

ENVIRONMENTAL IMPACTS ON MARINE POLLUTION

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Abstract: Marine Pollution can be defined as the introduction of substances to the marine environment directly or indirectly by man resulting in adverse effects such as hazards to sea lives, obstruction of marine activities and lowering the quality of sea water. The discharging of wastes into the sea from land side is one obvious reason in which the marine pollution may occur.

Pesticides and fertilizers from agriculture land which are washed off the land, enter into sea causes the pollution in the sea water. The washed off petroleum and oils from the roads enter into the sewage system and the storm water overflows carry these materials into rivers and finally into the sea.

Keywords: Marine Pollution, ship, pesticides, water.

1. INTRODUCTION

The cause of marine pollution may be similar to that of general water pollution; there are some very specific causes that pollute marine waters. Ship carries many toxic substances such as oil, liquefied natural gas, pesticides, industrial chemical etc in huge quantities. Ship accidents and accidental spillages at sea therefore can be very damaging to the marine environments. Shipping channels in estuaries and at the entrances to port often require frequent dredging to keep them open. This dredged material that may contain metals and also other contaminants which are often dumped out to sea. Offshore oil exploration and extraction also pollute the seawater to a larger extent.

2. POLLUTION DUE TO ORGANIC WASTES

The amount of oxygen dissolved in the water is vital for plants and animals living in it. Waste materials, which directly or indirectly affect the oxygen concentration, play an important role in determining the quality of the water. Normally the more volume of waste discharged to watercourses, estuaries and the sea is sewage, which is primarily organic in nature and is degraded by bacterial activity. The Oxygen present in the water which includes wastes is broken down into stable inorganic compounds. This result of this bacterial activity the oxygen concentration falls below 1.5 mg/lit, the rate of aerobic oxidation is reduced and their place is taken over by the anaerobic bacteria that oxidize the organic molecules without the oxygen use. This shows the result the end product such as hydrogen sulphide, ammonia and methane, which are toxic to many living organisms. This process results in the formation of an anoxic zone which is low in its oxygen content from which most of the life disappears except for anaerobic bacteria, fungi and yeasts. This makes the water foul smelling.

3. CONTROL MEASURES

The way of reducing the pollution on marine waters is through the introduction of sewage treatment plants. This will reduce the biological oxygen demand of the final product before it is discharged to the water.

Various stages of treatment such a primary, secondary or advanced can be used depending on the quality of the effluent that is required to be treated.

Primary Treatment

These treatment plants use physical processes such as screening and sedimentation to remove pollutants that will settle, float or, those are too large to pass through simple screening devices. This includes stones, sticks, rags and all such material than can clog pipes. A screen consists of parallel bars spaced 2 to 7 cm apart followed by a wire mesh with smaller openings. The way of avoiding the problem of disposal of the materials collected on the screen which is to use a device called a comminuter which grinds the coarse material into small pieces that can be left in the waste water. After screening the waste water passes into a grit chamber. The detention time is chosen to be long to allow lighter, organic material to settle. From the grit chamber the sewage passes into a primary settling tank also called a sedimentation tank where the flow speed is reduced sufficiently to allow most of the suspended solids to settle out by gravity. If the waste is to undergo only primary treatment it is then chlorinated to destroy bacteria and control odours after which the effluent is related. This type of primary treatment usually removes about 35% of the BOD and 60% of the suspended solids.

Secondary Treatment

The main objective of secondary treatment is to remove most of the BOD. These are three commonly used approaches; trickling filters, activated sludge process and oxidation ponds. This type of secondary treatment can remove at least 85% of the BOD.

A *trickling filter* consists of a rotating distribution arm that sprays liquid waste water over a circular bed of 'fist size' rocks or other coarse materials. The space between the rocks allows air to circulate easily so that aerobic conditions can be maintained. The individual rocks in the beds which are covered with a layer of slime, which consists of bacteria, fungi, algae etc. which degrade the waste trickling through the bed. The slime periodically slides off individual rocks and is collected at the bottom of the filter along with the treated waste water and is then passed on the secondary settling tank where it is removed.

In the *activated sludge process* the sewage is pumped into a large tank and mixed for several hours with bacteria rich sludge and air bubbles to facilitate degradation by micro-organisms. The water goes into a sedimentation tank where most of the microorganisms settle out as sludge. This sludge is the broken down in an anaerobic digester where methane-forming bacteria slowly convert the organic matter into carbon dioxide, methane and other stable end products. The gas produced in the digester is 60 percent methane, which is a valuable fuel and can be uses with the treatment plant itself. The digested sludge, which is in the state of liquid, is normally pumped out onto sludge drying beds where evaporation and seepage remove the water. This dried sludge which is potentially a good source of manure. Activated sludge tanks use less land area than trickling filters and have fever problems with flies, and odour and can also achieve higher rates of BOD removal. Thus although the operating costs are a little higher due to the expenses incurred on the energy for running pumps and blowers they are preferred over trickling filters.

Oxidation ponds are large shallow ponds approximately 1 to 2 metres deep where raw or partially treated sewage is decomposed by many microorganisms. They are easily to build and manage and accommodate large fluctuations in flow and can provide treatment at a much lower cost. This causes to require a large amount of land and hence can be used where land is not a limitation.

Advanced Sewage Treatment

The advanced sewage treatment involves a series of chemical and physical process that removes specific pollutants left in the water after primary and secondary treatment. Sewage treatment plant effluents left in the water after primary and secondary treatment. This sewage treatment plant effluent contains nitrates and phosphates in larger amount. This contributes to eutrophication. The advanced treatment plants which are designed to specifically remove these contaminants. This advanced sewage treatment plants are very expensive to build and operate and hence are rarely used.

4. POLLUTION DUE TO OIL

Oil pollution of the sea normally attracts the greatest attention because of its visibility in the sea water. There are several sources through which the oil can reach the sea.

Tanker operations

Half the world production of crude oil which is close to three billion tones a year is transported by sea. After a tanker has unloaded its cargo of oil it has to take on seawater ballast for the return journey. This ballast water which is stored in the cargo compartments that previously contained the oil. During the unloading its cargo of oil it has to take on seawater as ballast for the return journey. This ballast water which is stored in the cargo compartments that contained the oil. During the unloading of the cargo a certain amount of oil remains clinging to the walls of the container and this may amount to 800 tonnes in a 200,000 tonne tanker. The ballast water thus finally becomes contaminated with this oil. When a fresh cargo of oil is to be loaded, these compartment are cleaned with water, which discharges the dirty ballast along with the oil into the sea. Two techniques have substantially reduced the oil pollution. In these type of load-on-top system, the compartments are cleaned by high pressure jets of water. The oily water is returned in the compartment until the oil floats to the top. The water underneath contains only a little oil is then discharged into the sea and the oil is transferred to a slop tank. At the loading terminal, fresh oil is loaded on top of the oil in the tank and hence the name of the technique in the second method is called crude oil washing, the clingage is removed by jets of crude oil while the cargo is being unloaded. Some modern tankers have segregated ballast where ballast water does not come in contact with the oil. Thus the introduction of these new methods of deballasting, the amount of oil entering the sea has been considerably reduced.

Dry Docking

The ships needed periodic dry docking for in case of servicing, repairs, cleaning the hull etc. During this period when the cargo compartments are to completely emptied, residual oil finds its way into the sea.

Bilge and fuel oils

The ballast tanks take up valuable space, additional ballast is sometimes carried in empty fuel tanks. When being pumped overboard it carries oil into the sea. Individually the quality of oil released may be small but it becomes a considerable amount when all the shipping operations are taken into consideration.

Tanker Accidents

The tanker accidents happens in the sea very often every year. Sometimes this can result in major disasters may happen due to this accidents.

5. CONCLUSION

The Cleaning of oil from surface waters and contaminated beaches is a time consuming labour intensive process. The process of emulsification of oil in the water can be accelerated through the use of chemical dispersants which can be sprayed on the oil. A variety of slick-lickers in which a continuous belt of absorbent material dips through the oil slick and is passed through rollers to extract the oil have been designed. The Rocks, harbor walls shall be cleaned with high pressure steam or dispersants after which the surface must be hosed down.

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