

Rayat Shikshan Sanstha's

D. P. Bhosale College, Koregaon
Department of Microbiology

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EUTROPHICATION

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EUTROPHICATION



DEPARTMENT OF MICROBIOLOGY

YEAR:2021-22

INTRODUCTION

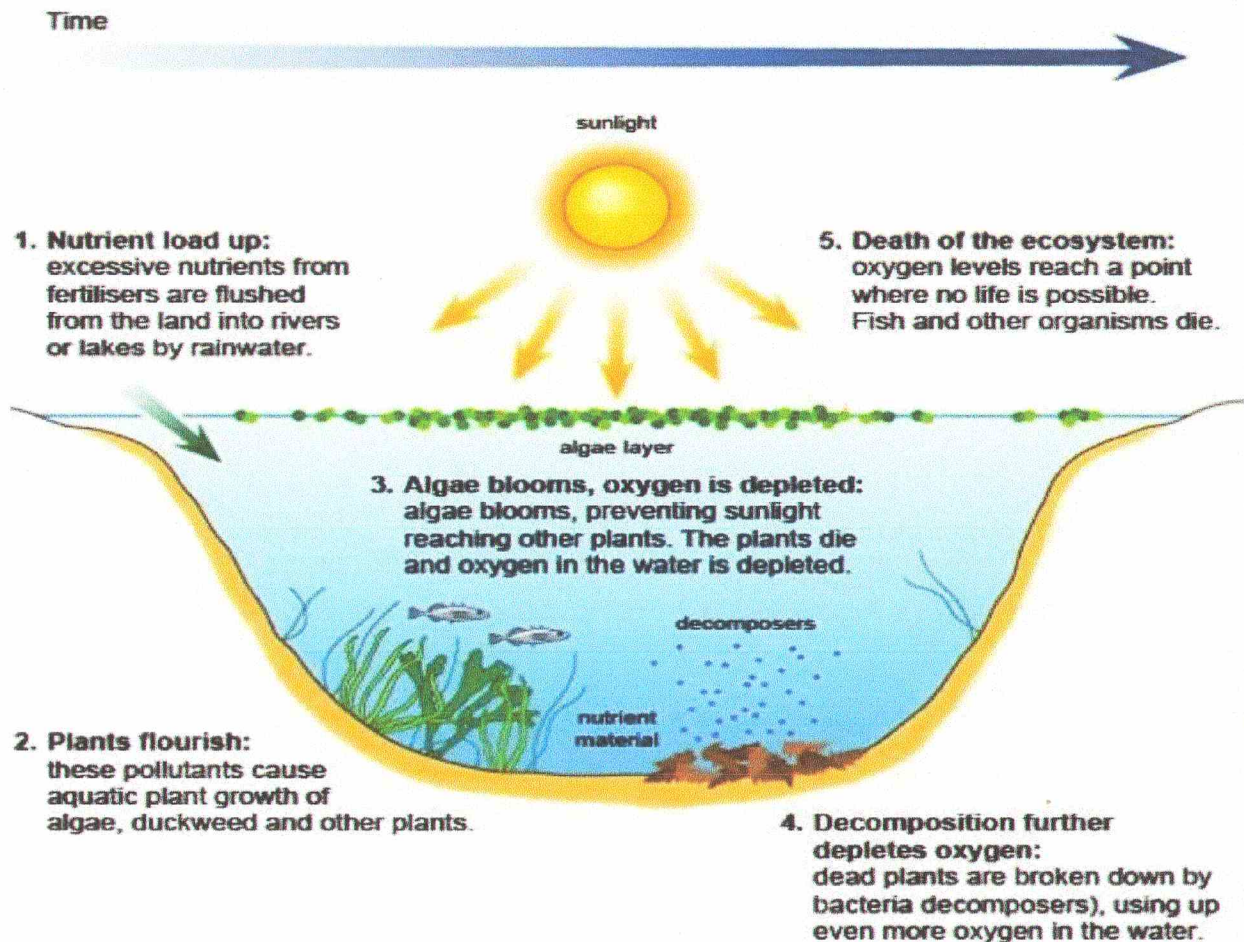
Eutrophication is characterized by excessive plant and algal growth due to the increased availability of one or more limiting growth factors needed for photosynthesis, such as sunlight, carbon dioxide, and nutrient fertilizers. Eutrophication occurs naturally over centuries as lakes age and are filled in with sediments.

In India, water hyacinth is creating a serious problem in polluting water bodies. These water hyacinth block the storage of clean water, inhibits growth of aquatic life, cattle and other animals are unable to use the water for drinking. In India, it is estimated that about 5 to 10 lac hector water surface is covered by hyacinth and other water weeds. So it is known as "Terror of Bengal".

Rivers are the most important sources in India, used for different purposes like drinking, water supply, irrigation and fisheries. The stagnant water bodies in the form of legs, manmade reservoirs and ponds are used by people for variety of purposes.



SOURCES OF NUTRIENTS

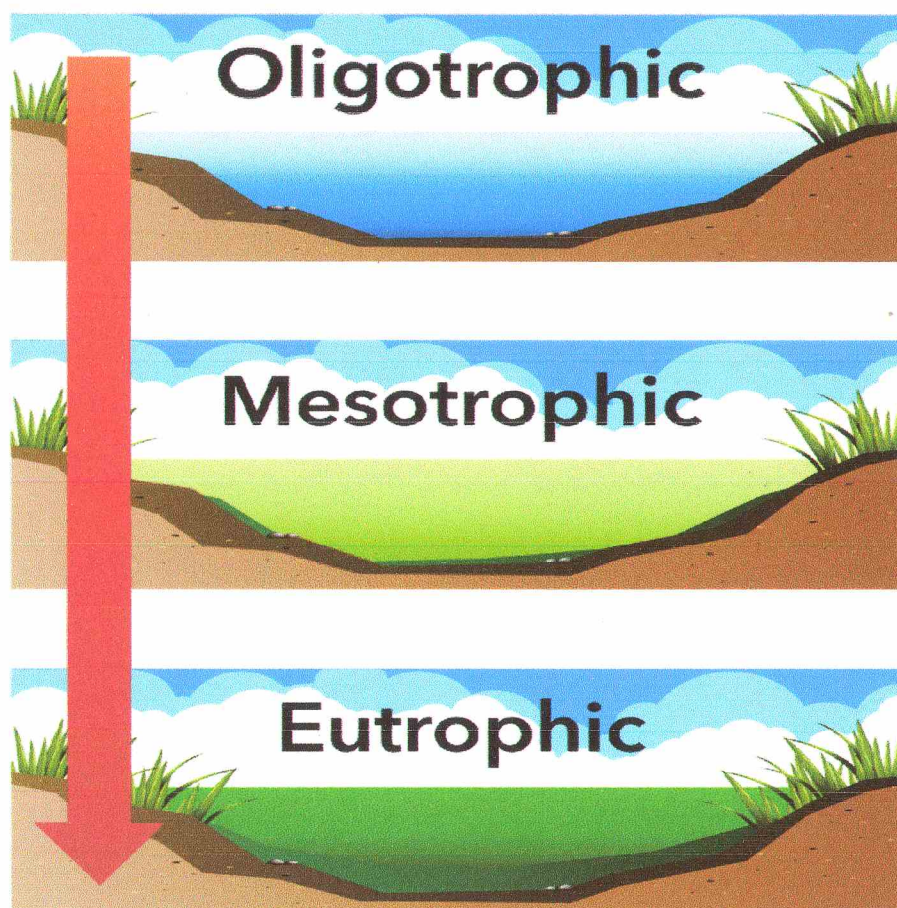


Rapid cutting of surrounding vegetation increases silt and nutrient flow, disposal of sewage, cultural activities, agriculture around water bodies and use of agrochemicals greatly increase the amount of nutrient and organic matter into the water body. Thus the lake starts getting eutrophic at the very early stage. Acid rain is one of the important source of nitrogen. Most of the fertilizers used in agriculture run off into water bodies. These stimulate algae and other aquatic plants.

PROCESS OF EUTROPHICATION

The lake or reservoirs may be either natural or manmade. During the early stage of their formation they are very deficient in the term of biolife. Such lakes are clean and young are referred to as oligotrophic lakes.

With the passage of time organic matter begins to accumulate in the lake. Biological productivity of such lakes also increases. The lake first become mesotrophic and finally it becomes eutrophic.



FACTORS SUPPORTING EUTROPHICATION

- Disposal of organic matter
- Debris in the lake
- Degradation of complex organic matter
- Released nutrients by bacteria
- presence of phosphates and nitrates

EFFECTS OF EUTROPHICATION

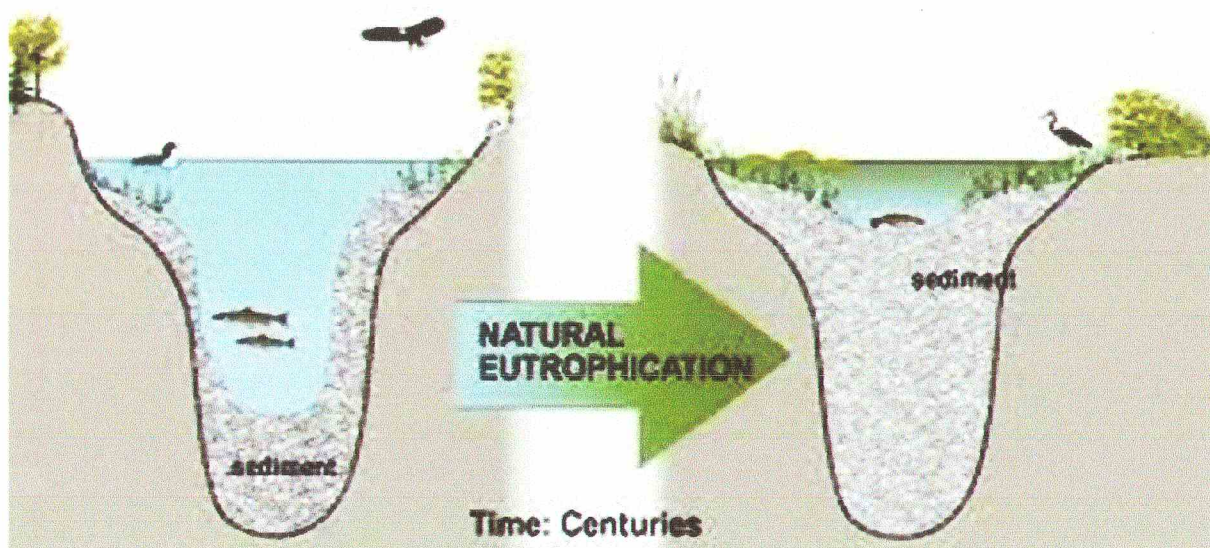
- Algae bloom releases toxic chemicals, which kills fishes, birds and other aquatic animals causing the water sink.
- It causes oxygen depletion in water and increases CO₂ level.
- Clean water turns into a stinking drain.
- H₂S causing foul smell.
- It gives putrefied test water.
- It spread fatal water born diseases such as polio, dysentery, diarrhoea, typhoid and viral hepatitis.
- O₂ deficient water destroying fish habitats.

Many detergent contains tripolyphosphates. These cut out light to other plants, reduce O_2 level and toxic to fishes and other vertebrates. The key nutrients which may cause eutrophication are phosphate and nitrate. Thus eutrophication is a natural process. Many lakes, ponds rich in nutrients converted to eutrophic lakes. It occurs as a part of the aging phenomenon of the lake due to accumulation of nutrients.

TYPES OF EUTROPHICATION

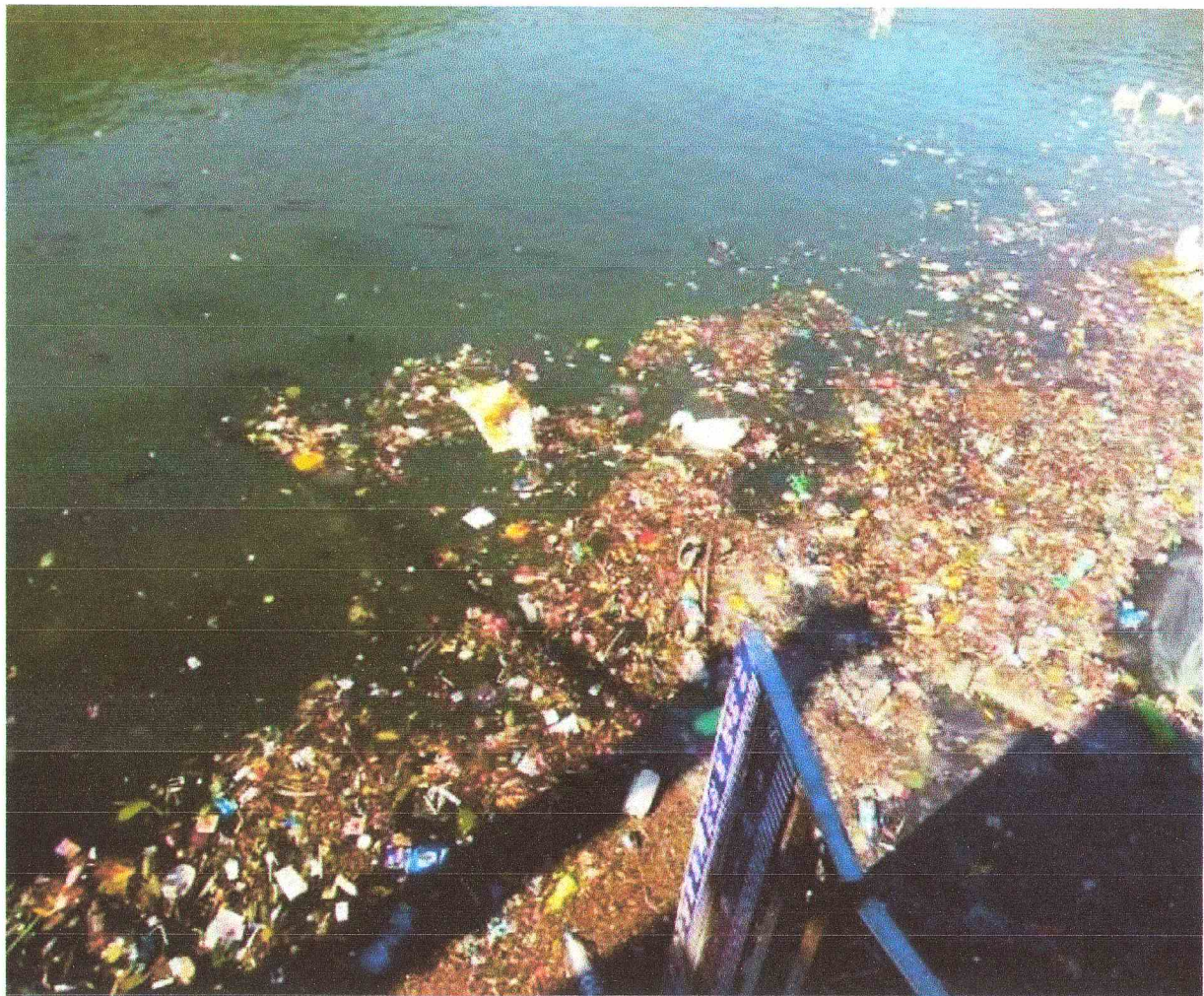
NATURAL EUTROPHICATION-

The process of lake aging characterised by nutrient enrichment is called natural eutrophication. During this process oligotrophic lake is converted to a eutrophic lake. It permits the production of phytoplankton, algal blooms, aquatic vegetation, water hyacinth, aquatic weeds, water fern and water lettuce which in turn provide ample food for herbivorous zooplankton and fishes.



CULTURAL EUTROPHICATION-

This is due to different human activities which are responsible for the addition of 80% nitrogen and 75% phosphorous to lakes. In India recreational value of Kashmir lake is reduced while Nainital lake is undergoing a rapid eutrophication due to human activities, sewage, domestic waste and detergent addition.



CONTROL OF EUTROPHICATION

- Waste water must be treated before discharge into water bodies.
- Removal of dissolved nutrients by chemically or physically.
- Removal of algae blooms and higher plants.
- Artificial inoculation of bacteria which compete with algae for their food. The microbes simply eat a contaminants such as oil and organic matter. The process degrade substances that are hazardous to human health.
- Removal of phosphates and nitrates.
- Dilution of nutrients in the lake by addition of no nutrient water.
- Diversion of nutrient rich effluents and prevent them from entering the lake.
- Inoculation of pollution tolerant high nutrient absorbing mutant algae and their subsequent removal.
- Water treatment with CuSO_4 and Na-arsenite.
- Setting up of natural food chain in the lake ecosystem. e.g- Fishes
- Biomanipulation- It involves action of organism to control the growth of unwanted plants.