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TOXIC DUMPING IN OCEANS

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ABSTRACT: The ocean covers two-thirds of the surface of the Earth, it is surprisingly vulnerable to human influences such as overfishing, pollution from run-off, and dumping of waste from human activity. This kind of pollution can have serious economic and health impacts by killing marine life and damaging habitats and ecosystems. Toxins from pesticides, fertilizers, and other chemicals used on farms contaminate nearby rivers that flow into the ocean, which can cause extensive loss of marine life in bays and estuaries leading to the creation of dead zones. The dumping of industrial, nuclear and other waste into oceans was legal until the early 1970's when it became regulated; however, dumping still occurs illegally everywhere.

Litter items such as 6-pack ring packaging and microfilament fishing lines can entrap pelicans and other seabirds, and ultimately strangle or starve the birds. Whales, dolphins, and other marine mammals are at risk through ingestion or entanglement of plastic refuse. Plastic bags are mistakenly ingested by sea turtles as jelly fish, a common food item. For example, the world's largest living turtle, the leatherback, is found off our Atlantic and Pacific coasts. With a shell as long as 2.5 metres, it can weigh up to 900 kilograms. You wouldn't think much could get in this giant's way. However, common plastic debris is causing leatherbacks terrible trouble. They mistake plastic bags, balloons or containers for jellyfish — their favourite food. Once swallowed, the plastic clogs the turtles' intestines, causing them to die. Leatherbacks are already endangered worldwide because humans hunt the adult turtles and their eggs for food. They certainly don't need to deal with another deadly menace like plastic debris. When animals get tangled, the debris causes cuts and infection. Seabirds, turtles, dolphins, and seals get exhausted from trailing nets behind them. These creatures can slowly strangle, suffocate, or die from infection. Recent studies in Alaska show that, each year, as many as 30,000 northern fur seals get entangled in plastic debris and die. Marine debris can also damage boat engines by clogging intake valves and ports and becoming tangled around propellers. Although some claim the risk to human health is small, the long-term effects of nuclear dumping are not known, and some estimate up to 1,000 deaths in the next 10,000 years as a result of evaporated nuclear waste.

KEYWORDS: toxic, wastes, debris, plastic, nuclear, fishing, pesticides, fertilizers

I. INTRODUCTION

Plastic is a synthetic organic polymer made from petroleum with properties ideally suited for a wide variety of applications including: packaging, building and construction, household and sports equipment, vehicles, electronics and agriculture. Over 300 million tons of plastic are produced every year, half of which is used to create single-use items such as shopping bags, cups and straws. If discarded improperly, plastic waste can harm the environment and biodiversity. Microplastics have been found in tap water, beer, salt and are present in all samples collected in the world's oceans, including the Arctic. Several chemicals used in the production of plastic materials are known to be carcinogenic and to interfere with the body's endocrine system, causing developmental, reproductive, neurological, and immune disorders in both humans and wildlife. Recently, microplastics were found in human placentas but more research is needed to determine if this is a widespread problem.[1,2]

Toxic contaminants also accumulate on the surface of plastic as a result of prolonged exposure to seawater. When marine organisms ingest plastic debris, these contaminants enter their digestive systems, and over time accumulate in the food web. The transfer of contaminants between marine species and humans through consumption of seafood has been identified as a health hazard, and research is ongoing.



Plastic pollution

Plastic waste damages the aesthetic value of tourist destinations, leading to decreased income from tourism. It also generates major economic costs related to the cleaning and maintenance of the sites. The build-up of plastic litter on beaches can have a negative impact on a country's economy, wildlife, and the physical and psychological wellbeing of people. The UN 2030 Agenda for Sustainable Development calls for action to 'Conserve and sustainably use the oceans, seas and marine resources' (Goal 14) and 'By 2025, prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution' [3,4]

II. OBSERVATIONS

Radioactive wastes and oil pollution were the first two types of marine pollution to receive international attention.



In response to the extremely dangerous nature of nuclear waste materials, controls have been established relatively quickly compared to other forms of marine pollution.



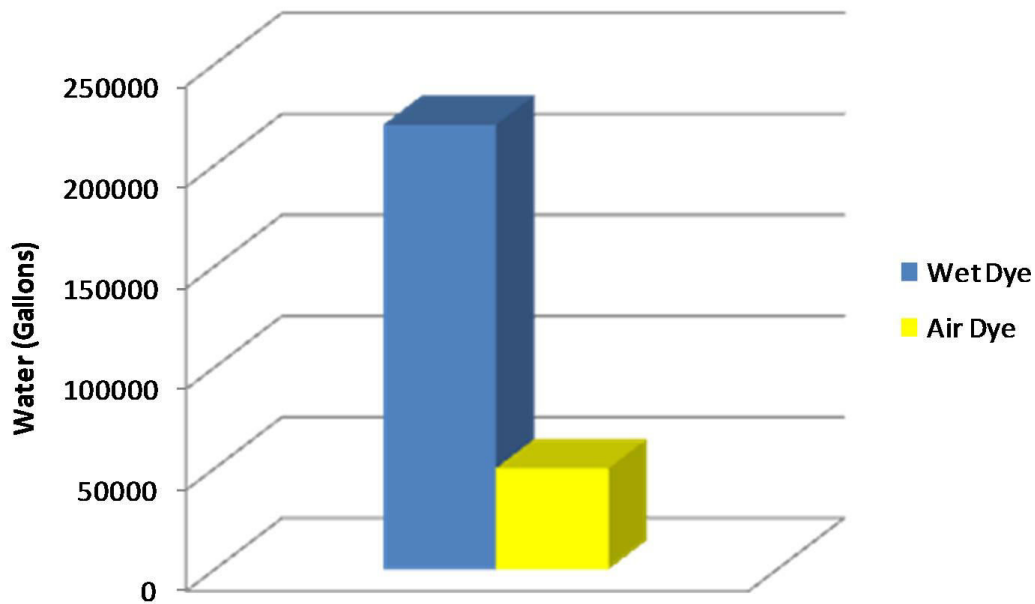
Gulf oil spill

The international community has recognized the importance of minimizing environmental damage from radioactive wastes. This recognition is particularly crucial in view of the inevitable increase in the amount of these wastes. Several countries have a significant reliance on nuclear power and have future commitments to nuclear energy programs.' As of 1983, there were 277 nuclear power plants in operation around the world and 241 units under construction or on order.² Nuclear power has been considered a viable energy source especially for developing nations, such as Pakistan, that neither possess energy resources such as oil or coal,³ nor are able to finance the importation of these commodities.^[5,6]



Textile dyes pollution

The developing nations see nuclear power as their most desirable alternative for rapid economic growth. Coal and solar energy are often mentioned as alternative sources but they do not compare favorably to nuclear power in terms of practical and environmental considerations. Efficient, low-cost solar collection systems have not yet been implemented and energy storage continues to be a problem. Substantial reliance on coal would result in large amounts of carbon dioxide being released into the atmosphere. This could eventually lead to undesirable changes in climate due to the "greenhouse effect."⁴ Therefore, nuclear power could become a major worldwide source of energy.^[7,8]



Textile dyeing industry-an environmental hazard

The textile dyes significantly compromise the aesthetic quality of water bodies, increase biochemical and chemical oxygen demand (BOD and COD), impair photosynthesis, inhibit plant growth, enter the food chain, provide recalcitrance and bioaccumulation, and may promote toxicity, mutagenicity and carcinogenicity. In spite of this, the bioremediation of textile dyes, that is, the transformation or mineralization of these contaminants by the enzymatic action of plant, bacteria, extremophiles and fungi biomasses is fully possible. Another option is the adsorption. Despite some disadvantages, the bioremediation is essentially positive and can be progressively enhanced by modern biotechnological techniques that are related to the generation of more degrading and more resistant engineered organisms. This is a sustainable solution that provides a fundamental and innovative contribution to conventional physicochemical treatments. The resources of environmental biotechnology can, therefore, be used as tangible technological solutions for the treatment of textile dye effluents and are related to the ethical imperative of ensuring the minimum necessary for a quality life for the humankind.[9,10]

Microalgae attached to microplastics are assumed to be more easily captured by filter feeders than free microplastics in the water column [11,12]. After microplastics are assimilated into the organism they accumulate in the gut, translocate into other tissues or are excreted, depending on the size, shape and composition of the particles. For example, fish fed with langoustines (*Nephrops norvegicus*) containing polypropylene filaments were found to ingest but not to excrete the microplastic strands, further corroborating the potential for trophic transfer and ecological impacts

III. DISCUSSION

The chemicals found in plastic marine litter can be classified in the following four categories of origin:

- Chemicals intentionally added during the production process (additives such as flame retardants, plasticizers, antioxidants, UV stabilisers, and pigments);
- Unintentional chemicals coming from the production processes, including monomers (e.g. vinyl chloride, BPA, etc.) which may also originate from UV radiation onto the plastic waste—and catalysts, normally present in traces (ppm);
- Chemicals coming from the recycling of plastic waste; and finally,
- Hydrophobic chemicals adsorbed from environmental pollution onto the surface of the plastics.[13,14]



Chemical pollution effect

Marine scientists say they have found what they believe to be as many as 25,000 barrels possibly containing DDT dumped off the southern California coast near Catalina Island, where a massive underwater toxic waste site dating back to the second world war has long been suspected.[15]

IV. RESULTS

The wastes that are dumped into the oceans tend to have toxic substances, which soak in all the oceanic oxygen. This leads to a marked depletion of oxygen available to mammals and other fishes causing them to die in their natural habitat



Cargo spill

- Cargo ships both accidentally and deliberately discharge crude oil into the ocean. As far as ocean pollution goes, this is one of the primary causes.
- Other reasons for marine pollution are the dumping of industrial waste. These products contain toxins including mercury, PCBs, PAHs, and radioactive material, all of which pollute the ocean.
- Heavy rains and floods wash trash and debris into the waters.[17]



Sri Lankans face upto unmeasurable cost of cargo ship disaster

- Human waste and sewage water that has been partially treated or untreated goes into the ocean. This is called “garbage dumping” and is one of the world’s leading causes of ocean pollution.
- Automobiles emit carbon dioxide due to fossil fuels being burned. This leads to air pollution. The carbon dioxide in the air reaches the ocean and becomes acid rain which then pollutes the water.
- Oil spills are dangerous for marine life and can affect coral reefs that thrive in the ocean. In fact they can greatly affect the life cycle. The gills of fish can be clogged by spilled oil which can block off respiration. If sunlight is blocked, marine plants will die because it affects photosynthesis and its process.[18]



Sewage dumping

- These toxins not only affect the marine life, but they affect humans as well. For example, let’s say the fish are contaminated, if someone were to catch a fish and eat it, they could get food poisoning.
- If garbage is dumped into the ocean, the oxygen in the water could be depleted. This results in poor health for marine life due to lack of oxygen. Animals such as seals, dolphins, penguins, sharks, whales, and herring could all die.
- Bottles and other plastics including bags can suffocate or choke sea creatures. Thinking they are food, they may eat them. Plastic items are one of the major causes of death among turtles. They think plastic bags look like jellyfish and try to eat them.[19]

The effects of ocean dumping are due to our carelessness. Roughly two thirds of the world's marine lives have been threatened with chemicals we throw down the drain every day such as house hold cleaners. It may do you good to remember that marine life is a part of our food chain. Not only do we eat fish and other marine life, but so do other animals. Underwater creatures are a main food source for other fish and bears.

There's a lot we can do to save our oceans. The best place to start is to keep them clean and not throw anything into them. It's also a good idea to keep the beaches clean. Garbage on the beach can easily end up in the water. Another thing we can do is to stop pouring chemicals down the drain such as paint or oil. Stop using toxic household products and don't overwater our lawns, in other words, conserve water.

Now that you know the cause and effects of ocean dumping, you'll be able to understand that it's just something you shouldn't do. You never know how much water is worth, until you have none. It's best to remember the causes, consider the animals and always keep them in the back of your mind. If we work together we can stop the effects of ocean dumping for good.

V. CONCLUSION

Solutions and Management to Ocean Dumping

1. Management and Minimization of Waste Dumping at the Port

Ocean dumping challenges compound day after day. Regardless, the waste substances that are disposed of in the oceans can be controlled through effective management and minimization efforts. Primarily, efforts should focus on controlling and monitoring cargo activity at the port while limiting the amount of waste substances dumped into the ocean from the ships.

Moreover, by taking effective management and minimization strategies at the ports, cargo sweeping activity that releases slag and iron ore pellets can be controlled to reduce the possibilities of ocean dumping. [20]



Reuse of plastic waste

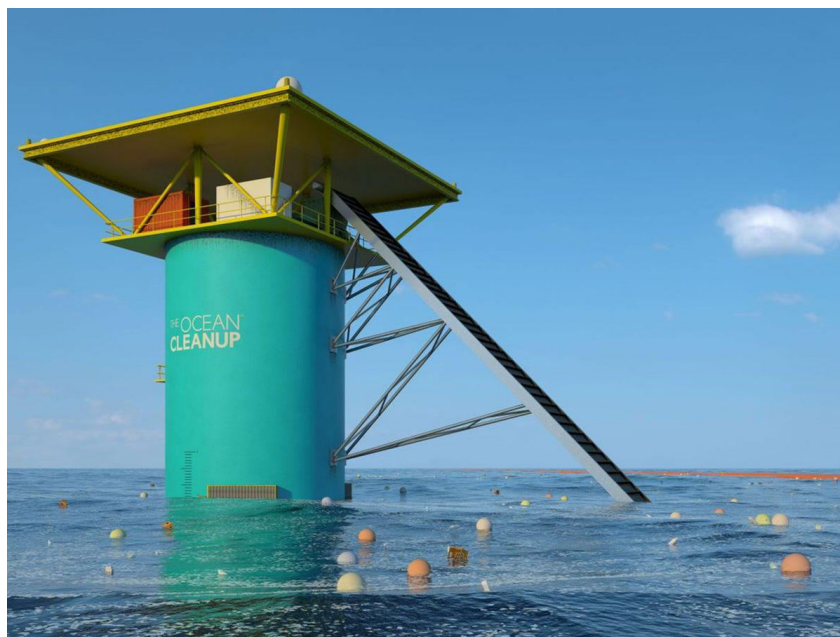
2. Education and Awareness Creation

The initiation of campaigns aimed at stopping ocean dumping can go a long way in educating people and creating awareness on the hard facts regarding the problem. Most people are unaware of the dangers of ocean dumping simply because they are not enlightened about its repercussions.

For instance, for a long time, some people have held on the belief that dumping in the ocean eliminates the toxicity of the trash. In truth, this misconception is merely due to a lack of awareness creation. So, the lack of education and awareness on the dumper's part is to blame for ocean dumping. However, environmental networks like "Stop Ocean Dumping" campaigns can tremendously aid in addressing the problem.

3. Regulations and Laws

Regulations and laws account for the most effective tool for addressing the issues surrounding ocean dumping. As much as laws are put in place, further implementation of the laws is important. It's not just enough to enact laws and regulations to mitigate the ocean dumping problems.



Clean up projects

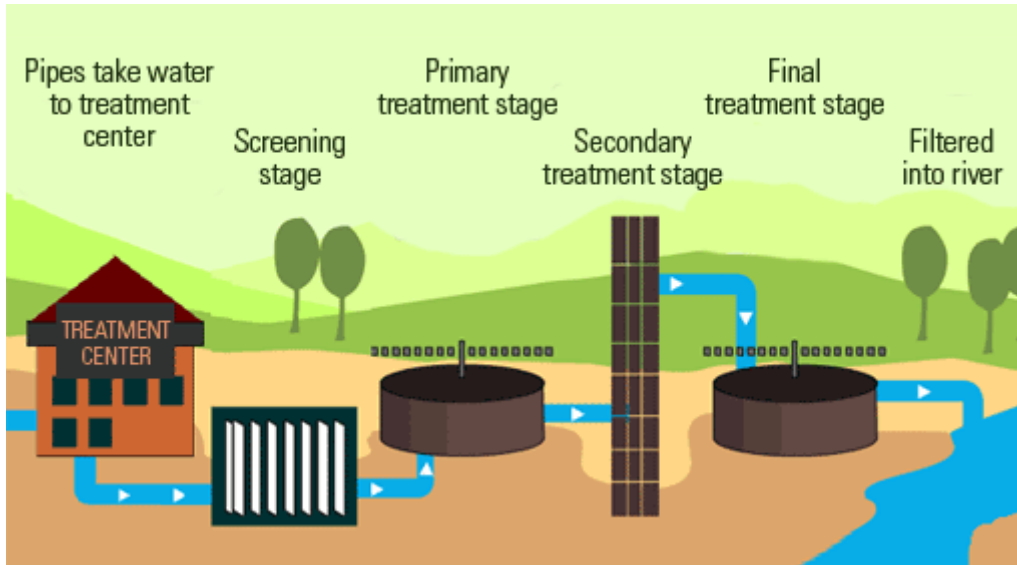
Rather, responsible parties, people and organizations must seriously assume their responsibility to deal with the common problems. Bans should center on convicting industries, institutions and people that engage in ocean dumping activities.

A great example is the Ocean Ban Act of 1988 intended to put an end to industrial sewage sludge and waste dumping at sea in the US. Other prominent effective acts in history include the Ocean Dumping Act (ODA) and Clear Water Act (CWA) initiated by the US to deal with ocean dumping problems. In other words, the enactment and use of appropriate laws and regulations against ocean dumping can do wonders in mitigating the problem.

4. Organizing a Cleanup

In order to prevent or reduce ocean dumping, it is essential that we all do our part in cleaning up the mess. And, in order to make that happen, a clean up drive could be organized to clear the shoreline.

If the shore can be properly cleaned off the mess, ocean dumping rates can be reduced manifolds. While the small wastes can be picked up by hand, agencies could be hired in order to clean the heavier mess on the shoreline. A clean shore could easily ensure a cleaner ocean.



Sewage treatment plants

5. Securing Items on the Boats

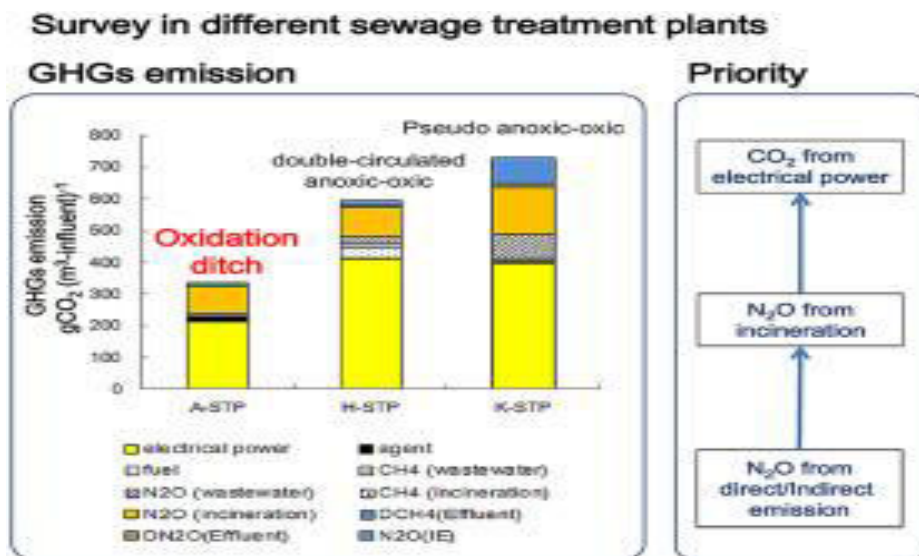
Often, it has been seen that the small boats on which the fishermen sail in the oceans can be a cause of the ocean dumping problem. It happens because the materials that they carry on the boat are often not properly secured. This gives the wind a chance to blow things off the boat. Also, if the waves are big, the turbulence could also have the same effect or even adverse. In order to prevent any event of this sort, it is better to ensure that everything on the boat is properly secured.



Wastewater treatment plants

6. Raise Your Voice against the Wrong

Everyone needs to do their bit in saving the ocean. So if anyone is seen throwing things into the ocean or even if they are seen littering the shoreline, it is essential that they are stopped from doing the same. It is important to openly raise our voices against such an act. This could help in reducing ocean dumping.[21]



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