

Management Of Forest And Aquatic Ecosystems

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An ecosystem, a widely used term in biological and environmental sciences, refers to a community of animals and plants interacting within a particular region along with the non-living environments of that area. This can include climate, earth, soil, sun, atmosphere, and climate. The ecosystem is linked to the fact that all these diverse organisms survive and live in proximity to each other, and each of them acts as a component that interacts with the other.

A forest ecosystem is the community of plants and animals in that particular area that interact with the chemical and physical properties of the environment in which they live. On Earth, forests are the foremost terrestrial ecosystem that encompasses the world. They are responsible for 75% of the gross primary productivity of Earth's terrestrial biosphere, containing about 80% of the terrestrial biomass (Yude Pan). Forests are more than a community or population of trees, in fact they are made up of biologically integrated communities of animals, plants and microbes, as well as the atmosphere (climate) and the local substrates or soils that interact together. A forest includes many ecosystem processes and a number of elements of the forest ecosystem. In the forest structure, Short-term changes do not lead to forest loss as long as forest ecosystem processes remain reasonably functional (Kimmmins).

Human society and forests are affected positively and negatively. Forests deliver ecosystem functions and attract tourists. They also affect the health of humans. Several human activities, including the use of forest resources for various purposes, disturb the forest ecosystems. Compared to other plant communities on land, Forests are often very heterogeneous environments. This heterogeneity allows a wide variety of plant and animal species to survive by coexisting and interacting with each other. Some components, such as tree ferns, are key to the survival of a variety of other species. Many factors in the forest affect biodiversity. The main factors that favor the abundance of wildlife and biodiversity are the presence of several tree species in the forest and the lack of old wood management (Fountain-Jones).

An aquatic ecosystem exists in a body of water. Interdependent organisms live within their environment as communities in aquatic ecosystems. Aquatic ecosystems are of two main types: freshwater ecosystems and marine ecosystems. About 71% of the Earth's surface is covered by marine ecosystems and holds about 97% of the water on the planet, generating about 32% of the primary production in the world. Freshwater ecosystems are different due to the presence of several dissolved compounds, particularly water salts. Freshwater ecosystems embrace 0.78% of the Earth's total surface and occupy 0.009% of their total amount of water, producing almost 3% of Earth's net primary production.

Many important environmental functions, similarly, are performed by aquatic ecosystems. For instance, they purify water, recycle nutrients, weaken floods, increase groundwater, and create habitat for wildlife. The aquatic ecosystem's health deteriorates once the ability to absorb stress by the ecosystem is exceeded. Aquatic ecosystems can be stressed as a result of chemical, physical, or biological environmental changes. Physical changes include variations in the temperature of the water, the availability of light, and the water flow. Chemical changes may involve changes in bio-stimulants' nutrient loading rates, oxygen-consuming materials, and toxins. Biological changes include the introduction of exotic species and overexploitation of commercial species. The population of humans can unduly overload aquatic ecosystems (Stanford L. Loeb).

Sustainable forestry must maintain an equilibrium amid three main factors: ecological, socio-cultural, and economic. If sustainable forest management is successful, it will offer integrated benefits for all, including the preservation of local livelihoods, the protection of ecosystems and biodiversity through forests, the reduction of poverty in rural areas, and the mitigation of climate change effects (Franklin). Over time, human activities have intensified and expanded and have increasingly impacted the quality of the aquatic environment and ecosystems or ecosystems. Recognition of these effects has generated a growing interest in describing the relationship between humans and their environment. This led to the understanding that water is the foundation for all life forms, not just humans. In addition, many of the uses and benefits humans derive from water resources depend on healthy and functional ecosystems. In addition, the ability to create conditions for such ecosystems means that the systems are in equilibrium. Balanced systems are needed to sustainably use water resources. For example, a wide range of human activities can affect aquatic ecosystems, such as wastewater treatment systems or facilities, not selective drainage from rural, urban, or mining sources, changes in channel characteristics by sedimentation or sedimentation, changes in the flow regime through the disposition of dam vegetation or shifting the riparian zone, introduction of exotic or exotic species. Human activity can affect organisms in the streams and influence the habitats in which they occur. Consequences of many human activities, such as the impact of discharges on water quality, creation of barriers that reduce the flow of electricity, changes in land use, and impact on habitat and aquatic ecosystems, are very complex and variable to understand, with varied expected outcomes in response to different circumstances (Ramachandra).

Change and variability in aquatic ecosystems are natural processes, and individual organisms and ecosystem communities have often adapted to various environmental conditions. Humans impact aquatic ecosystems through environmental pollution, landscape changes, or hydrological systems. Further large-scale impacts are caused by factors such as overall climate change. Due to the complexity of aquatic ecosystems and related relationships, it can be difficult to predict the impact of the disturbance on them. These compound factors signify that one component of the ecosystem if damaged, can affect other components of the ecosystem. A better understanding can result in healthier practices that reduce the stress on aquatic ecosystems. Many human activities continue to affect aquatic ecosystems, continually disrupting natural processes and patterns and leading to ecosystem disruption because species cannot adapt to the rapid changes that may occur in their environment. Humans as a whole have neither managed their forest ecosystems nor aquatic

ecosystems well enough, despite the system's ability to restore itself.

In the book by (Christopher J. Huggard), leading environmental historians show what happened in the fragile forests of SW USA. Through case studies, controversies, and current concerns, a lot of issues related to forest ecosystem mismanagement are discussed, as well as changes in forest management perspectives from a conservative-dominated area to a focus on concepts such as biocentrism, which views forests as dynamic ecosystems, where each component works and interacts with each other to form a system. Despite this gradual change in approach, the research shows that forest destruction still continues through overgrazing of pastures, deforestation, mountain erosion, fire suppression, and threats to the habitats of endangered species that can lead to extinction. A reassessment of forest and environmental management priorities is needed before it is too late, and efficient management controls must be established to preserve forest ecosystems.

To protect forests and aquatic ecosystems, the EU and the United States have passed several laws. The 'National Forest Management Act' (NFMA) of 1976 is a United States federal law that is considered the most important legislation for the management of forests in the US. It is an amendment to the original 'Forest Management Act.' It was intended to remedy the damage to the natural ecosystems on public lands. The law introduced a forest management system after several debates on the legality of logging. To protect national forests from excessive and destructive deforestation, Congress commissioned the development of the US Forest Service, making provisions that limited the size of open slopes, protecting the rate of logging, limiting annual rates of deforestation, and preparing afforestation security. The NFMA is a cornerstone of environmental legislation, which aims to protect biodiversity in national forests and to ensure public participation in forest planning and forestry. It provides forest services and at the same time recognizes "the basic need to protect and, where necessary, improve soil, water and air resources". (Musgrave). The NFMA ensures that timber on national forest lands is "not harvested unless the soil, hills or other conditions in the basin are irreversibly damaged" (Musgrave). Furthermore, it advocates the protection of streams, riverbanks, wetlands, lakes, and other bodies of water due to adverse changes in temperature. It also protects streams and sediment deposits, where harvesting is likely to have serious and negative consequences on water conditions or fish habitat. In addition to other requirements, the NFMA, like the Forest Service, will receive viable populations of non-native vertebrate species that are existing and desirable in the planning area (Musgrave).

The Federal Forest Law of 4 October 1991 was approved by the Swiss government for the purpose of preserving forestry and its spatial distribution on its territory and protecting them as an almost natural community, thus ensuring its protection. It also contributes to social and economic functions, such as the protection of important assets or human life against avalanches, erosion, and landslides. Chapter 4 of the federal law deals with the conservation and utilization of the forest. Section 1 contains laws on forest management. Section 20, Section 1, Chapter 4 of the Act refers to the principles of forest management, which require that the "forest be managed in such a way that it can perform its functions without interruption or restriction." Article 6 of the Forest Damage Prevention and Compensation Act requires the Federal Council to take measures to prevent and repair damage

caused by natural disasters or pests threatening their function. Forest to prohibit or restrict certain organisms, plants, or pesticides or impose requirements for their authorization, information, registration, or documentation. Article 38 deals with the protection of forest biodiversity by indicating that the confederation delivers monetary support for processes contributing to the preservation and enhancement of forest biodiversity, in particular for the conservation and protection of forest reserves and other habitats linked to the forest. It recognizes the ecological value of the forest by promoting biodiversity and genetic diversity of the forest and the interconnection of forest habitats by preserving traditional forms of forest management (The Federal Council). Switzerland's forest law has been helpful in reversing some of the mismanagement of forest ecosystems by enacting comprehensive laws for the protection of forests, biodiversity, and ecosystems.

Legislation has also been enacted to protect the aquatic ecosystem, the 'Marine Protection, Research and Sanctuaries Act of 1972' (MPRSA) or the 'Ocean Dumping Act', is one of the key laws passed by the US Congress relating to the environment and aquatic ecosystems. Its main objectives are to regulate the deliberate disposal of materials in the ocean and to authorize research. However, MPRSA regulates the disposal of waste in the ocean and establishes an ocean dumping research program to monitor stress. It also defines the regulation and designation of marine protected areas. The law controls the unloading of all substances outside the territory (4.8 km) from coast to sea and strictly inhibits or restricts the dumping of any material that could "adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities" (EPA).

Another important law is the 'Clean Water Act' (CWA), which creates a basic arrangement for controlling and reducing pollutant emissions into US waters and regulates surface water quality standards. The initial draft of the CWA was circulated in 1948 and was called the 'Federal Water Pollution Control Act,' but the law was restructured and significantly extended in 1972. The 'Clean Water Act' became the familiar name of the law with changes in 1972. The CWA has stated that it is illegal to dump a point source pollutant in navigable waters (US EPA). The 1972 changes in the law further created a structure for the regulation of pollutant emissions in US waters. It has given the EPA the "power to implement pollution control programs, such as setting wastewater standards for the industry." The modern Clean Water Act, CWA, has become an environmentally friendly technology law, but it is actually much more. Its stated purpose was and is "to restore and maintain the chemical, physical, and biological integrity of the waters of the nation." In other words, the CWA has been specifically designed to protect aquatic ecosystems and promote their recovery where they have already been abused (Holly Doremus).

Despite numerous laws, conventions, and regulations, the oceans are currently endangered by overfishing, climate change, invasive species, and marine pollution. The recognition of ecosystem management in international environmental law is relatively recent. Previous environmental agreements were simply related to species conservation. It is possible to group the general classes of relevant international obligations for the purpose. It is of immediate importance for humanity to recognize the importance of ecosystem management, not just its components, and ensure the implementation of laws that have been formulated to reduce the stress on ecosystems and promote

better management of them.

Works Cited

Christopher J. Huggard, Arthur R. Gomez, Jacqueline Vaughn Switzer. "Forests under fire: A century of ecosystem mismanagement in the southwest." *Electronic Green Journal* 89.16 (2002): 1121-1122.

EPA. "FEDERAL WATER POLLUTION CONTROL ACT." 27 November 2002. *Environment Protection Agency*. 9 March 2018.

<<https://www.epa.gov/sites/production/files/2017-08/documents/federal-water-pollution-control-act-508full.pdf>>.

—. *Marine Protection, Research and Sanctuaries Act (Ocean Dumping Act) 1972*. 2000. 9 March 2018. <<https://web.archive.org/web/20120508220037/http://www.epa.gov/aboutepa/history/topics/mprsa/>>.

Fountain-Jones, N. M., P. B. McQuillan, S Grove. "Beetle communities associated with the tree fern *Dicksonia antarctica* Labill. in Tasmania." *Australian Journal of Entomology* 51 (2012): 154-165.

Franklin, Jerry F. *Understanding and Managing Forests as Ecosystems: A Reflection on 60 Years of Change, and a View to the Anthropocene*. 2016. 9 March 2018. <<http://www.pinchot.org/doc/612>>.

Holly Doremus, A. Dan Tarlock. "Can the Clean Water Act Succeed as an Ecosystem Protection Law?" *JOURNAL OF ENERGY & ENVIRONMENTAL LAW* (2013): 46-66. Document. <http://faculty.uml.edu/sgallagher/Clean_Water_Act_case_study.pdf>.

Kimmins, J. P. (Hamish). *Forest Ecosystem Management: An Environmental Necessity, But Is It A Practical Reality Or Simply An Ecotopian Ideal?* 2003. University of British Columbia, Vancouver. 9 March 2018. <<http://www.fao.org/docrep/ARTICLE/WFC/XII/MS18-E.HTM>>.

Musgrave, Ruth. "Statute Summaries: NATIONAL FOREST MANAGEMENT ACT OF 1976 ." Institutes, Government. *Federal Wildlife Laws Handbook with Related Laws*. 1. Government Institutes, 1998.

Ramachandra, T.V. *Aquatic Ecosystems: Conservation, Restoration and Management*. 2005. 9 March 2018. <http://wgbis.ces.iisc.ernet.in/energy/water/paper/cons_res_mgmt/index.htm>.

Stanford L. Loeb, Anne Spacie. *Biological Monitoring of Aquatic Systems*. CRC Press, 1994.

The Federal Council. *CC 921.0 Federal Act of 4 October 1991 on Forest (Forest Act, ForA)*. 24 February 2018. Official Publications Centre. 10 March 2018. <<https://www.admin.ch/opc/en/classified-compilation/19910255/index.html#>>.

Yude Pan, A Richard Birdsey, Oliver L. Phillips, Robert B. Jackson. "The Structure, Distribution, and Biomass of the World's Forests." *Annual Review of Ecology, Evolution, and Systematics* 44 (2013):

593-622.