

Peatlands

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A peatland is a type of wetland that is underlain by peat in various stages of decay (Figure 1). Like all wetlands, in peatlands the soil (in this case, peat), is saturated with water.

Peat

Peat is partially decomposed organic matter containing mostly plant materials, lesser amounts of animal remains, and typically a large percentage of water (Figure 1). In a peatland, a short distance under the surface, oxygen is absent inhibiting the rate of decay. In upland soils, on the other hand, there is plenty of oxygen for decay. Because there is plenty of available oxygen for fungi, bacteria and actinomycetes to do their work dead plant and animal litter is constantly broken down within a few years' time, and therefore in the upland peat does not accumulate.



Figure 1: Peat in varying stages of decay (Geology.com, 2012).

In peatlands the rate of accumulation of plant material exceeds the rate of its decomposition because there is not enough dissolved oxygen present in the water-saturated peat for most decay organisms to thrive. Each year dead plant and animal material accumulates and decays slowly and incompletely. In Figure 1, remnants of twigs, moss and other plant material are still visible in the peat. This process of partial decomposition and accumulation builds up thick layers of peat over thousands of years. The accumulation of peat also impedes the movement of dissolved oxygen in water thus creating a reciprocating cycle which supports the continuation of more peat accumulation.

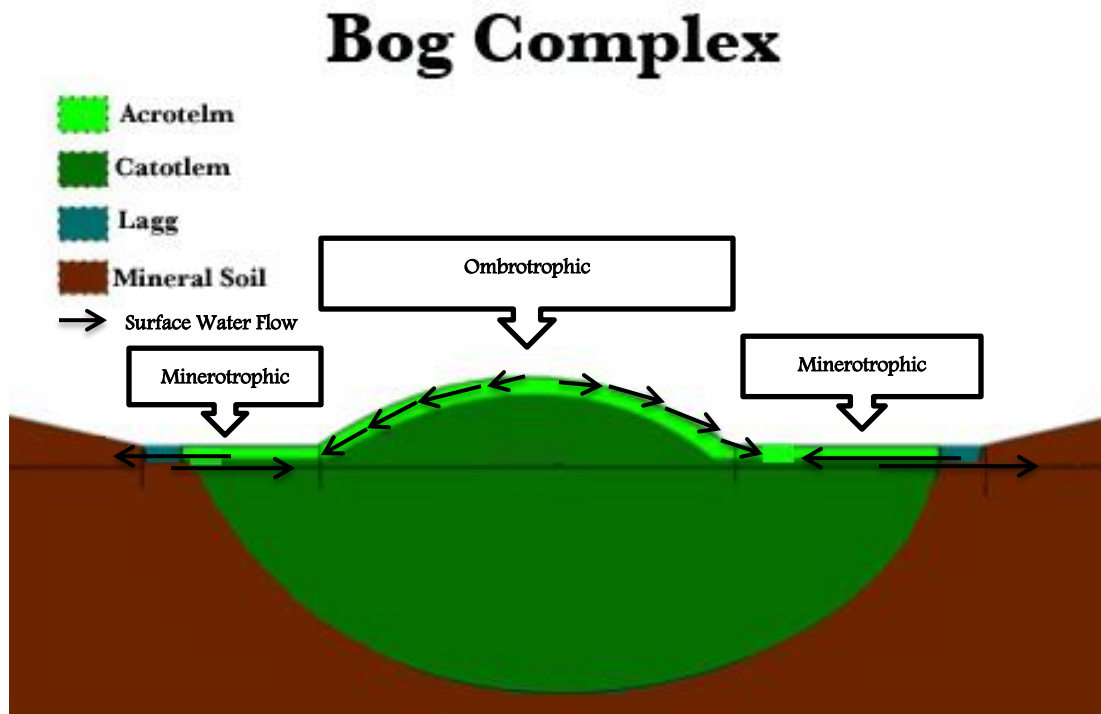


Figure 2: Raised Bog Complex, denoting peat layers and habitat type (Modified from Beebe, 2008).

The layer of peat closest to the surface of the peatland is the acrotelm. The acrotelm is typically limited to the top 4-24 inches of peat, and primary decomposers there are fungi. Because there is some water movement and drying of the peat in this layer there is also some available oxygen for decomposers. However, the peat is still only partially decomposed in this layer before another year of dead plant material accumulates. Under the acrotelm is the catotelm (Figure 2). In the catotelm the peat is permanently water-saturated, inhibiting the movement of oxygen from above. Water movement is very slow and oxygen from above cannot penetrate. Here, the peat is broken down only very slowly by anaerobic bacteria. The accumulation of partially decomposed material has been occurring at Orono Bog for about 10,000 years. Peat at Orono Bog is 25 feet deep in some places.

Difference between Minerotrophic and Ombrotrophic

Peatlands surfaces that are supplied by water carrying minerals from surrounding or underlying mineral soil are called minerotrophic. Peatland surfaces that are supplied only with only rain and snow are called ombrotrophic. Generally minerotrophic surfaces are more fertile for plant growth.

Peatlands that are entirely minerotrophic are called fens. Peatlands containing areas that are ombrotrophic, usually at the center, are called bogs. Virtually all bogs are “bog complexes” because the peripheral areas adjacent to mineral soil uplands are minerotrophic. The minerotrophic areas of a bog complex have fen like vegetation.

Orono Bog is a bog complex. The center of the bog complex is higher than the edges. The center is ombrotrophic, and the edges are minerotrophic (Figure 2). The minerotrophic area is surrounded by a lagg. A lagg is a very wet zone similar to a moat, which surrounds a castle, only in this case the lagg surrounds much of the bog complex. At Orono Bog the lagg drains the entire bog complex and exist towards Pushaw Lake to the northwest. In very dry seasons the lagg will dry down to standing pools. When upland soils become saturated with water the excess water and soil mineral nutrients will drain into lower lying areas of the landscape. Upland soils drain into the lagg and eventually move into the minerotrophic areas of the bog complex. The plants growing in minerotrophic zones have access to these mineral nutrients, but the plants in the ombrotrophic center do not. The raised landscape makes mineral nutrients inaccessible to plant roots in the ombrotrophic zone, because surface water doesn't flow uphill. Because of the raised topography, exchange of mineral nutrients occurs in limited quantities from the atmosphere only. Because the ombrotrophic zone is fed by precipitation events: rain, fog, mist, snow, and on occasion from wind in the form of soil particles, mineral nutrients are extremely limited, which makes them also nutrient poor.

References

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