



A wetland ethic?

Aldo Leopold (1949) encouraged a **land ethic**, wherein people would choose to live in harmony with the land in order to sustain natural resources. Much later, Jim Bohnsack (2003), a NOAA Fisheries Manager, advocated an **ocean ethic** to gain support for marine reserves to protect ocean fisheries, concluding that "Marine reserves not only protect marine resources but can help restore human expectations and provide a basis for new conservation ethics by providing a window to the past and a vision for the future."

Do we also need a **wetland ethic**? Yes, even though Leopold wrote comprehensively about the "land." Wetlands differ from both the drier land and the deeper waters in providing far more ecosystem services per area. Those services include biodiversity support, water quality improvement, flood abatement and carbon storage, plus esthetic, recreational, educational and scientific values.

What sets wetlands apart from drier lands and deeper waters is the amount of services provided per area (data in Costanza et al. 2014). Thanks to wetlands, the earth supports more biodiversity. And thanks to large wetlands, floodwaters are detained and absorbed, protecting downstream lands. Wetlands provide disproportionately more services, in large part by collecting water and materials from uplands and accumulating, storing, and transforming a wide variety of materials, then discharging cleaner water. Often called "nature's kidneys," wetland vegetation and soils remove both organic and inorganic matter. As wetlands accumulate sediment, they become flat, and water flows slowly. The ecosystem **processes more materials** where water-residence times are prolonged.

The ability of wetlands to remove nitrogen is especially notable. Wetland bacteria convert nitrate to harmless nitrogen gas (which makes up ~80% of the air we breathe). We call the amazing bacteria that are responsible, **denitrifiers**. A bit like Goldilocks, denitrifiers cannot do their job where soils have *too much* oxygen, as in uplands, or *too little* oxygen, as in deep waters. **Wetland conditions are just right**. Our wetlands are denitrification powerhouses that make downstream water safer for drinking. Given more and larger wetlands, all of these services could further improve human well-being.

Is a wetland ethic necessary? Yes. First, the lower 48 states have lost half their wetland area. Wetlands warrant extra protection for their high efficiency—providing more services per area while occupying <10% of earth's land area (Zedler and Kercher 2005). The loss of half our wetland area simultaneously eliminated their services.



Photo: Cal DeWitt

Second, we are not fully protecting or restoring our remaining wetlands. While the US Clean Water Act protects some wetlands from filling and discharges of pollutants, the regulations apply only to a subset, called *jurisdictional* wetlands. Ecologists and the US Fish and Wildlife Service consider a broader range of habitats to be wetlands. So, laws do not protect all wetlands. Nor do regulations reduce damages enough to sustain historical wetland services. And even where regulations are set, the management measures are not monitored to enforce regulations. Because the law protects only a subset, the damages regulated are only a subset, and regulations that are enforced are only a subset, the overall outcomes fall short of adequate protection.

Aldo Leopold said, "The land relation is still strictly economic, entailing privileges but no obligations." He went on to criticize the "clear tendency in American conservation to relegate to government all necessary jobs that private landowners fail to perform". Instead Leopold called for "a land ethic, or some other force which assigns more obligation to the private landowner." He argued that "a system of conservation based solely on economic self-interest is hopelessly lopsided. It tends to ignore, and thus eventually to eliminate, many elements in the land community that lack commercial value, but that are (as far as we know) essential to its healthy functioning.It tends to relegate to government many functions eventually too large, too complex, or too widely dispersed to be performed by government." He concluded that, "An ethical obligation on the part of the private owner is the only visible remedy for these situations."

Leopold also said that an ethic evolves; it is not written. Thus, a wetland ethic need not be restricted to private landowners or even to landowners. All people in all organizations benefit from wetlands; in return we can all respect wetlands and facilitate their ecosystem services. Here are four ways to facilitate the evolution of a wetland ethic: (1) acknowledge that wetlands provide multiple functions that enhance human-well being at rates far greater than their global area indicates; (2) accept obligations along with benefits of wetlands; (3) support conservation and restoration of wetland biota and natural functions for posterity; and (4) realize that watersheds upstream will also need restoration, in order for downstream wetlands to be more restorable.

A wetland ethic would foster understanding that protection means more than setting regulations and promising enforcement. A wetland ethic would add voluntary responsibility for ecosystems because they provide services well beyond the small area of earth that they occupy. At the same time, wetland restoration efforts could expand and strengthen.

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