Thermal pollution assignment

Individual Episcopal Institute of Management (MM) hereby declare that this report as a part of the course ?? Contemporary Issues in Management (MBA 805. 1) is the result of my own work. I also acknowledge the other works / publications cited in the report. (Signature) Place: Change Date: 17. 06. 2013 (Name of the student) 2 BRIEF OF TOPIC Thermal Pollution may be defined as ‘ the excessive raising or lowering of water temperature above or below normal seasonal ranges in streams, lakes, or estuaries or oceans as the result of discharge of hot or cold effluents into such water’.

Thermal Pollution is harmful because its increase water temperature in streams, rivers, lakes, or occasionally, coastal ocean waters. Thermal pollution is caused by either dumping hot water from factories and power plants or removing trees and vegetation that shade streams, permitting sunlight to raise the temperature of these waters. Like other forms of water pollution, thermal pollution is widespread, affecting many lakes and vast numbers of streams and rivers in the United States and other parts of the world. A temperature increase as small as 1 or 2 Celsius degrees (about 2 to 4

Fahrenheit degrees) can kill native fish and plants or drive them out in favor of other species, often with undesirable effects. CLC Control of Thermal Pollution CLC Effects of Thermal Pollution CLC Sources of Thermal Pollution CLC OBJECTIVE C] To know what is Thermal pollution To identified reason of Thermal Pollution and its sources 0 To measurement effect of Thermal Pollution on environment. CA To find effective control tools and Step for decrease Thermal pollution. 3 DATA ANALYSIS AND INTERPRETATION In

India, about 75 to 82 percent of thermal pollution is generated by power plants.

The remainder is from industrial sources such as petroleum refineries, pulp and paper mills, chemical plants, steel mills and smelters. This study is based on global monthly temperature data, from 1880 until today (NOAA NCSC, 2001). These temperatures are separated into land area tem- premature (LA T), sea surface temperature (SST), and a combined global mean temperature (MEAN). MEAN is calculated by area weights corresponding to the global sea area (71 %) and land area (29%). During the year, SST is rather constant while the LAT varies considerably.

CAT is about 3 ?? 12 j lower than SST during the year. Fig. Indicates the LAT increase since 1880 to be 1. 2 j (to 9. 3 j) while the SST increase is 0. 5 j (to 16. 4 j). The corresponding combined global mean temperature has increased boy. 7 j (to 14. 3 j). Before that, during the years 1856 – 1880, the global mean temperatures were al- most constant (Jones et 2001 In water above 1400 F (600 C) it is very unusual for algae or bacteria to live, and serious problems occur at even much lower temperature levels.

Unlike warm-blooded animals, fish and other cold-blooded organisms do not have a regulatory mechanism for maintaining a fixed internal body temperature. Therefore when water temperature changes, the body temperatures of the organisms also change. The resulting thermal stress may be lethal to some species. Factors such as diet, age, previous temperature exposure, weather, season of the year, and chemical composition of the water may change the specific lethal temperature point

for fishes. Gender certain conditions, for example, brown trout cannot live in water at a temperature above 790 F (260 C).

However, some hardy fish, often known as ?? rough” fish, can survive in even higher temperatures?? carp, for example, can live at 950 F (350 C) water temperature. 4 Even comparatively small temperature increases may have serious results, affecting for example, reproduction in aquatic organisms. For example, the natural rise in water temperature during the spring causes female oysters and clams to shed their eggs. A similar, but artificially produced, temperature rise at a different time of the year can trigger the release of immature eggs.

Excessive temperature can also prevent the normal development of certain eggs. Increased temperature may also affect hatching time in certain species. For example, herring eggs normally hatch in 47 days at a temperature of 320 F (0. 0 C). When the Water temperature is raised to 580 (14. ICC) the eggs hatch in 8 days. Such an early hatching often results in smaller adult size and shortened life span. Small water-temperature increases may increase the level of activity of certain organisms, whereas higher temperatures tend to decrease the level of activity.

Lake trout, for example, cruise more rapidly as the temperature nears 610 (160 C) but then slow down above that temperature. A water temperature of 750 F (240 C) is lethal for them. As the fish’s level of activity decreases so does its ability to catch food. 5 ARTICLE 1 Sources of Thermal Pollution Thermal pollution may be caused by four major sources. They are A) Water as a cooling agent. B) Soil erosion, C) Deforestation of shorelines, and D)

Run-off from hot paved surfaces. A) Water as a cooling agent: It is the major source of thermal pollution of water in most part of the world.

The use of water as a cooling agent in power plants and factories and industrial facilities causes thermal pollution. B) Soil erosion: Soil erosion makes the water muddy, which in turn increases the absorption of light, thus increasing the water temperature. C) Deforestation of shorelines: This contributes to the problem of thermal elution in two ways. First the plant roots hold soil particles together. Hence the deforestation results erosion of soil particles. Secondly, vegetation provides shade to the water surface. Deforestation increases the amount of light hitting the water surface, thereby raising the water temperature.

D) Run- off on hot surface: Storm water runoff on warmed urban surfaces, such as streets, 6 sidewalks and parking lots causes raising of the temperature water that flows on the surface Effects of Thermal Pollution Thermal Pollution increased the temperature of water considerably. This increase in temperature causes the following effects. A) Change in water properties: Temperature affects physical, biological and chemical parameters in a water body B) Disturbed Ecosystem: Most aquatic organisms have adapted to survive within a range of water temperatures.

Some organisms like trout and strongly nymphs prefer cooler water, while others such as carp and dragonfly nymphs thrive under warmer conditions. As the temperature of river or lake increases, cool water species will be replaced by warm organisms. Few organisms can survive in temperatures of extreme heat or cold. C) Reduced dissolved oxygen: The addition of heat

reduces the water’s ability o hold dissolved gases, including the oxygen required for aquatic life. Fifth water temperature in greater than 95 degree Fahrenheit the dissolved oxygen content may be too low to support some species.

D) Increased bacterial growth: Warmer water allows bacterial populations to increase and thrive and algae blooms may occur. E) Photosynthesis: The rate of photosynthesis by algae and larger aquatic plants is also affected by thermal pollution. F) Thermal shock: When a power plant first opens or shut down for repair, fish and other organisms adapted to a particular temperature range can be ailed by the abrupt change in water temperature. This is called as thermal shock. 7 G) Increase in toxicity: The rising temperature increases toxicity of the chemicals present in water causes massive morality of fishes.

Control of Thermal Pollution Following are some of the preventive measures of thermal pollution. A) Temperature of water can be reduced by taking the water to wet or dry cooling towers which are being used to pre cool that water before discharge transfers the heat from the water to the atmosphere. 8) Discharging the heated water into shallow ponds or canal, allowing it to cool, and reusing it as cooling Water. C) The thermal discharge from an industry can also be used in heating homes, building or other such structures. This is achieved by circulating the hot water through pipes in the structures.

D) Water with temperature can be successfully used in aquaculture. E) The heated water can also be used in agriculture, especially for frost protection

during the cold seasons. 8 ARTICLE 2 INTRODUCTION Thermal Pollution, harmful increase in water temperature in streams, rivers, lakes, or occasionally, coastal ocean waters. Thermal pollution is caused by either dumping hot water from factories and power plants or removing trees ND vegetation that shade streams, permitting sunlight to raise the temperature of these waters.

Like other forms of water pollution, thermal pollution is widespread, affecting many lakes and vast numbers of streams and rivers in the India and other parts of the world. A temperature increase as small as 1 or 2 Celsius degrees (about 2 to 4 Fahrenheit degrees) can kill native fish, shellfish, and plants, or drive them out in favor of other species, often with undesirable effects. MAJOR SOURCES The major sources of thermal pollution are electric power plants and industrial factories. In most electric power plants, heat is produced when coal, IL, or natural gas is burned or nuclear fuels undergo fission to release huge amounts of energy.

This heat turns water to steam, which in turn spins turbines to produce electricity. After doing its work, the spent steam must be cooled and condensed back into water. To condense the steam, cool water is brought into the plant and circulated next to the hot steam. In this process, the water used for cooling warms 5 to 10 Celsius degrees (9 to 18 Fahrenheit degrees), after which it may be dumped back into the lake, river, or ocean from which it came. Similarly, factories contribute to thermal pollution when hey dump water used to cool their machinery. The second type of thermal pollution is much more widespread.

Streams and small lakes are 9 naturally kept cool by trees and other tall plants that block sunlight. People often remove this shading vegetation in order to harvest the wood in the trees, to make room for crops, or to construct buildings, roads, and other structures. Left unshaved, the water warms by as much as 10 Celsius degrees (18 Fahrenheit degrees). In a similar manner, grazing sheep and cattle can strip streamside of low vegetation, including young trees. Even the removal f vegetation far away from a stream or lake can contribute to thermal pollution by speeding up the erosion of soil into the water, making it muddy.

Muddy water absorbs more energy from the sun than clear water does, resulting in further heating. Finally, water running off of artificial surfaces, such as streets, parking lots, and roofs, is warmer than water running off vegetated land and, thus, contributes to thermal pollution. IMPACTS All plant and animal species that live in water are adapted to temperatures within a certain range. When water in an area warms more than they can tolerate, species that cannot move, such as rooted plants and hellish, will die.

Species that can move, such as fish, will leave the area in search of cooler conditions, and they will die if they can not find them. Typically, other species, often less desirable, will move into the area to fill the vacancy. In general, cold waters are better habitat for plants and animals than warm ones because cold waters contain more dissolved oxygen. Many freshwater fish species that are valued for sport and food, especially trout and salmon, do poorly in warm water. Some organisms do thrive in warm water, often with undesirable effects.

Algae and other plants grow more rapidly in warm eater than in cold, but they also die more rapidly; the bacteria that decompose their dead tissue use up oxygen, further reducing the amount available for animals. The dead and decaying algae make the water look, taste, and smell unpleasant 10 CONTROLS Thermal pollution from power plants and factories is relatively easy to control. Instead of discharging heated water into lakes and streams, power plants and factories can pass the heated water through cooling towers or cooling ponds, where evaporation cools the water before it is discharged.

Alternatively, power plants can be designed or refitted to be more efficient ND to produce less waste heat in the first place. In a process called generation, the excess heat energy from generating electricity can be used in another manufacturing process that needs such energy. Where homes or other buildings are located near industrial plants, waste hot water can be used for heating?? an arrangement often found in Scandinavian towns and cities, and proposed for use in China.

In the United States, the problem of industrial thermal pollution was first addressed in 1970, when Congress gave the Atomic Energy Commission authority to regulate thermal pollution from nuclear power plants. In 1 972, the comprehensive Clean Water Act instructed the Environmental Protection Agency to issue regulations to clean up all hot water discharges from all power plants, nuclear or conventional. Since then, thermal pollution from power plants has not been a major issue in the United States. To prevent thermal pollution due to deviation, the prescription is simple: do not devastate.

Landowners can leave strips of trees and vegetation along streams and shorelines. Grazing livestock can be kept away from streamside by fencing. All efforts to control erosion also have the effect of keeping water clearer and, thus, cooler. As a practical matter, however, thermal pollution from deviation is quite hard to control because it is caused by the cumulative effect of many peoples' actions, most of which are individually minor. Regulations focus on a few of the most important threats. Grazing 1 1 management plans, for instance, are intended to counter thermal pollution and other problems on lands owned by the federal government.

In the United States, regulations governing logging on both public and private lands supposedly protect streamside, though enforcement is often lax. Elsewhere, streamside protection is largely up to private landowners, encouraged and died by such advisory organizations as the federal Natural Resources Conservation Service and cooperative Resource Conservation Districts. Solutions Several engineering solutions are available to minimize thermal pollution from major industrial sources. One is a cooling pond into which heated wastewater is released before it enters a natural waterway.

The cooling pond permits evaporation of some water, carrying heat into the air and thus releasing cooler water into the waterway. The evaporated water might, however, under some conditions, condense, producing fogs where none existed before. In addition, the evaporation from the cooling pond sight deprive the waterway of significant amounts of water, which could be serious during summer months when the natural flow in a river is low. Another possible solution to the problem of thermal pollution is the cooling tower?? either wet or dry?? which also transfers heat to the air.

In both types, heated water is introduced into a tower through which air is blown, and some heat is passed to the air. In wet towers, water and air are in contact, resulting in water loss. In dry towers, a device like a car radiator carries the heated Water, and less Water is lost. Several suggestions for the beneficial uses Of Herman pollution have been made. Among them is the possible use of heated water under fields to lengthen the growing season for certain crops, under city streets in winter to melt snow, or in cold estuaries areas to increase growth offish and shellfish.

At the moment, these schemes are untested on a large scale. All solutions must consider the general health of the environment as well as energy use patterns, overall population growth, and other factors.