Committee: Environmental Commission

Issue: Reducing Ocean Acidification

Student Officer: Marina Emmanouilidou

Position: Deputy President

Dearest Delegates,

My name is Marina Emmanouilidou and I am serving as a co-chair in this year's Environmental Commission in the Campion School Model United Nations. This will be my first time as a student officer and my first time attending Campion School's Model United Nations conference, as well. Concerning my previous MUN experience, I have attended the 19th Athens Model United Nations in the Disarmament and International Security committee, and also in the 20th Athens MUN in the Commission of Economic and Social Development. I am very excited that I will be a student officer this year, because I loved the experience as a delegate and I wanted to explore MUN more. So, it is an honour that I am chosen for the position of a student officer in Campion School.

In this year's Environmental Commission, me and my fellow student officers will be responsible for the correct, smooth and precise process of the conference according to the rules of procedure. We will be there, all through the lobbying, to help you, to answer your questions and to address any possible problems that may occur. Afterwards in the debate, we will make sure that a fruitful debate will take place and that your resolutions will be efficient and productive.

The topic that I am responsible for, actually caught my attention the first time I saw it. Ocean Acidification is a problem considered by scientists as the cousin of global warming and of major importance, and yet the people aware of it are very few, despite its major significance. I believe it is one of the most noteworthy topics I have come across in MUN, because we live in a world where few people acknowledge the true problems of our planet and the bad impacts that occur because of them. Eventually I think that everyone should know about the problem called Ocean Acidification and which will be the results, if people ignore it.

In this study guide you will find many information concerning the topic. You should read it carefully. Also, I want to draw your attention to the multimedia resources at the end of the study guide because it is very important not to rest on your laurels but to make some research of your own, too. My suggestion is first to understand the situation of the topic completely and then to research on your country's policy upon the matter.

I want at this point to emphasize that when you have a question upon the topic or when you need help, or even when you need something regarding the procedure, do not hesitate to ask me. My job

at this point is to make you understand completely the topic on Ocean Acidification, so I urge you to email me any questions you may have.
I will try my best in this year's CSMUN because I want all of you to experience the amazing and unforgettable experience that MUN has to offer. I am looking forward to meeting you and becoming acquainted with you this October.

Best regards,
Marina Emmanouilidou
Co-chair of the Environmental Commission
Email: marinaemmanouilidou00@gmail.com

INTRODUCTION

Ocean Acidification refers to a reduction in the pH of the ocean over an extended period of time, normally decades, which is caused primarily by the uptake of carbon dioxide from the atmosphere. The ocean and the atmosphere exchange massive amounts of carbon dioxide, and the oceans absorb about one third of the existing CO_2 in the atmosphere. Consequently, as the rate of carbon dioxide in the atmosphere increases, the rate of the carbon dioxide absorbed by the ocean increases, too. As a result, the carbon dioxide reacts with water creating a weak acid called carbonic acid.

Ocean acidification has a severely detrimental impact. A primary consequence is biological. Some sea microorganisms, such as the Photosynthetic algae and sea grasses, may benefit from the high levels of the CO_2, as they require high conditions of CO_2 like normal plants on land, but the acidic environment has a dramatic effect on many calcifying species including oysters, clams, sea urchins, shallow water corals, deep sea corals, and calcareous plankton. If shelled organisms are at high risk then the entire food web is also at risk. Thus, marine organisms are affected, too.

The impacts on marine organisms are not easily predicted. Their way of life, reproduction, growth or photosynthesis, is very vulnerable and if their physiological processes is damaged, there will be a very important loss in marine biodiversity. More specifically, several sea species' shells, such as the Pteropods, are destroyed. Other species such as the Shellfish, the Corals and the Oysters, are unable to rebuild their shell or skeletons so they eventually die. The effect of this process is a gradual dying out of these species, which ultimately has negative implications for food chains.

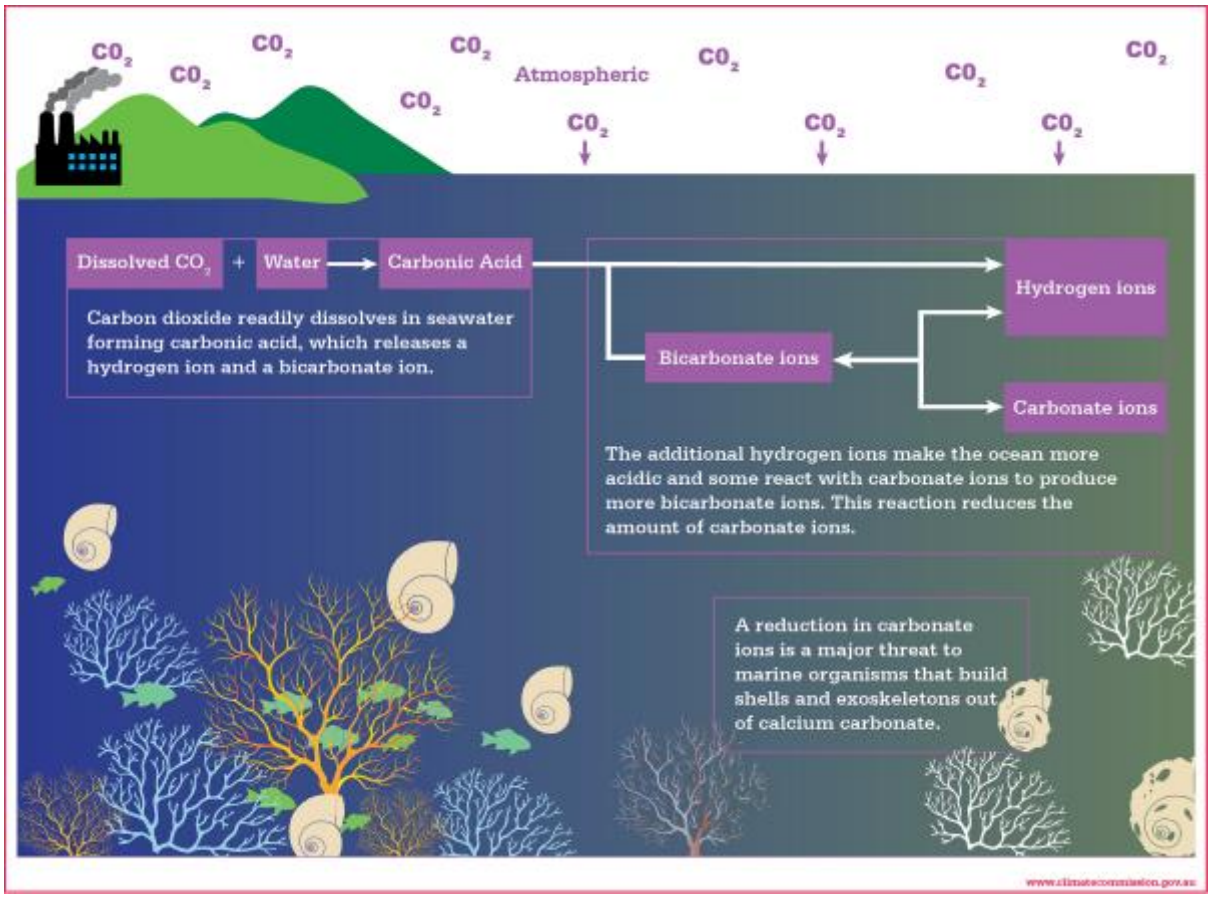
This in turn, has consequences on the economies of several countries which depend on seafood as a source of income. Today, marine and coastal biodiversity – ecosystems, species, and genetic resources – provide enormous benefits for human well-being. Roughly 40 percent of the world's population lives within 100 kilometres of the coast. Fisheries employ approximately 200 million people, provide about 16 percent of the protein consumed worldwide, and have an annual value estimated at 80 billion USD. Coastal ecosystems provide services, including tourism and protection from storms, valued at nearly 26 billion USD annually. [1] Specifically, China has the world's largest exporter of fish and seafood products (14.1 billion USD), followed by Norway (8.8 billion USD) and Vietnam (5.8 billion USD). Other countries with such high export rates are USA (5.1 billion USD), India (4.6 billion USD), Canada (4.2 billion USD), Chile (4.0 billion USD), Sweden (3.7 billion USD), The Netherlands (3.13 billion USD) and Indonesia (3.11 billion USD). [2] It is clear that many economies worldwide depend on the fish and shellfish in our oceans. The damage that these countries will have, if those exports stop, are significant. So, ocean acidification has dire implications for these economies. As ocean acidification increases, most of the fishing industries will go out of business, since essentially their entire existence revolves around the sea. This means those billions of dollars' worth of sea life will be lost if the ocean becomes more acidified than it already is.

Also, coral feed degradation can also impact coastal tourism of several countries. The extraordinary beauty, cultural wealth and great diversity of EU's coastal areas have made them the preferred destination for many holidaymakers in Europe and abroad, making coastal and maritime tourism an important tourism sector. Employing over 3.2 million people, this sector generates a total of 183 billion Euros in gross value added and representing over one third of the maritime economy. As much as 51% of bed capacity in hotels across Europe is concentrated in regions with a sea border. [3] However, the distraction of the corals and oysters has negative results to tourism and slowly in countries with coastal tourism will fall apart, if oceans become more acidic than they already are.

Lastly, we have to mention the ocean's pH. Scientists predict that the ocean's average pH will have reached 7.8 by the end of the century. This doesn't sound like a very big change, but the pH scale is logarithmic, meaning that such a change is equivalent to a threefold increase in Hydrogen

ions concentration and a changing rate that is 100 times faster than has been observed in the past. The marine species will not be able to adapt to these rapid ocean chemical changes.

The problems caused by ocean acidification are many but there is still time to take action, face this problem and try to tackle it. Although, the reduction of CO_2 emissions to the atmosphere appears to be the only practical way to minimise the risk of large-scale and long-term changes to the oceans. [4]



DEFINITION OF KEY TERMS

Ocean Acidification

It is the decrease in the pH and increase in acidity of the Earth's oceans. It is caused by the increase of carbon dioxide that humans have put into the atmosphere. More than 30% of the carbon dioxide in the air goes into the oceans. Therefore, when carbon dioxide in the atmosphere increases, the carbon dioxide in the ocean increases, too. [5]

Greenhouse Gas

A gas that contributes to the greenhouse effect by absorbing infrared radiation. Carbon dioxide and chlorofluorocarbons are examples of greenhouse gases [6], which absorb energy in the atmosphere causing climate change.

Carbon Dioxide (CO_2)

A colourless, odourless greenhouse gas produced by burning carbon and organic compounds and by respiration. It is naturally present in air (about 0.03 per cent) and is absorbed by plants in photosynthesis. [6] Carbon dioxide traps heat or energy in the atmosphere causing climate change. Also, it is a major source of both global warming and ocean acidification.

Food chain

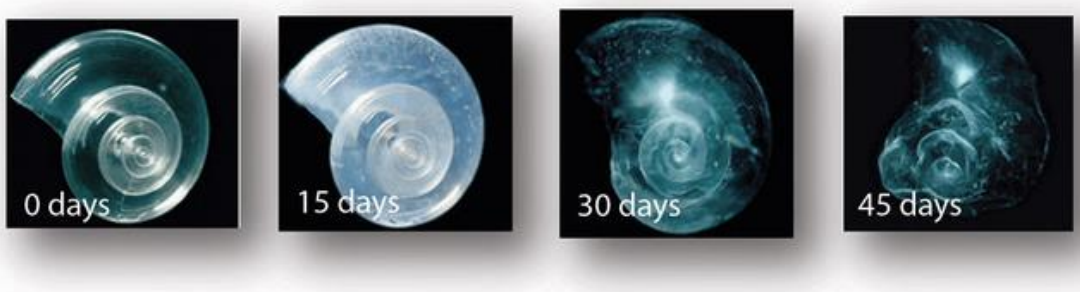
A series of organisms each dependent on the next as a source of food.

pH (potential of hydrogen)

The atmosphere and the upper layer of the ocean constantly exchange substances. Nature strives towards equilibrium, and thus for the ocean and the atmosphere to contain equal concentrations of Carbon dioxide, Carbon dioxide in the atmosphere must dissolve in the surface waters of the oceans in order to establish a concentration in equilibrium with that of the atmosphere. As carbon dioxide dissolves in the ocean it generates dramatic changes in A scale of acidity from 0 to 14. It indicates how acidic or alkaline a substance is. The more acidic a substance is, the lower the pH is; the more alkaline a solution is, the higher its pH is. Substances that are neither acidic or alkaline (neutral solutions) usually have a pH of 7.

Pteropod

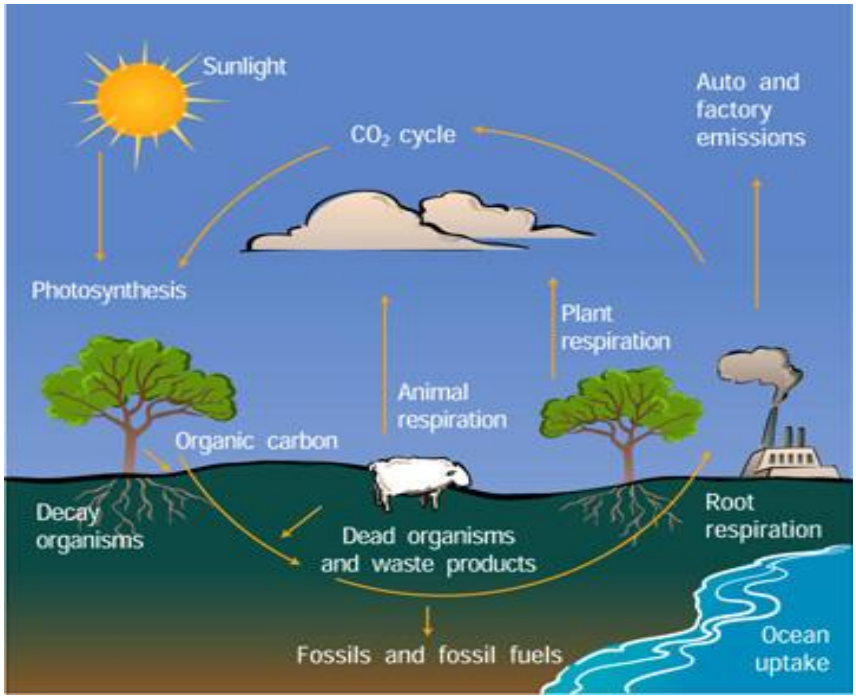
Small creatures whose existence is significant to the sea food chain as several sea organisms are dependent on them as means of nutrition. With ocean acidification, an increasing number of pteropods are being affected from shell damage. In essence, a pteropod's shell needs no more than a few days in an acidic environment to start dissolving and thus can no longer persist without its shell. The photos below demonstrate what happens to the pteropods' shell when it is in an acidic environment.



The Carbon Cycle

The series of processes by which carbon compounds are interconverted in the environment, involving the incorporation of carbon dioxide into living tissue by photosynthesis and its return to the atmosphere through respiration, the decay of dead organisms, and the burning of fossil fuels. [8]

Carbon, as other elements, circulates in different chemical forms between different parts of the Earth's system. These fluxes of carbon constitute the carbon cycle. Human activities, such as the use of cars or an increase in fumes emitted from factories, require the use of an old supply of carbon (fossil fuels) which has taken millions of years to accumulate, ultimately releasing a massive flux of CO_2 into the atmosphere. The oceans therefore, can absorb this additional carbon dioxide flux and further mitigate global warming. The world's oceans play a fundamental role in the exchange of carbon dioxide with the atmosphere. Once carbon dioxide is dissolved in seawater, it is subject to two possible fates. It will either be used up by photosynthesis, or remain scattered in several different dissolved forms in the water causing ocean acidification.



Being Carbon Neutral

This refers to achieving a state in which the amount of carbon dioxide in the atmosphere is reduced to zero as a result of actions taken to reduce these emissions.

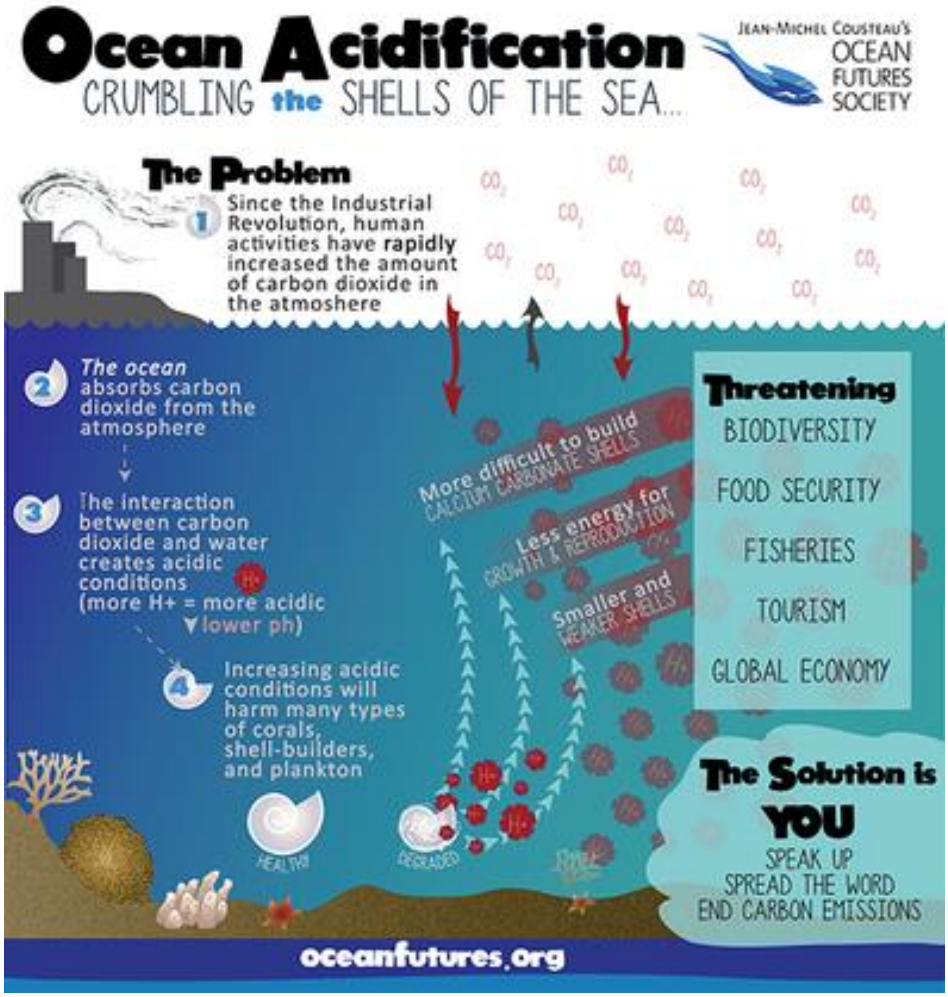
CHEMICAL PROCESS

Seawater chemistry. Carbon dioxide reacts with water molecules (H_2O) and forms carbonic acid (H_2CO_3) which is a weak acid that does not affect human skin. Most of this acid dissociates into hydrogen ions (H^+) and bicarbonate ions (HCO^{3-}). The increase in hydrogen ions reduces pH and the oceans acidify, and they become more acidic or rather less alkaline

since although the ocean is acidifying, its pH is still greater than 7 (that of water with a neutral pH). The average pH of today's surface waters is 8.1, which is approximately 0.1 pH units less than the estimated pre-industrial value 200 years ago.

HISTORICAL INFORMATION

The Industrial Revolution was the transition to new manufacturing processes and the rise of the factory system in the period from about 1760 to sometime between 1820 and 1840. It began in Great Britain and most of the important technological innovations were British.
The Industrial Revolution marks a major turning point in history; almost every aspect of daily life was influenced in some way. In particular, average income and population began to exhibit unprecedented sustained growth. Some economists say that the major impact of the Industrial Revolution was that the standard of living for the general population began to increase consistently for the first time in history, although others have said that it did not begin to meaningfully improve until the late 19th and 20th centuries.[9]



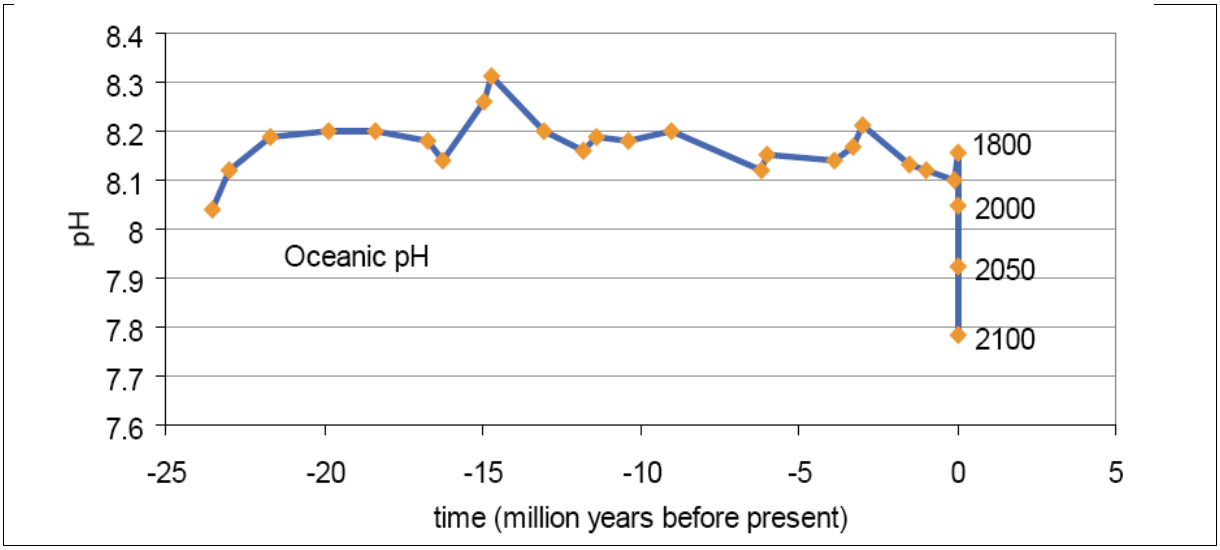
But what were the consequences of the industrial revolution to the environment? The origins of the environmental movement lay in the response to increasing levels of smoke pollution in the atmosphere, and the release of pollutants directly into rivers and streams during the Industrial Revolution. The emergence of great factories and the concomitant immense growth in coal consumption gave rise to an unprecedented level of air pollution in industrial centers; after 1900 the large volume of industrial chemical discharges added to the growing load of untreated human waste.

In industrial cities local experts and reformers, especially after 1890, took the lead in identifying environmental degradation and pollution, and initiating grassroots movements to demand and achieve reforms. Typically the highest priority went to water and air pollution. The Coal Smoke Abatement Society was formed in Britain in 1898 making it one of the oldest environmental NGOs. It was founded by artist Sir William Blake Richmond, frustrated with the pall cast by coal smoke. Although there were earlier pieces of legislation, the Public Health Act 1875 required all furnaces and fireplaces to consume their own smoke. It also provided for sanctions against factories that emitted large amounts of black smoke. The provisions of this law were extended in 1926 with the Smoke Abatement Act to include other emissions, such as soot, ash and gritty particles and to empower local authorities to impose their own regulations.[10]

As a result of all the pollution, the oceans have absorbed almost half of the CO2 we have released into the atmosphere from fossil fuels and cement-manufacturing, and the pH has dropped by almost 0.1. The pH scale is logarithmic, so each 1 point on the scale indicates an order of magnitude change; 0.1 may not sound like much, but it indicates about a 25% increase in ocean acidity so far. It is estimated that the pH will drop another 0.4 by 2100.

That acidity would decrease the availability of the vital shell-building compound by 60%. While the current pH levels are not record-breaking, the damage has already begun and the rapid rate of change is unprecedented and foreboding.

Ocean acidification is occurring at an unprecedented rate. The scale of the following graph is millions of years, that's why the last 2 data points and projections for the next century appear like a vertical line. Anywhere else in this record, 300 years would look like one overlapping, unchanged dot.[11]



TIMELINE OF EVENTS

1760-1840	Industrial Revolution
1969	Chemical waste released into Ohio's Cuyahoga River caused it to burst into flames and the waterway became a symbol of how industrial pollution was destroying America's natural resources. [12]
1972	The Congress passed the Clean Water Act to reduce water pollution. The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.
1992	The Kyoto Protocol was signed. It was the first greenhouse-gas agreement achieved by the United Nations. Kyoto emerged from the UN Framework Convention on Climate Change (UNFCCC). It was signed by nearly all nations at the 1992 mega-meeting commonly known as the Earth Summit. Its goal was to minimize all anthropogenic threats to the climate system, so that global warming and ocean acidification could be reduced. After many years of negotiations, in 2005 it went

	into force. Most of the countries have ratified the treaty but the United States of America is a notable exception.
2003	The software developer climate scientists, Ken Caldeira, published a paper in which he noticed that the ocean pH was 0.1 units less than the estimated pre-industrial value, and he predicted a drop of 0.4 pH units by 2100 and 0.7 units by 2250.
2003	The Ocean Foundation has been fighting ocean acidification, employing a four-part approach that addresses the issue from all angles. [13]
2004	First International Symposium, "The Ocean in a High-CO_2 World", is held. The symposium "brought together 120 of the world's leading scientists from 18 countries with expertise from different branches of marine biology, chemistry and physics to piece together what is known about the impacts of ocean acidification on marine ecosystems, and to identify urgent research priorities to understand the mechanisms, magnitude and time scale of these impacts. [14]
2005	The Royal Society of London releases a report that identified an increasing carbon dioxide level in the atmosphere causing a decrease in the pH levels in the world's oceans. [15]
2006	German Advisory Council on Global Change (WBGU) releases a report that introduces new facts about the continuing threat of ocean acidification, and provides innovative solutions to help reduce further damage to the ocean's ecosystems.[16]
2008	First International Conference on climate change. This "international conference", hosted by the wealthy think-tank Heartland Institute, included one hundred speakers and panelists from many countries who came together in order to show that leading scientists and economists from around the world do in fact dispute the claim that global warming, and therefore, ocean acidification is a crisis. [18]
2008	Second International Symposium. "The Ocean in a High-CO_2 World". The meeting brought together 220 scientists from 32 countries to assess what is known about ocean acidification impacts on marine

	chemistry and ecosystems. [19]
2009	The think-tank The Global Warming Policy Foundation is launched. This foundation claims to have an open mind in regards to the effects of climate change and does not have an official policy or stance on the validity of such claims. They are a foundation dedicated discovering "the possible effects of any future global warming and the policy responses that may evoke." [21]
2010	National Science Foundation Awards grants to study ocean acidification. Twenty-one grants were awarded By the NSF under the Ocean Acidification theme of its Climate Research Investment to various universities, scientific institutions, and individuals. the projects funded by these grants are designed to "foster research on the nature, extent and effects of ocean acidification on marine environments and organisms in the past, present and future--from tropical systems to icy seas." [22]
2011	The NOAA Ocean Acidification Program (OAP) was established. The mission of the NOAA Ocean Acidification Program (OAP) is to better prepare society to respond to changing ocean conditions and resources by expanding understanding of ocean acidification, through interdisciplinary partnerships, nationally and internationally. [23]
2015	At the Paris Climate Conference (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The Paris Agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C. [24] In 2017, Donald Trump, president of the USA, withdrew from this agreement, while acutely dampening global efforts to curb global warming. Foreign leaders and business executives, lobbied heavily for him to remain a part of the deal, but ultimately lost out to conservatives who claim the plan is bad for the United States. [25]
2017	United Nations Ocean Conference. It was a United Nations conference,

	which sought to mobilize action for the conservation and sustainable use of the oceans, seas and marine resources. UN Secretary-General António Guterres stated that decisive, coordinated global action can solve the problems created by Humanity. Peter Thomson, President of the UN General Assembly, highlighted the conference's significance, saying "if we want a secure future for our species on this planet, we have to act now on the health of the ocean and on climate change". The conference sought to find ways and urge for the implemention of Sustainable Development Goal 14. Its theme is "Our oceans, our future: partnering for the implementation of Sustainable Development Goal 14". It also asked governments, UN bodies, and civil society groups to make voluntary commitments for action to improve the health of the oceans with over 1,000 commitments − such as on managing protected areas − being made.

MAJOR COUNTRIES AND ORGANISATIONS INVOLVED

The following picture shows a study of the vulnerability of individual nations to ocean acidification, the carbon dioxide emission ranks and the GDP rank.

Acidification Vulnerability Rank	Country	Carbon Dioxide Emissions Rank	GDP Rank
1	Japan	5	2
2	France*	16	6
3	United Kingdom*	8	5
4	Netherlands*	24	16
5	Australia	12	14
6	New Zealand*	65	53
7	Philippines, Republic of the	45	47
8	United States*	2	1
8	Malaysia	31	41
10	Indonesia, Republic of	20	22
11	Taiwan, Province of China	21	23
12	Thailand, Kingdom of	25	35
13	China	1	4
14	Iceland	134	94
15	Mexico	13	15
16	Norway	66	25
17	Greenland	180	152
18	Korea, Republic of	9	13
18	United Arab Emirates	28	38
20	Vietnam, Socialist Republic of	44	60
21	Singapore, Republic of	32	45
22	Canada	7	9
23	Belize	170	158
24	Papua New Guinea	126	133
25	Maldives, Republic of	173	161

Japan ranks first in the analysis of most vulnerable nations, followed by France, the United Kingdom, the Netherlands and Australia. China and the United States, the world's top-ranked carbon dioxide emitters, ranked 13th and 8th, in relative vulnerability to ocean acidification.

It is worth noting that several Less Economically Developed countries that do not necessarily pollute the atmosphere with CO_2 and that are not overpopulated, are actually very high on the vulnerability scale, like New Zealand, Iceland, Greenland, Belize etc.

Each nation's vulnerability to acidification is based on many factors, including its dependence on coral reefs, the size of its fishery, and its fish and shellfish consumption patterns, so nations at high latitudes are especially vulnerable, as acidification will tend to occur sooner in their waters .

Apart from that, an important factor of a country being vulnerable is the fact that large and More Economically Developed Countries (MEDs) tend to have a bad impact on the neighbouring countries' environment as they have many industries which pollute and destroy the environment of the area. So, in a situation in which a rather small and Less Economically Developed Country (LEDs) in sharing borders with a larger and More Economically Developed one, this country will be facing many issues and with no way of dealing with them due to their economical state, and even though the country itself may not have been polluting at the first place, they will end up being the most affected ones.

More than one-third of the world's population lives in one of the 25 nations that will be most affected by ocean acidification. Moreover, among the most vulnerable are those with the highest GDP, including the United States, China, Japan, Canada, the United Kingdom and the Republic of Korea. These six nations alone were responsible for 51 percent of global CO_2 emissions in 2007.

Japan

Scientists have said that the seawater chemistry is changing in Japan, as elsewhere, but little work has been done on the effects. One of Japan's main concerns should be the possible effects on coral reefs around Okinawa, where already there is evidence to suggest the combination of warming and acidification is damaging the corals. This could hurt tourism and lead to coastal erosion, as the reefs act as a barrier against strong tides. Experts believe that there will be a simplification of the marine biodiversity around Japan in the next years. However, scientists are keen to stress the sea will remain productive for the marine industry in the future, but in a different way. Japan's seaweed harvesters may benefit from larger yields, for example. [27]

US

For decades, if not longer, ocean protection has been a bipartisan priority. Much of this harmony has been driven by recognition that healthy oceans are a huge economic driver. From recreation and tourism to commercial fishing, healthy oceans and sustainable resources are massive money-makers for seaside states, cities, and towns. Both protecting and restoring coastal ecosystems provide huge financial pay-outs. But now, President Trump is shifting that dynamic and driving a wedge into a heretofore harmonious policy arena. President Trump has rejected the Paris Agreement on the false claim that its voluntary targets are somehow too onerous to swallow. In reality, this decision is both immoral and irrational. The implications of failing to act on climate change are already acutely felt in the world's oceans. Also, President Trump doubled down on his initial climate change denialism

by announcing his intent to dramatically and rapidly expand offshore oil and gas production in federal waters. In addition, more than 120 local governments from Key West to New Jersey have already expressed formal opposition to needlessly jeopardizing their thriving tourism and fishing-based economies with the risk of an offshore oil spill. This bipartisan coastal uprising has even made its way to Congress, where more than 30 members of congress, including many Republicans from Florida to New Jersey, have expressed staunch opposition to any drilling off their shores. Eventually, President Trump's ocean policy actions to date represent a direct attack on sustainable, science-based management of America's marine resources and coastal economies. What's more, the policies buck decades of ocean progress delivered by recent Republican and Democratic administrations alike to balance preservation, management, and use of America's coasts and oceans. Trump's proposals represent a dangerous outlier from mainstream ocean policy, one that will certainly face growing bipartisan resistance over the next three and a half years[28].

Iceland

Iceland builds bases its livelihood on the sea, and ocean acidification has proven to be a much direr problem than global warming. After the Paris Agreement, Iceland has agreed to participate in a joint EU-Iceland-Norway target of a 40% reduction by 2030, but has failed to specify exactly what its contribution will be. Iceland's 'Young Environmentalists' are accusing the government of dodging responsibility on the issue of climate change by not committing to anything more than the blanket European objective. [29] The Arctic Council Working Group for the Protection of the Arctic Marine Environment (PAME) has recently started the project "Desktop Study on Marine Litter including Micro plastics in the Arctic". Iceland is participating as co-lead on this project. Iceland is also engaged in the work of the Marine Group of the Nordic Council of Ministers, which funds projects that contribute to the build-up of scientific basis and create a foundation for joint efforts against pollution in the Nordic marine and coastal environments, including plastics and micro plastics. [30]

UK

One of the most important actions of the UK on ocean acidification, was the founding of the UK Ocean Acidification Research Programme (UKOA). The overall aims of UKOA were to increase understanding of processes, reduce uncertainties in estimating future impacts, and improve policy advice. Scientific studies have included observations and surveys; impacts on upper-ocean biogeochemistry; responses by seafloor organisms; effects on commercially-important species, food webs and human society; ocean acidification in the geological past; and regional and global modelling. As might be expected, early ideas have been modified and new avenues of research have been identified. [31]

POSSIBLE SOLUTIONS

There is lot that Nations could do in order to reduce ocean acidification. Taking into consideration the Paris Agreement, countries must review and publicly declare a plan for action every five years. It is of major importance that all countries take action on the matter.

- The Government's duty would be to raise awareness about the issue of Ocean Acidification, in an attempt to make people understand the urgency of the matter.
- Encourage people to adopt a CO_2-free lifestyle which would require the following:
    - Using renewable sources of energy.
    - Being Carbon Neutral
- It is essential for countries that share sea areas to seek cooperation, as they're facing similar problems regarding ocean acidification. Cooperating would make solving the problems easier.
-

Governments, businesses and civil society together with the United Nations have started to mobilize efforts to achieve the Sustainable Development Agenda by 2030. Universal, inclusive and indivisible, the Agenda calls for action by all countries to improve the lives of people everywhere. In 2015, countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals.

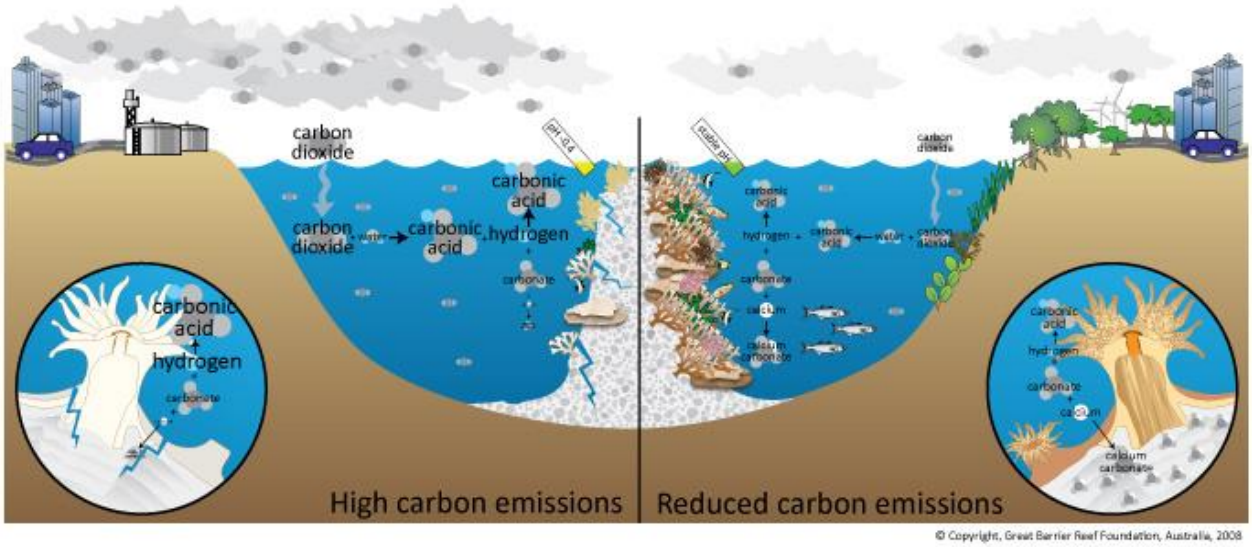
The Goal number 14, was the one referring to the conservation and sustainably of the oceans, seas and marine resources.

The targets of Goal 14 are:

- By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.
- By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.
- Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels.
- By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.
- By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.
- By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies,

recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation.

- By 2030, increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism.
- Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries.
- Provide access for small-scale artisanal fishers to marine resources and markets.
- Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of The Future We Want. [32]



Multimedia Resources:

Impacts:

http://jncc.defra.gov.uk/pdf/gbsc_0602oceanAcidificationv1.pdf

More on Historical Informantion:

https://www.timetoast.com/timelines/ocean-acidification-controversy

More about the Kyoto protocol

http://unfccc.int/kyoto_protocol/items/2830.php

https://www.theguardian.com/environment/2011/mar/11/kyoto-protocol

More on OA:

http://www.eartheclipse.com/environment/causes-effects-solutions-of-ocean-acidification.html

http://oceanacidificationkdmpspjs.weebly.com/ocean-acidification.html

http://www.un.org/sustainabledevelopment/water-and-sanitation/

http://www.un.org/sustainabledevelopment/oceans/

http://www.epoca-project.eu/index.php/what-is-ocean-acidification.html

http://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/14_Why-it-Matters_Goal-14_Life-Below-Water_3p.pdf

More about the Paris Agreement:

https://ec.europa.eu/clima/policies/international/negotiations/paris_en

http://oceans.taraexpeditions.org/en/m/environment/ocean-climate/cop21-a-universal-agreement-and-a-first-for-the-ocean/

Ocean Conferance:

https://oceanconference.un.org/

Vulnerability

https://www.newsecuritybeat.org/2012/10/vulnerable-ocean-acidification-warming/

Possible Solutions:

https://www.oceanfdn.org/sites/default/files/Ten%20Ways%20States%20Can%20Combat%20Ocean%20Acidification.pdf

http://www.un.org/sustainabledevelopment/takeaction/

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