

Ecosystems Management

Working definitions

An **ecosystem** is a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit. Humans are an integral part of ecosystems. Ecosystems vary enormously in size; a temporary pond in a tree hollow and an ocean basin can both be ecosystems.

The **ecosystem approach** is a strategy for the integrated management of land, water and living resources that provides sustainable delivery of ecosystem services in an equitable way.

Ecosystem services are the benefits that people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other non-material benefits.

Ecosystem resilience is the level of disturbance that an ecosystem can undergo without crossing a threshold to a situation with different structure or outputs. Resilience depends on ecological dynamics as well as the organizational and institutional capacity to understand, manage and respond to these dynamics.

Human well-being is the freedom of choice and action to achieve basic material for a good life, health, good social relations and security. Well-being is at the opposite end of a continuum from poverty, a pronounced deprivation in well-being.

Sources: Convention on Biological Diversity, Millennium Ecosystem Assessment

Bundling of ecosystem services: One ecosystem service (e.g., freshwater provisioning) is not delivered in isolation from others. The Millennium Ecosystem Assessment demonstrated the interdependencies among ecosystem services. Overuse of one ecosystem service may lead to a decline in other ecosystem services as well. Ecosystem management approach ensures that interdependent ecosystem services are identified and that an ecosystem-specific analysis revolves around the bundled set of ecosystem services rather than individual services.

Bundling of ecosystem services is a complex task. Studies have shown, however, that there are varying degrees of interdependence and the ones that need to be targeted are those with strong interlinkages. Bundling involves mapping of strong interdependent ecosystem services. The final bundle of ecosystem services that emerges will have a high level of interdependence and clear implications for human well-being and poverty reduction for developing countries.

Advantages of bundling are:

- (a) Reducing trade-offs that could occur across ecosystem services and promoting synergies;
- (b) The potential for reducing the high transaction costs that could derive from establishing response strategies for multiple ecosystem services;
- (c) The potential to reap multiple dividends if sustainable use of one ecosystem service leads to the conservation of other services. Bundling may offer opportunities for multilateral environmental agreements to work together to achieve their respective objectives;
- (d) Bundling will also reduce the risk of initiatives failing because of the diversification of responses to multiple drivers.

The 11 ecosystem services identified for UNEP attention and action at the global level are described below. Understandably, the package of services in decline that need attention will differ from country to country and region to region.

1. Provisioning services

These are the products obtained from ecosystems, including:

- (a) *Freshwater*: the well-being of both ecosystems and humans is strongly dependent on this vital ecosystem service, increasingly affected by excessive demand and detrimental land-use changes;
- (b) *Energy*: this ecosystem service did not appear as such in the Millennium Ecosystem Assessment, but as “biomass energy”. The increased production of biofuels to replace such fossil fuels as wood and charcoal, of particular importance to poor people, has provoked keen debate about the potential impacts of this production on ecosystem and human well-being. Hydropower as a low-carbon energy source is dependent on freshwater-related ecosystem services (provided, for example, by dams) and can also have major impacts on upstream and downstream ecosystems;
- (c) *Capture fisheries*: marine and freshwater fisheries are in decline, in spite of increasing demand. Fish protein is of particular importance to poor people. Overfishing is the main issue, but healthy aquatic ecosystems can positively affect the supply side of the equation.

2. Supporting services

Supporting services are necessary for the production of all other ecosystem services. They differ from provisioning, regulating, and cultural services in that their impacts on people are either indirect or occur over a very long time, whereas changes in the other categories have relatively direct and short-term impacts on people. These include:

- (d) *Nutrient cycling*: healthy ecosystems have a large capacity to absorb, retain and recycle nutrients. In simplified low-diversity agricultural landscapes this capacity is much reduced. Many parts of the world suffer from either inadequate or overabundant nutrients;
- (e) *Primary production*: without this supporting service, life as we know it is simply not possible. Although what is referred to as “net primary production” seems to be on the increase, at least in terrestrial ecosystems, it is not yet known whether there any limits to this increase and what the risk of collapse under increasing pressure from climate change and other drivers is unknown.

3. Cultural services

These are the non-material benefits that people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences, including:

Recreation and ecotourism: healthy ecosystems that express these cultural values are an increasingly important economic resource which, if arrangements are made to give poor people access to it, can go beyond providing a mere aesthetic experience for the privileged, and help alleviate poverty and improve human well-being.