**CHAPTER: Pollution in the Ocean**

**Discussed:** Sewage pollution, oil in waters, litter in waters, chemicals, clean waters

As the society grows so does the waste, with this comes irresponsibility of where we choose to put that waste. People have been dumping waste into our oceans for years and have just now decided to do something about it. After realizing what it is doing to the ecosystems of the ocean, the toxic chemicals and garbage are now polluting everything. People are now changing their lifestyles to fix this. The ocean is an important source to humans for its food, activities, and beauty. This chapter is going to discuss the different types of waste in water, the effects it has on humans, and the benefits of having clean waters.

**Sewage pollution**

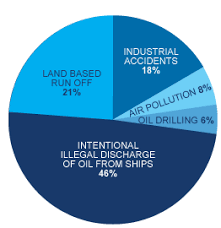
Before we started settling in one place, we never had garbage or waste accumulation. Given that the waste created then was mostly degradable by the soil. Waste began accumulating when plastic, paper sources, and other solids were created. We first developed sewage pollution along coast of bodies of water, given it was the most convenient. This was what began the dumping of waste into the water and has since washed everything away. Pollutants are given their name because those are the things that actually have harmful effects. Due to these, some beaches are being condemned because of the sewage, wastes, that are contaminating our waters. Testing these waters frequently to check for the presence of human waste. These can contain a variety of harmful pathogens since it comes from intestinal waste (feces). The public water system is responsible for checking the water normally, to see if the water is contaminated by waste. This is checked by a water coliform test or e-coli test. E-coli is a bacterium that grows in suitable environments that cause illness and should not be present in water samples according to the standards of the EPA. To reduce this if present, facilities must treat the waste before releasing it. There is also a sludge that is formed at the bottom of the tanks that cannot be dumped into bodies of water without the right treatment because there could be different chemicals in the mix that could have a hurtful effect on the marine animals. This was not realized until 1991, when the federal law changed to making sludge be recycled or converted into fertilizer. The rain does have an effect on the sewage plants for the extra water from drains makes it difficult to handle in large cities. Believe it or not there are still different countries that do not treat their sewage before inserting it into the sea. There are billions of people on earth, making this a major priority for the environments.



*(70% wastewater enter the sea untreated. Image from Greenpeace.org)*

**Oil in Waters**

Oil in the marine environments are completely at fault from human activity. This is a large pollution problem that effects the different oceans ecosystems and it is not something that will just go away overnight. Such pollution can happen carelessly or chronically, from the use of oil products in the ocean. Many times it is forgotten that the storm water can also contain oil from the cities roadways and with out being treated is very harmful. There is an estimation of how much oil enters the ocean every year and its more than the amount of water you can go through in a lifetime. 706 million gallons, a year, this comes from ships, tankers, and offshore drilling. The oil also acts unusual when it is in the ocean. It gets denser the longer it sits on the water, dissolving into the water and also forms a thick layer on top of the water. Decomposing this with sunlight is Biodegradation, letting nature decompose with its our natural microorganisms through sunlight, water currents, or wind. This process does take longer than the other routes of clean up and is temperature dependent since only a small amount will dissolve itself into the water (still not good). Once the oil reaches the coast, it coats everything causing contamination, poisoning vegetation, sand, wildlife, and potentially humans.



(American academy of sciences, Oil in the Sea III, 2003)

The oil will move throughout the ocean getting into many areas and harming animals, vegetation, and the shoreline. The largest spill to date was in the Persian Gulf when 240 million gallons of oil spilled from tankers during war operations. Some of these accidents come from blowouts, a chaotic release of oil into the ocean after control systems fail. The hardest part of it all is seeing the damage to the wildlife in these areas that have to fight for their homes and their lives. Seeing birds unable to fly because of all the oil weighing them down is impacting. The clean up takes time and uses many different techniques. Some of the oil is skimmed, and the natural processes occur, lately scientist have been working on a microorganism that can clean up oil quicker and more effectively. The thing people tend to worry about most is the costs of these spills. This is a major penalty but focusing on prevention to not only save money and time, but the environments of the coastal wildlife as well. The damage done to the wildlife should have the biggest effect on humans for their source of food, and attraction. Infecting them toxically, the mass of mortality, and ecological effects are all long term. They ingest these chemicals and get smothered depending on the location of their environment. Some facilities such as PETA, go out to these populations and try to help these animals since it caused by humans, it helps a small amount for these species making the area look better but the actual recovery is long lasting.

**Litter in Waters**

When waste had first been noticed was when it began washing up on the coast, with no area being untouched by garbage. In a study, scientist counted 953 pieces of trash in a half mile range [1]. Metal, plastic, and glass; all materials that cannot be broken down are called non-biodegradable. These are the things being thrown overboard by ships in the ocean and what is filling our beaches, and being absorbed by marine animals. Not only are these things unattractive to our beaches, but largely effective to our wildlife. They suffocate, starve, and develop deformities trying to adjust to their new lifestyle surrounded by trash. For example, turtles are mistaking plastic bags as jellyfish since it is their food of choice, filling their stomachs with plastic. Humans are not changing their lifestyle but the wildlife is making the real change for them. Out of all the countries the United States take the lead with the most trash thrown away. The US is still working on better ways to dispose of solid waste but as our population keeps increasing so does the garbage. Incineration is combusting these waste by burning them and generating energy. Some cities cannot afford incinerators and others believe the pollutants put off are just as harmful. Getting companies to convert to biodegradable products give consumers a better chance of recycling because most people are not going to change what they like but the companies can help the ecosystem by it and themselves. People participating in recycling of their garbage is essential to reducing litter. There are groups fighting the waste, scientist are trying to find microorganisms that can digest and break down the debris.

**Chemicals in water**

Toxic chemicals that come from waste or by-products are a major pollutant hurting our environment. Using the chemical known as DDT, which is an insecticide, has a larger impact that anticipated. Mostly farmers use it on their crops to kill insects, but it soon travels to marine areas getting passed along to each animal that has contact with each other. Mosquitos, fish, and birds soon are all infected causing the worst possible outcome, extinction. This product has been banned, but still remains in some marine animal’s tissue. Polychlorinated biphenyls are another chemical causing harmful effects such as cancer [1]. The commercial fish are tested before being sold for consumption and fishing can be stopping depending on their results. Mercury is another chemical that is invading our waters. Factory’s can dump their waste into bays that are near fish environments also causing humans cancer if the fish infected are consumed. This is mainly happening in Japan where the DDT and PCB were released near marine areas. There are many other metals that are discharged from different wastes, that are a problem in animals and our drinking water that must be tested regularly to keep contamination at lower risk. The most dangerous waste is radioactivity in waste. Some materials threaten the environment because of their inability to break down from their nuclear activity. These are hard to diminish and remain present for many years. If human’s interactions come in contact with radioactive reactions, they will cause genetic mutations and cancer at the worst. All of these chemicals are tested by public health systems for drinking water and marine animals. Luckily these do not cause problems often, but with we are still producing and throwing out materials with these properties.

**Clean waters**

Plants do much of the work for us to keep water clean. Through photosynthesis and biodegrading the pollution in water is decreased. This is referred to as the turbidity, the cloudiness from suspended particles. EPA has a specific way of measuring this, using a stick with markers and lowering into the water until the end of the stick is no longer seen is the turbidity level. The further down it can go the better since water needs to mostly be clear. Cloudiness in the water can come from algae, sand, oil, and many other things depending on the area. Water also is usually tested for pH, dissolved oxygen, and chlorine since they can be in the water but at a good consistency. The weather changes also can cause the water to change as well as hurt the fish if the water makes a large change.

**Conclusion**

In conclusion to the many pollutants in our ocean they are all things we can work on to decrease the likely hood of them growing. Out of all of the different sources of pollution there isn’t any specific one that is worse than the other. We have the information on how to keep this from reoccurring but for some reason we think that as our population grows its okay to grow the pollution. By limiting use of plastic and start using a recycling system instead of throwing everything away should help with litter in water. The best way to remove chemicals from water is to be cautious about what we put down our sink and storm drains. The future will hopefully not get any worse and work on a more successful clean up plan.

References

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[3] http://www.marinedefenders.com/oilpollutionfacts/sources.php (image)

[4] https://liqigeography.wordpress.com/human-interactions/ (image)