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.