

FORUM:	Environment Commission
ISSUE:	Measures to Alleviate the Problems Arising from the Increase in Sea Level Due to Global Warming
STUDENT OFFICER:	Jason Lee
POSITION:	Deputy President of Environment Commission

Introduction

The ocean covers up nearly 70% of the planet, and any issues regarding the ocean are essential to the planet and humans because the ocean brings various benefits to human life. To be specific, the ocean is in charge of producing half of the world's oxygen, absorbing 50 times more carbon dioxide than our atmosphere, regulating the weather and climate, and providing the site for transportation and trade. Since the



Possible future of the Earth.

beginning of the industrial revolution, however, the Earth's climate started to change, bringing problems such as sea-level rise to the environment. Climate change, also known as "Global Warming," is mainly the result of greenhouse gas emissions from the usage of transportation, electricity, industry, commercial and residential, and agriculture. These toxic gases damage the atmosphere and trap heat inside our planet, making it warmer and causing extreme weather events such as tornados, hurricanes, blizzards, dust storms, floods, hail storms, and ice storms. The frequency of these events is increasing at a fast speed, causing more and more damages to our lives and economy. Save our old friend Earth by regulating anthropogenic activities that cause greenhouse gas emissions; immediate solutions are needed for a better future and sustainable recovery.

Background

Since 1880, the mean global sea level has risen about 8-9 inches. In 2014, the global sea level was 2.6 inches above the 1993 average. According to the data from National Oceanic and Atmospheric Administration, sea level is rising at a rate of about one-eighth of an inch per year. This phenomenon is mainly caused by meltwater from glaciers and ice sheets as well as thermal expansions of the warming waters. Due to the rise of the sea level, residents in the coastal area are in great danger. To be specific, 40



percent of the United States' population lives in coastal areas that may be vulnerable to sea-level rise, and 8 of the world's 10 largest cities are located near a coast: Tokyo, Japan; Mexico City, Mexico; Mumbai, India; São Paulo, Brazil; New York City, United States of America; Shanghai, China; Lagos, Nigeria; and Los Angeles, United States of America.

If the sea level keeps on rapidly rising, cities near coasts will suffer from huge economic damages. For instance, in urban settings along coastlines around the world, rising seas threaten the infrastructure necessary for local jobs and regional industries: roads, bridges, subways, water supplies, oil and gas wells, power plants, sewage treatment plants, landfills, etc. Furthermore, environmental effects (coastal flooding and drinking water contamination) are also considered chief issues to be resolved. To prevent the rise of sea level, the world should first cooperate to reduce the emission of greenhouse gases.



Greenhouse gases are emitted from factories.

Starting from the 20th century, the topic of greenhouse gas (the fundamental cause of the current issue of sea-level rise) in the atmosphere gained overfull interest from scientists and researchers around the world. Specifically, the initial detection of greenhouse gas in the atmosphere was in the 19th century. Scientists noticed that the greenhouse gas brings about the greenhouse effect, influencing Earth's temperature. However, this issue did not gain much interest from scientists and researchers until the early 1960s, when a scientist measured the level of carbon dioxide in the atmosphere, discovering that it was rising at a tremendous speed. The existence of greenhouse gas in the atmosphere is an essential natural phenomenon that has been controlling Earth's temperature and climate for billions of years to support a perfectly balanced shelter for organisms to thrive in. The greenhouse effect occurs when sunlight is reflected and absorbed in the atmosphere; the greenhouse gas in the atmosphere traps heat from sunlight and keeps Earth warm. Without this effect, Earth's temperature may drop below average, making it impossible for any creatures to survive.

However, from the start of the Industrial Revolution, the level of greenhouse gas in the atmosphere has increased rapidly until now. By damaging the ozone layer and causing ozone depletion, excess amounts of greenhouse gas negatively impact the climate. Gases from burnt fossil fuels and exhaust fumes from automobiles are the two main sources of anthropogenically produced greenhouse gases and are the main culprit of climate change. The biggest quest for human beings right now is switching fuel-based energy to cleaner and renewable energy. Various solutions are theoretically possible, but with the current technology level, no such clean energy sources can completely replace fossil fuels. Already many governments, communities, and organizations are cooperating to find solutions: some



countries are in the stage of switching energy sources, and the leading members are Sweden, Costa Rica, Nicaragua, Scotland, Germany, Uruguay, Denmark, China, Morocco, USA, and Kenya. For new energy sources, hydrogen technology, solar energy, wind power, and geothermal energy are being considered as prevalent alternatives.

Problems Raised



Coastal Flooding is occurring more often.

Coastal Flooding

Changing sea levels are affecting human lives and activities by inundating low-lying lands, eroding shorelines, contributing to coastal floods, and increasing the flow of saltwater into rivers and groundwater aquifers. The major cause behind this phenomenon is global warming resulting from anthropogenic climate change. Coastal flooding occurs during seasonal high tides and storms that

push water toward the shore. In recent days, coastal flooding is occurring more often as rising sea level reduces the gap between the sea level and ground level. Infrastructures of coastal cities are being threatened by the flooding, needing immediate actions from the world to prevent any more economic damages and inundations. To be specific, coastal flooding can cause impacts such as frequent road closure, reduced stormwater drained capacity, and deterioration of infrastructure not designed to withstand frequent inundation or exposure to saltwater.

Contaminated Drinking Water

As the sea level continues to rise and as seas crawl farther and farther up the shore, saltwater will ooze into the underground freshwater sources in many places. This underground freshwater is an essential source of drinking and household water that most people rely on. To be specific, in Florida, seawater is moving rapidly inland along coastal rivers as the sea level rises. In addition to advancing up tidal rivers, saltwater is also contaminating aquifers as seas rise, degrading the sustainability of groundwater usage in coastal communities.

International Actions

Intergovernmental Panel on Climate Change(IPCC)

The IPCC was set up by the World Meteorological Organizations (WMO) and the United Nations Environment Programme(UNEP) to provide scientific information on climate change. In 2013, the IPCC made a conclusion about this issue in the Fifth Assessment Report, saying that climate change is real and human activity is the main cause. The Fifth Assessment Report provides the records and explanations of sea-level rise, CO2 emission in the atmosphere, etc.

The Paris Agreement

This agreement's central aim is to globally combat climate change with support from developed countries. To reach the goals, new technology, financial support, and efforts from the world are needed. Moreover, the Paris Agreement requires all parties to work with their full efforts through Nationally Determined Contribution (NDC).

United Nations Framework Convention on Climate Change(UNFCCC)

The main purpose and the goal of the UNFCCC are to reduce greenhouse gases in the atmosphere and to prevent dangerous anthropogenic interference with the climate system. This international environmental treaty was adopted on May 9, 1992, and was ratified by a sufficient number of countries. The UNFCCC does not help other countries physically to solve climate change issues. Instead, it outlines specifically how international treaties should take action towards the goal of the UNFCCC.



United Nations Climate Change

Kyoto Protocol

The Kyoto Protocol was adopted on December 11, 1997. The protocol operationalizes the UNFCCC by committing industrialized countries and economies in transition to limit and reduce greenhouse gases emissions in accordance with agreed individual targets. Under the protocol, the countries' true emissions are recorded and monitored.

Key Players

United States of America

Being one of the largest greenhouse gas emitters in the world, the USA made a promise to decrease the amount of greenhouse gas pollution between 26 to 28 percent from 2005 levels by 2025. Because of the concern of losing competitiveness in the global market, the USA pulled itself back from the Kyoto Protocol and the Paris Agreement. One of the main ways to reduce greenhouse gas emissions is shifting the main energy source from fossil fuels to alternative sources. However, as the USA's economy and energy source is highly dependent on cheap fossil fuels, immediate alteration of their main energy source will induce inevitable economic damages.

China

Emitting the largest amount of greenhouse gases in the world, China has promised to decrease emissions by 2030. By examining China's recent actions, many experts believe that its goal is appropriate and achievable. By 2030, it is expected that 20 percent of the energy in China would come from non-fossil fuel sources. To be specific, China recently committed to strictly controlling projects that cause high pollutions and carbon emissions. President Xi Jin Ping also consistently announces that China must help to limit climate change.



Renewable energy sources are needed.

Possible Solutions

Hydrogen Based Economy

The hydrogen-based economy is one of the cleanest energy systems that can be used to be less dependent on fossil fuels. When hydrogen is burnt and used as a fuel, unlike other burnt fuels, it only emits water vapor into the atmosphere. According to the current technology level, however, it is difficult to extract hydrogen without generating any pollutants. Most of the hydrogen produced in the world today comes from gases like methane using a method called steam-methane reforming, which uses high temperature to extract hydrogen out of methane gas. During this process, greenhouse gas is inevitably emitted to the atmosphere, making the hydrogen-based economy less practical as of the moment.

Nuclear Powerplant

Despite its renown unsafeness, the nuclear power plant is an eco-friendly energy source. Unlike fossil fuel energy, it does not emit greenhouse gases during operation and it is a consistent energy source that can be used by humans. However, there are also some drawbacks to this energy source. Nuclear power plants have the risk of accidents where radioactive material gets released. Although the accidental rate is extremely low, it is dangerous due to the catastrophic consequences of the accidents. Nuclear power plants have been utilized globally, and there have been only three accidents in human history: the Chernobyl, Fukushima, and Three Mile Island disasters. However, these three nuclear accidents are still some of the deadliest disasters in human history. Despite the relative inexpensiveness of running the nuclear power plant, it is expensive to build the powerplant, making it harder for Less Economically Developed Countries to build nuclear power plants without any financial support.

Glossary

Anthropogenic

Caused or produced by humans

Greenhouse Gas

Gases that causes greenhouse effect in the atmosphere by absorbing solar radiation (ex: Carbon Dioxide, Methane, Flurocarbon)

Greenhouse Effect

Greenhouse effect is the process when radiation from the Sun is aborded in the atmosphere and heats the surface of the planet



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