

In the Hot Seat: Climate Change and Agriculture in Ethiopia and Malawi

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Abstract

This article evaluates climate change and its effects on food security and agriculture in Ethiopia and Malawi. In Ethiopia and Malawi, climate change has caused an uptick in extreme weather events, most notably droughts and floods, which threaten the agricultural sector of the countries. Ethiopia and Malawi are both agro-dependent countries with high food insecurity, which will be exacerbated by climate change. Climate change and its effects pose an ethical dilemma for the people of Ethiopia and Malawi and for the global community as a whole. On the one hand, neither country contributes significantly to carbon emissions, which are driving human-induced climate issues. On the other hand, however, both countries are highly vulnerable to the effects of climate change. Ethiopia and Malawi have both made concerted efforts to adapt to the effects of climate change to reduce food insecurity and bolster the food production sector.

I. Introduction

Climate change is possibly the most significant issue facing the global community today. Though changes in the climate occur naturally, human-induced climate change due to the emission of greenhouse gasses, such as carbon dioxide and methane, is causing severe consequences for the world's population. There are two aspects of climate change: long-run rising temperatures and increasing volatility of weather conditions. In many parts of the world, increasing weather volatility amounts to more extreme weather events, including droughts and flooding, which have massive impacts on human and animal populations. Much of the responsibility for the greenhouse gas emissions that are causing climate change is assigned to industrialized countries which have been contributing to emissions for longer and at higher rates than developing countries. However, the developing countries are the most vulnerable to the effects of climate change, reflecting what is referred to as climate injustice.

This article will evaluate the disproportionate effects of climate change on two such developing countries, Ethiopia and Malawi. It evaluates how the two most common forms of extreme weather in these countries, drought and flooding, impact the agriculture sectors in both countries. In Ethiopia and Malawi, agriculture, especially small-scale farming, accounts for a massive portion of the economies, employing more than half of their populations, and providing food for a majority of the countries' residents. The reliance on agriculture has, however, made Ethiopia and Malawi vulnerable to the effects of climate, which they are largely irresponsible for. This article assesses

the ethical perspectives applicable to situations that Ethiopia and Malawi face as populations with high vulnerability to climate change, but with low impact on global emissions.

Following the introduction is a review of the literature that delves into prior research regarding climate change in Ethiopia and Malawi. Next, this article analyzes the socioeconomic background of both countries, including factors such as GDP per capita, life expectancy, and literacy rate. The fourth section analyzes the specifics of the climate change crisis and how it impacts Ethiopia and Malawi, especially in the context of their extreme vulnerability to shocks in the agricultural sector. Then, the article assesses the ethical perspectives of climate change in Ethiopia and Malawi and examines the measures taken to reduce the effects of climate change in the two countries. Lastly, the paper concludes by making recommendations for steps that should be taken to mitigate climate change effects and reduce climate injustice in Ethiopia and Malawi, and in the rest of the developing world.

II. Literature Review

Climate and global development experts have, in recent years when climate change has come to the forefront of current international discussion, conducted a significant amount of research on the effects of climate change on the vulnerability of African states. Ethiopia and Malawi are two such states in which vulnerability is significantly high in large part due to economic dependence on domestic agriculture, especially by small-scale household farms. Both of these countries also face food security dilemmas posed by climate change which only contribute further to their vulnerability. Hope (2009) focuses on the entire African continent, Di Falco, Veronesi and Yesuf (2011) and Bedeke et al. (2020) focus on Ethiopia, while Warnatzsch and Reay (2020) and Nordhagen and Pascual (2013) focus on Malawi. All of the articles note the severity of the vulnerability, economically and in terms of food security, in Ethiopia and Malawi as a result of climate change, as well as provide outlines for measures that farmers can take to resist the effects.

- Hope (2009) evaluates how climate change in Africa is leading to an increase in poverty due to the impacts of climate change on the agriculture sectors of African countries, which are crucial to the economies of these nations. It reveals that in Africa, like in other places, the poor are the most vulnerable to issues caused by climate change. The article also notes that African nations contribute little to carbon dioxide emissions but are some of the most vulnerable to its effects. The author concludes that this conundrum has informed Africa's strategy of adaptation to climate change, rather than carbon emission reduction.
- Di Falco, Veronesi and Yesuf (2011) discuss how climate change is impacting food security in Ethiopia, especially as it relates to agricultural productivity. A large portion of Ethiopia's citizens is employed in farming, predominantly household farming. The article explores the factors that motivate household farmers to take adaptive measures against climate change. It also evaluates how such adaptations impact the crop yields of Ethiopia's farmers. Lastly, the author suggests a number of adaptive measures that will best prevent climate change-related decreases in crop yields.
- Bedeke et al. (2020) assess the impacts of climate change on the vulnerability of Ethiopian maize production. Maize, as it is explained, is a staple crop of Ethiopian agricultural production and is crucial to providing food security for much of the population, as well as comprising a significant portion of revenue for farmers. The article explains that food production by household farmers in Ethiopia is hindered by socio-economic factors as well

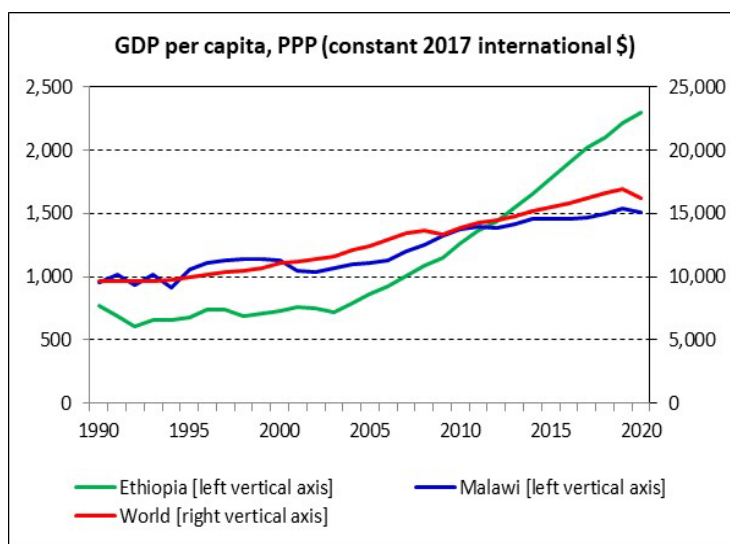
as biophysical factors. In response, the author suggests specifically tailoring solutions to improve agricultural productivity.

- Warnatzsch and Reay (2020) examine Malawi’s reliance on maize production and propose projections of the effects that climate change will have on maize farming. The article evaluates the characteristics that make maize susceptible to climate change factors. Like Ethiopia, the authors note that Malawi is highly vulnerable because of its reliance on domestic and small-scale agriculture for food production and economic output. They suggest that bolstering the Malawi government’s Farm Input Subsidy Program will improve the capacity for the country’s institutions to adapt to climate change.
- Nordhagen and Pascual (2013) focus on how the procurement of crops’ seeds can impact the ability of Malawi’s farmers to make adaptations to rising temperatures and lower precipitation. The article highlights the importance of promoting genetic diversity among crops as a partial solution to projections of decreasing crop yields. The authors also point out that giving farmers useful knowledge on their farming practices will improve their ability to initiate adaptive measures.

III. Socioeconomic Background

Ethiopia and Malawi are both classified by the United Nations as Least Developed Countries (LDCs).¹ As displayed in Figure 1, purchasing power parity (PPP)-adjusted GDP per capita in Ethiopia and Malawi has been roughly about one tenth of the international average (shown on the right vertical axis) from 1990 to 2020. Ethiopia caught up a bit over the last 15 years, while Malawi has fallen a bit further behind. In 1990, Ethiopia’s PPP-adjusted GDP per capita was \$767 (in 2017 constant \$), while that of Malawi was \$953. In 2020, Ethiopia’s PPP-adjusted GDP per capita was \$2,297 (in 2017 constant \$), while that of Malawi was \$1,509.

Figure 1: GDP per capita (PPP, constant 2017 international \$)

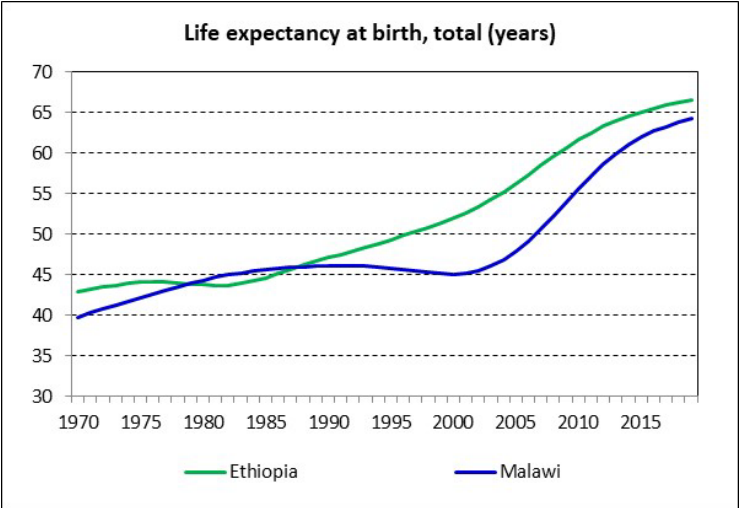


Source: Created by author based on World Bank (2022).

¹ <https://www.un.org/development/desa/dpad/least-developed-country-category.html>

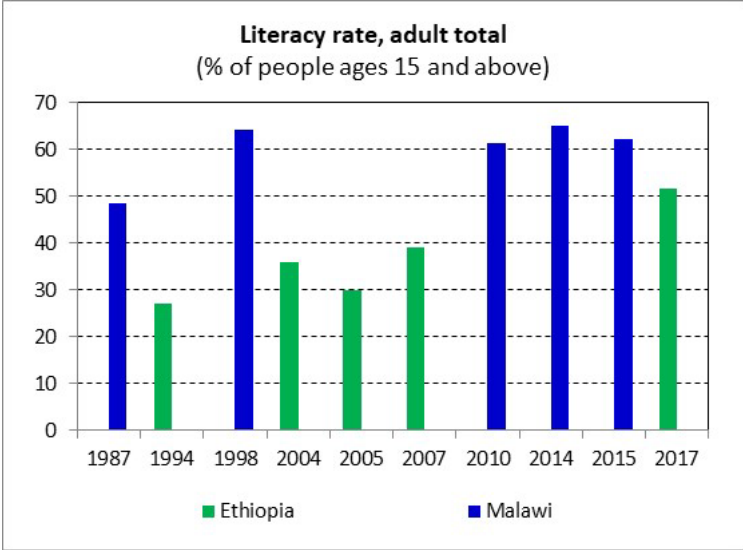
The average international life expectancy has risen from 65 years in 1990 to 73 years in 2020.² As shown in Figure 2, residents of both Ethiopia and Malawi can expect to live a shorter life than the average person around the world. As of 2019, the life expectancy in Ethiopia was 66.6 years, whereas it was 64.3 years in Malawi in the same year. Both countries have experienced significant growth in life expectancy between 1970 and 2019, having had a life expectancy of 43.0 years and 39.8 years in 1970, respectively in Ethiopia and Malawi.

Figure 2: Life Expectancy at Birth (years), 1970-2019



Source: Created by author based on World Bank (2022).

Figure 3: Adult Literacy Rate (percent of people ages 15 years and above), available years



Source: Created by author based on World Bank (2022).

² World Bank (2022).

As shown in Figure 3 above, Ethiopia and Malawi both suffer from low literacy rates. Based on the latest data reported by the World Bank (2022) for Ethiopia, only 51.8 percent of adult Ethiopian residents were literate in 2017. Despite this low proportion, Ethiopia has seen growth in its literacy rate since the first data collection in 1994, when the literacy rate was only 27.9 percent. Malawi also increased its literacy rate from 48.6 percent in 1987 to 64.1 percent in 1998, but then saw a drop in its literacy rate to only 61.3 percent twelve years later in 2010. Malawi's literacy rate then improved to 65.1 percent in 2014, but it decreased again in the subsequent year to 62.1 percent. Hence, Malawi had a lower literacy rate in 2015 (which is the last year such data is available for Malawi) than it had 17 years earlier in 1998.

IV. Analysis of Facts

IV.1. Carbon Dioxide (CO₂) Emissions

The threat of climate change is one that looms large over the entire world, as it will have global impacts. Primarily, climate change will lead to increased average temperatures in all parts of the world, changes in precipitation patterns, and an increase in extreme weather events, such as cyclones and droughts. All of the primary impacts of climate change on the world have auxiliary effects outside of the realm of physical changes to weather patterns. Climate change, though naturally occurring, has been concentrated within a shorter period of time than is natural and exacerbated by human activity, most notably the emission of greenhouse gases. It is crucial to note that, while developed countries are the highest emitting countries, the people most affected by climatic changes will be the world's poorest people, who are heavily concentrated in developing countries, including Ethiopia and Malawi.

In 2021, the Intergovernmental Panel on Climate Change (IPCC) released a report summarizing the scientific basis for understanding current trends in climate change. The report noted, crucially, that the concentration of greenhouse gases has been consistently increasing since 1750 due to human behaviors.³ Most of these emissions have come from developed countries, those that have the largest industrial capabilities. The top ten highest contributors to carbon dioxide emissions between 1750 and 2020 accounted for nearly 70 percent of all carbon dioxide emissions in the world during the period.⁴ On the other end of the spectrum, the 133 lowest contributing countries each account for less than 0.1 percent of emissions between 1750 and 2020.⁵ What this data reveals is that, despite climate change being a shared-fate issue, the problem has historically been caused by only a small portion of the world's countries. More recently however, the world's greatest contributors to current carbon dioxide emissions also account for a massive portion of the world's total population.

As demonstrated in Figure 4, Ethiopia had nearly nine times the carbon dioxide emissions of Malawi in 2018. Ethiopia contributed 16,280 kilotons of carbon dioxide into the atmosphere, whereas Malawi contributed only 1,570 kilotons. The difference in total carbon dioxide emissions between Ethiopia and Malawi can, in large part be attributed to Ethiopia's significantly larger population. A better measure of the two countries' climate change contributions is by assessing the trends of carbon output. Ethiopia has continued to increase the amount of CO₂ it emits, whereas Malawi has managed to stabilize its emissions. In the same timeframe, Ethiopia's total carbon

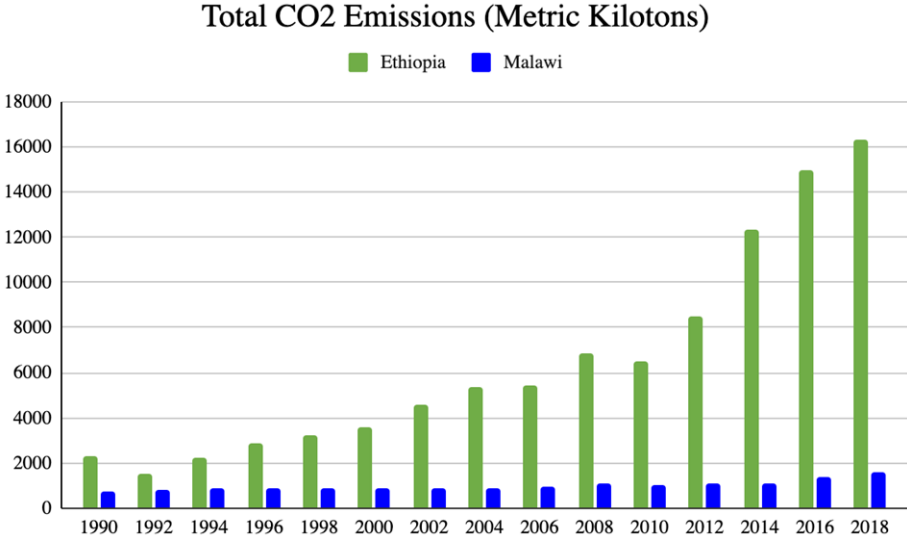
³ Intergovernmental Panel on Climate Change (2021) p. 5.

⁴ Ritchie and Roser (2020).

⁵ Ritchie and Roser (2020).

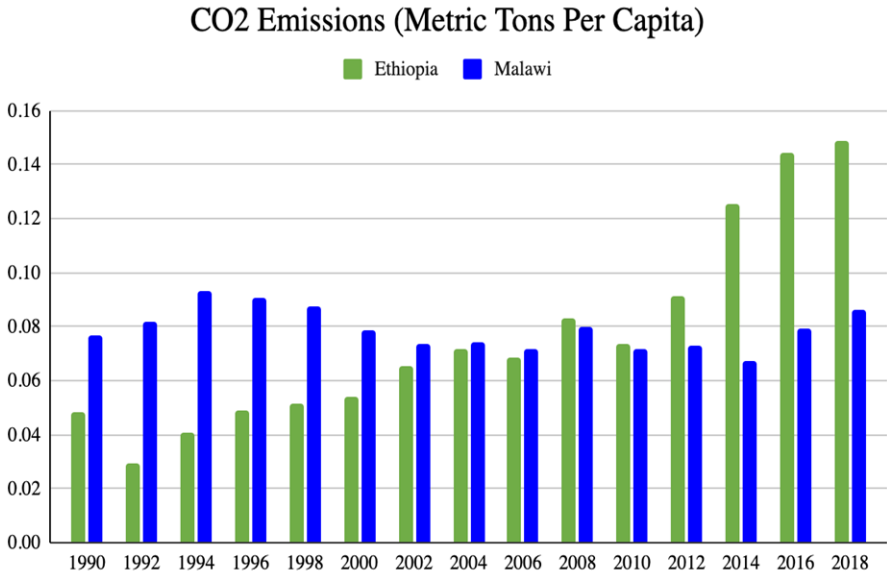
dioxide emissions have increased nearly eightfold, whereas Malawi’s total emissions have doubled over the past 28 years. In any case, it is important to keep in mind that neither Ethiopia nor Malawi have a significant carbon output compared to the rest of the world. Both countries account for less than 0.1 percent of the world’s emissions since 1750.

Figure 4: Total CO₂ Emissions (metric kilotons)



Source: Created by author based on World Bank (2022).

Figure 5: Per capita CO₂ Emissions (metric tons)



Source: Created by author based on World Bank (2022).

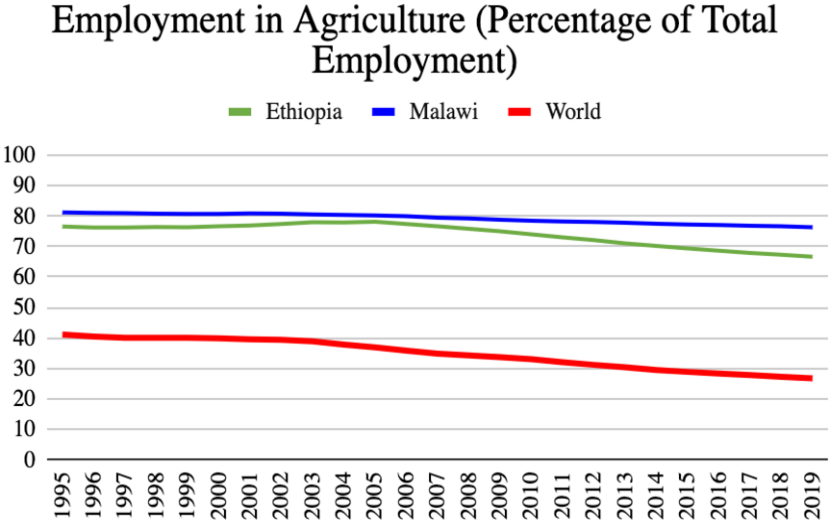
The trend in emission rate is also somewhat apparent in Figure 5, which depicts carbon dioxide emissions per capita in metric tons. While Ethiopia’s per capita emissions have continually risen over time, Malawi’s have fluctuated, finishing 2018 with roughly the same about of carbon dioxide emissions per capita as in 1990. While total emissions can be blamed on population growth, per capita emissions cannot. In Ethiopia, carbon dioxide emissions have outpaced population growth. In Malawi, on the other hand, population growth and carbon dioxide emissions have, on average over the 28-year span, mirrored each other.

Though Malawi has seemingly handled its carbon output better than Ethiopia, this is largely due to Malawi achieving little economic growth and industrialization. In 2011, Ethiopia’s industrial sector produced ten times as much carbon dioxide as Malawi’s industrial sector.⁶ Yet, despite Ethiopia’s edge over Malawi in terms of industrialization, carbon dioxide emissions from both countries come overwhelmingly from their agricultural and land-use sectors, accounting for 79 percent of Ethiopia’s total emissions and 96 percent of Malawi’s emissions in 2011.⁷

IV.2. Vulnerability to Climate Change

Despite contributing little to human-induced climate change, Ethiopia and Malawi, like other developing countries worldwide, will suffer far greater consequences due to the effects of climate change in comparison to the developed countries that are largely responsible for the phenomenon. A host of issues accompany the rise in temperatures and other related issues associated with climate change, most of which will have severe consequences for the countries’ critical agricultural sector, which employs most of their citizens. As displayed in Figure 6, despite declining over time, nearly 67 percent of Ethiopians and 76 percent of Malawians still worked in agriculture in 2019.

Figure 6: Employment in Agriculture (percent of total employment)

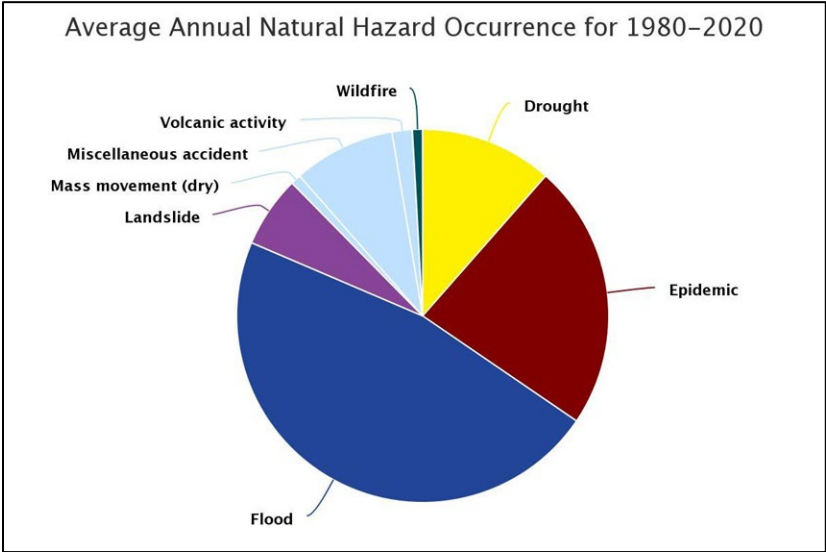


Source: Created by author based on World Bank (2022).

⁶ Ritchie and Roser (2020).
⁷ Ritchie and Roser (2020).

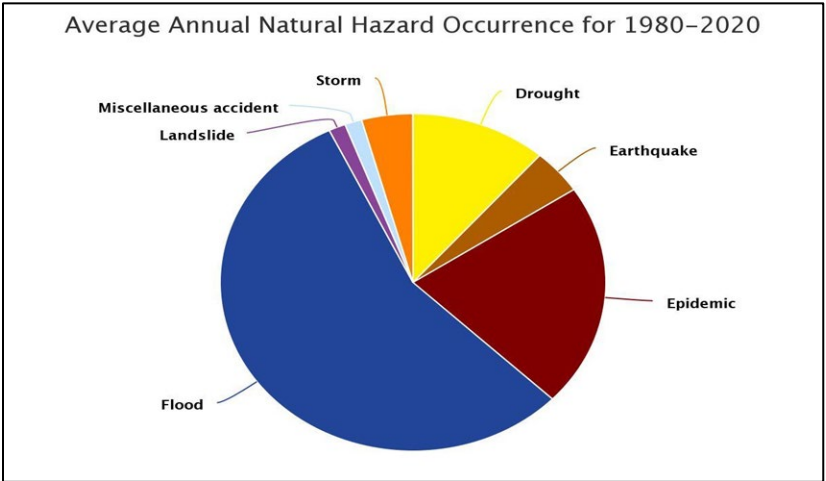
Ethiopia and Malawi must expect similar consequences of climate change, which could have drastic effects on the agricultural productivity of both countries. Figure 7 and Figure 8 display the most common extreme natural events from 1980-2020 in Ethiopia and Malawi, respectively. In both countries, floods, droughts, and epidemics are the three most common forms of extreme natural occurrences. Though epidemics are linked to climate change, they have a much less significant impact on the agricultural capabilities of a country. Droughts and floods, however, will have major impacts on farming in Ethiopia and Malawi.

Figure 7: Ethiopia: Average Annual Natural Hazard Occurrence for 1980-2020



Source: World Bank Climate Change Knowledge Portal (2021), <https://climateknowledgeportal.worldbank.org/country/ethiopia/vulnerability>.

Figure 8: Malawi: Average Annual Natural Hazard Occurrence for 1980-2020



Source: World Bank Climate Change Knowledge Portal (2021), <https://climateknowledgeportal.worldbank.org/country/malawi/vulnerability>.

In Malawi, over 90 percent of agricultural workers work on smallholder farms, which are characterized by smaller size in comparison to corporate farms and high intrafamilial employment.⁸ Small farms are more susceptible to climatic changes the most crucially of which are variations in precipitation levels and extreme weather events. In Malawi, the two most significant weather conditions for the health of the agriculture sector are droughts and floods, which generally only occur in the Shire River basin in southern Malawi.⁹ Droughts, occurring throughout the whole of Malawi, tend to be more devastating for crop production amongst small farmers and large plantations, in comparison to floods. Small farms lose on average 2.97 percent of their crop production due to droughts, which can result in a significant decline of 2.02 percent in annual GDP.¹⁰

For Malawians, climatic shocks can be truly devastating and threaten the security of large swathes of the population. With climate change and rising temperatures, the soil will retain less moisture as water evaporates faster, causing the soil to become hard and less conducive to growing crops. The lack of crop variety also threatens the livelihoods of many Malawian farmers who tend to grow local maize varieties.¹¹ Maize is the most important crop for Malawi's farmers, but because most small farms grow local varieties, rather than drought-modified modern varieties, like the large-scale farms, the maize is highly susceptible to drought. Decreased production for a staple crop like maize could threaten the livelihood of many Malawi farmers and threatens to plunge many Malawians into poverty and serious food insecurity.

For Ethiopian farmers, the effects of climate change differ slightly compared to those felt by Malawian farmers. In Ethiopia, variations in precipitation can actually benefit farmers, if they fall in the right season. For example, higher precipitation rates during the spring can increase farmers' revenue by \$225 per hectare, whereas more rain during the winter could cost farmers \$465 per hectare.¹² Higher precipitation in the spring benefits crops by promoting earlier germination, whereas rain and higher temperatures in the winter could promote the spread of disease and pests, both of which harm crop yields. Ultimately, though, experts predict that climate change would serve to harm total farming productivity and revenue for Ethiopian farmers. They project that agricultural revenue in Ethiopia will decrease by 9.7 percent by 2050 and will be even greater by 2100.¹³

While Ethiopian farmers may enjoy boosts in productivity and revenue during some harvests, they will ultimately find themselves less productive. Interestingly, it seems that agricultural production and carbon dioxide emissions are inversely related in Ethiopia. As carbon dioxide emissions continue to rise, farming revenue decreases. This could be due to increasing urbanization, which often accompanies industrialization, which can cause, or be caused by, a decrease in rural farming. As farming becomes less productive, more Ethiopians will likely abandon the trade to work in the growing industry sector in Ethiopia, which will ultimately raise food prices and increase carbon emissions. It is important to remember, however, that neither in the case of Malawi nor Ethiopia are the two countries solely responsible for the effects of climate change on the agriculture industries.

⁸ Stevens and Madani (2016), p. 1.

⁹ Pauw, Thurlow, Bachu and van Seventer (2011), p. 180.

¹⁰ Pauw, Thurlow, Bachu and van Seventer (2011), p. 188 and 191.

¹¹ Pauw, Thurlow, Bachu and van Seventer (2011), p. 191.

¹² Deressa and Hassan (2009), p. 542.

¹³ Deressa and Hassan (2009), p. 545.

V. Ethical Analysis

This section will analyze the ethical implications implicit in the issue of climate change, which is a shared-fate issue that disproportionately affects developing countries like Ethiopia and Malawi. The first section explains the ethical issues associated with climate change, as well as evaluates the steps that Ethiopia and Malawi are taking to reduce the effects of climate change. The second section will discuss the applicable ethical perspectives and approaches associated with the issue of climate change as it applies to Ethiopia and Malawi.

V.1. Ethical Implications of Climate Change

In addition to the threat of destruction that climate change presents to the livelihoods of massive portions of the Ethiopian and Malawian populations, it also reflects an ethical issue. The effects of climate change are felt worldwide. However, as the theory of distributive justice suggests, “climate change impacts will not be evenly distributed across space”.¹⁴ In Ethiopia and Malawi, as well as other developing countries, where the agriculture sector employs the majority of workers and accounts for a massive portion of the countries’ GDP, the effects of climate change will have a massive impact on people’s livelihoods. Conversely, in countries that are not agriculture-dependent, predominantly developed countries, climate change will have a less significant impact on people’s lives. Thus, in developing countries, such as Ethiopia and Malawi, climate change poses a far more serious risk to the people than in developed (or advanced industrialized) countries, which poses a major ethical issue.

A second crucial aspect of the ethical question of distributive justice is in assessing the responsibility for climate change. Despite being less severely impacted by the climatic changes, developing countries disproportionately produce carbon emissions, the cause of human-induced climate change trends. According to the Union of Concerned Scientists (2020), the top ten highest emitting countries in the world emit about 68.4 percent of the world’s total CO₂ emissions. Comparatively, Ethiopia, which ranks 114th in the world for carbon emissions, and Malawi, which ranks 163rd, both contribute less than 0.1 percent of the world’s total CO₂ emissions.¹⁵ Yet, Ethiopia and Malawi will continue to be affected by the actions of developed countries unless serious measures are taken to reduce carbon dioxide emissions to quell the effects of climate change.

Unfortunately for developing countries like Ethiopia and Malawi, the process of developing solutions to climate change poses a different barrier described as procedural justice. As stated in Jouni, Adger and Huq (2006, p. 264), in international negotiations, developing countries are frequently not given the same powers to take action and make decisions as more politically powerful, developed, countries. In world forums, such as the United Nations, which has been critical in developing solutions to climate change and its accompanying issues, developed countries hold disproportionate amounts of power compared to developing countries. Another aspect of procedural justice is that many countries are not held accountable by the international community when they fail to follow international guidelines.¹⁶ For example, the United States, in 2019, filed to leave the Paris Climate Agreement despite being one of the largest contributors to carbon dioxide emissions in the world. Developing countries, like Ethiopia and Malawi, which

¹⁴ Jouni, Adger and Huq (2006), p. 263.

¹⁵ World Bank (2022).

¹⁶ Jouni, Adger and Huq (2006), p. 264.

have ratified the Paris Agreement and are more vulnerable to climate change, have, meanwhile, undertaken massive initiatives to reduce their own infinitesimal emissions.

As part of the Paris Agreement, Ethiopia and Malawi have submitted so-called Nationally Documented Contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC), which detail the measures they have taken to reduce carbon dioxide emissions and mitigate climate change-related issues in their respective countries and report on the progress they have made. For example, in 2010, Ethiopia launched the Ethiopian Program of Adaptation on Climate Change and Nationally Appropriate Mitigation Actions, among other initiatives.¹⁷ Ethiopia has set a target of 68.8 percent reduction in carbon dioxide emissions by 2030, compared to the business-as-usual (BAU) scenario.¹⁸ Likewise, Malawi enacted the National Climate Change Management Policy (NCCMP) in 2016, which provides strategic direction for the country's priorities for climate change interventions covering both adaptation and mitigation.¹⁹ They set their target for carbon emission reduction at 51 percent less than the BAU scenario.²⁰ Thus, despite their small contribution to total global carbon emissions, Ethiopia and Malawi have demonstrated a commitment to contributing to limiting global warming.

V.2. Ethical Perspectives and Approaches

Despite the efforts to reduce carbon dioxide emissions by Ethiopia and Malawi, the main emphasis of both countries' climate change mitigation efforts is to reduce economic vulnerability to climate change, mainly by bolstering their agricultural sectors. The efforts by the Ethiopian and Malawi governments to reduce economic vulnerability reflect the priority perspective to solving ethical issues, which states that "benefits to the worst off have higher ethical value than benefits to the better off".²¹ As stated in Ethiopia's National Adaptation Plan of 2019: "With significant numbers of people in Ethiopia living in conditions of chronic food insecurity, building resilience and adaptive capacity for vulnerable communities and groups is critical."²² Likewise, Malawi establishes that one of the three pillars of its climate adaptation plan should hinge on "resilience of the most vulnerable".²³ Due to the reliance on agriculture, Ethiopia and Malawi have massive vulnerable populations who would suffer severely from climate change impacts on the agricultural sector, so it makes sense that they would prioritize the most vulnerable.

In addition to the priority perspective, Ethiopia's policy also reflects the utilitarian approach of ethical decision making, which emphasizes balancing costs and benefits.²⁴ Ethiopia's National Adaptation Plan²⁵ tries to balance the positive impacts of economic growth on development with the negative impacts of economic growth on climate change vulnerability. The document states (p. 35) that "Ethiopia aims to achieve middle-income status by 2025 while developing a green (low emissions) economy."

¹⁷ Government of the Federal Democratic Republic of Ethiopia (2021), pp. 4-5.

¹⁸ Government of the Federal Democratic Republic of Ethiopia (2021), p. 9.

¹⁹ Government of Malawi (2021), p. VIII.

²⁰ Government of Malawi (2021), p. IX.

²¹ Barrientos et al. (2016), p. 12.

²² Government of the Federal Democratic Republic of Ethiopia (2019), p. 42.

²³ Government of Malawi (2021), p. X.

²⁴ Markkula Center for Applied Ethics (2009), p. 2

²⁵ Government of the Federal Democratic Republic of Ethiopia (2019).

Malawi seems to utilize the common good approach. The common good approach places an emphasis on the “interlocking relationships of society” as the basis for solving ethical problems.²⁶ Unlike Ethiopia, Malawi does not appear to have plans for becoming a middle-income or developed nation in the near future. Instead, their climate change policies focus entirely on benefitting the people of Malawi and focus much less on economic development. In their National Adaptation Plan, Malawi outlines using a “community-based participatory approach” and a “gender and human rights approach” to solving issues related to climate change.²⁷ They seem to place an emphasis on community building as a method to reduce climate change vulnerability, which is the most crucial issue facing Malawi. In fact, one of the five mandates of the National Adaptation Plan is to “improve community resilience to climate change” by enhancing agricultural production.²⁸ Malawi differs from Ethiopia in the sense that improving agricultural production revolves around strengthening the bonds of communities to create support networks to reduce vulnerability to climatic shocks.

IV. Conclusion

The populations of Ethiopia and Malawi are highly vulnerable to the effects of climate change. The rise in droughts and flooding in both countries threaten the agriculture industries of both countries, which employ significantly more than 50 percent of the population. However, the countries, which are at different stages in the development process are taking two different approaches to deal with climate change issues.

Ethiopia, which has aspirations of becoming an industrialized nation, is seeking to employ the use of technology in the agriculture sector to reduce its vulnerability to extreme weather shocks. While this method may create better food security for the people of Ethiopia, it will also result in a massive increase in unemployment, as well as an increase in Ethiopia’s contribution to global greenhouse gas emissions, which has been rising since 1990. Conversely, Malawi is less developed than Ethiopia and is pursuing a more traditional approach to climate change mitigation, focusing on strengthening community bonds to create contingency options to reduce food insecurity vulnerabilities. As Malawi is not industrializing, it has significantly lower carbon emission rates, which have remained relatively stable since 1990.

Despite the differences in approaches to climate change mitigation and contribution to carbon dioxide emissions, neither Ethiopia nor Malawi is responsible for a significant portion of global emissions. Independently, neither country contributed more than 0.1 percent of global carbon emissions. Regardless, both countries have made commitments in international forums, such as the UNFCCC to take measures to reduce carbon emissions, and both are signatories to the Paris Climate Agreement. Ultimately, their efforts will be in vain if the main carbon-emitting countries are not able to significantly reduce their emissions.

In order to ensure these carbon-emitting developed nations are being held accountable for their commitments to reduce carbon emissions, Ethiopia and Malawi, in collaboration with other low emission countries, should form a coalition to demand accountability from the main emitters. Often in international forums, such as the UN, small, developing, countries are discounted by the larger, more economically and politically powerful, countries. By forming a coalition of low-emission

²⁶ Markkula Center for Applied Ethics (2009), p. 2

²⁷ Government of Malawi (2020), p.vi.

²⁸ Government of Malawi (2020), p. vii.

countries, Ethiopia, Malawi, and other such countries, would be able to form a united front against the more powerful developed countries.

In the short term, it will be crucial for Ethiopia to Malawi to take drastic measures to reduce the vulnerability of their populations. Climate change mitigation efforts should focus on utilizing technology that can reduce the effects of extreme weather events on the agricultural production of the countries. This will provide more food security, while simultaneously increasing the countries' GDPs, which would benefit all of the citizens of Ethiopia and Malawi. It will also be important to educate farmers, especially on small, family-operated, farms about methods to reduce the vulnerability of their crops to climate change effects, such as using a greater variety of seed types and crops.

Ultimately, the success of Ethiopia and Malawi in mitigating climate change effects will rely on their ability to advocate for themselves at the international level, as well as protecting their populations. For that, both countries will need to improve their low literacy rates, which will allow both countries to a.) better adapt to the negative impacts of climate change, b.) better prevent increases in their national carbon dioxide emissions, and c.) be more competitive in the world economy and having a bigger say at the international level.

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