Global Majority E-Journal, Vol. 17, No. 1 (June 2026), pp. 35–47

Facing a Rising Tide: Ethical and Economic Dimensions of Climate Change in the Philippines and Indonesia

Sydnee Patak

Abstract

This article looks at the impacts of climate change on the economic and ethical landscapes of the Philippines and Indonesia. Both archipelago developing countries as vulnerable to climate change as they are more susceptible to both extreme weather and rising sea levels. Ocean warming and increased acidification threaten sea-life industries and rising waters cause displacement in both island nations from shoreline retreat, coastal flooding and freshwater contamination. As the impacts, policies and struggles of the two countries are compared, there are of course differences between the Philippines and Indonesia, but there is no question that both are being significantly compromised by global warming.

I. Introduction

Climate change has become one of the defining global challenges of the twenty-first century, reshaping economic systems, political priorities, and everyday life across the world. In recent decades, rising sea levels, increasing temperatures, and extreme weather events have intensified in both frequency and severity, with coastal and low-lying regions experiencing the greatest harm. Over the past 10 years, weather-related disasters have caused some 250 million internal displacements in the world.[1] As climate risks escalate, scholars and policymakers alike are increasingly focused on how environmental degradation intersects with development, inequality and moral responsibility.

This article examines these intersections by focusing on two highly climate-exposed archipelagic nations, the Philippines and Indonesia. While these countries are powerful case studies, they illuminate broader global issues surrounding climate vulnerability, economic precarity, and ethical responsibility in the Global South. Further, this article investigates how climate change has reshaped economic stability, agricultural security and patterns of natural disaster exposure in both nations, as well as how each government's policies reflect ethical frameworks and priorities. Through an approach that draws on economic data, climate science, and moral thought, the article

[1] United Nations High Commissioner for Refugees (UNHCR) (2025).

seeks to analyze not only the material impacts of climate change but also the ethical tensions embedded within national and global responses.

This article is structured into six sections. Following this introduction is a literature review of a select count of sources who have done significant research in the areas of focus. Next is a socioeconomic background for both the Philippines and Indonesia. The fourth section is an analysis of existing facts and conditions concerning climate change within the two countries. The fifth section covers existing policy and an ethical analysis of the different climate strategies employed by both countries. And the final section gives insight into potential conclusions and summaries of the examined situations.

II. Literature Review

There is a substantial amount of literature and research on the impacts of global warming in Indonesia and the Philippines, particularly concerning the rise of sea levels and the subsequent threat for food security as well as loss of certain lower-class industries. Of prominent literature covering the topic, Measey (2010), Naylor et al. (2007), Suryadi and Sugianto (2018), and Peñalba et al. (2021) examine Indonesia, while Holden and Marshall (2018) talk about impacts on the Philippines. Tolentino and Landicho (2013) in turn, study both nations together. In each case, the authors are assessing risks of climate change and how these vulnerable countries are facing a loss of agriculture, industry and, potentially, overall stability.

- Measey (2010) examines the vulnerability of Indonesia as a nation when facing climate change and all the issues that come with it, with a specific but not exclusive focus on temperature increase, rising sea level, intense rainfall and food security threat. The author discusses the focus on Indonesia being partly due to its standing as one of the top greenhouse gas emitters as well as its recent increase in natural disasters such as typhoons, forest fires, and floods. The economic costs of the environmental changes are also discussed, speaking to the fact that the poorer populations in the country are most impacted by the additional costs implemented to combat air pollution and other side effects.
- Naylor et al. (2007) focus on assessing the vulnerability of Indonesia to climate impacts but focuses explicitly on what these changes mean for Indonesian rice agriculture, a topic that is especially relevant in Indonesia which is particularly vulnerable to changes in precipitation patterns. The authors breaks down what oscillations in the El Nino weather pattern mean for the agriculture, lifestyle and food security of the populations. In the main study, an overall reduced rainfall level is seen to be the primary issue or threat to stability.
- Suryadi and Sugianto (2018) conduct a study to illustrate the ways that Indonesia's maritime continent is highly vulnerable to climate change impacts and how that vulnerability in turn becomes issues of increased infrastructure concern, ecosystem damage, health problems and overall residential discomfort. To understand these impacts there are multiple studies broken down within the document such as temperature trends and patterns, annual rainfall trends, and counts of extreme weather activity.
- Peñalba et al. (2021) focus not just on the Philippines but specifically homes in on coastal communities. To do so, information and studies were collected by three coastal towns and there were four main themes found. These themes included: vulnerability conditions, risk awareness, risk perceptions and climate change awareness. The study also delves into some

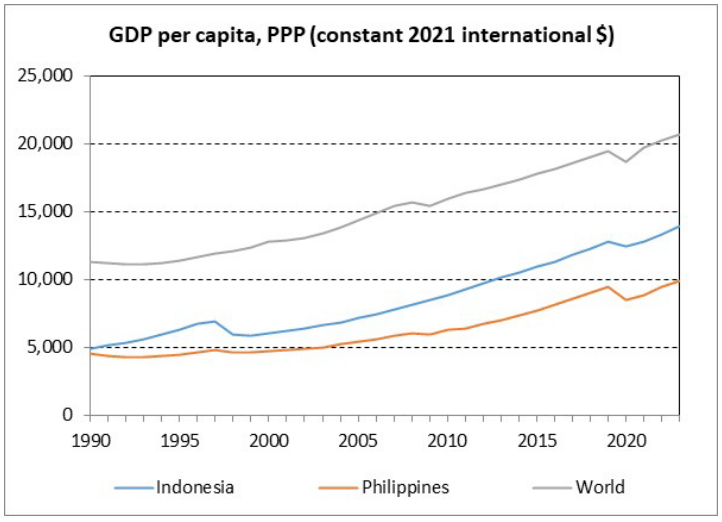
solutions reports which emphasize the importance of integrating knowledge into local communities.

- Holden and Marshall (2018) study typhoons in the Philippines and in doing so, provide evidence that the worsening of global warming has had an imminent impact on these recurring weather events within the island nation. The so-called greenhouse effect leads to warmer waters in the oceans, and then leads to stronger typhoons, moving faster and carrying more water. These heightened natural occurrences have a more powerful impact on the Philippines because of the nation's dense population and preexisting cases of environmental degradation. This initiates a discussion of climate injustice due to the fact that the Filipino people have contributed relatively little to global warming.
- Tolentino and Landicho (2013) discuss both the Philippines and Indonesia in the context of small farmers and the ways they have been impacted by climate change, and therefore impacted the economic landscape. While the two nations have faced some of the same challenges, the weather and farming conditions are not entirely the same, with the Philippines dealing with more intense rainfall and typhoons while Indonesia has more increased heat issues. Some of the observed impacts are low crop yield, delays in harvests and declining crop quality. Tolentino and Landicho (2013) also discuss the impacts of climate degradation on local institutions and education strategies.

III. Socioeconomic Background

As shown in Figure 1, GDP per capita in constant 2021 international dollar (PPP-adjusted) has overall been increasing in the Philippines and Indonesia from 1990 to 2023, with a similar trend for the rest of the world. However, the Philippines' and Indonesia's GDPs per capita are always at a considerably lower level than the world average. In 1990, the Philippines' GDP per capita was $4,504, Indonesia's GDP per capita was $4,873, while the world average was $11,263. By 2023, the Philippines's GDP per capita increased to $9,901, Indonesia's GDPs per capita increased to $13,890, while the world average GDP per capita increased to $20,671.

Figure 1: PPP-Adjusted GDP per capita, 1990-2023

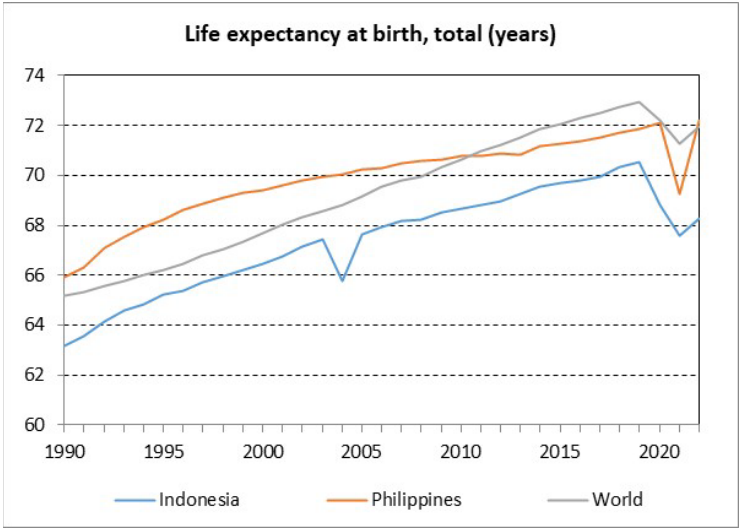


Source: Created by author based on World Bank (2025a).

While the Philippine's gap to the world average GDP per capita increased in absolute terms from $6,758 in 1990, to $10,770 in 2023, the Philippines caught up a bit in relative terms: the Philippine's GDP per capita, which was only 40.0 percent of the word average GDP per capita in 1990, increased to 47.9 percent in 2023. Similarly, while Indonesia's gap to the world average GDP per capita increased in absolute terms from $6,390 in 1990 to $6,781 in 2023, Indonesia also caught up a bit in relative terms: Indonesia's GDP per capita was 43.3 percent of the word average GDP per capita in 1990, while it was 67.2 percent in 2023.

When looking at life expectancy at birth, Figure 2 shows that in 1990 the Philippines had with 65.9 years a slightly higher life expectancy than the world average (65.2 years), while Indonesia's life expectancy was 2.0 years below the world average. Some three decades later in 2022, the Philippines had with 72.2 years once again a slightly higher life expectancy than the world average (71.9 years), while Indonesia's life expectancy was 3.7 years below the world average. While Indonesia's life expectancy was always below that of the Philippines as well as below the world average, the world average life expectancy was higher than the Philippines from 2011 to 2021. Figure 2 also shows that Indonesia suffered a substantial decline in life expectancy in 2004, and that life expectancy declined for both countries and the world average during the COVID-19 pandemic.

Figure 2: Life Expectancy at Birth (years), 1990-2022



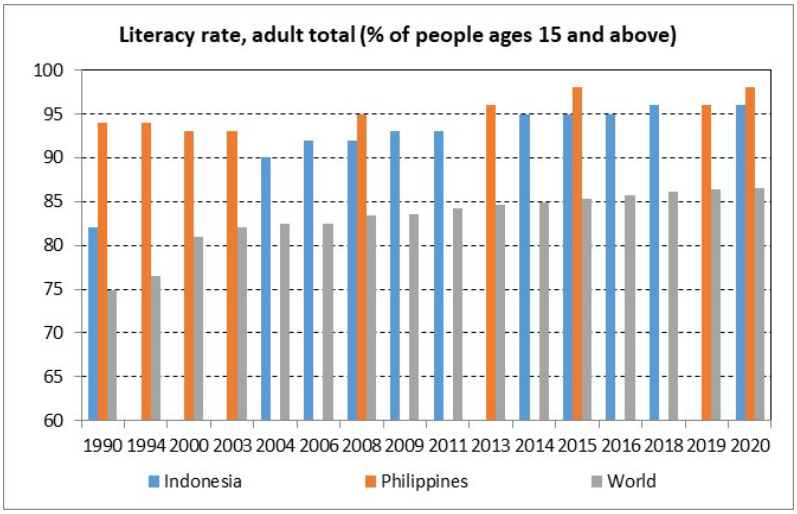
Source: Created by author based on World Bank (2025a).

As shown in Figure 3, Indonesia's adult literacy rate increased significantly from 82 percent in 1990 to 96 percent in 2020, while the Philippines's adult literacy rate increased only marginally from 94 percent in 1990 to 98 percent in 2020. The world average adult literacy rate increased moderately from 74.9 percent in 1990 to 86.5 percent in 2020. Hence, both countries always had a considerably higher adult literacy rate than the world average.

Chamdani, Mahmudah and Fatimah (2019) related the increase of literacy in Indonesia to explicit programs targeting illiteracy. On the other hand, despite that the Philippines have higher adult literacy rates than Indonesia and the world, elementary students in the Philippines face boundaries in receiving standards of education due to "the multilingual nature of the country, coupled with

varying cultural norms and socioeconomic inequalities."[2] Further challenges are amplified in more rural areas of the Philippines with issues involving availability of teachers and materials, solidifying the disparity between urban and rural spaces in the nation.[3]

Figure 3: Adult Literacy Rates (in percent), All Years with Data for at Least Indonesia or the Philippines



Source: Created by author based on World Bank (2025a).

IV. Analysis of Facts

This analytical section is structured into three subsections examining first the evolution of CO_2 emissions in Indonesia, the Philippines and the world, second, the history of natural disasters and hazards in Indonesia, the Philippines, and third, the reliance on farming and agriculture in Indonesia and the Philippines. Each subsection breaks down the degree to which the issue is present in each nation. Each is vital in understanding the vulnerability of the two nations to climate change and environmental degradation. Particularly, looking at the historical trends of natural disasters and how they have changed, as well as the reliance on the agriculture, it is necessary to frame the later ethical implications of both countries' environmental policies.

IV.1. Carbon Dioxide Emissions

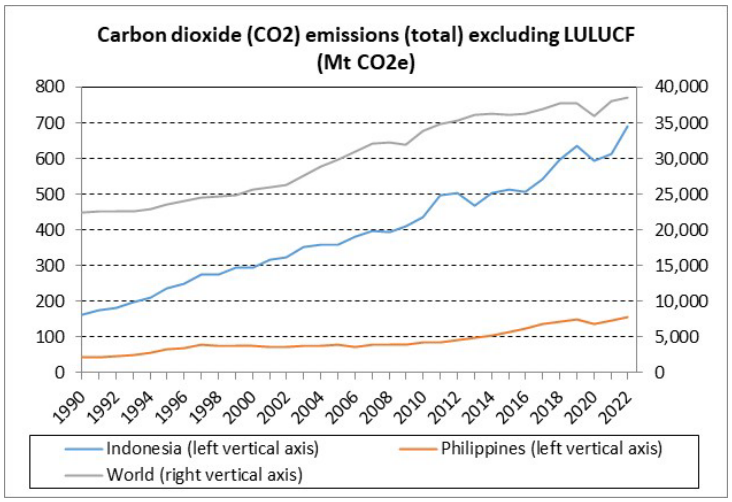
While Indonesia and the Philippines obviously have far lower CO_2 emissions than the world in absolute levels, this subsection first compares the trends of total CO_2 emissions of these two countries relative to the world, and then examines the per capita CO_2 emissions for the two countries and the world.

As shown in Figure 4, from 1990 to 2022, CO_2 emissions excluding land use, land-use change, and forestry (LULUCF) have increased from 161 million tons (Mt) to 692 Mt in Indonesia (which implies a cumulative increase of 330 percent), from 44 Mt to 155 Mt in the Philippines (which implies a cumulative increase of 257 percent), and from 22,516 Mt in 1990 to 38,522 Mt in the world (which implies a cumulative increase of 71 percent). The far higher cumulative increases of

[2] William et al. (2025), p.1.
[3] William et al. (2025).

Indonesia and the Philippines than of the world are due to the relatively low emissions of Indonesia and the Philippines in 1990.

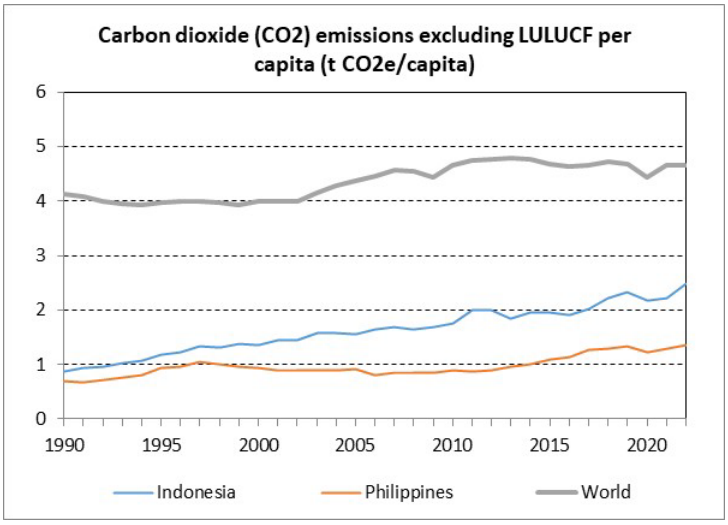
Figure 4: Total Carbon Dioxide Emissions, 1990-2022



Source: Created by author based on World Bank (2025a).

Correcting these numbers for differences in population size, Figure 5 shows the per capita CO_2 emissions excluding LULUCF. From 1990 to 2022, the per capita CO_2 emissions increased from 0.87 tons to 2.48 tons in Indonesia, from 0.69 tons to 1.36 tons in the Philippines, and from 4.12 tons to 4.67 tons in the world. Hence, in per capita terms, both countries' CO_2 emissions are still considerably below the world average. However, they have been growing more in relative terms, with Indonesia having experienced a cumulative increase of 183.2 percent, the Philippines having experienced a cumulative increase of 96.8 percent, and the world average saw a cumulative increase of 13.2 percent.

Figure 5: Carbon Dioxide Emissions per capita (excluding LULUCF)



Source: Created by author based on World Bank (2025a).

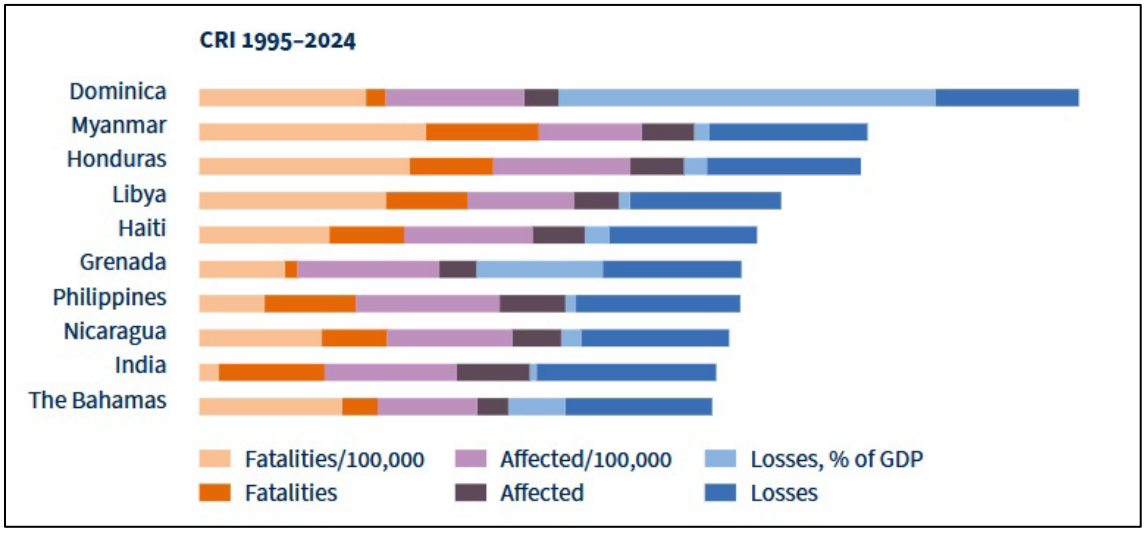
IV.2. History of Natural Disasters and Hazards

The Philippines experiences more direct human costs, with stronger and more frequent typhoons, urban flooding and internal displacement because of those factors. Holden and Marshall (2018) note that intensifying storms, such as Typhoon Haiyan in 2013, represent a climate injustice, as communities with limited resources bear disproportionate losses. Additionally, the Emergency Events Database (EM-DAT) 2024 report points out that the Philippines had over 9 million people impacted (injured, homeless or otherwise) in Typhoon Trami, and over 6 million in Typhoon Gaemi and Prapiroon.[4] Rising sea levels in the Philippines, increasing 5–7 mm/year, outpace the global average sea level rise, causing more intense flooding of coastal areas, erosion, and saltwater intrusion, which threaten communities, livelihoods, and infrastructure across the archipelago.[5]

Meanwhile, Indonesia's environmental strain manifests through heat, flooding and air pollution, producing health burdens in growing cities and coastal areas.[6] Depending on the region, Indonesia is coping with both intensified rainfall in northern areas and drought conditions in southern areas. The northern regions such as Sumatra, northern Kepulauan Riau, Kalimantan Barat, Sulawesi Tengah, and Papua are experiencing intensified flash floods and rainfall events. Simultaneously, dry seasons in southern regions like Sumatra, Java, Bali, and Nusa Tenggara have intensified.[7] Both issues cause disruptions to crop yield and food distribution systems.

While both nations face similar climatic pressures, their specific vulnerabilities and capacities to adapt differ somewhat. Indonesia, with a greater infrastructure investment and a more diversified economy, was able to implement national-scale adaptation efforts such as sea wall projects and relocation plans for sinking urban areas such as Jakarta. The Philippines, by contrast, has a smaller economy and denser coastal settlements, relies more heavily on community-based adaptation and foreign aid programs to respond to intensified typhoons and flooding**.**

Figure 6: The Ten Most Affected Countries by Climate Change, 1995–2024



Source: Figure 1 of Adil, Eckstein, Künzel and Schäfer (2025).

[4] Centre for Research on the Epidemiology of Disasters (CRED) (2024).
[5] Climate Tracker Asia Team (2024).
[6] Suryadi and Sugianto (2018).
[7] World Bank (2025b).

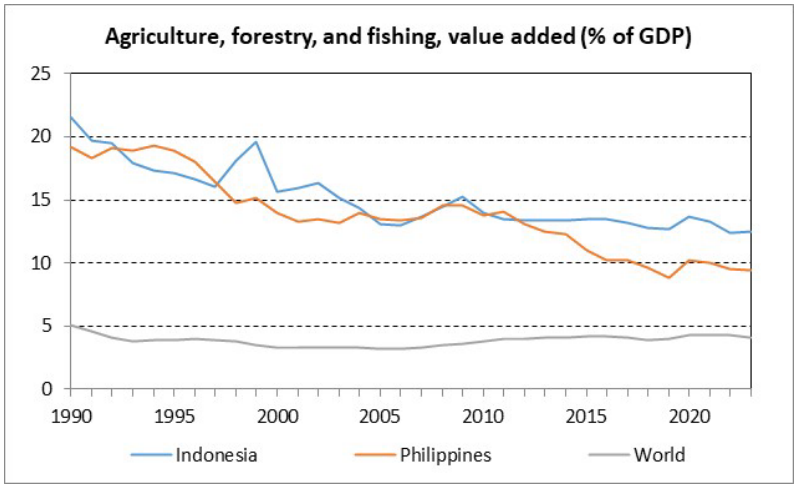
This higher relative vulnerability of the Philippines is illustrated by the Philippines ranking number 7 in the long-term Climate Risk Index (1995-2024), while Indonesia ranked number 48 in the long-term Climate Risk Index (1995–2024).[8] Figure 6 provides the degree of Philippine's climate risk based on the six indicators used to calculate the Climate Risk Index: a.) fatalities per 100,000, b.) total fatalities, c.) affected per 100,000, d.) total affected, e.) losses in percent of GDP, and f.) total losses.

IV.3. Reliance on Farming and Agriculture

One vulnerability both nations share is that agriculture remains a key climate-sensitive sector in both nations. Historically, Indonesia's rice yields fluctuate with changing rainfall and El Nino cycles and have been shown to threaten food security.[9] Similarly, recent studies show that Philippine farmers face crop delays, reduced yields and declining soil quality due to more frequent typhoons and erratic rainfall.[10]

As shown in Figure 7, the Philippines and Indonesia are both nations whose agriculture, fishing and forestry sector contribute significantly to their GDP. In 1990, almost 25 percent of both nations' GDPs were accounted for by agriculture, fishing and forestry. Though both countries have seen a pattern of declining shares of agriculture to GDP, both countries continue to depend on agriculture, forestry and fishing as the share of agriculture amounted in 2023 to about 9 percent of GDP in the Philippines, and to about 13 percent in Indonesia (compared to a global average near 4 percent).

Figure 7: Agriculture, Forestry and Fishing, Value Added (percent of GDP), 1990–2023



Source: Created by author based on World Bank (2025a).

V. Ethical Analysis

For both Indonesia and the Philippines, climate change is not only a significant economic, technological or scientific problem, but also holds moral implications and dilemmas. It poses a challenge to how their governments and societies will react and relate to the future of the natural

[8] https://www.germanwatch.org/en/cri.
[9] Naylor et al. (2007).
[10] Tolentino and Landicho (2013).

world and the responsibility that they hold. Policy cannot be created without the consideration of morality. This ethical analysis explores first the existing climate policy structures in action (subsection V.1), and then looks at how these structures measure up to ethical lenses (subsection V.2).

V.1. Ethical Origins and Structures in Climate Action

Climate change policy in both countries did not emerge overnight in response to climate change but rather evolved from deeper ethical imperatives tied to vulnerabilities, national trajectories and claims made within climate negotiations. Gardiner and Hartzell-Nichols (2012) make the argument that global climate change is not simply a scientific or economic problem, and that instead it is fundamentally an ethical one. This statement is reflected by both countries' policy evolutions, which embody differing ethical structures rooted in historical experience, social aspects and the values of development versus environmental responsibility.

The Philippines and Indonesia share a colonial history and subsequently impacted development path, leaving them with limited financial capacity and heightened exposure to climate risks. The Philippines, situated in what is called by Keller (2013) one of the most disaster-prone urban coastal regions, faces intense sea-level rise that disproportionately impacts certain settlements. Keller points out that the poorest communities in Metro Manila are already coping with regular flood, subsidence, and insufficient infrastructure, therefore framing climate action as a moral obligation to protect the people in the most jeopardy who are unable to protect themselves.

In Indonesia, early environmental concerns centered on forest loss and air quality issues. In global level discussions, Indonesia often aligned itself with what the World Meteorological Organization (2025) describes in a Pacific context as a struggle not just for the achievement of environmental stability, but for the survival of communities whose livelihoods depend on fragile ecosystems. This framing, shared among many Asia-Pacific nations, has been a major contributor to Indonesia's ethical approach which recognizes the threat of climate degradation not only to nature, but to cultural survival and sovereign control over environmental resources.

V.2. Ethical Concepts and Frameworks Applied to Climate Action

The Philippines institutionalized its ethical commitments by passing the Climate Change Act of 2009 which treated protection from climate risk as a human security issue and not just a natural issue. The act also mandated all levels of government to mainstream climate change in planning. Following the act, in 2011, the National Climate Change Action Plan (NCCAP) was put together as the Philippines' long-term national strategy to address climate change impacts with a strong focus on adaptation, while also pursuing mitigation opportunities. The NCCAP placed emphasis on several key areas such as food security, water sufficiency, ecological and environmental security, climate friendly industries and services, sustainable energy and education. Across all areas, the NCCAP emphasizes gender responsiveness, technology transfer, educational research and development and capacity building. In the Philippines, both the establishment of the Climate Change Commission and the publication of the NCCAP, formalized a moral stance that climate policy should prioritize those in society who were most vulnerable.

This supported and aligned with Rotman's (2013) claim that climate change poses a moral challenge because those who are least responsible for emissions are often most affected, which has also been illustrated in Figure 4 of this article for Indonesia and the Philippines. Philippine climate

policy directly attempts to internalize this justice-based framing. The policies also directly relate to the Markkula Center's justice and rights approaches as the NCCAP's emphasis on food, water and security aligns with the idea of prioritizing each individual's rights while their focus on education and infrastructure speaks to equal treatment. Furthermore, as emphasized in Jamero et al. (2017), the small-island communities in the Philippines prefer local measures to relocation in response to sea-level rise, which can be linked to the more individual rights approach, possibly being in conflict with national solutions more reflected in the common good approach.

Meanwhile, Indonesia's commitment to ethical consideration intensified after the Kyoto and Paris Agreements. The country's consideration is shaped by a dual ethical identity that represents both a developing country with the capacity and right to grow, and as a significant emitter of GHG emissions due to forest loss. Its nationally determined contributions (NDCs) justify this tension by asserting a need to balance development aspirations with global climate responsibility. Further, Arnold (2011) emphasizes that climate ethics must account for the moral legitimacy of development rights in poorer nations, an idea that Indonesia pushes more in its climate policies than the Philippines. Indonesia emphasizes fairness in mitigation and burden-sharing especially when considering forests and natural spaces, where international support is considered an ethical necessity. Similarly, Indonesia positions forest stewardship as a long-term responsibility to future generations which is consistent with Gardiner's (2012) argument that climate change is really about what society owes to those children of the future.

When comparing both nations' policies, the Philippines' ethical structure is centered on vulnerability, justice and human security, while Indonesia's is more characterized by sovereignty, development rights and global distributive fairness. More simplistically, the Philippines' model is more people centered, while Indonesia's is more system and economy centered. However, both struggle with internal ethical contradictions such as unequal adaptation outcomes in the Philippines and conflicts between forest protection and economic growth in Indonesia.

The ethical analysis of climate change action in the Philippines and Indonesia reveals how climate ethics, as Gardiner (2012) writes, demand that we rethink conventional boundaries of responsibility, time, and justice. The Philippines embodies an ethics of vulnerability and justice rooted in immediate climatic harm. Indonesia embodies an ethics of sovereign development and global fairness rooted in historical inequity. Together, their perspectives illustrate the complex moral terrain of climate change in the Global South where countries bear the burdens of a warming world but continue to fight for an ethically just global response.

VI. Conclusion

Climate change poses profound economic, social and ethical challenges. This article has shown how these pressures manifest in the Philippines and Indonesia. The analysis demonstrated that although both countries have contributed minimally to global greenhouse gas emissions, they bear disproportionate burdens through intensified typhoons, sea-level rise, changes in rainfall patterns, heat events and disruptions in agriculture. Socioeconomic indicators, including GDP growth, life expectancy and literacy indicate trajectories of development that remain deeply vulnerable to environmental shocks. This vulnerability frames the ethical dimensions of both countries' climate policies. Together, these findings reveal the complex interrelationship between climate impacts, national capacity and moral responsibility.

Yet the significance of these analyses extends beyond documentation of vulnerability. The Philippines and Indonesia offer broader insights into what equitable climate action must entail in the Global South. Solutions moving forward require not only national reforms but also structural changes in global climate governance. Domestically, both countries can expand community-based adaptation, climate-resilient agriculture, early warning systems and investments in urban resilience particularly in dense coastal areas. Strengthening local governance capacity and integrating scientific data with indigenous and community knowledge would also produce more sustainable and context-appropriate policies.

At the international level, meaningful progress requires greater financial and technological support from high-emitting nations. Instruments such as the Loss and Damage Fund, technology-transfer mechanisms, forest conservation financing and concessional adaptation loans are essential for aligning global responsibility with global impacts. Ultimately, the ethical imperatives analyzed in this article point toward a central conclusion that climate justice requires recognizing that nations like the Philippines and Indonesia stand at the frontlines of a crisis they did little to cause. Addressing this topic demands coordinated, long-term solutions that uphold human dignity, protect vulnerable ecosystems and promote sustainable development for future generations.

References

Adil, Lina; David Eckstein; Vera Künzel; and Laura Schäfer (2025). *Climate Risk Index 2026: Who Suffers Most from Extreme Weather Events*. Berlin, Germany: Germanwatch (November 2025); available at: https://www.germanwatch.org/sites/default/files/2025-11/CRI%2026%20full%20report.pdf.

Arnold, Denis G. (ed.) (2011). *The Ethics of Global Climate Change* (Cambridge, United Kingdom: Cambridge University Press).

Centre for Research on the Epidemiology of Disasters (CRED) (2024). Emergency Events Database (EM-DAT). Louvain, Belgium: University of Louvain, Centre for Research on the Epidemiology of Disasters (CRED); available at: https://www.emdat.be/,

Chamdani, Muhamad; Umi Mahmudah; and Siti Fatimah (2019). Prediction of illiteracy rates in Indonesia using time series. *International Journal of Education*, Vol. 12, No. 1, pp. 34–41.

Climate Change Commission (2011). *National Climate Change Action Plan: Philippines*. 2011–2028. Climate Change Commission; available at: https://climate.emb.gov.ph/wp-content/uploads/2016/06/NCCAP-1.pdf.

Climate Tracker Asia Team (2024). Rising Sea Levels and Coastal Vulnerability in the Philippines – Climate Tracker Asia. *Climate Tracker Asia*, internet resource of December 11, 2024; available at: https://climatetracker.asia/rising-sea-levels-and-coastal-vulnerability-in-the-philippines/.

Gardiner, Stephen M. and Lauren Hartzell-Nichols (2012). Ethics and Global Climate Change. *The Nature Education Knowledge Project*; available at: https://www.nature.com/scitable/knowledge/library/ethics-and-global-climate-change-84226631/.

Holden, William N. and Shawn J. Marshall (2018). Climate Change and Typhoons in the Philippines: Extreme Weather Events in the Anthropocene. In: Pijush Samui, Dookie Kim, and Chandan Ghosh (eds.). *Integrating Disaster Science and Management: Global Case Studies in Mitigation and Recovery* (Amsterdam, The Netherlands: Elsevier), pp. 407–421 (Chapter 24).

Jamero, Laurice; Motoharu Onuki; Miguel Esteban; Xyza Kristina Billones-Sensano; Nicholson Tan; Angelie Nellas; Hiroshi Takagi; Nguyen Danh Thao; and Ven Paolo Valenzuela (2017). Small-island communities in the Philippines prefer local measures to relocation in response to sea-level rise. *Nature Climate Change*, Vol. 7, No. 8, pp. 581–586.

Keller, Lauren (2013). The Impact of Sea Level Rise in the Philippines: Charting Climate Change in Metropolitan Manila. Medford, Massachusetts: Tufts University, Class: UEP 232-Introduction to GIS; available at: https://bpb-us-e1.wpmucdn.com/sites.tufts.edu/dist/8/8205/files/2013/11/Keller_Lauren.pdf.

Measey, Mariah (2010). Indonesia: A Vulnerable Country in the Face of Climate Change. *Global Majority E-Journal*, Vol. 1, No. 1, pp. 31–45; available at: https://www.american.edu/cas/economics/ejournal/upload/measey_accessible.pdf.

Naylor, Rosamond L.; David S. Battisti; Daniel J. Vimont; Walter P. Falcon; and Marshall B. Burke (2007). Assessing risks of climate variability and climate change for Indonesian rice agriculture. *Proceedings of the National Academy of Sciences* Vol. 104, No. 19, pp. 7752–7757; available at: https://www.pnas.org/doi/pdf/10.1073/pnas.0701825104.

Peñalba, Ericson; Albert Patrick David; Michael John Mabanta; Chaddlyn Rose Samaniego; and Sheryl Ellamil (2021). Climate change adaptation: the case of coastal communities in the Philippines. *Journal of the Geographical Institute*, Vol 71, No. 2, pp. 115–133.

Rotman, David. (2013). Climate Change: The Moral Choices. *MIT Technology Review*, April 11, 2013; available at: https://www.technologyreview.com/2013/04/11/16301/climate-change-the-moral-choices/.

Suryadi, Yadi and Denny Nugroho Sugianto (2028) Climate Change in Indonesia (Case Study: Medan, Palembang, Semarang). *E3S Web of Conferences*. Vol. 31. EDP Sciences. https://www.e3sconferences.org/articles/e3sconf/pdf/2018/06/e3sconf_icenis2018_09017.pdf

Tolentino, Lutgarda L. and Leila D. Landicho (2013). Climate change adaptation strategies of selected smallholder upland farmers in southeast Asia: Philippines and Indonesia. *APN Science Bulletin* Vol. 3: 61; available at: https://www.apn-gcr.org/wp-content/uploads/2020/09/6af921c4ebfdcc24991a0c7f98e287cb-1.pdf#page=63.

United Nations High Commissioner for Refugees (UNHCR) (2025). No Escape II: The Way Forward. Bringing Climate Solutions to the Frontlines of Conflict and displacement. New York: United Nations High Commissioner for Refugees; available at: https://www.unhcr.org/media/no-escape-ii-way-forward.

William, Bruce; Taiwo John; Muhammed Olamide; and Afeez Adebayo (2025). Assessing Socioeconomic and Cultural Determinants of Literacy Skills Among Elementary Students in the Philippines. Research Gate; available at: https://www.researchgate.net/publication/388174663_Assessing_Socioeconomic_and_Cu

ltural_Determinants_of_Literacy_Skills_Among_Elementary_Students_in_the_Philippines.

World Bank (2025a). *World Development Indicators database* (Washington, DC: The World Bank); as posted on the World Bank website: https://datacatalog.worldbank.org/home (downloaded on January 4, 2025).

World Bank (2025b). Climate Risk Country Profile: Indonesia. Washington, DC: The World Bank; available at: https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/17254-WB_Indonesia-Country%20Profile-WEB.pdf.

World Meteorological Organization (WMO) (2025). *State of the Climate in South-West Pacific 2024* (Geneva, Switzerland: WMO, WMO-No. 1374); available at: https://library.wmo.int/idurl/4/69552.