

Chapitre 2 : Ecosystem services

Introduction

Ecosystem services are classified into four main categories: provisioning, regulating, cultural, and supporting services. Provisioning services include cultivated crops, livestock, wild fish, and wild edible species, as well as timber, non-wood fibers, biofuel, freshwater, genetic resources, and natural pharmaceuticals. Regulating services refer to the ecosystem's role in maintaining air quality, regulating global and local climate, controlling water flows and erosion, purifying water and waste, and managing pests, diseases, pollination, and natural disaster risks. Cultural services encompass recreational activities like hiking, birdwatching, and ecotourism, as well as spiritual, religious, aesthetic, and intrinsic values attributed to ecosystems and biodiversity. Supporting services involve nutrient cycling and primary production, which underpin ecosystem productivity by recycling nutrients and producing biomass through processes such as photosynthesis, forming the foundation of aquatic and terrestrial food webs.

1. Provisioning Services

These are the tangible products obtained from ecosystems for human use:

- **Crops:** Cultivated plants and agricultural products harvested for human or animal consumption, such as cereals, vegetables, and fruits.
- **Livestock:** Domesticated animals raised for domestic or commercial purposes, including chickens and cattle.
- **Fisheries:** Wild fish caught by trawling or other non-aquaculture methods, such as cod, crabs, and tuna.
- **Wild Foods:** Edible wild plant and animal species gathered or hunted, including fruits, nuts, mushrooms, and bushmeat.
- **Timber and Wood Fibers:** Forestry products harvested from natural or planted wood ecosystems for industrial use like pulp and paper.
- **Other Fibers:** Non-wood, non-combustible fibers such as cotton, hemp, and silk, used in textiles and rope.
- **Biomass Fuel:** Biological material from living or recently living organisms, both plant and animal, used as energy sources like firewood, charcoal, and ethanol crops.
- **Freshwater:** Internal water bodies, groundwater, rainwater, and surface waters used for drinking, cleaning, refrigeration, industrial processes, electricity generation, and transport.

- **Genetic Resources:** Genes and genetic data used for animal breeding, crop improvement, and biotechnologies, such as genes to enhance pest resistance in crops.
- **Biochemicals and Natural Medicines:** Pharmaceuticals, biocides, and other biological materials derived from ecosystems for commercial or domestic use, including Echinacea, ginseng, paclitaxel, and natural pesticides.

2. Regulating Services

These involve ecosystem functions that regulate environmental conditions:

- **Air Quality Control:** Ecosystems affect air quality by emitting or absorbing chemical substances. Lakes act as sinks for industrial sulfur compounds, while forest fires release particulates and volatile organic compounds.
- **Global Climate Regulation:** Forests sequester carbon dioxide, while livestock and rice paddies release methane, influencing greenhouse gas levels.
- **Regional and Local Climate:** Ecosystems affect temperature, rainfall, and other climate factors at regional and local scales, with forests influencing precipitation levels.
- **Water Regulation:** Ecosystems regulate water runoff, floods, and groundwater recharge by storing water in soils and landscapes like floodplains and wetlands, reducing flood risks.
- **Erosion Control:** Vegetation, including grasses and trees, stabilizes soils against wind and rain erosion, preventing sedimentation of watercourses and landslides.
- **Water Purification and Waste Treatment:** Ecosystems filter and decompose organic waste and pollutants in waters through processes in soils and wetlands that trap heavy metals and degrade organic matter.
- **Disease Control:** Ecosystem conditions influence the incidence and abundance of human pathogens; intact forests can reduce stagnant water breeding grounds for mosquitoes, lowering malaria prevalence.
- **Pest Control:** Natural predators in forests, like bats, toads, and snakes, feed on agricultural pests and livestock diseases, helping to control outbreaks.
- **Pollination:** Ecosystems mediate the transfer of pollen by insects such as bees, aiding fertilization of crop plants.
- **Natural Hazard Risk Control:** Ecosystems reduce damage from natural disasters like hurricanes and tsunamis, with mangrove forests and coral reefs protecting coastal zones, and biological decomposition reducing forest fire fuel.

3. Cultural Services

These are non-material benefits from ecosystems:

- **Recreation and Ecotourism:** Enjoyment and leisure activities such as hiking, camping, birdwatching, and safaris that rely on natural or cultivated ecosystems.
- **Ethical and Spiritual Values:** Spiritual, religious, aesthetic, and intrinsic values linked to ecosystems, landscapes, or species, including the belief in preserving biodiversity for its own sake or sacred sites.

4. Supporting Services

These services support other ecosystem functions and life:

- **Nutrient Cycling:** Ecosystems recycle nutrients such as nitrogen, sulfur, phosphorus, and carbon through decomposition and absorption processes, contributing to soil fertility.
- **Primary Production:** Formation of biological material by plants via photosynthesis, converting sunlight and nutrients into biomass, forming the base of aquatic and terrestrial food webs, such as algae producing organic matter in aquatic systems.