



Impact Of Pollution On Marine Lives And Sustainable Development Goals As Transacting Tool In Changing Scenario

Sujit Kumar Srivastava^{1*}, Dr. O.P. Singh²

¹*Ph.D. Research Scholar, Department of Law, Deen Dayal Upadhyaya Gorakhpur University, Gorakhpur, Uttar Pradesh

²Supervisor Assistant Professor Department of law DDU Gorakhpur University Gorakhpur UP.

Abstract

Water covers more than 70% of surface of Earth and out of this more than 95% is held by Ocean. Oceanic water and Marine ecosystem play key role in existence of life on mother Earth. It is scientifically well known that life started from water. Marine ecosystem is most diverse and important ecosystem, it contributes in global and regional elemental cycling, and regulating the climate. Oceanic environment provides natural resources including food, materials, substances, and energy which are important for existence of life. With the advent of industrial revolution, pollution and subsequently climate change became a foresight reality. Previously it is believed that Oceans can't be polluted but when in decade of late 1950s data appeared that Oceans are getting polluted it raised an alarm in international community. Continuing ocean acidification by way of trade ship discharge, oil spills, municipal discharge at coastal area and rise of oceanic temperatures are great threats to marine species and impacting marine ecosystem services negatively. Plastic pollution which is again a major source to pollute the Ocean. It is reported that almost 17 million metric tons of plastic is discharged in Oceans in year 2021¹. It is expected that by 2040 the volume of plastic polluting Oceans each year to get double or more seriously to triple in number. About 14 per cent of coral reefs were lost between 2009 to 2018². The Sustainable Development Goals (SDGs) were developed during the 2012 United Nations Conference on Sustainable Development, which took place in Rio de Janeiro, Brazil. This conference was held with a purpose to create a set of global goals, related with the environmental, political and economic challenges that world is facing as human race. In 2015, UN has chosen 17 SDGs by voting to be applicable universally to curb the climate change scenario and to promote them as global goals for the period of 2015-2030. Out of 17 SDGs Goal No 14 which termed as LIFE BELOW WATER is about conserving and sustainably using the oceans, seas and marine resources. Healthy marine ecosystem is essential for human existence and life on Earth. Therefore, in the prevailing challenges afore noted, Sustainable Development Goals are understood to be transacting tool and mechanics of which is being explored in the present research article.

Keywords: - Sustainable Development Goals, Climate Change, Marine Ecosystem

Introduction: -

World's 70 percent surface is covered by Seas and Oceans which provides diverse habitat and millions of unique species. From tiny plankton and shrimp to massive blue whales and giant squid, marine life in coral reefs comes in a vast array of stunning shapes and sizes. Shallow coastal waters, which get profit of extra sunlight are more fertile for life than the deep trenches of open ocean but various expeditions have proved that life exists in the darkest crevices of the sea. Actually seas are the canvas of all life on earth, from which our distant ancestors crept up onto the shore some 500 million years ago. Aseptic ocean has enormous implications for the existence of any kind of life on the planet. It was believed that oceans are so vast and deep that it can engulf everything and human race cannot hinder its nature and condition but however vast the oceans maybe they cannot sustain the amount of pollution human beings pour into them. Oceanic environment is under high pressure to preserve itself from Rising Temperature, Acidification, Plastic, Fishing and other modes. Marine environment is critically important to the entire planet for several reasons. It is estimated that and widely agreed by scientist that marine photo synthesizers like tiny phytoplankton, produces over 50 percent of the Earth's Oxygen demand³. Again, various streams like Gulf, El-Nino, Labrador, North and South Atlantic, North and South Equatorial etc. helps to regulate the climate and weather of our planet. The United Nations being an international organization actually established to keep peace and security among the nations which was the biggest threat for global order at that time but when it was realize that pollution will be the greatest threat for human being this organization started working on this issue under different heads.

This article will be discussed into three parts first part will be about what is marine environment, second will be how marine environment is getting polluted and third part will be how SDGs being used as transacting tool in present situation.

¹ United Nations Sustainable Development Oceans Data, available at www.un.org/sustainabledevelopment/oceans/ (last visited January 09, 2024)

² D. Souter, S. Planes, et.al., "Status of Coral Reef of the World: 2020" 18 (2021)

³ Y. Sekerci, and R. Ozarlan, "Oxygen-Plankton Model Under the Effect of Global Warming with Nonsingular Fractional Order" 132 Chaos, Solitons & Fractals 109532 (March 2020).

Marine Environment

Marine environments are such aquatic environment which have high salt dissolve in it. This environment includes such plant and animals which can grow in low sunlight, Alkaline medium, less soil contain surface etc. One significant characteristic of marine ecosystem is that though the average temperature is low but at certain places it shows high temperature because of deep sea pore from where plate tectonic lava is regularly coming out. This is the reason why marine ecosystem is so diverse. Marine ecosystem is made up of two components Biotic (i.e., living) and Abiotic (i.e., nonliving). Biotic components includes living things like plants, animal, microbes etc. Abiotic component includes soil, sand, sunlight, temperature, nutrients dissolve in water, salinity of water, Oxygen concentration etc. Healthiness of marine ecosystem including biotic factor depends upon how good abiotic factors are, because its presence of sunlight, availability of Oxygen, kind of temperature, which form the condition that what kind of biotic factors will grow there.

In a marine environment there could be different marine ecosystem. Marine ecosystem is of various types like Estuaries, Salty Marshes, Mangrove Forests, Coral Reefs, the Open Ocean, and the Deep-sea Ocean. An estuarine ecosystem is a coastal zone area where river meets oceans. Here, nutrients are high and salts level is low here the ocean mix with those form of river in regions sheltered from extreme weather. This is the reason why estuary is the most productive places on Earth which can support any type of life. Salt marsh ecosystem is found at the meeting point of ocean and land. In such ecosystem nutrients are high as it is brought by the ocean. This ecosystem is regularly flooded by high tides which makes the surrounding salty and wet. Here soil have low oxygen concentration and filled with such matter having decomposing nature. Low-growing shrubs and grasses dominates these ecosystems. Mangrove forest is another type of ecosystem generally found in tropical areas. In these ecosystems mangrove trees are found with submerging roots in frequently flood ocean water. This one is unique as though it is marine ecosystem but we can find here reptiles, amphibians, birds including fish, crabs, shrimps etc. Mangroves root system filters out salt and sit above ground to access oxygen. These trees are home for variety of species. Various animals, including fish, crabs, shrimp, reptiles, and amphibians, thrive among the mangrove roots, while the canopy offers a nesting place for birds. Coral reefs ecosystem is found farther from the coastal area in tropical sea. Coral-polyps secretes exoskeleton which builds this system. Exoskeletons create intricate structures that serve as shelters for various organisms. It is extremely diverse ecosystems which hosts sponges, crustaceans, mollusks, fish, turtles, sharks, dolphins, and many more creatures. In some research it is estimated that coral reefs accounts for a quarter of all oceanic species. Open ocean ecosystems, major part of marine environment is covered by this. It varies widely and changes its nature with the depth of Sea. Near the surface it receives plenty of light and also high Oxygen concentration and is fairly warm, hence supports photosynthetic organisms. Many organisms we know about Marine Environment like Dolphins, Whales, Sharks, Octopus etc. are found here. With the increase of the depth of the ocean sunlight availability become low and Oxygen concentration decreases and temperature goes down. Organisms living in deep-sea ecosystems have extreme adaptation which help them to survive there in challenging condition.

Marine Environment Pollution

The entry of any such substance solid, liquid, or gas as well as sound waves, nuclear radiation, etc. that is damaging to the ecosystem's organisms, is referred to as pollution. Pollutants are any such element, materials, waves, or gases. Pollutants can be dissolved, diluted, decomposed, recycled, or dispersed in any environment at a certain rate, but when they are introduced into the environment more quickly, sediments are produced that harm the environment's state. We can define marine pollution as the discharge of any energy source or other substance that worsens the marine environment. That entails harming both living and nonliving resources, upsetting the balance of the marine environment, and ultimately endangering human health. as a large portion of the human population now consumes marine products. Nearly 45% of the world's population is thought to reside within 150 km of an oceanic coastline⁴, which is a significant contributor to marine pollution due to increased population density and industrialization in the area. Previously the issue of marine pollution was confined to near shore area rather than the open ocean but this has changed as now a day pollution is visible in open sea in form of plastic and oil pollution.

Principal Marine Pollution Sources

Sewage: Pollution can reach the ocean when sewage or harmful substances flow through sewage systems, rivers, or drains directly into the water. This is frequently how minerals and substances from mining sites are described to find their way to oceans. Other chemical nutrients released into the ocean reduce oxygen levels, harm plant life, and significantly degrade the quality of seawater. As a result, all aspects of ocean life, including both plants and animals, are severely affected. Not all human waste that gets into the water is cleaned up. Typically, sewage that enters the water is not treated, which can cause illness.

Toxic substances produced by industries: - Another frequent type of waste that is immediately dumped into the oceans and causes ocean pollution is industrial and agricultural waste. As these wastes are dangerous hence dumping of such toxic liquids into the ocean have an immediate impact on marine life. Additionally, they increase the ocean's temperature,

⁴ A.G. Cosby, V. Lebakula, et.al., "Accelerating Growth of Human Coastal Populations at the Global and Continent Levels: 2000–2018." 14 Scientific Report 22489 (2024).

a phenomenon known as thermal pollution, as the temperature of these liquids is quite high. Animal and plants that cannot survive at higher temperatures eventually perish. Sadly, crude oil is extremely challenging to remove, so once it spills, it usually remains in the environment. Additionally, each year thousands of crates are lost by numerous ships as a result of storms, emergencies, and mishaps. This results in excessive algae growth, ballast water, and noise pollution (excessive, unexpected noise that disturbs the delicate equilibrium of life). Other species can frequently invade an environment and cause harm to it by interfering with other organisms' life cycles, resulting in a clash of nature that already has been harmed by the overabundance of pollution.

Ocean Mining: - Ocean mining in the deep sea is yet another source of ocean pollution. Deep sea mining is a process through which minerals were extracted from the seabed. Sulfide deposits can be found up to 3.5 km (1.8 mi) below the surface of the water at ocean mining sites that drill for metals like silver, gold, copper, cobalt, and zinc. The expected impact of offshore mining could be in form of Plume at seafloor, water column turbidity and addition of bottom sediments to the surface resulting in change in marine ecosystem.⁵ Although we don't yet have enough scientific data to fully explain the severe environmental impact of deep-sea mining, we do know that it damages the ocean's deepest layers and increases toxicity in the area. The region's ecosystem is further severely hampered by the leaks, corrosion, and oil spills that result from this permanent harm.

Littering: - Pollution from the atmosphere is, believe it or not, a huge source of ocean pollution. This happens when items from far inland are carried far by the wind and end up in the ocean. These items can be made of anything, including garbage and debris, as well as natural materials like sand and dust. The majority of trash, particularly plastic trash, cannot decompose and hangs around in the ocean current for a long time. The most prevalent element in the ocean today is plastic. Plastic, in particular, is harmful to the ecosystem as it does not break down readily and is often mistaken as food by marine animals. According to a study completed by “University of Georgia found that every year, 18 billion pounds of plastic trash find their way into our oceans. To put that into perspective, there would be five full trash bags of plastic compounding per year to cover every foot of coastline on the planet.”⁶ Around the world, the top five items discovered during coastal cleanups are all made of single-use plastic, these are the objects like plastic straws, drink stirrers, plastic beverage bottles, food wrappers and bottle caps. It is estimated that, there are 5.25 trillion pieces of plastic trash in the Ocean, out of that, 269,000 tones float on the surface, and the deep sea is littered with four billion plastic microfibers per square kilometers. Research estimates anywhere from 15 to 51 trillion particles of floating microplastic are in our oceans, weighing between 205-520 million pounds⁷. This includes synthetic fibers and plastic microbeads, both of which are too small to be filtered out by many waste water treatment plants. Plastic microbeads are used as exfoliates in some personal care products. The two countries that contribute the most to ocean plastic waste globally are China and Indonesia. They make up one-third of all marine pollution collectively.

Effect of Marine Pollution on Living Organism and Non-Living factors in Marine Environment

The South East Pacific is home to 97 species, including 20 fish species, 5 sea turtle species, 53 seabird species, and 19 marine species⁸. A comprehensive review of photographic records, unpublished data, conference proceedings, and published studies showed interactions with plastics for these species. The fact that four out of the five species of sea turtles experience both entanglement and ingestion highlight how sea turtles are most impacted by plastic interactions. “Scientists have documented 700 marine species affected by ocean plastic. One in three marine turtles, up to nine out of ten seabirds, and more than half of all whale and dolphin species have consumed plastic. In the Canadian Arctic, 87% of birds have ingested plastics of some sort”⁹. Tested crustaceans at the Mariana Trench, the deepest part of the ocean, had consumed plastic. Every year, entanglement and ingestion with plastic cause over 100,000 deaths in marine life and more than a million sea birds per year are killed by ocean pollution¹⁰. It is impossible for marine organism or plant life to survive in dead zones that pollution has created in the oceans. Over 500 of these dead zones exist, covering an area about the size of the United Kingdom. The oil spill is dangerous to marine life in several ways. The gills and feathers of marine animals may become contaminated by oil spilled in the ocean, making it difficult for them to move, fly, or feed their young. Long-term effects on marine life may include cancer, reproductive system malfunction, behavioral modifications, and even

⁵ Rahul Sharma, “Environmental Issues of Deep Sea Mining,” 15 Elsevier B.V, Procedia Earth and Planetary Science 204-2011 (2015).

⁶ Jenna R. Jambeck, Roland Geyer, et.al., “Plastic Waste Inputs from Land into the Ocean” 347 (6223) Science 768-771 (2015)

⁷ Erik Van Sebille, Chris Wilcox, et.al., “A Global Inventory of Small Floating Plastic Debris” IOP Publication, Environmental Research Letters 10 (2015)

⁸ Thiel et al. 2018, “Impacts of Marine Plastic Pollution from Continental Coasts to Subtropical Gyres—Fish, Seabirds, and Other Vertebrates in the SE Pacific”. Frontiers Marine Science, Volume-5, 2018.

⁹ Gall S.C., Thompson R.C., “The impact of debris on marine life”, Marine Pollution Bulletin, Volume 92, Issues 1–2, 2015, Pages 170-179, ISSN 0025-326X

¹⁰ United Nations Educational, Scientific and Cultural Organisation’s Intergovernmental Oceanographic Commission data available at www.unesco.org/en/articles/world-oceans-day-unesco-reinforces-importance-preserving-largest-ecosystem-planet (last visited January 09,2024)

death. An oil spill floats on the water's top, blocking sunlight from reaching marine vegetation and interfering with photosynthesis. Marine life may experience skin, eye, lung, and liver issues for long period of time. The majority of oceanic debris does not break down and floats around for many years. It consumes oxygen as it degrades. As a result of this, oxygen level goes down. As oxygen levels decrease, the chances of long-term survival for marine animals such as whales, turtles, sharks, dolphins, and penguins also diminish. Waste products from industry and agriculture often contain noxious substances that are dangerous to marine life. Animals' fatty tissue can accumulate chemicals from pesticides, which can cause their reproductive system to malfunction. Chemical used in industries and farms get washed into the rivers and from there are carried into the oceans. These substances do not dissolve and end up at the ocean's floor. These chemicals are consumed by small animals, which then impact the entire food chain when eaten by large animals. Humans are at the top animals in the affected food chain, which has an effect on their health because the toxins from these contaminated animals accumulate in human tissues and can cause cancer, birth defects, or long-term health issues.

Sustainable Development Goals as Transacting Tool

The Sustainable Development Goals (SDGs) were developed during the 2012 United Nations Conference on Sustainable Development, which took place in Rio de Janeiro, Brazil. The purpose of this conference was to establish a set of global goals addressing the environmental, political, and economic challenges faced by the human race. In 2015, UN has chosen 17 SDGs by voting to be applicable universally to curb the climate change scenario and to promote them as global goals for the period of 2015-2030. Out of 17 SDGs Goal No 14 which termed as LIFE BELOW WATER is about conserving and sustainably using the oceans, seas and marine resources.

Targets set under goal number 14: - By 2025, prevent and greatly reduce all forms of marine pollution, especially that resulting from land-based activities, such as marine debris and nutrient pollution. By 2020, marine and coastal ecosystems must be managed and protected responsibly in order to prevent serious negative effects, including by boosting their resilience, and to take steps towards their restoration in order to achieve healthy and productive oceans. To lessen and resolve the effects of ocean acidification, including through improved cross-cutting scientific collaboration. By 2020, implement science-based management plans to effectively regulate fishing, eliminate overfishing, and combat illegal, unreported, and unregulated fishing, along with harmful fishing practices, while working to restore fish stocks as quickly as possible, aiming for levels that can produce the maximum sustainable yield based on their biological traits. Conserve at least 10% of coastal and marine areas by 2020, following both national and international laws and the latest scientific research. By 2020, prohibit specific fisheries subsidies that contribute to overfishing and overcapacity, remove subsidies that promote illegal, unreported, and unregulated fishing, and prevent the introduction of new such subsidies, while ensuring that developing and least-developed countries receive appropriate special and differential treatment as part of the World Trade Organization fisheries subsidies negotiations. By 2030, increase the economic benefits derived from the sustainable use of marine resources, including sustainable fisheries management, aquaculture, and tourism, for Small Island Developing States and least-developed countries. Improve ocean health and boost the role of marine biodiversity in the development of developing nations, especially Small Island Developing States and least-developed countries, by enhancing scientific knowledge, building research capacities, and transferring marine technology, all in line with the Criteria and Guidelines on the Transfer of Marine Technology set by the Intergovernmental Oceanographic Commission. To make marine resources and marketplaces accessible to small-scale, artisanal fishermen. By putting international law into practice as it is mirrored in UNCLOS¹¹, which offers the legal framework for the conservation and sustainable use of oceans and their resources, we can improve the conservation and use of oceans' resources.

Goal 14 needs the implementation of international instruments through institutional and legislative frameworks for the cross-sectoral and integrated conservation and sustainable use of oceans. Although progress has been achieved, the instruments' implementation varies, underscoring the demand for renewed effort and expanded support.

Conclusion: -

Marine ecosystems play a vital role in maintaining the Earth's environmental balance and supporting life on the planet, marine ecosystems are integral to the Earth's environmental health, providing essential services for climate regulation, food security, biodiversity, and economic prosperity. Their preservation is crucial to maintaining a sustainable planet. Marine pollution not only harms marine organisms but also has significant consequences for human health and other terrestrial organisms. Pollutants get accumulated in the body of marine organism which are subsequently being used as seafood by human or other terrestrial animals causing various diseases. Healthy marine ecosystem is essential for human existence and life on Earth. Deterioration in marine environment leads to temperature rise of ocean surface becoming a reason of climate change. Therefore, in the prevailing challenges afore noted, Sustainable Development Goals are understood to be transacting tool and mechanics of which is being explored in the present research article.

¹¹ United Nations Convention on the Law of the Sea, 1982