

Ecosystem Goods & Services

Ecosystem goods: Physical elements that are directly, or indirectly, consumed by humans

Ecosystem services: processes that produce, or support the production of, ecosystem goods

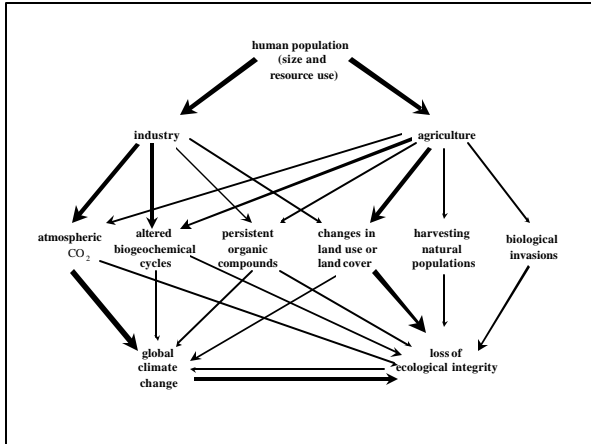
- Processes that are essential to sustain life
- Technologically irreplaceable, or economically infeasible to replace
- Seldom traded in traditional economic markets

Threats to Availability of Ecosystem Goods & Services

- Land-use change and irreversible conversion
- Disruption of biogeochemical cycles (N,C,P)
- Invasion/introduction of exotic organisms
- Toxins, pollutants, human wastes
- Changes in the chemical composition of the atmosphere
- Climate change

The Importance of Scale

Ecosystem goods and services are the products of processes operative over long temporal scales and broad spatial scales. The perceptual world of the individual human is largely restricted to short time frames and local areas. Therefore, the effects of individual decisions and behaviors is not perceived to affect the functioning of ecological systems.



Ecosystem Goods – Fishery Example

- Annual marine fish harvest is ~ 100 million metric tons values at \$50-100 billion/year
 - (most major commercial marine fisheries are in collapse due to over-harvest)
- Annual freshwater fish harvest is ~ 14 million metric tons values at ~ \$8.2 billion/yr
- Annual freshwater sport fishery in the US is ~ \$16 billion/yr

Ecosystem Services – Soils Example

- Contributes significantly regulation of the hydrological cycle
- Shelters seeds & provides physical support for plants
- Retains & delivers nutrients needed for plant growth
- Contributes significantly to decomposition of organic matter and wastes
- Recycles nutrients from decomposition and makes them available for plant growth
- Contributes to the regulation of major element cycles (N, C, P, S)

Ecosystem Service – Role of Species (Example)

- Pollination of plants
 - ~88% of all plant species require an animal pollinator
 - 1/3 of human food plants are animal pollinated
- Control of plant pests
 - ~99% of plant pests are controlled by organisms (birds, spiders, parasitic wasps and flies, viruses, etc.)
- Dispersal of plant seeds
 - An unknown # of plant species depend on animals as their primary means of dispersal

Ecosystems Goods & Services

- Dependent upon intact local ecological systems that are densely distributed across the surface of the earth
- Goods & services provided depends on:
 - Type(s) of local ecosystem(s)
 - The spatial arrangement of these systems
 - The spatial extent of these systems
 - The proximity of these systems to human population centers

Failures of Traditional Economic Systems

- Based on a model of continual growth – however, ecosystems are bounded and finite
- Fails to value ecological goods and services that are not traded in the marketplace
- Many ecosystem goods & services benefit the public at large, not the private land owner
- Society does not compensate individuals owners who contribute to environmental welfare
- Assumes that all natural capital has a man-made substitute

Key Question To Ask

“Which is greater, the economic benefits of a particular development project or the benefits provided by the ecosystem that would be destroyed by the project, measured over a time period that includes multiple human generations?”