

Water pollution and its prevention assignment



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The Mississippi River encompasses 40% of the land area of US ; Lack of oxygen is deadly to bottom dwelling animals ; Nitrogen is a common limiting factor in coastal marine waters

17. 1 Water Pollution

Any material that causes pollution is called a pollutant I. Pollution Essential ; Pollutants are almost by-products of otherwise essential activities ; .

Many materials now widely used are nonprogrammable ; The general strategy for fighting pollution must be:

1. Identify the material or materials that are causing the pollution
2. Identify the sources Of the pollutants . Clean up the environment already impacted by pollution
4. Develop and implement pollution control strategies to prevent the pollutants from entering the environment
5. Develop and implement alternative means of meeting the need that do not produce the polluting by product II.

Water Pollution: Sources, Types, Criteria ; For purposes of regulation, it is customary to distinguish between point sources and nonpoint sources of pollutants ; Point sources involve the discharge of substances from factories, sewage systems, power plants, coal mines, and oil wells ; Two basic strategies are employed in attempting to bring water pollution under control:

- 1) reduce or remove the sources and
- 2) treat the water before it is released so as to remove pollutants or convert them to harmless forms A.

Pathogens Most serious water pollutants are the infectious agents that cause sickness and death ; Pathogens - disease causing bacteria, viruses and other parasitic organisms ; The following measures were important in controlling waterborne diseases:

1. Purification and disinfection of public water supplies with chlorine or other agents
- 2.

Sanitary collection and treatment of human and animal wastes 3.

Maintenance of sanitary standards in all facilities in which food is processed or prepared for public consumption 4. Instruction in personal and domestic hygiene practices Largely because of poor sanitation regarding water and sewage, a significant portion of the world's population is chronically infected with various pathogens B.

Organic Waste When bacteria and detritus feeders decompose organic matter in water, they consume oxygen gas dissolved in the water ; Bacteria keep the water depleted in DO as long as there is dead organic matter to support their growth and oxygen replenishment is inadequate ; Biochemical oxygen demand is a measure Of the amount Of organic material in water, in terms Of how much oxygen will be required to break it down biologically, chemically, or both ; If the system goes anaerobic, only bacteria can survive, using their abilities to switch to fermentation or anaerobic respiration C.

Chemical Pollutants ; The organic chemicals are another group of substances found in polluted waters ; Many of these pollutants are toxic even at low concentrations ; At higher concentrations, they can change the properties of bodies of water so as to prevent them from serving any useful purpose except navigation D. Sediments ; Sediments have direct and extreme physical impacts on streams and rivers ; Sediment entering waterways in large amounts has an array of impacts Modern storm-water management is designed to reduce the bed load E.

Nutrients ; More nutrients mean more plant growth, so nutrients become water pollutants when they are added from point or nonpoint sources and

stimulate undesirable plant growth in bodies of water F. Water Quality Standards ; The EPA has listed 167 chemicals and substances as criteria pollutants ; Two important applications Of water quality criteria are the National pollution Discharge Elimination System and Total Maximum Daily Load programs 17. 2 Wastewater Management and Treatment ; Sewage borne bacteria were responsible to infectious diseases .

Development of Wastewater Collection and Treatment System ; To alleviate the problem of sewage-polluted waterways, facilities were designed and constructed to treat the outflow before it entered the receiving waterway ; Gradually, regulations were passed requiring municipalities to install separate systems-?? storm drains for collecting and draining runoff from precipitation and sanitary sewers to receive all wastewater II. The Pollutants in Raw Wastewater ; The total mixture of water collected from all drains is called raw sewage.

It mostly consists of water ; The pollutants in raw sewage are usually divided into four categories which correspond to the techniques used to remove them: 1. Debris and grit: bags, coarse sand, gravel, other objects 2. Particulate organic material: fecal matter, food wastes, toilet paper 3. Colloidal and dissolved organic material: very fine particles of particulate organic material, bacteria, urine, soap, detergent 4. Dissolved inorganic material: nitrogen, phosphorous, nutrients III. Removing the Pollutants from Waste term The challenge of treating wastewater is more than installing a technology A.

Preliminary ; Removing debris and grit is called preliminary treatment Debris is removed by letting raw sewage flow through a bar screen B. Primary Treatment (Removal Of particular Organic Material) ; After preliminary treatment, the water moves onto primary treatment, where it flows very slowly through large tanks called primary clarifies ; At the same time, fatty or oily material floats to the top, where it is skimmed from the surface ; All the material that is removed is combined into raw sludge which is treated separately C.

Secondary Treatment (Removal of colloidal and Dissolved Organic Materials) ; Secondary treatment uses natural decomposer and detritus feeders The wastewater from primary treatment is a food- and water-rich medium for the decomposer and detritus feeders ; As the organisms feed on each other, they tend to form into clumps, called flocs D.

Biological Nutrient Removal (Removal of Dissolved Inorganic Material) ; In the natural nitrogen cycle, various bacteria convert nutrient forms of nitrogen back to non iterative nitrogen gas in the atmosphere through denitrification ; Phosphate is removed as excess organisms are removed from the system E.

Final Cleansing and Disinfection ; With or without chlorine, wastewater is subjected to a final clarification and disinfection IV- Treatment of Sludge ; Pathogens are certain to be present in raw sludge because it includes organic material ; The commonly used methods for treating sludge and converting it into Organic fertilizer are anaerobic digestion A. Anaerobic Digestion ; Anaerobic digestion is a process of allowing bacteria to feed on

the detritus in the absence of oxygen ; Because of its methane content, biogas is flammable and can be burned for fuel B.

Composition Raw sludge is mixed with wood chips to reduce the water content ; Bacteria and other decomposer break down the organic material to rich humus like material that makes an excellent treatment for poor soil C.

Bastardization ; After the raw sludge is dewatered, the resulting sludge cake may be put through ovens that operate like oversized laundry dryers. In the dryers, the sludge is pastured ; The product is dry, odorless organic pellets V.

Alternative Treatment Systems A. On-site Wastewater Treatment Systems ; Wastewater flows into the tank, where particulate organic matter settles to the bottom ; Soil bacteria decompose the colloidal and dissolved organic material that comes through the leaching field B. Using Effluents for Irrigation ; The nutrient-rich water coming from the standard secondary-treatment process is beneficial for growing plants ; It can be used for irrigation.

However, it is important to ensure that it has been properly treated C.

Reconstructed Wetland Systems ; In treating wastewater, it is also possible to make use of the nutrient absorbing capacity of wetlands in suitable areas and under existentialistic conditions ; Many aquatic systems are simply not able to act like wetlands ND absorb extra nutrients without a major change in ecosystem function ; This response is called transportation 17. 3

Transportation ; Atrophic means well nourished I.

Different Kinds of Aquatic Plants Benthic plants are aquatic plants that grow attached to, or are rooted in, the bottom of a body of water ; Benthic plants

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may be categorized as submerged aquatic vegetation, which generally grows totally under water, or emergent vegetation, which grows with the lower parts in water but the upper parts emerging from the water ; Phytoplankton consists of numerous species of photosynthetic algae, protozoa, and chlorophyll-containing bacteria ; Phytoplankton reach high densities only in nutrient-rich water II.

The Impacts of Nutrient Enrichment ; A lake in which light penetrates deeply is oligotrophic ; Benthic plants support the rest of a diverse aquatic ecosystem by providing food, habitats, and dissolved oxygen A. Transportation ; As the water of an oligotrophic body becomes enriched with nutrients, numerous changes are set in motion ; Phytoplankton soon reach a maximum population density, and continuing growth and reproduction are balanced by die-off ; Transportation refers to the whole sequence of events, starting with underachievement B.

Transportation of Shallow Lakes and Ponds ; In lakes and ponds whose water depth is 6 feet or less, transportation takes a somewhat different course ; As the mats of vegetation die and sink to the bottom, they create a BODY that often depletes the water of dissolved oxygen, causing the death of aquatic organisms C. Natural vs.. Cultural Transportation ; In nature, apart from human impacts, transportation is part of the process of natural succession ; The accelerated transportation caused by humans is called cultural transportation III.

Combating Transportation ; There are two approaches to combating the problem of cultural transportation A. Attacking the Symptoms ; Methods of

attacking the symptoms of transportation include 1 . Chemical treatments, 2. Aeration, 3. Harvesting aquatic weeds, and 4. Drawing water down ; Herbicides are often applied to ponds and lakes to control the growth of plants ; An aeration technique currently gaining in popularity is to lay a network of plastic tubes with microscopic pores on the bottom of the waterway to be treated ; Another option for shallow-water weed control is to draw the lake down for a period each year 8.

Getting at the Root Causes ; The first step is to identify the major point and nonpoint sources of nutrients and sediments. Then it is a matter of developing and implementing strategies for correction ; Bans on detergents with phosphate have brought improvements in waterways that were heavily damaged by the effluents from the plants ; Reducing or eliminating pollution from nonpoint sources will involve different strategies from different sources ; Once control measures have been put in place, the polluted body Of water must be monitored to determine whether water quality standards are being attained C.