



Forum: Environmental Commission

Topic: Addressing the Impacts of Climate Change on Agriculture
and Food Security

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Introduction

In an era where climate change is continuously worsening and taking its toll on our environment, a great risk has been posed on agriculture and food security globally. The theme of this year's Amman Model United Nations, "Deliberate to Liberate", highlights the urgent need to discuss and propose meaningful solutions that directly addresses the importance of providing all regions with stable food sources and protecting agriculture across the globe. Not only is it necessary to focus on environmental preservation but also securing stability and safety for farmers and wildlife.

Climate change, and more specifically, rising temperatures has a detrimental impact on global agriculture. Agriculture heavily relies on land, water, and other natural resources, as well as the weather, which is all being affected by climate change. Around the world, increased temperature is causing irregular precipitation patterns and extreme weather conditions, which effects livestock, crop, and food production systems. Extreme weather conditions may include unexpected floods, droughts, wildfires, and storms which damage infrastructure and kill crops, and could potentially lead to soil degradation. Although there have been many agricultural advancements and innovations throughout the past 60 years, studies show that global farming would have been 21% more productive without climate change. This sets us back almost 7 years in farming production. Less economically developed countries, particularly in Sub-Saharan Africa, Asia, and small islands that are already struggling with malnutrition and food insecurity are at great risk, as they heavily rely on agriculture as a form of income and sustenance.

When discussing the impacts of climate change on agriculture, it is also crucial to consider the impacts on farmers, ecosystems, and water sources. Heatwaves, droughts, and floods are becoming more frequent and unpredictable, making it unsafe for a large majority of farmers, as they face dehydration and other health risks. In less economically developed countries and areas around the world facing poverty, there are no protocols or safety policies put in place to protect the health of farmers. Moreover, agricultural areas with diverse wildlife have been dealing with a shift in species behavior. There has been reduced pollination of bees and the spread of pests. Finally, water stress is being placed on regions struggling with water access. Freshwater supplies are being affected by unpredictable precipitation patterns and high temperatures, which will potentially impact water access globally in the decades to come. These challenges underline the urgent need to

deliberate effective solutions that ensure a secure future for our global food systems.

Definition of Key Terms

Food Security

Food security refers to stable and sufficient access to safe and nutritional food that meets the dietary needs and preferences of an individual. Decreased agricultural activity due to climate change has the potential to increase food insecurity, creating a rise in malnutrition rates globally.

The Intergovernmental Panel on Climate Change (IPCC)

The IPCC is an organization that assesses the impacts and consequences of climate change. Their main purpose is to collect scientific information on climate change to provide to the UN and governments across the world. The reason behind this is so international bodies can create new climate policies to prevent the worsening of climate change.

The United Nations (UN)

The UN is an international organization created to spread peace and safety internationally. They also focus on taking action against climate change, promoting agricultural sustainability and food security, and ending hunger.

World Health Organization (WHO)

The WHO is an organization under the United Nations that focuses on international public health and strives to promote health and well-being worldwide.

Sustainable Development Goals (SDGs)

The SDGs are a set of 17 goals that were put in place by the UN that address necessary global challenges. The goals were created with the intended purpose of ending inequality and protecting the safety and peace of people internationally. Important goals that relate to the topic at hand include taking climate action and ending hunger.

Pre-Industrial Levels

Pre-industrial levels are the climate conditions that existed before the release of greenhouse gases into the atmosphere. This refers to the time before industrialization, which started during the industrial revolution in the 1750s.

Vector-Borne Diseases

A vector-borne disease is a disease that is transmitted to humans through ‘vectors’, which are living organisms, such as mosquitos, ticks, and fleas. Climate change is causing the population and species of vectors to change. These organisms are often bred in bodies of water or grassy meadows.

General Overview

Climate change is an alteration in weather patterns and temperature that is long lasting. These changes can be due to natural effects, such as volcanic eruptions or a shift in sun activity. However, since the industrial revolution in the 1800s, the main cause of climate change has been due to the burning of fossil fuels. This is called anthropogenic climate change, which is the pollution of the environment resulting in a negative shift in climate caused by human activity. Global warming caused by climate change has reached almost 1.5°C above pre-industrial levels for 11 months in the year, as of 2024.

When fossil fuels are burned to generate energy, for practices such as creating electricity or powering manufacturing processes, they go through combustion. During combustion, greenhouse gases such as carbon dioxide are released into the atmosphere. When these greenhouse gases are emitted into the atmosphere, they trap heat and lead to global warming, unpredictable weather events, and a rise in sea levels. Increased temperatures create extreme weather events such as droughts and floods, and lead to glaciers to melt which causes rising sea levels. The IPCC has warned consistently on the irreversible and drastic impacts that climate change has had and will continue to have if greenhouse emissions are not reduced.

As the world’s population continues to grow, the demand for food intensifies, along with

the difficulty of production. One of the most pressing issues of the 21st century is providing sufficient food across the globe and preventing food and water insecurity, which is becoming harder due to climate change. Agriculture is heavily reliant on the weather, as crop growth and livestock depend on certain temperatures and precipitation patterns. Climate change is making it more difficult for farmers to predict such precipitation patterns and temperatures, along with unexpected extreme weather conditions. These may include long droughts and heatwaves, as well as floods and rising sea levels. High levels of carbon dioxide can also cause a decrease in nutritional content in crops and soil degradation.

In the long run, if climate change continues without global action, there will be severe and irreversible effects on agriculture. Soil degradation will worsen and continue to spread and losses in biodiversity will cause the spread of diseases and pests among crop production. This will cause unreliability when it comes to the food market, and widen the gap between developing and developed countries, putting thousands at risk of food and water insecurity.

When it comes to the effects of climate change on agriculture, developing nations face a much larger load. More specifically, developing countries that are sensitive to climate in areas such as Sub-Saharan Africa, Southeast Asia, and small islands. These areas are climate-vulnerable, and extreme weather events such as hurricanes and floods are becoming much more frequent. Many of these countries rely on local food production as their main source of sustenance, as well as primary income streams. Since they have limited access to resources and infrastructure, they cannot implement adaptation strategies to help protect their crops in the case of a weather disaster or increased temperatures. This causes many less developed communities to face food shortages and decrease in income because of livestock loss and crop failure. SDG 2, 'Zero hunger', highlights the need to also focus on food insecurity and ensure that everyone has access to sufficient food, which starts with addressing agriculture and decreasing climate change.

Subtopic 1: Farmer Safety and Health Risks

Along with heavily impacting crops and livestock, climate change poses a great risk to the lives of those working in agriculture. Due to changing temperatures and an increase in extreme and unpredictable weather events, farmers are being exposed to hazardous conditions.

In regions such as Europe, South Asia, the US West and especially north-central Africa,

heatwaves are being felt much more than past years and are becoming prolonged and even more humid. Spending long hours in the heat has severe consequences on the health of farmers, causing dehydration, heat stroke, and can even worsen existing health conditions or put a strain on the heart. It is also important to consider the mental health impacts that long exposure to heat can have on farmers, such as stress, anxiety, and insomnia. These effects will negatively impact the performance and productivity of the farmers, putting a strain on food production. While heatwaves impact all farmers, it is especially crucial to focus on those in rural or less economically developed areas. This is because they have less access to measures that can protect them from the heat, such as cooling centers or early warning systems.

Rising temperatures is causing higher evaporation levels, causing heavier rainfall and leading to stronger and more frequent storms. Furthermore, warmer ocean temperatures and rising sea levels are causing more powerful hurricanes and floods. Unpredictable and prolonged rainfall forces farmers to often work during such storms, risking their health and safety. Floods and hurricanes put farmers at risk of being hit by flying debris or drowning. Additionally, floods can cause still water ponds, which creates vector-borne diseases such as malaria or dengue fever. Without access to proper healthcare or prevention systems, farmers will face extreme health and safety consequences due to floods and storms.

Since the working conditions of farmers are already demanding and dangerous, factors caused by climate change places a large hazard on their well-being both physically and mentally. The WHO has identified agricultural workers as a vulnerable group in terms of climate change adaptation. This is why it is necessary to discuss and install methods that prevent and protect farmers from such risks.

Subtopic 2: Wildlife Disruption

Without any intervention, climate change is and will continue impacting wildlife in terms of agricultural production and productivity. Change in weather conditions and increase of temperatures is causing irregular migration and extinction of many species, creating a decline in biodiversity. Important species that are at risk of extinction include pollinators, such as bees and butterflies, which play an important role when it comes to fertilizing crops.

Pest populations are also increasing, as their activity and reproduction rates increase in

warmer temperatures. Melting snow and glaciers resulting in more frequent precipitation in certain areas also creates more moist environments, which is ideal for pests to live in. A surge in pest populations is causing the infection and failure of crops, making it harder to grow healthy and nutritional crops. This leads to many farmers having to use pesticides, which destroys habitats and contaminates soil and water. The destruction of habitat in rural areas due to droughts or fires is also causing many wild animals to search for food and shelter in agricultural area, which can destroy crops and spread disease.

Livestock is becoming more exposed to different diseases, sprouting from a rise in pests, which make it harder for farmers to sustain their health. Additionally, livestock is sensitive to climate, since heat stress can reduce productivity, fertility and growth rates, while also increasing mortality. Change in climate also causes limited resources for many areas, making it more difficult to provide sufficient food and water for livestock because of dry land and decrease water sources. Overall, impacts on livestock will cause decreased quality and limited availability of meat, milk, eggs and other animal produce.

It is important that action is taken to protect biodiversity and livestock in agricultural areas, to protect vulnerable species, maintain agricultural productivity and ensure that the food web stays intact.

Subtopic 3: Water Scarcity

Water is the root of agriculture and the most essential resource when it comes to growing crops and nurturing livestock. However, as the planet continues to get warmer, water supplies are diminishing due to change in precipitation patterns, drought, and reduced snowmelt. As supply becomes more unreliable, water demand continues to rise. Agricultural areas in regions already struggling with access to sufficient water sources, such as areas in the Middle East, South Asia, and central Africa, are struggling with crop production. Without sufficient water, crops cannot go through with the process of photosynthesis and die, creating a dent in the food production system. Additionally, reduced water intake will impact the performance of livestock and potentially cause death among them as well.

Smallholder farmers in rural areas or less economically developed countries are the first to feel the impact of water scarcity. This is because they lack the infrastructure and access to secure

reliable and clean water. Due to the diminish of freshwater sources, many farmers are resorting to using unclean water from ponds or rivers to feed livestock and water crops. This is especially problematic as it contaminates food and exposes livestock to diseases, as well as damaging the long-term health and productivity of the soil.

Water scarcity is also leading farmers to rely on extracting water from underground sources. This threatens the long-term sustainability of agriculture as it damages the underground layers that store groundwater called aquifers. Furthermore, excessive extraction from aquifers during droughts can dry out these resources and cause further water shortages and long-term damage to water access.

Major Parties Involved

The United States of America (USA):

The US has some of the highest agricultural production in the world and contribute a large amount to both domestic production and international exports and food trade. However, they are also one of the top emitters of greenhouse gases. While their agricultural exports play a big role in food access around the world, the rising temperatures in states such as California, is threatening the country's productivity. The US is also known for providing financial and technical assistance for agricultural industries in developing countries.

China:

Globally, China is the number one emitter of greenhouse gases, and its contribution to climate change and global warming has been noticeable. In China, climate change has affected water supply and fertilized land. This has led to the country implementing policies against emissions and installing sustainable agricultural processes, which can influence countries around the world.

Brazil:

Brazil, as one of the largest agriculture exporters in the world, plays an important role in the

global food supply chain. However, deforestation caused by fires and human practices in the Amazon rainforest and decrease in precipitation is making it increasingly difficult to keep its food production system stable.

Small Developing Island States (SIDS):

SIDS, including nations like Fiji, the Maldives, and Barbados, are some of the nations that are facing the cruelest impacts of climate change when it comes to agriculture. Rise of sea levels is damaging their farmland, which is already very limited. These countries have contributed the least to climate change, yet they are the first to face food insecurity and water scarcity.

Food and Agricultural Organization (FAO):

The FAO is a UN agency that promotes international efforts to end hunger and improve agriculture. The agency promotes climate resilient agricultural practices to developing countries and monitors food security globally. They provide technical innovations to countries to help them adapt to the changing weather conditions, to ensure that their agricultural practices remain unaffected.

Timeline of Events

Date:	Event:
1760-1840	The Industrial Revolution, which marked the spark of fossil fuel use and began the buildup of greenhouse gases in the atmosphere. During this era, mechanized agriculture was created, adding to environmental degradation of agricultural areas and natural habitats.
June 5-16, 1972	The UN held the Stockholm Conference. This was the first global summit on the environment and addressed environmental degradation and pollution. This set the tone for future international climate and

	agricultural discussions.
1988	The IPCC was established by the UN to assess climate disruptions. This shed light on the impact of rising temperatures on crop yields and the future of food production.
September 8, 2000	The Millenium Development Goals (MDGs) were set, with MDG 1 aiming to halve hunger. This boosted funding programs and awareness on agriculture in developing countries that are facing the effects of climate change.
December 15, 2015	The Paris Agreement was signed, which addressed the impact of climate change on food security and called for building climate safe agriculture systems.
September 23, 2021	The UN Food Systems Summit began, which was entirely focused on developing global food systems to be able to withstand the changes that climate change is inducing and prevent food insecurity.
2024	Due to an increase in food insecurity, the FAO introduced a global plan to ensure that agrifood systems are climate-resilient and sustainable by 2050. It emphasizes the importance of focusing on developing countries and protecting farmers.

Attempts to solve the issue

“The Kyoto Protocol” (Date: 1997/12/11) (COP3)

The Kyoto Protocol was the first legally binding treaty that required developed countries to decrease their greenhouse gases emissions. The treaty was signed at the third Conference of the

Parties (COP3) to the United Nations Framework Convention on Climate Change (UNFCCC). The treaty set the stage for future global climate policies and framework and later expanded into treaties such as the Paris Agreement. However, the Kyoto Protocol was limited in its impact as major emitters, such as the US, withdrew from the treaty due to economic and commitment concerns, since it required only developed countries to abide by the regulations.

[“Agriculture Development and Food Security” \(Date: 2017/12/20\) \(Resolution Number: A/RES/72/238\)](#)

The United Nations General Assembly passed the resolution to ensure global commitment to end hunger and promote sustainable agriculture. The resolution highlighted the vulnerability of developing countries to weather conditions due to climate change and the effects that this would have on agriculture and food security. The resolution called for developed countries to provide developing countries with the infrastructure and technology to develop climate-resilient agriculture. While the resolution had effective solutions, it was not legally binding, meaning it had limited funding and influence on developed countries.

[“Agriculture Development, Food Security and Nutrition” \(Date: 2024/12/17\) \(Resolution Number: A/RES/79/227\)](#)

This resolution, which was adopted by the UN General Assembly, reflects on the urgent need to focus on agriculture due to worsening hunger and malnutrition. The resolution highlights the role that changing climate has had on agriculture and the risk that this plays on rising food insecurity globally. It stresses the need to implement initiatives to protect rural and small communities from the effects of extreme weather, to ensure that the food production system stays intact. While the resolution made important points, it used very broad language, making it unclear what the final goals and targets of the resolution were.

Possible Solutions

Subtopic 1:

It is necessary to address the growing concerns regarding the health and safety of farmers

due to the increased risk that climate change is causing in the agricultural field. Countries must invest in infrastructure that have protective measures in agriculture communities. This includes shaded areas, cooling equipment, clean drinking water, and accessible healthcare. Training programs can be put into place that inform farmers on the effects of climate change and how to ensure that they are protecting both their crops and personal health. Early heat and storm warning systems are also important for governments in countries that are facing extreme weather to implement, to ensure that farmers have prior information on what's to come. Due to increased pests caused by climate change, farmers are resorting to using more pesticides, which has an impact on their health. To avoid respiratory illnesses, skin diseases, and other illnesses, farmers should be obligated to use protective clothing and equipment as well as being trained on how to use pesticides correctly. Promoting organic pest management systems to reduce chemical dependency can also help with this issue.

Subtopic 2:

Reducing the negative effect of wildlife disruption requires the promotion of agroecological farming methods, which includes farming that protects biodiversity. This involves the collaboration of governments and environmental organizations such as NGOs including the World Wildlife Fund and other biodiversity focused non-profits. Wildlife barriers and buffer zones should also be installed around agricultural land to protect crop and livestock from wild animals. Supporting farmers use of organic and biological pest control to decrease the use of chemical pesticides to protect biodiversity, since harmful chemicals contribute to environmental degradation. Installing flowering strips, which are areas around or in agricultural land that are planted with native plants and flowers will attract pollinators and support biodiversity by providing shelter for beneficial insects. These strips also decrease the need for pesticides, since they attract natural pest predators. Including methods such as rotational grazing and disease inspection into livestock care will also ensure that livestock is able to thrive even through changes in climate.

Subtopic 3:

Water scarcity is a big issue in agriculture. To ensure that farmers have sufficient water access, countries should prioritize rainwater harvesting and regulate groundwater extraction. Governments can also promote the use of soil moisture sensors in agriculture, which show farmers when to irrigate crops and the exact water they should use, to ensure that they aren't overusing

water. Farmers should be provided with subsidies from the government to allow them to invest in water-smart infrastructure that allows them to irrigate their crops sustainably. Installing wastewater treatment infrastructure for farms and agriculture land can avoid farmers reliance on contaminated water sources as well. Growing crop varieties that require less water should also be distributed. Policies should be enforced in countries that ensure that water is distributed equitably, especially when it comes to transboundary water sources.

Guiding Questions

1. Does your delegation struggle with climate issues such as drought, flooding, or soil degradation that effect agriculture?
2. Does your delegation face water scarcity or low access to clean water sources?
3. What percentage of your delegation's population relies on agriculture for livelihood and food security?
4. How can developed countries support developing nations in building agricultural resilience to climate change?
5. Why is it important that policies are implemented to protect farmers against climate change?
6. How can countries protect biodiversity while still maintaining productivity in agriculture?
7. What are the main ways that climate change has impacted agriculture and food systems globally?
8. What role does the UN, WHO, and NGOs play in protecting agriculture against climate change?
9. Why is agriculture one of the most vulnerable sectors to climate change?
10. What responsibilities do countries that highly contribute to emissions have in supporting nations facing food insecurity related to climate change?

Appendix

- <https://www.epa.gov/climateimpacts/climate-change-impacts-agriculture-and-food-supply>
- <https://www.who.int/teams/environment-climate-change-and-health/air-quality-energy-and-health/health-impacts/climate-impacts-of-air-pollution>
- <https://www.ipcc.ch/>
- <https://www.un.org/en/climatechange/what-is-climate-change>
- <https://openknowledge.fao.org/server/api/core/bitstreams/ef0d7f01-4591-4a9c-bc53-6884ef2d4379/content>

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