Hofstra University

Model United Nations Conference 2024

United Nations Environment Programme (UNEP)

Melanie Quackenbush, Co-Chair
Anna Waitword, Co-Chair

Dear distinguished delegates,

My name is Melanie Quackenbush, and I am very excited to be your Co-Chair for this year's UNEP committee. I am beginning my senior year at Hofstra University, where I double major in Global Studies and Public Policy & Public Service. Within the Public Policy program, I have a concentration in American Education Reform, so feel free to come talk to me about the education system or anything related to it.

I have only been in Model UN since my freshman year at Hofstra (unlike you lucky ducks doing MUN in high school), but I came to love it. My second semester in the club, I had the opportunity to be a delegate for a crisis committee at the Cornell International Affairs Conference (CIAC), where every delegate was a different townsperson of Salem, Massachusetts during the witch trials. My character was the town priest, who had recently began practicing magic in a secret room of the church. That conference was a great experience, and then, in the spring of 2022, I was the Co-Chair for our ECOSOC committee at that year's HUMUNC. Since then, I have become the Treasurer for Hofstra's Model UN club. Last year, the club also traveled to New York City for NYUMUNC in the fall, and then to Chicago for CHOMUN in the spring.

School and extracurriculars keep me busy, but I enjoy a handful of hobbies in my free time. Some of my favorite shows are *The Good Place*, *The Walking Dead*, *DC's Legends of Tomorrow*, *Lucifer*, *ATLA*, *Death Note*, and *WandaVision*. I am also a big fan of reading and writing novels/short stories and poems (in varying degrees of quality), with Christopher Paolini and Rick Riordan having been major influences on me from a young age. When I am not consuming or creating media, I like to work out, usually with calisthenics/ bodyweight exercises or at one of Hofstra's many group sessions held at the gym. No matter what else I am doing, I am always thinking about Model UN (or y'know, general socio-political matters).

With our UNEP committee, I am looking forward to you all engaging the topics with a sense of realism, but also creativity. These topics affect real people across the planet, and real people are working on the issues as you read this. I encourage you to not only read the background guide, but do your own research on problems, solutions, and the challenges to implementing those solutions. Keep in mind your country's interests, their resources, how they look out for their citizens, and how they work with countries inside and outside their region. My goal for this committee is to bring attention to some pressing environmental issues, but I want to hear your thoughts and what you think we (the world) should do.

Sincerely,

Melanie Quackenbush
UNEP Co-Chair
HUMUNC 2023

Dear delegates,

Hello everyone, my name is Anna Waitword, I am from Queens, New York and I am a senior studying Forensic Science. This will be my third year participating in Model UN and my second year participating in HUMUNC. I am so excited to be your Co-chair for this year's UNEP committee!

I started participating in the Model UN at Hofstra during my sophomore year, when I helped with HUMUNC and participated in a collegiate conference at the University of Chicago (CHOMUN) where I was a delegate in a committee that simulated Disney's acquisition of Lucasfilm. In high school, I took an AP government class, which had many lessons that were run like a Model UN debate.

Outside of Model UN, I love to dance and swim. In high school I swam competitively for my school's team, and it was also an opportunity to meet most of my high school friends. At Hofstra I am a member of a sorority on campus, where I have met many close friends who share similar interests, whether it be dancing or swimming, or even music and television interests.

My goal with this committee is to create an environment where delegates can learn a little more about collegiate Model UN, as well as some UNEP issues while also having fun. Welcome to the UNEP committee—I cannot wait to meet you all!

Sincerely,

Anna Waitword
UNEP Co-chair
HUMUNC 2024

Introduction: The United Nations Environmental Programme (UNEP)

Maintaining the environment while being able to sustain modern lifestyles is critical to meeting the needs of everyone alive today. The United Nations Environmental Programme (UNEP) follows these tenets of sustainability as they work "to inspire, inform, and enable nations and peoples to improve their quality of life without compromising that of future generations."[1] Headquartered in Nairobi, Kenya, UNEP's governing body, the Environment Assembly (UNEA), has 193 members, meets once every two years, and is considered the world's most significant environmental decision-making body. [2] It was established as the "Governing Council of the United Nations Environmental Programme," but was changed to the UN Environmental Assembly in 2013.[3]

While the UNEP itself was founded in 1972, the formation of the UNEA during the United Nations Conference on Sustainable Development (or RIO+20) corresponded with an important upgrade to the organization's strength.[4] The UNEA is supported by the Committee of Permanent Representatives, which works between UNEA meetings to prepare topics for the meetings, provide policy advice, assists with the implementation of UNEA decisions, and create ways for non-resident Council members to participate.[5]

Our committee will be based on a meeting of delegates of the UNEA. At the start of each committee session, attendance will be taken. Each present member will say if they are "present" or "present and voting." Any delegate who chooses to be "present" must vote in procedural matters but can optionally vote on resolutions. All delegates marked "present and voting" must vote on both procedural matters and resolutions. For procedural matters a simple majority of all people in attendance will be needed to pass the motion. For all resolution matters, a simple majority of all "present and voting" members is needed to pass the resolution.

Topic 1: Ocean Plastic

Some scholars have dubbed the current geological period the Plasticene epoch, on account of how much plastic future archeologists would find in the earth.[6] Approximately 400 million tons of plastic are produced every year, a significant portion of which ends up in Earth's waterways, as only twelve percent of the plastic is incinerated and nine percent is recycled. Much of the remainder becomes waste, with a staggering eleven million tons of plastic waste entering rivers, oceans, and other bodies of water in 2016 alone. This figure is projected to jump to nearly thirty million tons by 2040.[7] That might not seem like much in proportion to the vast size of Earth's oceans, but it adds up, and it is increasing.

Marine plastics are expected to outweigh the total biomass of fish by 2050. Additionally, plastic makes up eighty percent of all debris found throughout the world's oceans, and while it breaks apart into microplastics over centuries, it never truly degrades. As such, there are currently over fifty trillion plastic fragments floating in the ocean that had originated on land from litter or poor manufacturing processes. The plastic is often carried to the ocean by rivers, meaning that any solution to cleaning up the ocean also requires preventing more plastic from ending up there from rivers.[8]

While this problem affects every continent and every country, there are different ways to measure the problem. In 2016, World Population Review found that the three biggest producers of plastic waste are (in order) the United States, India, and China. Though this waste could potentially enter the ocean in numerous ways, the World Population Review distinguishes between the waste producers and the countries that release the most plastic waste into the ocean.

This specification changes the list, and the top three countries releasing plastic into the ocean in 2021 were the Philippines, Indonesia, Malaysia.[9]

Table 1: Largest plastic waste producers, alongside the respective amounts generated[10]

Nation	Total Plastic Waste Produced (*tons*)
United States	34,020,748
India	26,327,933
China	21,599,465
Brazil	10,675,989
Indonesia	9,128,000

Table 2: Largest marine plastic waste producers, alongside the respective amounts released[11]

Nation	Plastic Waste Released to Oceans (*tons*)
Philippines	356,371
India	126,513
Malaysia	73,098
China	70,707
Indonesia	56,333

Plastic pollution has a significant impact on marine life, human life, and the quality of natural resources. Animals can be injured by getting tangled in plastic trash floating in the water. It is not uncommon for marine animals to also eat a piece of plastic thinking it was their prey. Unable to digest the plastic, but slowly filling their stomach with it, they starve to death. Humans and animals are affected by a process known as bioaccumulation, where chemicals found in or

released by plastic absorb into an animals' bodies, and then move up the food chain until a human consumes food that has accumulated a large amount of chemicals.[12] Microplastics have become incredibly widespread, having "been found in tap water, beer, salt and in all samples collected in the world's oceans".[13] Individual chemicals that make up plastic "are known to be carcinogenic and to interfere with the body's endocrine system, causing developmental, reproductive, neurological, and immune disorders in both humans and wildlife".[14]

Economic Policy on Recycling

The Environmental Performance Index (EPI) was designed to measure the "environmental performance score" of each country, measured by "40 performance indicators [that rank] 180 countries on their national efforts to protect environmental health, enhance ecosystem vitality, and mitigate climate change."[15] Nations sitting at the top of the list with high environmental performance scores have had a sustained effort to enforce environmental protection policies and invest in eco-friendly measures. Industrialized economies were found both at the top and the bottom of the 2022 EPI rankings with Denmark found at the top and India found at the bottom of the index in 2022.[16]

Table 3: Comparison of top ten- and bottom ten-ranked countries on EPI 2022[17]

Country	EPI	EPI rank
Denmark	77.9	1
United Kingdom	77.7	2
Finland	76.5	3
Malta	75.2	4
Sweden	72.7	5
Luxembourg	72.3	6
Slovenia	67.3	7
Austria	66.5	8
Switzerland	65.9	9
Iceland	62.8	10

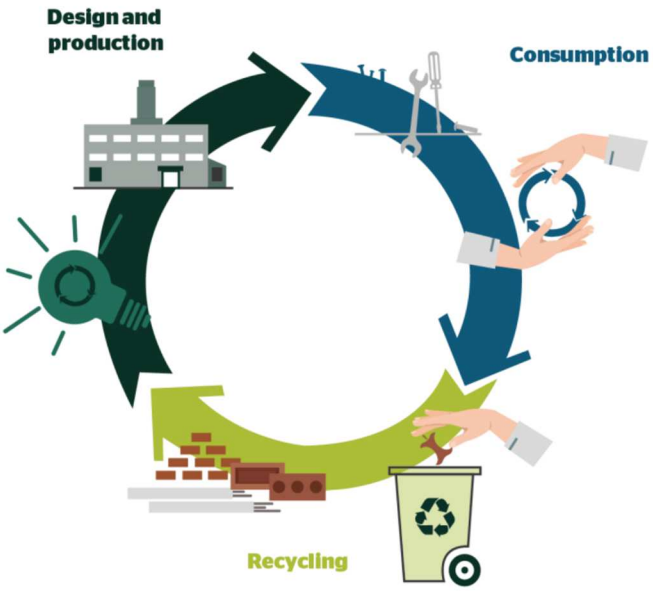
Country	EPI	EPI rank
Sudan	27.6	171
Turkey	26.3	172
Haiti	26.1	173
Liberia	24.9	174
Papua New Guinea	24.8	175
Pakistan	24.6	176
Bangladesh	23.1	177
Vietnam	20.1	178
Myanmar	19.4	179
India	18.9	180

One of the essential factors preventing the proper recycling of plastics on a national level is that recycling does not contribute an essential portion to the economy. UNEP has advocated for the benefits of a circular economy of plastics, or the economic activity that incorporates the financial benefits of recycling, by stating:

> Benefits [of a circular economy] (compared to the scenario in 2040 if circular economy approaches are not applied) include a 25 per cent reduction in greenhouse gas emissions across the global plastic life cycle, while saving governments $70 billion over the period 2021-2040 and creating 700,000 additional jobs, mainly in the global South.[18]

The UNEP's four point strategy to address plastic pollution and support a responsible life cycle of plastics include (1) reducing and eliminating unnecessary plastic use, (2) ensuring that plastics that are used are recyclable, (3) ensure that plastics in use are reused, recycled, or composted, (4) responsible management of non-recyclable plastic waste so that it does not contribute to greater pollution.[19]

Figure 1: Diagram Representing the Economic Life Cycle of Plastic in a Circular Economy[20]



As delegates draft resolutions, they should be aware of existing measures, practices, development goals, and national policies towards plastic recycling. Many solutions have already been attempted and some have fallen through. What could be improved to create an effective resolution on the handling of plastics?

Case Study: Denmark's "Action Plan for the Circular Economy"

EU members committed to recycling obligations for plastics packaging waste, requiring members states to recycle fifty percent of their plastic waste by 2025 and fifty-five percent by 2030. Challenges remain, as Denmark, which implemented these policies in its own "Action Plan for the Circular Economy", has only achieved one-third of the 2025 goal.[21] The Action Plan's targets include reducing waste and improving the use of natural resources, making all government purchases eco-labeled by 2030, more and better recycling, significant reduction of marine waste, obtaining more value from renewable materials, reducing food waste in all parts of the food chain, reducing the environmental impact from construction and demolition, and reducing consumption and improving reuse and recycling of plastics.[22]

How effective has this action plan been? Denmark has struggled to effectively enforce rules and policies to generate a circular economy with minimal waste. While the global economy stands at 7.2 percent circularity, Denmark lags behind with only four percent circularity. This means that consumption in Denmark is too broadly based upon "virgin" resources instead of recycled or reused plastic products.[23]

The Danish government's Ministry of the Economy and Danish Technological Institute recently partnered with major Danish private sector companies like Coloplast, Novo Nordisk, Danfoss, Topsoe, Grundfos, and COOP, some early attempts to generate new plastic recycling

methods are still taking shape. For example, Grundfos has improved its reuse of plastic waste in its products but has acknowledged that "It is a very complex task to match materials and end-of-life circular technologies. Grundfos cannot accomplish that on its own."[24] These companies stand a better chance of working together to research how to improve plastic use within their products and reuse or minimize waste generated during production.

Plastic Alternatives

While plastic recycling and waste reduction is important for progress, many nations and companies have begun turning towards greener alternatives for the sake of improving practices for the future. "The global plastic alternative packaging market size grew from $4.48 billion in 2022 to $5.2 billion in 2023 at a compound annual growth rate (CAGR) of 16.1%.[25]" While this is encouraging, the size of the global plastic market in 2022 was estimated at $609.01 billion and is projected to only grow in 2023 to $627.29 billion.[26]

Several plastic alternatives include stainless steel and glass for single-use plastics, while several polymers have been developed for the sake of mimicking the functionality of plastic. In the UNEP report, "Turning off the Tap", one of the three main goals is to reorient and diversify the plastic market with alternatives as well as increase plastic reuse and recycling.[27] One study describes how alternatives to petrochemical-based plastics as still "good" plastics because they are biodegradable, compostable, or can easily be repurposed. At the same time, they are limited in application because they are "most suitable for single-use disposable applications where the post-consumer waste can be locally composted."[28] Furthermore, several polymers provide the functionality of plastic, but their ability to biodegrade can be limited by the environment they are disposed into, which can result in problems similar to plastic's issues of degrading into

microplastics. For example, a polymer composed of poly(lactic acid) is " basically non-degradable in seawater."[29]

The European Union has been at the forefront of the effort to shepherd plastic alternatives into everyday use. A 2019 law banned plastic utensils and straws, as these items become waste after just one use, and new legislation has since been proposed to further these efforts by banning mini-shampoo bottles in hotels and excessive wrapping used for shipped items. For example, the EU is looking to ban dining establishments from serving food on single use trays and force forty percent of takeout meals to be packaged in reusable containers. Businesses would be forced to search for and implement various plastic alternatives to allow reuse.[30]

In drafting resolutions, delegates should weigh the promise and the pitfalls of different plastic alternatives. Some "biodegradable" alternatives do not rely on plastic, but do not break down rapidly or completely. Many plastic alternatives are biodegradable, but lack reusability, and the cost needed to produce them needs to be weighed, as well. Still, UNEP encourages a reusable alternative as "usually the better option from an environmental perspective, when reused multiple times and cared for efficiently (e.g. efficient reverse logistics with short return distances; low energy use in washing during use-phase)".[31]

Collecting Marine Plastic Waste

Without removing existing marine plastic waste, pollution will continue to detrimentally impact marine ecosystems across the world. The two main types of plastic waste are microplastics and macroplastics. "Macroplastics" are pieces of plastic that are larger than 0.5 centimeters.[32] For example, on study of macroplastics in the estuary of the Cimandiri River in West Java, Indonesia found macroplastics in nine categories: plastic bags; Styrofoam boxes;

product packaging; sponges (ex. cigarette butts); plastic utensils and cups/straws; plastic bottles; baby equipment; slippers; others.[33]

Due to their size, collecting macroplastics may be easier than microplastics, which are smaller than 0.5 centimeters and typically "enter the ocean from marine plastic litter breaking down, run-off from plumbing, leakage from production facilities and other sources."[34] The UNEP has a program called Clean Seas which works with governments to improve knowledge on the topic and address plastic pollution through domestic regulations and legislation. It also works with the clothing industry to make more sustainable clothing and the soap industry to limit microplastics in their products.[35]

The Clean Seas initiative provides several educational initiatives to address plastic pollution on a local level. The Tide Turners Plastic Challenge has educated over 360,000 youth in 30 developing countries about plastic pollution and how to become community leaders on the issue.[36] Another program, CounterMEASURE, trains communities around the Mekong and Ganges rivers to track plastic pollution to better understand its source and effects.[37] Clean Seas also supports policy choices that will help clean or manage pollution. One example of this is by highlighting the beneficial actions of countries like Antigua and Barbuda, which was the first country in the Caribbean to ban single-use plastic bags, which "contributed to a 15 per cent decrease in the amount of plastic discarded in landfills."[38]

Much of UNEP's work is related to preventing plastic pollution in the long-term, which is critical, but collection and clean-up efforts are also being organized by companies, communities, and individuals. Several new private-sector technologies have been developed in recent years, including System 001, "a 62-mile long barrier that targets plastic debris, micro plastics and ghost nets" around the Great Pacific Garbage Patch. The Seabin V5 is a device that

collects trash in marinas or harbors by filtering water of debris. Mr. Trash Wheel is a water wheel that collects waste from "rivers, streams and harbors, and then turns it into electricity."[39]

Macroplastics are targeted by most filtering technologies, but microplastics are often too small to be collected easily. A German Company, Wasser 3.0, targeted this problem by developing a non-toxic chemical which, when circulated in large currents or bodies of water, pulls microplastics together into clumps which can be collected. It can also be promising at helping to gather microplastics in sewage, before they are released into oceans.[40] Delegates should research how their government or industries are creating solutions to break down the microplastics or remove them without leaving hazardous materials.

Case Study 2: The Great Pacific Garbage Patch

The Great Pacific Garbage Patch (or "Pacific trash vortex") is a key area of concern for the committee to confront. It is formed by the convergence of regional currents to form the North Pacific Subtropical Gyre, which traps waste in the center. Microplastics make up most of the waste, but larger items like fishing nets and spilled shipping cargo also float across the patch. While gyres in the Atlantic and Indian Oceans have fueled similar plastic patches (as have shipping lanes like the North Sea route), the Great Pacific Garbage Patch is the largest.[41] It is estimated that the Pacific Trash Vortex covers about 620,000 square miles located between Hawaii and California, with approximately 80,000 tons of plastic waste distributed across 1.8 trillion pieces. These plastics are not uniformly distributed, and some are below the surface or invisible to the naked eye.[42]

Bloc Positions

While all nations want to limit the amount of plastic in our oceans, national economies frequently influence their opinions on how to best accomplish this goal. Coastal nations are also more likely to be directly affected by ocean pollution, further influencing their policies.

Plastic Waste Producing Nations	Plastic Waste Vulnerable Nations
Example Nations: ● United States ● China ● Germany ● South Korea This bloc includes many developed and economically affluent nations whose citizens consume large amounts of plastic products in their daily lives leading to an excess of waste. Nations in this bloc are limiting plastic consumption, and some are considering banning single-use plastics.[43] Recycling remains an emphasis,[44] but much of the collected waste may be shipped to other nations.[45]	Example Nations: ● Thailand ● Malaysia ● Vietnam ● India This bloc is comprised of coastal nations whose economy or public health might be tied to plastic in the oceans. Thus, nations in this bloc favor limits on plastic waste, and they want nations who produce plastic to take responsibility. For example, as of 2025, Thailand will ban the import of plastic waste that was imported for recycling.[46]

Guiding Questions

1. Where does your country rank on the Environmental Performance Index (EPI)?
2. What advantages does your country have that can mobilize support for efforts to solve the issue of plastic pollution?
3. What are key factors in reducing plastic waste?
4. How can your country promote the production of alternatives for plastic?
5. What are feasible ways we can collect microplastics from the ocean while not further endangering any wildlife?
6. Should countries that heavily contribute to plastic waste have to pay more for cleanup costs? Why or why not?

Topic 2: Chemical Pollution

Chemical pollution is the addition of chemicals to an environment where the chemical would not typically be present, leading to contamination of the air, water, soil, and food.[47] One of the main categories of chemical pollution is persistent organic chemicals (POPs), which are:

> toxic chemicals that adversely affect human health and the environment around the world. Because they can be transported by wind and water, most POPs generated in one country can and do affect people and wildlife far from where they are used and released. They persist for long periods of time in the environment and can accumulate and pass from one species to the next through the food chain.[48]

While sometimes associated with a living organism and often used in relation to agriculture, their overabundance can become problematic for the ecosystem.

One of the most well-known examples of a persistent organic pollutant is dichlorodiphenyltrichloroethane, or as it is more commonly known, DDT.[49] DDT rose to prominence as an insecticide for agriculture in the late 1940s, but its dangers quickly became apparent. The chemical is highly toxic and considered a likely carcinogen (cancer-causing compound) in the United States and by some international agencies. In fact, DDT pollution inspired Rachel Carson's novel *Silent Spring*, and was banned in the United States 1972, but is still used in some countries.[50] Carson studied bioaccumulation (a process in which environmental toxins build up inside an organism) and biomagnification (the process of a toxin growing in concentration as it progresses through the food chain) of DDT. The pesticide was used so widely that had accumulated in large quantities where it was used and could not break down. Plants could not break down the large amounts of DDT and when they were consumed by animals at each stage of the food chain, it increased contamination. DDT use became such an issue that it almost caused the extinction of the bald eagle and other birds because the contamination made them unable to lay healthy eggs.[51]

In addition to organic pollutants, inorganic molecules are also common chemical pollutants. These compounds differ from organic ones in that they do not have both carbon and hydrogen, but they can still cause significant harm when released as a pollutant. Some examples of inorganic pollutants are heavy metals (lead, mercury, arsenic, chromium), mineral acids, and even elevated levels of nitrogen (nitrates, nitrites, and ammonium). These pollutants originate from a myriad of sources related to the petrochemical industry, including the production of pharmaceuticals and fertilizers.[52]

After World War II, an increase in chemical production led to an increase in chemical pollution. At the time, the effects of pollution were not widely known, but by the 1950s, more research was available. Major environmental disasters also drew attention to chemical pollution. The 1984 leak of forty tons of methyl isocyanate, or MIC, into Bhopal, India killed nearly 4,000 people immediately and caused later deaths to those exposed to the chemical. In 1986, in a large chemical spill in near Basel, Switzerland, released massive amounts of chemicals, causing "severe ecological damage to the Rhine river and massive mortality of benthic organisms and fish, particularly eels and salmonids."[53]

Reducing Chemical Pollution

It may be more difficult to gather up and clean up chemical pollutants after they are released into the environment; preventing the initial release of pollutants is important. This can be accomplished by using more environmentally friendly industrial processes or cleaner energy sources. For example, the 2021 Nobel Prize in Chemistry was awarded to Drs. List and MacMillan, who launched the field of "asymmetric organocatalysis", a technique that uses simple organic compounds like oxygen and nitrogen to catalyze industrial reactions, instead of

using toxic metals or other substances. Originally developed for pharmaceutical production, it has been applied to manufacturing solar cells.[54]

In addition to reducing the release of chemical pollutants, it is also possible to manage them after their release. In some cases, nitrogen- and phosphorus-rich fertilizers are not absorbed into the soil when released and leach out of agricultural fields and into the surrounding waterways and environment. To minimize the release of excess fertilizer, field buffers (or areas of trees and other plant matter at the border with a waterway) can be employed to capture the chemicals before they reach bodies of water. The U.S. Environmental Protection Agency also recommends farmers reduce field tillage to promote healthier soil that can soak up fertilizer rich runoff before it enters the waterways. Strategic nutrient management through correct fertilizer usage and continual plant cover through perennial crops are other useful methods to maintain the proper nutrient balance in the soil. Farmers are encouraged to monitor livestock near waterways so that they do not damage land near waterways and enable more nutrient loss.[55]

Similarly, there are numerous management protocols for heavy metals already released into the environment. Scientists have devised and implemented multiple methods to recover toxic metals including nanoparticle capture and chemical reactions. While nanotechnology is still an emerging field, nanoparticles are a promising avenue of research. It has been shown that "as iron is nontoxic, nano-iron oxides can be directly pumped to contaminant water supplies without health risk," and these particles then remove countless heavy metals from cadmium to lead.[56]

Case Study: Acid Rain

Even commonly used energy sources, despite their benefits to societies and economies, lead to environmental and human health risks.

> The use of fossil fuels, mainly coal for the generation of electricity, oil in transport services, and the impact of industrialization has caused a higher degree of concentration of pollutants and particulate matter in the atmosphere, thus enhancing air pollution.[57]

When there is more pollution in the atmosphere, water can become acidified during the water cycle. Acid rain has a pH of less than 5.61, while water has a pH of seven. There are natural sources of the chemicals that lead to acidification, including lightning, volcanic eruptions, and the decomposition of plants. However, acid rain can also result from human activities. Fossil fuel burning and agricultural emissions from pesticides and fertilizers are a few examples of ways anthropogenic pollution acidifies rain.[58]

Europe, East Asia, and North America have notable problems with both air pollution and acid rain. In the 1970s and 1980s, the eastern United States had especially bad air quality, leading to elevated levels of acid rain. The rain was so potent that there are "parts of New Jersey [where] over 90 percent of freshwater streams are still acidic today due to acid rain, according to the U.S. Environmental Protection Agency."[59]

In response, the U.S. passed the Clean Air Act in 1970. This legislation involved a "cap and trade" system where companies are permitted to produce limited quantities of acidifying sulfur dioxide emissions which are measured by a system of credits. The companies, however, can sell excess credits if they do not exhaust their credits. The Acid Rain Program's guidelines on nitric oxide reduction were similar in its "results-oriented approach, flexibility in the method to achieve emission reductions, and program integrity through measurement of the emissions." However, unlike sulfur dioxide emissions, no cap and trade system was utilized for nitric oxide emissions.[60]

Analyses of the program's success reveal a limited impact on the economy but a major impact on the environment. Corporate spending to meet guidelines and curb pollution amounts to

less than one percent of the value of the goods produced, despite the fact that the U.S. GDP skyrocketed 285 percent between the passage of the Clean Air Act (1970) and 2019. In fact, the benefit to cost ratio is estimated at 30:1.[61] Despite the overall low investment required to meet the Clean Air Act's requirements, emissions of sulfur and nitric oxides dropped by ninety-three percent and eighty-seven percent respectively between 1995 and 2022,[62] and waterways have experienced an eighty-one percent reduction in critical acid buildup due to an estimated sixty-nine percent decrease in acid rain.[63]

Eastern Europe also experienced high levels of acid rain during this period. The Geneva Convention on Long-range Transboundary Air Pollution was passed to regulate emissions from coal-burning factories in the region, significantly reducing the accumulation of acid rain particles.[64] [65] As China became an economic superpower, it has also suffered from the effects of chemical byproducts that coincide with rapid industrialization. To deal with the rise in air pollution, the Chinese government passed the Two Control Zones (TCZ) policy in 1998 to confine heavy polluting activities to two geographic zones and provide for more monitoring of pollution from those areas.[66]

One of the chemicals that contributes to acid rain is sulfur dioxide (SO_2), "a colorless gas or liquid with a strong, choking odor. It is produced from the burning of fossil fuels (coal and oil) and the smelting of mineral ores (aluminum, copper, zinc, lead, and iron) that contain sulfur".[67] To deal with the fine sulfur dioxide particles and acid depositions, one method is to "scrub" SO_2 using a technology called flue gas desulfurization (FGD), which removes sulfur gas from other emissions as they pass through a factory's smokestack. A process used by Duke Energy typically involves spraying a chemical reagent (limestone, lime, or magnesium oxide) mixed with water as

the exhaust passes through, removing the SO_2. After this, the emissions released from factory production is 95 percent water vapor (the white plume seen while driving past).[68]

Past Action to Address Chemical Pollution

Awareness of chemical pollution and the threats it poses has grown, and the global community has taken multiple actions to address the crisis. The United Nations Environmental Programme itself has worked to combat pollution for the past half century. Further, the United Nations has focused on pollution through Sustainable Development Goals amongst other programs.[69] The following resolutions offer important insight on past international actions that delegates should consider while planning their own resolutions.

The Stockholm Convention on Persistent Organic Pollutants (POPs) was a key agreement ratified by 152 nations seeking to prevent or limit the release of organic pollutants into the environment. Since it entered into force in 2004, its measures have been widely hailed as a success. The treaty divides organic chemical pollutants into action categories allowing targeted responses, whether the release of the chemical was intentional or accidental. Chemicals may either be outright banned or merely restricted in their use. A review by a panel of experts is used to classify compounds. Those recommended for control then receive risk assessments along with a targeted plan for management.[70] [71]

Table 4: Original 12 Banned POPs[72]

Chemical Name	Use and Environmental Impact
Aldrin	Aldrin was used as a pesticide, but it can work its way up the food chain. The chemical is lethal to humans and animals that consume treated crops.

Chlordane	Used as an insecticide and for termite control. It persists in soil and can spread through the air causing immune damage. Considered carcinogenic to humans and is also lethal for many fish and birds.
DDT	Used as an insecticide to protect crops and prevent mosquito-borne disease transmission. Causes chronic health problems in humans and thins bird eggshells making them more susceptible to cracking open.
Dieldrin	Dieldrin was a pesticide and can also form from aldrin decay and can contaminate humans through the food chain. It is incredibly toxic to marine organisms, especially frogs.
Endrin	An insecticide also used for rodent control. Though many animals can break down the toxin if ingested, it is "highly toxic to fish."
Heptachlor	Heptachlor was used as an insecticide. It was found to be incredibly toxic to birds, and geese can die from eating seeds treated with even low levels of the chemical.
Hexachlorobenzene (HCB)	HCB was a fungicide and may also be found in other pesticides as a byproduct of their manufacture. It can be lethal to humans and causes metabolic disorders, lesions, and other toxic effects.
Mirex	Mirex was an insecticide and fire retardant. It is an incredibly stable chemical that may be a human carcinogen. Mirex is also toxic to plants and some marine organisms.
Toxaphene	Toxaphene was an insecticide. Like Mirex, it is long lasting once released to the environment, may be a human carcinogen, and is toxic to fish.

Polychlorinated biphenyls (PCB)	PCBs were mainly used for insulation and heat exchange in various areas. For humans, it is a carcinogen, damages the immune system, and affects child development. Causes immune suppression and impedes reproductive success in fish and small animals.
Polychlorinated dibenzo-p-dioxins (PCDD)	PCDDs are byproducts of industrial pesticide production. Incomplete combustion of various waste sources also generates PCDDs. These polymers damage the immune system and may be carcinogenic.
Polychlorinated dibenzofurans (PCDF)	PCDFs are byproducts that emerge alongside PCDDs, and they are also generated during PCB production. They have a similar toxicity profile to PCDDs.

Ratified by nearly every nation on our planet and entering into force in 1987, the Montreal Protocol on Substances that Deplete the Ozone Layer is another example of UNEP-supported action that has been judged successful at combating a global threat caused by chemical pollutants. This agreement sought to protect the ozone layer from "nearly 100 man-made chemicals referred to as ozone depleting substances (ODS)."[73] In order to achieve this goal, nations were divided into different groups based on their economic and industrial status to create targeted plans. The chemical pollutants were also categorized similarly to those in the Stockholm Convention, based on a variety of characteristics. The binding plans outlined by the agreement all included specific goals with deadlines and measurable progress updates. Since its ratification, the protocols have been expanded and provided with increased monetary support leading to improvement of the ozone layer, with a full recovery expected near the middle of the century. Additionally, approximately two million fewer skin cancer deaths globally, *per annum*, have resulted from the results achieved by the treaty.[74]

The United Nations passed several Sustainable Development Goals (SDGs) related to pollution, intended to guide member states individually and cooperatively. The interconnection between each aspect of sustainability and health means most of the goals may have some relevance to nearly every issue the UNEP discusses. However, some of the most directly important goals delegates should keep in mind for this topic are *Clean Water and Sanitation* (Goal 6), *Sustainable Cities and Communities* (Goal 11), *Responsible Consumption and Production* (Goal 12), *Life Below Water* (Goal 14) and *Life on Land* (Goal 15).[75] The UN outlines sub-targets, events, publications, and actions taken with regards to each SDG, and this data can be an important source of information. For example, Target 14.1 aims to achieve the prevention and significant reduction of marine pollution of all kinds by 2025.[76] Target 6.3 of *Clean Water and Sanitation* aims to "improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, [and] halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally."[77]

The United Nations Environmental Assembly continues to pass new laws and agreements for the world to follow with regards to chemical pollution. On March 15, 2019, the UNEA passed a resolution to expand and improve sound chemical waste management practices in line with the SDGs.[78] On June 27, 2014, the UNEA passed a separate resolution discussing specific chemicals and sustainable, pollution free use.[79] A database of pollution related UNEA resolutions on topic including air pollution, chemical waste, freshwater, land and soil, marine and coastal, and cross-cutting topics can be viewed on the UNEP's website.[80]

Bloc Positions

Developed Nations Bloc:	Developing Nations Bloc:
This bloc already maintains well-established air quality and pollution testing sites throughout their nations.[81] Nations of this block may have already begun a transition to cleaner energy sources and chemical usage practices to capitalize on the opening in the market and hold an advantage in the changing global climate towards sustainability. Their policies involve a focus on **rapid** changes towards sustainable practices as their economies are stable. Examples of nations involved in the Developed Nations Bloc include France, Denmark, and Canada.[82]	This bloc maintains testing sites and facilities, though not as frequently throughout the nation.[83] Nations of this bloc often have an economic dependence on practices abandoned by developed countries, so creating an opportunity to allow nations to make a change is an essential need in getting nations of this bloc to begin shifting gears. Their policies involve maintaining the economic integrity and stability that they have built up to thus far while change is made **slowly** towards more sustainable practices.[84] Examples of nations involved in the Developing Nations Bloc include Saudi Arabia, China, and India.

Let it be clear that neither bloc has made significant progress towards the Sustainable Development Goals over the other. These are generalized blocs organized based on the economic dependency of the nations on prior practices as opposed to their availability to adopt newer practices. Over 17,000 sites in Europe have been contaminated with "forever chemicals" that have negative health effects.[85] Also in Europe, the presence of 4,700 chemicals composed of PFAs caused the European Environment Agency to caution against substance-by-substance monitoring and instead conduct "precautionary risk management actions for groups of chemicals and promoting the use of chemicals that are 'safe-and-circular-by-design' [which] could help to limit future pollution."[86] These troubles are not limited to the Developed Nations Bloc either, as

India and China face some of the worst air pollution across the world, especially in their respective capital cities. “Major contributors to bad air quality include auto emissions due to increasing urban traffic congestion, fossil fuel powered heavy industry, construction, and the burning of agricultural land post harvests.”[87]

What does this mean for delegates? The interests and policies of the two blocs are not limited by their geography or economic systems. Committee members are working towards the same goal: sustainable practices to preserve the environment and the planet. Working through perceived differences may reshape blocs and cause resolutions to emerge in the process, leading to more sustainable practices to combat pollution and protect humanity.

Guiding Questions

1. What chemical pollution control mechanisms has your nation implemented?
2. How did your country vote on previous UNEP or General Assembly resolutions on air quality, chemical pollution, freshwater, land and soil, marine and coastal, and other cross-cutting topics?
3. How can less-toxic chemicals be discovered to replace harmful pollutants needed for industrial processes? What is a fair trade-off?
4. How can persistent chemical pollutants be removed from the environment?
5. Where will funding for cleanup measures originate from?

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