding the ecological characteristics
4. Understanding the governance characteristics
5. Understanding the economic characteristics and applying relevant valuation methods
6. Developing appropriate mechanisms & incentives

For more details about this framework for designing mechanisms to conserve ecosystem services or other ecosystem benefits, see:

Byers, B.A. 2008. Ecosystem Services: What Do We Know and Where Should We Go?

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The Relationship between Biodiversity and Ecosystem Services

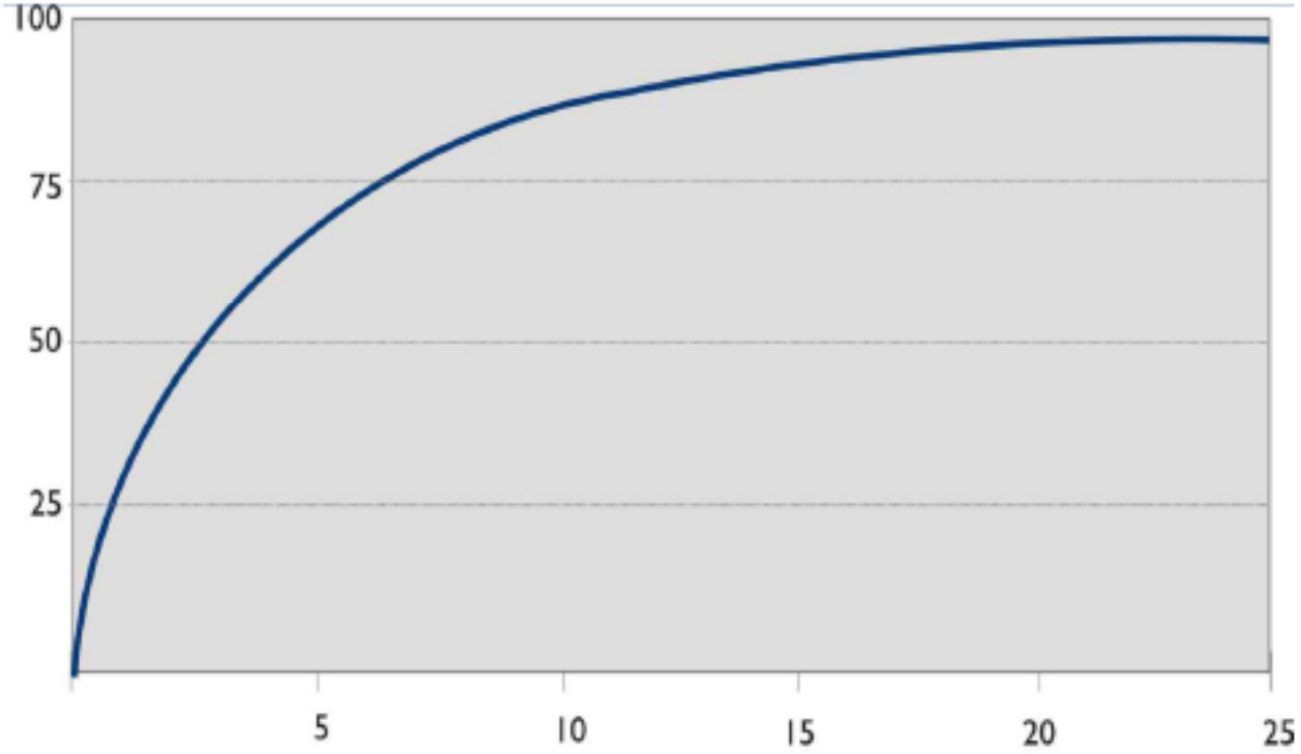
Biodiversity is not itself an ecosystem service, but rather the source of ecosystem services.

How does biodiversity provide ecosystem services?

- A diversity of species interact with each other and the physical environment to create ecosystems;
- Ecological processes and functions emerge from these systems;
- We benefit from these system-level functions.

- Studies often show a positive relationship between the diversity of species in an ecosystem and the level and stability of ecological functions.
- The exact relationships between species diversity and a particular ecological function are not well understood and this is an area of active scientific research.

Figure 1. Generalized relationship between species diversity and ecological functioning



Thanks!
Questions and Comments?



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