

Functions and Values of Wetlands

[This information is excerpted from Chapter 2 of "[At Home with Wetlands - A Landowner's Guide](#)".

Wetlands perform a dazzling array of ecological functions that we have only recently begun to appreciate. A century ago the president of the American Health Association promoted the idea of a national campaign to eliminate wetlands. Today, scientists recognize the environmental benefits that wetlands provide, and they are now alerting us to the importance of preserving rather than eliminating our wetland resources. Your wetland is likely performing vital ecological functions that were barely recognized a few short years ago.



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.

Water Purification

Wetlands protect water quality by trapping sediments and retaining excess nutrients and other pollutants such as heavy metals. 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 receiving waters, such as Puget Sound. In rural areas, agricultural and forest practices can affect runoff. Where the runoff drains a freshly-plowed field or clear-cut area, it may carry too much sediment. Runoff may carry pesticides and fertilizers if these have been applied to the land.

Sediments, which are particles of soil, settle into the gravel of streambeds and disrupt or prevent fish from spawning, and can smother fish eggs. Other pollutants -- notably heavy metals -- are often attached to sediments and present the potential for further water contamination. Wetlands remove these pollutants by trapping the sediments and holding them. The slow velocity of water in wetlands allows the sediments to settle to the bottom where wetland plants hold the accumulated sediments in place.

Runoff waters often carry nutrients that can cause water quality problems. An example of such an occurrence is an "algae bloom." Besides the aesthetic problems associated with algae blooms (a green, smelly slime) they result in low levels of oxygen in the water. This oxygen depletion can result in the death of fish and other aquatic life. Some algae release toxins that can kill pets and livestock when bloom conditions occur. Wetlands protect surface waters from the problems of nutrient overload by removing the excess nutrients, some of which are taken up and used by wetland plants, and some of which are converted to less harmful chemical forms in the soil.

Toxic chemicals reach surface waters in the same way as nutrients, and can cause disease, death, or other problems upon exposure to plants and animals (including humans). In a function similar to nutrient removal, wetlands trap and bury these chemicals or may even convert some of them to less harmful forms. Scientists are continuing to study what happens to toxic chemicals when they enter wetlands, and they warn us that even if the toxins are buried, they are still potentially dangerous. Disruptions of the wetland soils could release the toxins back into the aquatic environment.

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.

The Limits of Wetlands

As amazing as wetlands are, and for all their ecological contributions, they do have their limits. A partially filled or otherwise damaged wetland is one that only partially meets its potential for flood control, shoreline stabilization, or groundwater recharge. A badly degraded wetland can lose its capacity to remove excess sediments, nutrients, and other pollutants, and can lose its habitat value for fish and wildlife. Wetlands may have tremendous capacities to provide environmental benefits, but they are not indestructible. If we want wetlands to continue to perform their ecological functions, then we have to do our part to protect them.