

Benefits and Functions of Wetlands

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Even now our understanding of the complexities of wetland ecosystems is still developing, and it seems the more we learn, the more valuable wetlands become. Wetland ecologists have already documented the following environmental **benefits of wetlands: water purification, flood protection, shoreline stabilization, groundwater recharge, and streamflow maintenance.** Wetlands also provide habitat for fish and wildlife, including endangered species. Not all wetlands provide all of these benefits, and how your particular wetland works depends on its location and its type. What follows is a simple summary of how wetlands perform their complicated functions, along with a brief explanation of how these functions support humans and other species.

Wetland Functions

Wetlands are among the most productive ecosystems in the world, comparable to rain forests and coral reefs. An immense variety of species of microbes, plants, insects, amphibians, reptiles, birds, fish and mammals can be part of a wetland ecosystem. Physical and chemical features such as climate, landscape shape (topology), geology and the movement and abundance of water help to determine the plants and animals that inhabit each wetland. The complex, dynamic relationships among the organisms inhabiting the wetland environment are referred to as food webs. This is why wetlands in Texas, North Carolina and Alaska differ from one another.

Wetlands can be thought of as "biological supermarkets." They provide great volumes of food that attract many animal species. These animals use wetlands for part of or all of their life-cycle. Dead plant leaves and stems break down in the water to form small particles of organic material called "detritus." This enriched material feeds many small aquatic insects, shellfish and small fish that are food for larger predatory fish, reptiles, amphibians, birds and mammals.

The functions of a wetland and the values of these functions to human society depend on a complex set of relationships between the wetland and the other ecosystems in the watershed. A watershed is a geographic area in which water, sediments and dissolved materials drain from higher elevations to a common low-lying outlet or basin or a point on a larger stream, lake, underlying aquifer or estuary.

Wetlands play an integral role in the ecology of the watershed. The combination of shallow water, high levels of nutrients and primary productivity is ideal for the development of organisms that form the base of the food web and feed many species of fish, amphibians, shellfish and insects. Many species of birds and mammals rely on wetlands for food, water and shelter, especially during migration and breeding.

Watershed: An area of land that drains water, sediment and dissolved materials to a common receiving body or outlet. The term is not restricted to surface water runoff and includes interactions with subsurface water. Watersheds vary from the largest river basins to just acres or less in size. http://cfpub.epa.gov/watertrain/moduleFrame.cfm?parent_object_id=516&object_id=516#516

Environmental benefits of wetlands:

Water Purification

Wetlands protect water quality by trapping sediments and retaining excess nutrients and other pollutants. These functions are especially important when a wetland is connected to groundwater or surface water sources (**such as rivers and lakes**) that are in turn used by humans for drinking, swimming, fishing, or other activities. These same functions are also critical for the fish and other wildlife that inhabit these waters.

Sediments, nutrients, and toxic chemicals enter wetlands primarily by way of "runoff," a term used to describe the rain and stormwater that travels over land surfaces on its way to receiving waters. **In urban areas, runoff washes over buildings and streets in industrial, commercial, and residential areas where it picks up pollutants and carries them to other bodies of water. In rural areas, agricultural and forest practices can affect runoff. Runoff may carry pesticides and fertilizers if these have been applied to the land.**

Flood Protection

Almost any wetland can provide some measure of flood protection by holding the excess runoff after a storm, and then releasing it slowly. The size, shape, location, and soil type of a wetland determine its capacity to reduce local and downstream flooding. While wetlands cannot prevent flooding, they do lower flood peaks by temporarily holding water and by slowing the water's velocity. **Wetland soil acts as a sponge**, holding much more water than other soil types. Even isolated wetlands can reduce local flooding -- if the wetlands were not there to hold stormwater runoff, backyards and basements might end up under water.

Shoreline Stabilization

Wetlands that occur along the shoreline of lakes or along the banks of rivers and streams help protect the shoreline soils from the erosive forces of waves and currents. The wetland plants act as a buffer zone by dissipating the water's energy and providing stability by binding the soils with their extensive root systems.

Groundwater Recharge and Streamflow Maintenance

Aquifers and groundwater are "recharged," that is, replenished with water by precipitation that seeps into the ground and by surface waters. Those wetlands connected to groundwater systems or aquifers are important areas for groundwater exchange. They retain water and so provide time for infiltration to occur. Groundwater, in turn, provides water for drinking, irrigation, and maintenance of streamflow and lake and reservoir levels. During periods of low streamflow (or low lake water levels), the slow discharge of groundwater often helps maintain minimum water levels. In addition, wetlands located along streams, lakes, and reservoirs may release stored water directly into these systems, thus also contributing to their maintenance. Wetlands' many intricate connections with groundwater, streamflow, and lake and reservoir water levels make them essential in the proper functioning of the hydrologic cycle.

Fish and Wildlife Habitat

Many species of birds, fish, mammals, reptiles, and amphibians rely on wetland habitat for breeding, foraging, and cover. The special wetland conditions provide unique habitat for species that cannot survive elsewhere. Migratory birds depend on wetlands, and many endangered and threatened animal species require wetlands during part of their life cycle. The incredibly high rate of wetlands loss has contributed to their demise.

Wetland plants and small animals -- especially insects -- are essential links at the lowest levels of the food chain. A wetlands environment supports these plants and animals, which in turn support the larger animals that feed on them. While an otter or a trout may be a more attractive species to protect than some anonymous insect or plant, the latter are no less important in the overall scheme. If we diminish the lowest levels of the food chain, the higher levels will suffer as well.

Economic Benefits

The economic benefits associated with these environmental values of wetlands also can be substantial. If, for example, a community had to build flood control or water treatment systems to replace those functions provided by wetlands, the costs could far outweigh the land purchase price of preserving the natural wetland systems. Similarly, when wetlands lose their value as fish habitat, this value is difficult to replace, and the consequent losses to the recreational and commercial fishing industries can be significant. There are as yet no precise formulas that we can use to determine the accurate dollar value per acre of wetland, but the more we learn about wetlands, the higher that value becomes.

Other Benefits

Some of the values associated with your wetland will be yours and yours alone. No one else can really say what the open space means to you and your family. How your wetland affects your quality of life, and how you value it for its aesthetic contributions are personal matters. You or members of your family may also get recreational benefits from your wetland -- nature photography or birding or simply quiet time in a peaceful place.

If we want wetlands to continue to perform their ecological functions, then we have to do our part to protect them.