

TOPIC 2.2

ECOSYSTEM SERVICES

Enduring Understanding:

Ecosystems have structure and diversity that change over time.

Learning Objectives:

Describe ecosystem services and the results of human disruptions to ecosystem services.

“The Best Things in Life Are Free”

- **Ecosystem services** are services that arise from the normal functioning of healthy, natural systems.
 - Ecosystem services are not intended solely for the benefit of humans, but we could not live without them
 - We would have to pay to recreate the processes that provide us with these services.
 - It has been estimated that the annual economic value of just 17 of these services is \$48 trillion, an amount that is greater than the GDP of all national economies combined.
- As long as we protect the ecological systems that provide us with ecosystem services we can enjoy their benefits for free.



- The United Nations identifies four categories of ecosystem service:
 - **Provisioning services**
 - **Regulating services**
 - **Supporting services**
 - **Cultural services**

Provisioning Services

- *Provisioning services* are the material benefits (*natural resources*) people get from ecosystems.
- Many provisioning services are traded in markets. However, in many regions, rural households also directly depend on provisioning services for their livelihoods.

Provisioning Services



Virtually all ecosystems provide the conditions for growing, collecting, hunting or harvesting food



Ecosystems provide a great diversity of materials including wood, biofuels, and fibers from wild or cultivated plant and animal species.



No water, no life. Ecosystems play a vital role in providing the flow and storage of fresh water.



Natural ecosystems provide a variety of plants and mushrooms which offer effective cures for many kinds of health problems. They are used in popular and traditional medicine, and for developing pharmaceuticals.

Regulating Services

- **Regulating services** are the benefits obtained from the regulation of ecosystem processes.
 - They are often invisible and therefore mostly taken for granted.
 - When they are damaged, the resulting losses can be substantial and difficult to restore.

Regulating Services



Erosion Prevention and Maintenance of Soil Fertility



Carbon Sequestration and Storage



Pollination



Local Climate and Air Quality



Biological Control of Pest Species



Moderation of Extreme Weather Events



Regulation Of Water Flow



Waste Water Treatment

Supporting Services

- **Supporting services** are necessary for the production of all other ecosystem services,
 - Providing living spaces for plants or animals and maintaining a diversity of plants and animals, are 'supporting services' and the basis of all ecosystems and their services.

Supporting Services



Habitat for species

Ecosystems provide living spaces for plants and animals; they also maintain a diversity of complex processes that underpin the other ecosystem services.. Some habitats have an exceptionally high number of species which makes them more genetically diverse than others; these are known as 'biodiversity hotspots'



Maintenance of Genetic Diversity

Genetic diversity (the variety of genes between, and within, species populations) distinguishes different breeds or races from each other, providing the basis for locally well-adapted cultivars and a gene pool for developing commercial crops and livestock.

Cultural Services

- **Cultural Services** are non-material benefits people gain from ecosystems.
 - In many situations, cultural services are among the most important values people associate with Nature – it is therefore critical to understand them.

Cultural Services



Recreation and mental and physical health

Nature-based opportunities for recreation play an important role in maintaining mental and physical health, e.g. walking and playing sports in parks and urban green spaces.



Tourism

Enjoyment of nature attracts millions of travelers worldwide. This cultural ecosystem service includes both benefits to visitors and income opportunities for nature tourism service providers.



Aesthetic appreciation and inspiration for culture, art and design

Animals, plants and ecosystems have been the source of inspiration for much of our arts, culture, and design; they increasingly inspire science as well.



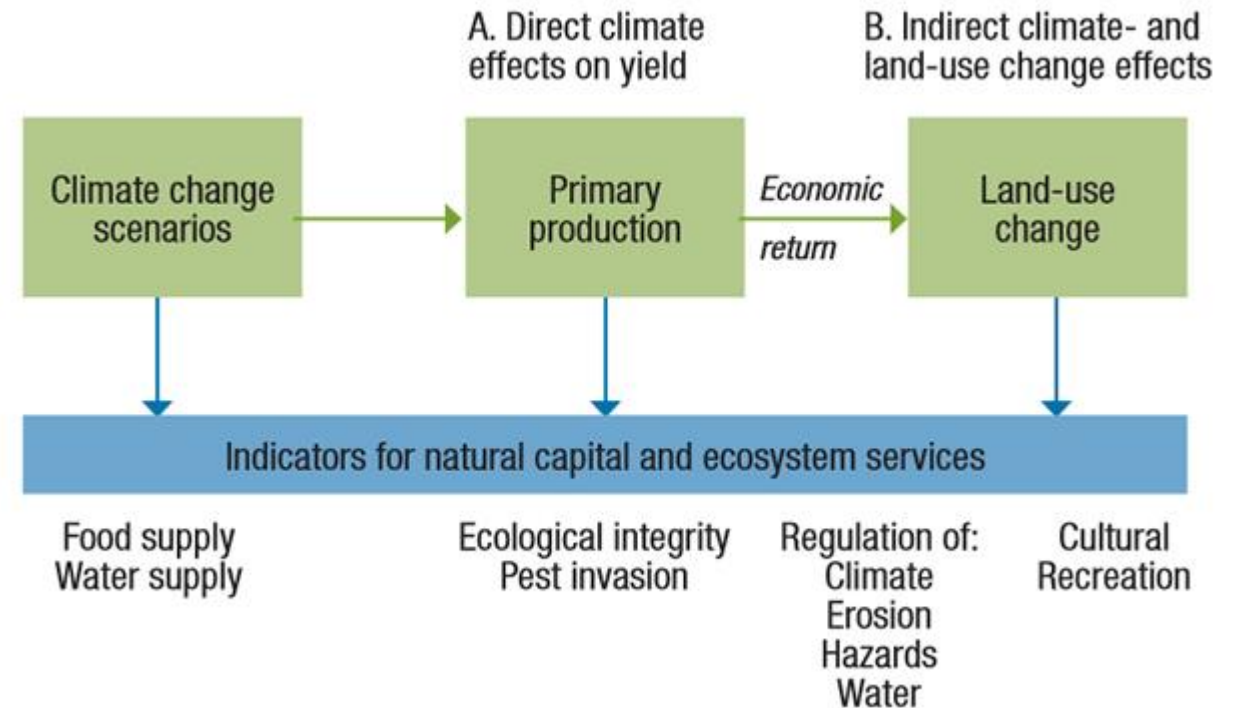
Spiritual experience and sense of place

Nature is a common element in most major religions. Natural heritage, spiritual sense of belonging, traditional knowledge, and associated customs are important for creating a sense of belonging.

Threats to Ecosystem Services

- Just as we may deplete natural resources we can degrade ecosystem services when we destroy habitat, generate pollution or reduce the biodiversity of ecosystems.
 - In recent years, ecosystem services have become increasingly compromised by our rising human population and our increasing levels of consumption.
- Research has demonstrated that biodiversity tends to enhance the stability of communities and ecosystems and increase their resilience to disturbance.
 - Thus when we lose biodiversity we can diminish an ecosystems ability function and provide services to our society

Climate Change Effects on Ecosystem Services



“To keep every cog and wheel is the first precaution of intelligent tinkering.”

-Aldo Leopold