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Eutrophication

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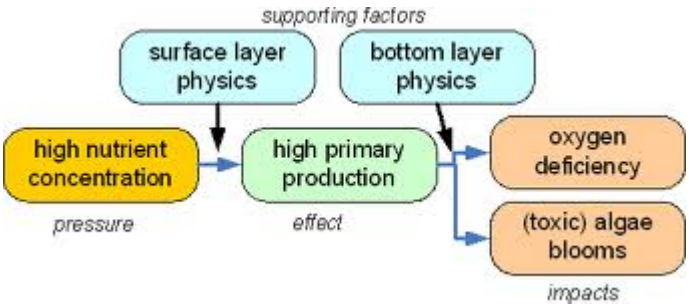
What is Eutrophication?
The addition of artificial or natural substances, such as nitrates and phosphates, through fertilizers or sewage, to an aquatic system is called as Eutrophication. It refers to the effects of nutrients on aquatic ecosystems. Great increase of phytoplankton in a water body is observed.

Can you understand the cycle below?

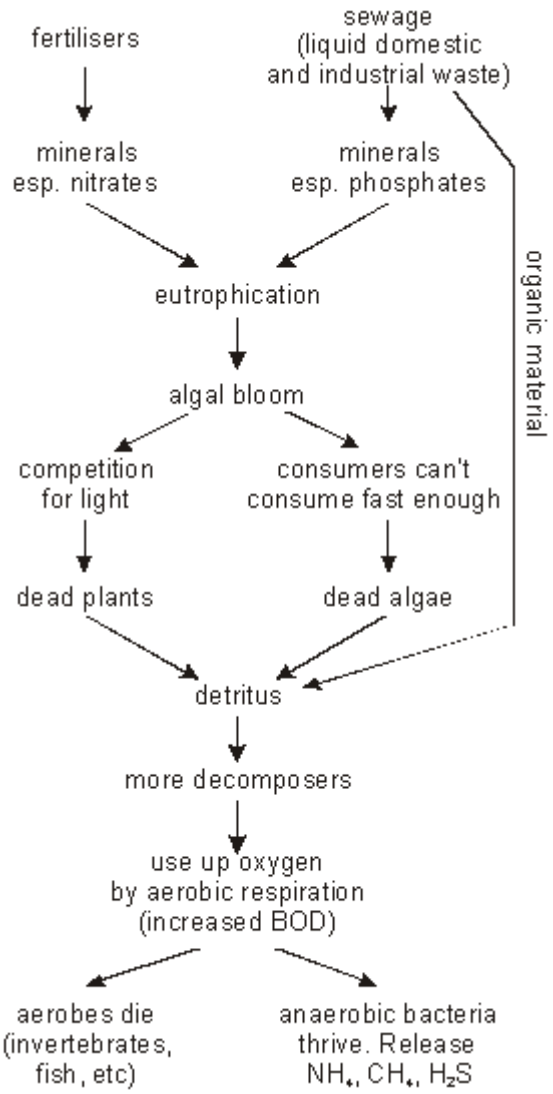
Oligotrophic ? Eutrophic and sometimes ? Hypertrophic

The clean water with few nutrients and algae (Oligotropic) will change into to murky water with many nutrients and plants (Eutropic) and sometimes to a swamp with a mass of plants and detritus (Hypertrophic). This is a common example of succession.

A sudden and dramatic increase in nutrients due to human activity may disturb and destroy the food chain. The main causes are fertilizers washed out from farm fields by watering or rain into the nearby river, pond or other water source or sewage. The dissolved minerals present in the fertilizers will enrich the water.



Supporting Factors



Eutrophication Process

Normally availability of minerals limits the producers and a sudden increase causes a sudden increase in producer growth. Algae grow faster than larger plants and produce oxygen. This results in a well oxygenated ecosystem which enable fish to survive.

But because of the algae's fast growth it will compete with larger plants for light and cause death of plants. It is an abnormal condition. This will lead to a sudden increase in detritus. Sewage may also contain organic matter, which adds to the detritus.

In response to this reaction the decomposing microbes can multiply quickly, and being aerobic, they consume oxygen. This over-consumption can't immediately be replaced by photosynthesis or diffusion. So the decreased oxygen content leads to the death of aerobic animals and induces the growth of anaerobic bacteria. Toxic waste products would be released by these anaerobic bacteria. In such a "bloom" tens of thousands of fish can literally suffocate in the water due to lack of oxygen or die from the toxic waste of the bacteria.

Biochemical Oxygen Demand (BOD)

Measuring the rate of oxygen consumption by aerobic bacteria in a sample of water is called measuring the BOD. It is a good indication of eutrophication. The amount of oxygen that can dissolve in water is limited by physical conditions such as temperature and atmospheric pressure.

Calculating BOD:
A high BOD level ? Lots of organic material and aerobic microbes.

- O_2 concentration is measured in the sample water chosen by using an oxygen meter.
- The sample is kept in the dark for 5 days at 20°C
- O_2 is measured again.
- Original O_2 concentration – final O_2 concentration =BOD.
- Unpolluted natural waters will have a BOD of 5 mg/L or less.

Want to know more about the uses of Eutrophication?Click here to schedule live online session with e Tutor!

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Reference Links:

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