



United Nations Environment Programme

Combatting Ocean Acidification
and Protecting Marine Biodiversity

AbbyMUN 2023



PRIME MINISTER • PREMIER MINISTRE

November 25, 2023

Dear Friends:

I am pleased to extend my warmest greetings to everyone taking part in the 2023 Abbotsford Model United Nations Conference.

This conference offers delegates a wonderful opportunity to experience international diplomacy firsthand and to gain deeper insights into pressing issues facing the world today. Through their research and preparation, students will learn more about the policies and positions of different countries on a wide variety of topics as they engage in debates and discussions with their peers.

I would like to thank the organizers for putting together a stimulating and rewarding program for everyone involved. I would also like to commend the students taking part for their hard work in preparing for these deliberations. I am certain that you will benefit greatly from this opportunity to lead, negotiate and collaborate, and that you will come away inspired to create positive change as informed and engaged global citizens.

Please accept my best wishes for a memorable and rewarding experience.

Sincerely,

The Rt. Hon. Justin P. J. Trudeau, P.C., M.P.
Prime Minister of Canada



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Director's Letter

Dear Delegates,

I would like to most sincerely welcome you all to AbbyMUN's United Nations Environment Programme committee. My name is Kunwar Banwait and I am honoured to be your Director. Thrilled to have alongside me, I am joined by Freddie Zhang, your Chair, as well as Youl Sim, your Assistant Director.

This year, we will be having the pleasure of combatting ocean acidification and preserving marine biodiversity. A guide to the rules of procedure can be found on AbbyMUN's official website.

AbbyMUN was the very first Model United Nations conference that I ever had the pleasure of attending. As I entered its gates in late 2021, that doe eyed boy fell in love with diplomacy straight away. I was enamoured by the flow of debate, the community of it all, and the fun loving atmosphere that revolved around passing notes. Since then, I have attended and staffed at over ten conferences, but I have always returned to AbbyMUN year after year. Now being my final year here, I hope to give the same experiences I got from Model United Nations to the delegates of UNEP. Whether you are a newcomer or a veteran, there is something for everyone in our committee.

Delegates, it is my dream to see you all thrive in the environment me and my fellow staffing mates have made for you in our committee. I challenge you all to spread your wings and soar above the skies in this very special Model United Nations experience. If you require assistance with anything at all, please do not hesitate to contact us at unep.abbymun@gmail.com. Position papers are not mandatory for this committee, but are required if you want to be eligible for awards.

Sincerely,

Kunwar Banwait
Director of UNEP | AbbyMUN 2023

Committee Description

The United Nations Environment Programme was first founded in 1972, in Nairobi Kenya. UNEP's 193 member states have worked to create policies that coordinate responses to the world's environmental changes. Environmental challenges have been discussed and collaborated on by various nation states in UNEP. In this committee session, the United Nations Environment Programme will be working on combating ocean acidification and preserving marine biodiversity, a hot button issue that affects nations around the globe.

Topic Overview

Marine life and biodiversity has been at threat for decades now. As carbon emissions get released from fossil fuels our rain clouds, rivers, and oceans begin to acidify. A hazard to both human life and the environment, nations around the world have attempted to collectively combat this increasingly dire situation. Particularly in coral reefs, the decreased pH caused by carbon dioxide in the atmosphere has led to mass destruction of marine ecosystems, reduced coral growth, altered food chains (including plankton), and coral bleaching. Scientists almost unanimously believe that it is caused by human beings. However, scientists also believe that there are many mitigations that can be made on behalf of various nation states. These include but are not limited to reducing carbon dioxide and/ or methane production, the establishment of marine protection zones, and techniques such as coral gardening

Timeline

Pre-Industrial Era - Prior to the industrial revolution (pre-1750), the concentration of atmospheric CO₂ was relatively stable at around 280 parts per million (ppm).

Late 18th Century - The industrial revolution marked the beginning of a significant increase in CO₂ emissions, as human activities like burning coal, oil, and natural gas became widespread.

1957 - Charles David Keeling starts the Mauna Loa Observatory CO₂ monitoring program in Hawaii, providing the first continuous record of rising atmospheric CO₂ concentrations.

Mid-20th Century - As CO₂ emissions continued to rise, scientists began to understand the potential implications for the world's oceans.

1979 - The concept of ocean acidification was first introduced by Dr. Roger Revelle and Dr. Hans Suess in a scientific paper, highlighting that increased CO₂ levels would lead to the ocean's pH decreasing.

Late 20th Century - Research into ocean acidification intensified, and evidence of declining ocean pH became more apparent.

2003 - The first comprehensive study of ocean acidification, known as the "Geochemical Ocean Sections Study" (GEOSECS), was conducted to assess its impact on various oceanic regions.

2008 - The second International Year of the Reef raised global awareness about the impacts of ocean acidification on coral reefs.

2010 - The United Nations Framework Convention on Climate Change (UNFCCC) recognized the need to address ocean acidification as part of the global climate change discussions.

2015 - The Paris Agreement was reached, setting international targets to limit global warming and reduce CO₂ emissions, which assist in mitigating ocean acidification.

Historical Analysis

Background

Due to the growing release of carbon dioxide (CO₂) from human activities into the atmosphere, the ocean's pH is steadily decreasing. Over the past two centuries, the ocean has absorbed approximately 30% of the total CO₂ emissions, which has already disrupted the production of calcium carbonate in marine waters, consequently affecting the carbonate-silicate cycle. This disruption has led to a gradual decline in the ocean's pH, a phenomenon referred to as Ocean Acidification (OA).

Past Research

Scientific studies since the 1990s reveal that OA has a broad spectrum of effects, encompassing changes in the physiology, behaviour, and growth rates of marine creatures, as well as shifts in their population dynamics. These consequences have far-reaching negative impacts on marine biodiversity. Organisms that are sensitive to increased acidity and those that rely on calcium carbonate for their structures are particularly vulnerable. This group includes species of ecological and economic importance, such as crabs, lobsters, clams, mussels, oysters, sea urchins, corals, squid, and certain types of plankton. The decline in calcifying organisms and the ecosystems they inhabit, as well as the fisheries and aquaculture industries dependent on them, leads to detrimental effects on marine biodiversity, food security, tourism, coastal protection, and cultural heritage.

Since the initial investigations into Ocean Acidification and the coining of the term in 2003, substantial progress has been achieved in the exploration, comprehension, assessment, and communication of the challenges posed by this phenomenon.

Current Situation

Before the Industrial Revolution, the pH of the ocean was 8.2. Now? 8.1. Although it does not seem like a big difference, it is important to note that one unit of pH is ten times more/less acidic. The change in pH of the ocean occurs naturally as well, over long periods of time anywhere between 5 000 to 10 000 years. However, with human-aid environmental problems such as a drastic increase in carbon emissions, caused the Ocean to become 26% more acidic in less than 100 years.

One of the main reasons for its acidification is due to carbon dioxide, as said above. Acidification by the dissolving of CO₂ creates carbonic acid which limits the number of carbonate ions (alkaline) in the oceans. Scientists have tried to add calcium carbonate to offset its acidity via more base, but due to the oceans rapid rise in acid, it does not hold a significant change in counteracting the problem at hand. The change in pH has caused pressure on marine life as well, with its drastic change aiding in loss of marine biodiversity. Its metabolic functions are threatened as well as most marine organisms have a specific pH they need to thrive. Their needed pH has been in tune with the ocean until the rise in acidity at an alarming rate. Scientists warn that due to the different water environment, by 2100, fishes such as the Atlantic cod could reduce in size by a whopping quarter of its original body. As they need more energy to sustain their internal conditions and the declining amount of well-developed prey to feed on, the small handfuls of marine life that can adapt to an acidic ocean will face problems that stem from ocean acidification as well. In short, no marine life is safe from the increasing problem.

Unfortunately, it is not just acidification that the oceans have to deal with. With overfishing, pollutants in the water as well as the sky above and the bleaching of once marvelous coral reefs, the biodiversity in our waters have declined significantly and continues to do so. Marine life affects everyone, as the algae sequesters carbon dioxide, humans have seafood in their diet, and more. But instead of protecting the ocean that gives and gives, humans continue to exploit the oceans of its resources. Now, scientists are saying that marine habitats and its habitants are declining faster than ever before, as humans altered two-thirds of the ocean in 2008. One and a half decades later today, that number has certainly risen. The greed of humans and their pressure is eroding the massive bodies of water, and the current rate of extinction is tens to hundreds times higher than it has been compared to the average over the past 10 million years. Also, in 1980, an average coral reef was affected by bleaching every 25 to 30 years. And as of 2020, it was every six years. We are all so dependent on the ocean and the resources it provides us, but the upscale disaster we are causing does not seem to have a big enough solution as of today.

Past Involvement

The Earth's many oceans are a major topic in regards to climate change and biodiversity as issues about the bodies of water heighten every year. The rise in acidity in the ocean's as well as great loss of marine diversity creates the urgency to combat, as well as talk about the waters. The UN has taken action in various ways about the problem at hand.

UN Ocean Conference

Started six years ago under the motto, "Our ocean's, our future," the UN Ocean Conference sought to mobilize action for better use of any marine resources including the oceans and seas. This conference is crucial as the oceans are under alarming threat due to pollution, overfishing, and poor handling. The conferences also address problems of health, economy, and the governance of the ocean that comes with the poor qualities of the waters. This conference brings together governments, representatives, scientists, and business people from over 200 countries to discuss the problem at hand.

Sustainable Development Goal 14: Life Below Water

Sustainable Development Goals are 17 ambitious goals made by UN Member States to hopefully achieve all goals by the year 2030. The 14th goal, named Life Below Water, focuses on many ocean issues, such as reducing marine pollution, putting an end to over and illegal fishing, protecting the ecosystems and more. They also call for more investments towards marine education and technologies to assist in reaching the goals that are mentioned above.

UN Decade of Ocean Science for Sustainable Development

The United Nations acknowledges that understanding our oceans is the first step towards combating loss within. As many parts of the ocean remain unmapped, unexplored and a mystery, the Decade provides a common framework so every country can be on the same page about ocean sciences, so that together, they are able to walk towards conversations of sustainability and soon, action in terms of better management of the oceans and its coasts for a brighter future for everybody.

Bloc Positions

The three blocks that delegates will be divided into will be wealthy nations, third world nations, and major oil exporting nations. Keep in mind, the interests of certain nations might align or overlap with different blocs.

Wealthy nations

Wealthier nations are often those who are less affected by the overall degradation of the world's Marine biodiversity. They are presented with more resources and geopolitical power to help aid with the ecological destruction of marine life. Several of these nations are not currently impacted by the acidification of oceans, however have invested interests in nations that are beginning to feel the consequences of it.

Third World Nations

Many third world nations are beginning to feel the effects of acidification of ocean water and destruction of marine life. These nations are going to require the assistance of wealthier nations to combat the acidification process. Further, more impoverished nations might have a more difficult time when faced with taxation or regulations considering many of their economies are already stagnating.

Oil Exporting Nations

Oil exporting nations have a vested interest towards the fossil fuels industry. Considering that one of the largest solutions to the entire acidification of the ocean crisis is to cut down on carbon dioxide emissions in the atmosphere, it will likely lead to some type of conflict between them and non-oil producing nations.

Potential Solutions

International organisations have suggested four strategies to address OA: reducing CO₂ emissions, supporting natural carbon sequestration mechanisms, leveraging negative emission technologies, and establishing Marine Protected Areas.

Firstly, reducing net CO₂ emissions on a global scale and rapid timeline can be accomplished through the adoption of low-carbon and carbon-neutral energy technologies, enhanced energy efficiency, and ocean-based solutions.

Secondly, natural carbon sequestration mechanisms use “Blue Carbon” coastal ecosystems like mangroves, seagrass beds, and salt marshes that naturally store carbon in their sediments over extended periods. Aquatic vegetation has demonstrated its ability to remediate or buffer against acidification impacts in nearshore coastal waters by elevating pH levels within submerged ecosystems, potentially benefiting sensitive species.

Thirdly, negative emission technologies (NETs) encompass established methods like afforestation and reforestation and newer ideas such as bioenergy production with carbon capture and storage. Another innovative concept, seaweed aquaculture on a large scale, may effectively

capture carbon while locally reducing ocean acidification, potentially aiding nearby coral populations by offsetting decreases in seawater pH.

Finally, establishing Marine Protected Areas (MPAs) can directly mitigate OA by preserving marine vegetation, which can in turn buffer against changes in water chemistry.

Discussion Questions

1. How will you as a wealthy nation aid more impoverished nations in the fight against ocean acidification?
2. How do you want wealthy nations to help?
3. How willing are you to alter the world economy to help battle the issue?
4. What actions or lack of action will be taken against
5. How impacted will your respective nation be by the destruction of marine biodiversity and ocean acidification

Further Resources

“The Impacts of Ocean Acidification on Coral Reef Ecosystems.” *Energy5*, energy5.com/the-impacts-of-ocean-acidification-on-coral-reef-ecosystems#:~:text=As%20ocean%20acidification%20continues%20to,and%20restore%20these%20vital%20ecosystems. Accessed 6 Nov. 2023.

Unep. “50 Years of Environmental Milestones.” *UNEP*, www.unep.org/environmental-moments-unep50-timeline#:~:text=Founded%20in%201972%20following%20the,to%20the%20world's%20environmental%20challenges. Accessed 6 Nov. 2023.

“Ocean Acidification.” *Woods Hole Oceanographic Institution*, <https://www.whoi.edu/know-your-ocean/ocean-topics/how-the-ocean-works/ocean-chemistry/ocean-acidification/>. Accessed 5 Nov. 2023.

Magazine, Essential. “How Coral Gardening Is Saving Reefs.” *Essential Marbella Magazine*, 16 July 2021, www.essentialmagazine.com/how-coral-gardening-is-saving-reefs/.

By Kirsten Isensee and Luis Valdes, IOC-UNESCO*,
sustainabledevelopment.un.org/content/documents/5844Ocean%20acidification.pdf. Accessed 7
Nov. 2023.

Bibliography

“Habitat and Biodiversity Loss.” *Our Shared Seas*, 8 June 2021,
oursharedseas.com/threats/threats-habitat-and-biodiversity/#:~:text=Marine%20habitat
s%20and%20biodiversity%20are%20declining%20faster%20than,other%20time%20in
%20human%20history.

Kwon, David. “Ocean Acidification: Interdisciplinarity in Marine Science.” *UC Davis Coastal
and Marine Sciences Institute*, 28 June 2022,
<https://marinescience.ucdavis.edu/blog/ocean-acidification-interdisciplinarity-marine-science>.
Accessed 5 Nov 2023.

“Ocean Acidification.” *Smithsonian Ocean*, 30 Apr. 2018,
<https://ocean.si.edu/ocean-life/invertebrates/ocean-acidification>. Accessed 5 Nov 2023.

“Ocean Acidification.” *National Oceanic and Atmospheric Administration*,
<https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification>.
Accessed 5 Nov. 2023.

“Ocean Acidification.” *Woods Hole Oceanographic Institution*,
<https://www.whoi.edu/know-your-ocean/ocean-topics/how-the-ocean-works/ocean-chemistry/ocean-acidification/>. Accessed 5 Nov. 2023.

“Ocean Acidification: The Worldwide Growing Concern.” *Home*, 25 Feb. 2022,
savethewater.org/ocean-acidification-the-worldwide-growing-concern/?gclid=CjwKCA
iA3aeqBhBzEiwAxFiOBrIx061ubG4a6SWxdbQdRzOzFUB24pOTt7iwISp7CH9MZel
91YHslRoCvmIQAvD_BwE.

Rafferty, John P. “Ocean Acidification.” *Britannica*, 13 Oct. 2023,
<https://www.britannica.com/science/ocean-acidification>. Accessed 5 Nov. 2023.

“UN Marks World Oceans Day at Ocean Conference.” *UN Marks World Oceans Day at Ocean
Conference - Xinhua | English.News.Cn*,
web.archive.org/web/20170609143250/news.xinhuanet.com/english/2017-06/09/c_
136351595.htm. Accessed 4 Nov. 2023.

“Lungs of Our Planet - Un Ocean Conference.” *United Nations*, United Nations, news.un.org/pages/lungs-of-our-planet/. Accessed 4 Nov. 2023.

“Un Chief Warns Oceans ‘under Threat as Never Before.’” *Al Jazeera*, Al Jazeera, 5 June 2017, www.aljazeera.com/news/2017/6/5/un-chief-warns-oceans-under-threat-as-never-before.

“About | UN Ocean Conference.” *United Nations*, United Nations, www.un.org/en/conferences/ocean2022/about. Accessed 4 Nov. 2023.

“Fast Facts - What Is Sustainable Development? - United Nations Sustainable Development.” *United Nations*, United Nations, www.un.org/sustainabledevelopment/blog/2023/08/what-is-sustainable-development/. Accessed 4 Nov. 2023.

Unep. “50 Years of Environmental Milestones.” *UNEP*, www.unep.org/environmental-moments-une50-timeline#:~:text=Founded%20in%201972%20following%20the,to%20the%20world's%20environmental%20challenges. Accessed 6 Nov. 2023.

“The Impacts of Ocean Acidification on Coral Reef Ecosystems.” *Energy5*, energy5.com/the-impacts-of-ocean-acidification-on-coral-reef-ecosystems#:~:text=As%20ocean%20acidification%20continues%20to,and%20restore%20these%20vital%20ecosystems. Accessed 6 Nov. 2023.

“U.S. Energy Information Administration - EIA - Independent Statistics and Analysis.” *Where Our Oil Comes from - U.S. Energy Information Administration (EIA)*, www.eia.gov/energyexplained/oil-and-petroleum-products/where-our-oil-comes-from.php. Accessed 6 Nov. 2023.

Magazine, Essential. “How Coral Gardening Is Saving Reefs.” *Essential Marbella Magazine*, 16 July 2021, www.essentialmagazine.com/how-coral-gardening-is-saving-reefs/.

By Kirsten Isensee and Luis Valdes, *IOC-UNESCO**, sustainabledevelopment.un.org/content/documents/5844Ocean%20acidification.pdf. Accessed 7 Nov. 2023.