EE463 Globalization and International Development

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Climate Change Impacts on Philippines' Agriculture

Group 10

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Background

The expected changes in global climate throughout the 21st century are a matter of worldwide concern, including in the Philippines. Climate change poses a multifaceted and intricate challenge that affects various aspects of the agricultural sector, society, politics, and economy, requiring the cooperation of multiple governments.

The Philippines, with a population of over 100 million people and comprising more than 7,600 islands, have also faced this problem, especially with typhoons exacerbated by climate change. The UN Office for the Coordination of Humanitarian Affairs (OCHA) states that the Philippines is among the countries most prone to disasters worldwide. Furthermore, greenhouse gas emission is one of the main reasons that affect climate change. In the Philippines, the share of global GHGs emissions is 0.31% and still rising. This country is even more vulnerable because of its many scattered islands, and the geographical location along the Ring of Fire. Surrounded by the Philippine Sea, the South China Sea, and the Celebes Sea, it is one of the most typhoon-impacted countries globally, with about 20 tropical cyclones, and is vulnerable to other natural disasters like earthquakes, and volcanic eruptions. The Philippines is highly sensitive to typhoons due to its location in the western Pacific, and the typhoon season is July-October which 70% of storms develop. Around 20 typhoons hit or pass through each year, causing significant damage and loss of life, and one of the world's most typhoon-prone regions, averaging 19 to 20 typhoons annually, with seven to nine making landfall. Typhoons bring strong winds, heavy rain, landslides, and flooding, destroying infrastructure, homes, and crops. In recent years, the Philippines has experienced several devastating storms. In 2020, Typhoon Goni, one of the strongest storms to hit the country in recent history, caused significant damage to infrastructure and homes and loss of life. A different strong tempest, Typhoon Haiyan or Yolanda in the local language, struck eastern Samar Island on November 7, 2013. It generated a storm surge that reached over five meters in certain regions. For flooding, there have been several instances of flooding in the Philippines in recent years. The country was hit by several typhoons, for instance, Typhoon Vamco caused widespread flooding and landslides, leaving many areas submerged and damaging infrastructure and homes in 2020.

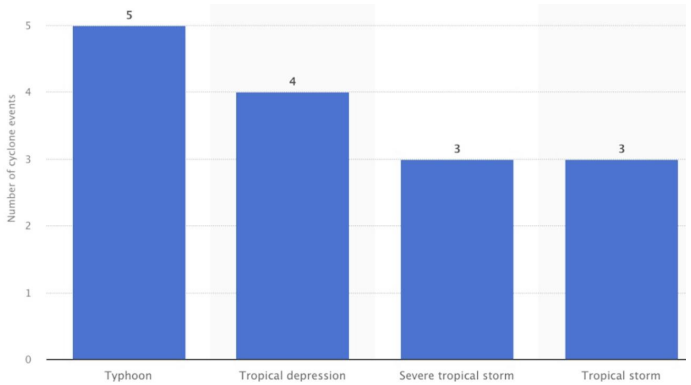

Figure 1; Number of tropical cyclone events in the Philippines in 2021

According to Figure 1, the Philippines has many categories of storms: typhoons, tropical depressions, severe tropical storms, and tropical storms. But, the most significant event is typhoons which have five cyclone events.

The government has implemented measures to reduce the impacts of typhoons, but some areas remain vulnerable due to inadequate infrastructure and high poverty levels. Climate change is expected to increase the frequency and intensity of typhoons. It mainly damaged the agriculture sector, reduced productivity, and caused more problems of food scarcity. The farmers also suffered damage from the effects as their input, residents, and farms were wiped out over a few days, leaving them with nothing. The country's agricultural sector has had the highest poverty rate of any industry since 2006, which led to many people who rely on the agricultural sector having to deal with poverty. It also affects other areas, such as damage to the building, declined agriculture, increased mortality, easily spread disease, and lowered attractiveness of the investment. Therefore, the government has prepared adaptation and mitigation efforts. However, the capacities of financing, human skills, and institutions are limited.

The aim of our paper is to examine the broader context of climate change in the Philippines, specifically focusing on the impact of typhoons and the government's policy strategy. Our analysis will elucidate the root causes of this issue, its consequences, and potential solutions. By bringing attention to the devastating impact of natural disasters, we desire to raise awareness globally and encourage collective action to mitigate the damage inflicted upon humanity and nations.

Key Issues and Challenges

Causes of Climate Change

The energy sector is responsible for over 50% of greenhouse gas emissions in the Philippines, followed by agriculture, industrial processes, waste, land-use change, and forestry. It is crucial to comprehend how human actions contribute to climate change to assess the potential harm caused by their actions, particularly with regard to climate change's negative impact on the country.

1. Energy consumption: The Philippines has been heavily reliant on fossil fuels, such as coal and oil, for electricity generation and transportation which releases carbon dioxide into the atmosphere. In 2019, coal accounted for 41% of the country's electricity generation, followed by natural gas (25%), oil (22%), and renewable energy (12%). The growth in energy consumption in the country, driven by population growth and economic development, has led to an increase in greenhouse gas emissions.
2. Deforestation and land use change: Philippines has one of the highest deforestation rates in the world, primarily due to the conversion of forested land for agriculture, mining, and urbanization. Since trees absorb CO2 from the atmosphere and store it in their biomass. When forests are degraded, the carbon stored in the trees is released into the atmosphere. Also, it reduces the capacity to absorb carbon dioxide from the atmosphere.
3. Agriculture: The emissions occur in different ways. For instance, converting forests, grasslands, and other natural habitats into farmland leads to the release of carbon dioxide from the soil and vegetation. This also lowers the ecosystems' ability to absorb CO2 from the atmosphere. Additionally, livestock, especially cattle and water buffalo, emit methane, which is a highly potent greenhouse gas.
4. Waste management: Improper handling and disposal of waste have a significant impact on climate change. Landfills, the most common method of waste disposal in the Philippines, emit substantial amounts of methane and incineration, and a waste management method, a potent GHGs that is around 28 times more effective at trapping heat than CO2. The process of burning waste produces carbon dioxide, a potent greenhouse gas that contributes to global warming.
5. Industrial processes: Many industries in the Philippines rely on the burning of fossil fuels to power their operations, and generate a significant amount of waste, which often includes toxic chemicals that can harm the environment and contribute to climate change.

Moreover, the Philippines is affected by GHGs emissions from various countries, including major emitters such as the United States, China, and the European Union. These

countries are responsible for significant amounts of global greenhouse gas emissions, and their emissions can contribute to the overall increase in global temperatures and resulting impacts on the Philippines and other countries. In addition to these major emitters, neighboring countries such as Indonesia and Malaysia also emit greenhouse gas that can affect the Philippines' environment and climate. These countries have large land areas covered by forests and other vegetation that are being cleared for agriculture and other purposes, resulting in emissions from deforestation and land-use change.

Effects of Climate Change on Philippines Agriculture

The collective effects of these impacts have had a significant impact on various aspects of the Philippines, including agriculture, water, infrastructure, human health, and coastal ecosystems. These impacts are expected to continue causing severe damage to both the economy and society of the Philippines.

When typhoons strike, they can bring strong winds, heavy rains, and storm surges, which can cause extensive damage to crops, livestock, and infrastructure. The Philippines is highly dependent on agriculture, which accounts for around 9% of the country's GDP and employs around 25% of the workforce. As such, any disruption to the agricultural sector can have a significant impact on the economy and people's livelihoods. The impact of typhoons on agricultural productivity in the Philippines can be seen in several ways. For example, crop damage, typhoons can damage crops in many ways, including flattening or uprooting plants, flooding fields, and washing away topsoil. This can result in significant yield losses and can also increase the risk of pests and diseases. Livestock losses, typhoons can also cause losses of livestock, either through direct damage or through the destruction of feed and water supplies. Infrastructure damage, typhoons can damage irrigation systems, roads, and other infrastructure that are crucial to agriculture. This can make it more difficult and costly for farmers to access markets and resources, which can further reduce productivity. In addition, there can also be indirect effects that can affect productivity. For instance, the disruption of markets, Typhoons can disrupt transportation and communication networks, making transporting crops and livestock to markets difficult. This can lead to oversupply and price drops in some areas, while other areas may experience shortages and price increases. Increased costs, the cost of repairing damage to farms and infrastructure, and the cost of implementing more resilient practices, can be a significant burden for farmers and the agricultural sector.

To conclude, the impact of typhoons on agricultural productivity in the Philippines can be severe and can have long-lasting effects on the economy and people's livelihoods.

However, there are also efforts underway to develop more resilient agricultural practices and infrastructure to help mitigate the impact of these natural disasters.

Government policies and strategies

Policies on climate change adaptation

The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) is a national institution in the Philippines that offers public weather forecasts and advisories, flood and typhoon warnings, meteorological, astronomical, and climatological information, as well as other specialized services, primarily to protect lives and property and to promote economic, productivity, and sustainable development. PAGASA disseminates information using a variety of Technology, including online, radio, TV, and mobile alerts and even collaborates with focal points at the village level to immediately warn residents during emergencies. The color-coded rainfall warning system, discusses the intensity of the precipitation and the likelihood of flooding, and identifies the community's required acts are also indicated in these color codes. When PAGASA issues a yellow rainfall alert, it indicates that the next three hours will see heavy rains. In low-lying areas and close to river channels, flooding is conceivable. Everyone in the affected regions needs to be vigilant and keep an eye on weather reports. Intense rain has already begun and will continue for the next three hours, according to an orange rainfall advisory. Low-lying regions and areas close to river channels are at risk of flooding. So be prepared. In case they are ordered to escape due to flood threats, residents in affected areas must be ready. Not to mention, a red rain alert indicates that it will rain heavily for the next three hours. You need to leave right away because there will probably be a lot of water. Local residents must start to leave as quickly as possible.

Project NOAH (Nationwide Operational Assessment of Hazards) is the Department of Science and Technology's (DOST) response to President Benigno S. Aquino III's need for a more precise, comprehensive, and rapid disaster prevention and mitigation system, particularly in high-risk areas around the Philippines. In collaboration with the UP National Institute of Geological Sciences and the UP College of Engineering, the Project will adopt a multidisciplinary approach to the creation of instruments and systems for disaster prevention and mitigation provided by the DOST through The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Philippine Institute of Volcanology and Seismology (PHIVOLCS), and the DOST-Advanced Science and Technology Institute (ASTI). By making better scientific data available to many stakeholders. Moreover, It makes use of a range of cutting-edge technologies to produce precise and trustworthy hazard information, including hazard maps and early warning systems, which can then be accessible through the Project NOAH online portal, its mirror sites, and the NOAH and Arko mobile apps. Moreover, The Project NOAH web portal offers crucial information for disaster protection based on local vital infrastructure identification, near real-time weather data, maps of flood and landslide hazards, and maps of storm surge inundation. For example, the

WebSAFE application, which enables more intelligent and thorough resource preparation in the event of an impending severe weather disaster, is also included in the online portal. and the Arko smartphone app, which enables users to examine important hazard data for floods, landslides, and storm surges in their location, was also launched by DOST.

Nevertheless, the Philippine government declared in January 2017 that Project NOAH would cease operations as of March 1 due to a lack of funding. On February 23, 2017, the University of the Philippines decided to absorb Project NOAH and carry on with its operations after the Department of Science and Technology (DOST) ended its oversight.

Policy on climate change mitigation

In 2009, the Philippines government took action against Typhoon Ketsana by preparing the *"Metro Manila Flood Management Master Plan"* to eliminate long-term flooding by building flood management dams and improving flood warning systems. This plan was approved by the National Economic and Development Authority (NEDA) on September 4, 2012, and obtained US$6 million in grants from the Australia-World Bank Philippines Development Trust Fund and Policy and Human Resources Development Trust Fund of Japan, to finance studies and designs of other interventions for the next phase of implementation of the master plan. And then on September 28, 2017, the World Bank, in partnership with the Philippine government and the Asian Infrastructure Investment Bank (AIIB) approved the Metro Manila Flood Management Project to improve urban drainage in Metro Manila. The project aims to modernize 36 flood management pumping stations and construct 20 more including supporting infrastructure along the critical waterways in the cities of Manila, Pasay, Taguig, Makati, Malabon, etc. Moreover, collaboration with local governments and key shelter agencies by the Department of Public Works and Highways (DPWH) and the Metro Manila Development Authority (MMDA) to improve flood management in the Pasig-Marikina River Basin which required temporary store flood waters until they can be conveyed into Laguna de Bay and Manila Bay without flooding urban areas. However, The Metro Manila Flood Management Master Plan still has challenges for example erosion and climate change that could result in higher water run-off and getting into the dam.

Conclusion

The Philippines has been faced with the challenge of the climate change problem of typhoons, with about 20 tropical cyclones each year. Five issues that caused the Typhoon in the Philippines are energy consumption, Deforestation, Agriculture, Waste management, and Industrial processes, which have been harming the Philippines for a long time. The root of the problem is the green glass emission that will affect the melting Glaciers, which will increase the sea level and lead to typhoons. Climate change greatly impacts the agriculture sector, such as damaging crops, soil fertility, property, and productivity, leading to an increase in poverty within the country. Those factors may lead to shortages and price increases.

Government policies to countermeasure climate change are divided into two parts, adaptation and mitigation policy. Policies on climate change adaptation are PAGASA, a national institution in the Philippines, which offers public weather forecasts and climate change warnings to protect lives and improve sustainable economic development. Moreover, Project NOAH adopted a multidisciplinary approach to creating instruments and systems for disaster prevention and mitigation. This project enhances the effectiveness of the PAGASA by improving technologies to produce precise and trustworthy information, which can then be accessible through online portals and mobile apps. Both projects help the Philippines to be more aware of the climate challenge. However, the NOAH has been declared closed due to the lack of funding.

On the contrary, policies on climate change mitigation are the metro Manila food management master plan in 2009 to build flood management dams and improve flood warning systems. In 2012 the Philippine government received funds from the Australia World Bank Philippines Trust Fund to enhance the effectiveness of the implementation of the master plan. In 2017, The World Bank also provided funds to improve urban drainage in Metro Manila to replace existing pumping stations that have become inefficient. The policies and assistance helped the Philippines relieve the Typhoon's negative impact as farmers could produce more and increase their income. However, some challenges may cause the policy to become ineffective, such as the limited funds to create the dams in every sector and the undefined problems.

The climate change problem is creating a massive negative impact on the country and its production. The government has a significant role in introducing the policy to solve the problem, and households and farmers have responded to reduce the emission. The carbon tax is a recommended policy that the tax rate rises over time to reflect the growing damage expected from climate change. Its objective is to decrease the demand of the manufacturers and agriculture sector that produce high emissions to respond more to the environment in exchange for extra benefits.

Citation

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