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СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ
КАФЕДРА ІНОЗЕМНИХ МОВ
ЛІНГВІСТИЧНИЙ НАВЧАЛЬНО-МЕТОДИЧНИЙ ЦЕНТР

МАТЕРІАЛИ

VIII МІЖВУЗІВСЬКОЇ НАУКОВО-ПРАКТИЧНОЇ

КОНФЕРЕНЦІЇ

ЛІНГВІСТИЧНОГО НАВЧАЛЬНО-МЕТОДИЧНОГО ЦЕНТРУ

КАФЕДРИ ІНОЗЕМНИХ МОВ

“TO LIVE IN A SAFER WORLD”

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EUTROPHICATION

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The process of eutrophication is natural. For many lakes, as they age over centuries, there is a buildup of nutrients, sediment, and plant material, which slowly fill the lake basin. Eventually, the process ends and the basin becomes colonized by terrestrial vegetation. The timing of natural eutrophication is highly variable and depends on the characteristics of the basin, watershed, and climate.

Pristine aquatic ecosystems function in approximate steady state in which primary production of new plant biomass is sustained by Nitrates and Phosphates released as byproducts of microbial and animal metabolism. This balanced state can be disrupted by human activities that artificially enrich water bodies with N and P, resulting in unnaturally high rates of plant production and accumulation of organic matter that can degrade water and habitat quality. These inputs may come from untreated sewage discharges, sewage treatment plants or runoff of fertilizer from farm fields or suburban lawns. In some cases the climax stage of algae blooms can release toxic chemicals such as acid to the aquatic environment, creating elevated metabolic risks to a variety of fish and marine mammals.

Depending on the degree of eutrophication, severe environmental effects can develop, which degrade water quality. For example, increased phytoplankton biomass can decrease clarity, reduce levels of light, and decrease levels of oxygen, all of which ultimately have negative consequences for organisms that live in the lake.

One more negative impact of eutrophication and increased algae growth is a loss of available oxygen, known as anoxia. These anoxic conditions can kill fish and other aquatic organisms such as amphibians. However, how does eutrophication actually lower oxygen levels when it is common knowledge algae produce oxygen? It is true algae produce oxygen, but only when there is enough light. Eutrophication reduces the clarity of water and underwater light. In

eutrophic lakes, algae are starved for light. When algae don't have enough light they stop producing oxygen and in turn begin consuming oxygen. Moreover, when the large blooms of algae begin to die, bacterial decomposers further deplete the levels of oxygen. As a result, eutrophication can quickly remove much of the oxygen from a lake, leading to an anoxic — and lethal — underwater environment.

The progression of eutrophication events for ponds and lakes can eventually create detritus layers that produce successively shallower depths of surface waters. Eventually the water body can be reduced to a marsh or bog, whose plant community is transformed from an aquatic environment to a recognisable terrestrial ecosystem. While this system may first emerge as a plant succession of marsh grasses and related aquatic forbs, the community may evolve to be more of a bog or fen, and finally a vernal pool or meadow. This progression can clearly spawn radical changes in the entire ecosystem, which began as an aquatic habitat, and has been transformed into a fully terrestrial community, albeit inhabited by a number of mesic plants and water oriented animals such as amphibians.

Laws and regulations have been established that support high water quality standards. Often they specifically limit nitrogen and phosphorus inputs, simply because the effects of eutrophication, though reversible, can be quite devastating. Lakes with lower nutrients have lower algae concentrations, are generally clear, and are considered to be high-quality water resources and recreational sites. However, the management of these resources includes a complex set of interactions from within system processes to watershed interactions to even larger, global issues. Therefore, the continued effort to control eutrophication will require ongoing cooperation of citizens, scientists, managers, and policy makers.