

Limnological Importance of Aquatic Biota

In most aquatic food chains, the community interactions are often controlled by abiotic factors or predation at higher levels of food chain. The control of primary production by abiotic factors such as nutrients is called “bottom-up control”. The control of primary production by the upper levels of food chain is referred to as “top-down control”.

Bottom-up control

The bottom-up hypothesis requires that the biomass of all trophic levels is positively correlated and depend on fertility (limiting resources) of the habitat

More available nutrients → more algae → more zooplankton → more planktivorous fish → More piscivorous fish (Fish eating or carnivorous fish).

Top-down Control

The top-down hypothesis predicts, however, that the adjacent trophic levels will be negatively correlated.

More piscivorous fish → fewer planktivorous fish → more zooplankton → fewer phytoplankton → more available nutrients .

So the above two hypotheses determine the following characteristics of water body such as

1. Changes in the species composition of the aquatic communities,
2. Changes in the dominant groups of organisms in a habitat,
3. Impoverishment (poor or diminish) of species,
4. High mortality of sensitive life stages (larvae and eggs),
5. Mortality in the whole population,
6. Changes in the behaviour of the organisms,
7. Changes in the physiological metabolism, and
8. Histological changes and morphological deformities.

Factors Affecting Aquatic Biota

The general effects of anthropogenic activities on ecosystems,

1. The presence and effects of common pollution issues (eutrophication, toxic organic chemicals, toxic metals, industrial inputs),
2. Common features of deleterious changes in the aquatic communities,
3. Pollutant transformation in water and in the organisms,
4. Long-term effect of substances in the water bodies (biomagnification and bioaccumulation),
5. Condition resulting from waste disposal and of the character and dispersion of wastewaters,
6. The dispersion of atmospheric pollution (acidification arising from wet and dry deposition of acid-forming compounds),
7. The effects of hydrological control regimes (impoundments),
8. The effectiveness of environmental protection measures, and
9. The toxicity of substances under controlled, defined laboratory conditions, (i.e. acute or chronic toxicity, genotoxicity or mutagenicity (gene abberations or mutation