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# SPOTLIGHT

## CLIMATE CHANGE RELATED THREATS TO LIVELIHOODS IN PAPUA NEW GUINEA: POSSIBLE INTERVENTIONS TO ADDRESS IT

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### Key Points

- Climate change poses a global security threat and is largely caused by human activities.
- Increase in greenhouse gas emissions from burning of fossil fuels and deforestation are key drivers of climate change.
- The case of Carteret Islands in Papua New Guinea (PNG) illustrate the consequences of global warming and the rising sea levels, leading to displacement and loss of livelihoods.
- Diversification of energy sources, protection of forests and forest resources, and the implementation of sustainable natural resource management policies and initiatives are the best approaches to reducing greenhouse gas emissions.
- Local interventions in the form of more climate change awareness are needed to build resilient communities to address the impacts of climate change in PNG.

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## CLIMATE CHANGE RELATED THREATS TO LIVELIHOODS IN PAPUA NEW GUINEA: POSSIBLE INTERVENTIONS TO ADDRESS IT

By Samuel Awayang

Climate change poses a global security threat to humanity as it has the potential to transform the landscape of its existence. There is frequent news on various natural hazards around the world such as earthquakes, rise in sea levels, famine, floods, and long spells of drought. These catastrophes are projected to intensify in the coming years and pose significant risks to human health, food security, and global stability. Fundamentally, as described by United Nations (2023), climate change refers to the long-term shifts in global temperatures and weather patterns. The key factors influencing climate change are either natural or caused by human activities (anthropogenic). Naturally induced factors include variations in the solar system and the earth's natural processes such as decomposition of organisms and or volcanic eruptions which are responsible for Greenhouse Gas (GHG) emissions. These processes are considered naturally induced because they are beyond human control but are in natural balance. Human induced emission from human activities such as relying more on energy produced from burning fuel and clearing forested areas for developments are widely acknowledged as the key drivers of climate change, as it increases greenhouse gas emissions, offsetting the natural balance of GHG in the earth's atmosphere which lead to global warming. The IPCC AR6 Report (2023), highlights that the global surface temperature has increased from 0.8°Celsius to 1.3°Celsius, particularly over the last century.

The significance of GHG and the role it plays to regulate the earth's temperature needed for life to exist is important. An ideal atmosphere requires the earth to absorb sufficient energy from the sun and simultaneously release an equal amount of energy back into space. This is the natural energy balancing process of the earth in the atmosphere. However, the increase of greenhouse gas emissions, particularly of carbon dioxide, nitrous oxide [commonly known as laughing gas], and methane, in the atmosphere enhances radiative forcing upsetting the earth's energy balance which becomes destructive and destabilises this equilibrium resulting in global warming (World Meteorological Organisation, 2022). In other words, due to anthropogenic emissions, the concentration of the aforementioned GHGs is enhanced. This, in turn, affects the

equilibrium flow of incoming solar radiation and outgoing infrared radiation within the atmosphere causing the earth's surface temperature to increase. Understanding the impact of GHG and the measures that can be adopted to mitigate its increase is critical to addressing climate change.

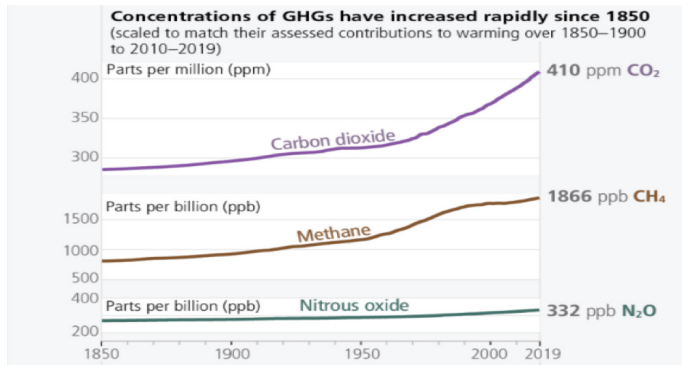
This article reinforces the awareness of climate change and its impact on the existence of humanity. It is essential for PNG, as a member of the various international and regional climate change treaties, to continue vigilance on a global security threat that requires local interventions. Addressing climate change would therefore require a collective effort and this may be done through individuals, the government, and organisations taking the lead in reducing greenhouse gas emissions which are considered as the primary factors of climate change. The level of global GHG emissions and the various impacts of climate change experienced throughout PNG are highlighted in this article. Finally, the recommendations on reducing greenhouse gases as a means of combating climate change are proposed to mitigate the emissions of GHGs.

### Activities contributing to enhanced GHG emissions

Anthropogenic emissions are the primary factors influencing global warming and climate change. According to IPCC AR6 Report (2023), the global net anthropogenic greenhouse gas emissions are carbon dioxide gas (derived from fossil fuel combustions and industrial processes), methane, and nitrous oxide (from agricultural and land use and land use change activities). Other factors that contribute to GHG emissions are waste which include solid waste disposal, incineration and open burning, and biological treatment of solid waste.

When there is an abundance in the concentration of GHGs in the atmosphere, they become destructive as they retain excess infrared radiation (heat) which results in global warming. According to the IPCC AR6 Report (2023), between the period of 1850 and 2019, the atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased exponentially (Figure 1).

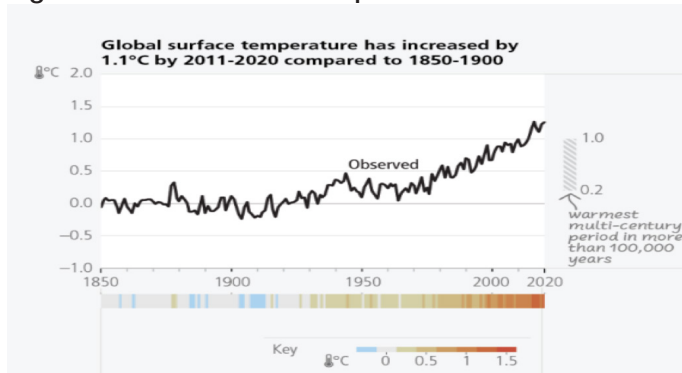
Figure 1. Composition of Greenhouse Gases since 1850



Source: IPCC AR6 Report (2023)

Similarly, the IPCC AR6 Report (2023) also highlights from 1850 to 2019, that the global surface temperatures have also increased (Figure 2). Both the GHG emissions and the temperature rise exhibit a clear relationship, indicated that increasing greenhouse gas emissions directly contributed to rising surface temperatures.

Figure 2. Global surface temperature



Source: IPCC AR6 Report (2023)

Similarly, the IPCC AR6 Report (2023) also highlights from 1850 to 2019, that the global surface temperatures have also increased (Figure 2). Both the GHG emissions and the temperature rise exhibit a clear relationship, indicated that increasing greenhouse gas emissions directly contributed to rising surface temperatures.

### PNG's Greenhouse gas emissions

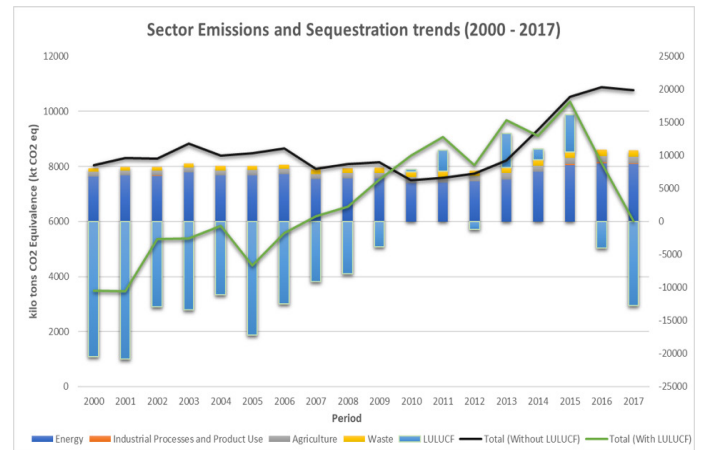
PNG, through the Office of Climate Change Development Authority, monitors sectors that are responsible for the emission and removal of greenhouse gases. These sectors include the following:

- Energy
- Industrial processes and product use (IPPU)
- Agriculture
- Waste Land Use, Land Use Change and Forestry (LULUCF)

Figure 3 shows carbon emissions with and without the

LULUCF sector. The green line indicates carbon emissions with LULUCF and black line without LULUCF. Between 2000 and 2007, PNG's emissions were zero. This is because the LULUCF sector was not contributing to emissions, rather, it was sequestering emissions from the other sectors. PNG then transitioned from being a sink to an emitter of GHG during the periods of 2007 to 2017, largely as a result of deforestation and forest degradation. In 2016 and 2017, the LULUCF sector returned to a net source to sequestered emissions. In other words, in the past two decades, PNG went from a net sink (removal of carbon from the atmosphere) to a net source (contributing to carbon emissions) in 2016. The main driver for this variation was the Land Use, Land Use Change and Forest sector largely as a result of deforestation and forest degradation in the country (Climate Change Development Authority, 2022).

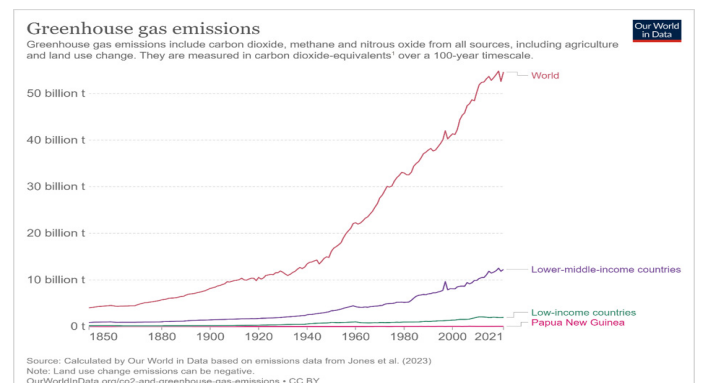
Figure 3: Sector Emissions and Sequestration trends (2000 - 2017) PNG GHG Inventory



Source: Climate Change Development Authority

PNG's emissions in comparison to global emissions are minimal when compared to other countries. Figure 4 indicates PNG's emissions which are just under 100 million tonnes. However, in the global perspective, these emissions contribute to the total global emissions and are responsible for driving climate change whose impacts are felt by small island countries including PNG.

Figure 4: GHG emission (Jones, et al., 2023)



Source: Calculated by Our World in Data based on emissions data from Jones et al. (2023)  
Note: Land use change emissions can be negative.  
OurWorldinData.org/cc2-and-greenhouse-gas-emissions · CC BY

## Some initiatives used for reducing GHG emissions

To reduce GHG emissions, strategies commonly used in the global arena include the following:

- Forest conservation. This entails sustainable practices, protected areas, community involvement, reforestation, alternative livelihoods, law enforcement, and awareness. These measures preserve ecosystems, biodiversity, and forest resources while mitigating GHG emissions.
- Diversification of energy sources. Organisations adopting green energy, for instance, the use of solar panels instead of fossil fuel generators.
- Transport sector reducing GHG emissions from the use of vehicles. These include countries forgoing the use of fossil fuel vehicles for electric vehicles. In addition, enhancing public transportation policies and regulations to encourage commuting via public transport and reducing private vehicle usage.

## Some climate change related threats to PNG

**Human security concerns.** PNG is currently facing external security challenges that are primarily non-traditional and development-oriented (Kutan, 2021). Among these challenges, climate change and natural disasters stand out as significant threats. These threats have the potential to affect PNG on the national, regional and district levels, leading to various security challenges. Examples of these challenges include human security concerns, food security, health crises, competition for resources, violence arising from mismanaged migration and adaptation, and conflicts over land disputes.

**The rise of sea level.** The Carteret Islands (Atoll Island) located in the northeast of Bougainville in PNG is an example of low-lying islands that are impacted by sea level rise and climate change. Storm surges and high tides have washed away homes, destroyed gardens, and contaminated freshwater supplies. Saltwater inundation on the island has impacted freshwater aquifers. This has impacted the livelihoods of people on the island (Connell, 2016). Relocation of inhabitants on the island to the Autonomous Region of Bougainville is ongoing.

**Prolonged droughts in segments of PNG.** Furthermore, in recent years, daily local newspapers have reported that various parts of PNG have experience prolonged droughts. These include East New Britain, parts of West New Britain, New Ireland, Morobe, and the Highlands Region. For instance, in the Eastern Highlands Province, water level of the Yonki Dam in Kainantu reached a critical low level. This has forced PNG Power Limited, the electricity service provider, to reduce its generating capacity and carry out load-shedding on the Ramu grid which is affecting the Momase

and Highlands regions (Post Courier, 2022). Similarly, the dry spell has affected the food and cash crops, freshwater sources, and stock of cattle in Morobe. Women and girls have taken on the responsibility of carrying water from long distances which has made them develop health conditions like backaches (The National, 2022).

## Some interventions that can be used to address climate change in PNG

**Building community resilience through awareness.** Raising awareness on climate change, fosters community resilience by educating members on disaster preparedness, climate adaptation, health, environment, social cohesion, and economic diversification. It empowers communities to be more informed, enhancing preparedness, response, and recovery for natural disasters, climate change, health emergencies, conservation, social cohesion, and economic challenges. Though, PNG's GHG emissions is insignificant as compared to other countries, it is important to ensure that Papua New Guineans are aware on the impacts of climate change on human survival.

**Building climate-proof infrastructures.** Climate-proofing infrastructures entail resilient design and construction to withstand climate change impacts. This involves climate data integration, green infrastructure, sustainable materials, and robust monitoring. Addressing rainfall, rising temperatures and sea-level rise in design reduces vulnerabilities and boosts resilience. Nature-based solutions, flexibility, and sustainability enhance long-term climate resilience. Such measures minimise risks, safeguard communities, and ensure adaptable infrastructure.

**Government need to embrace and support climate change plans.** The National REDD+ Strategy (2017-2027) offers a strategic framework to address land use emissions. Incentives from Green Climate Funds should be accessible to encourage forest conservation. PNG's forests, vital carbon sinks, are declining due to land use activities.

Individuals and organisations, both in the government and private sector have key roles to play in achieving PNG's ambitious target of net zero emissions by 2050. Everyone must be mindful of their carbon footprint in their day-to-day decision-making, as this would either contribute towards achieving net zero or enhance the current carbon emissions.

## Conclusion

Climate change is largely caused by human influenced activities. Increase of greenhouse gas emissions from burning of fossil fuels and deforestation have directly contributed to global warming. Consequently, rise in sea levels, longer spells of droughts, and famine have become more prevalent. Though PNG's GHG emissions is insignificant, the

experience of Carteret Islands should resound alarm bells of concern that the inactions of many countries in the world in reducing their GHG emissions has resulted in displacement and loss of livelihood of people in the small island countries. Diversifying energy sources, promoting forest management, and implementing supportive policies are common strategies used globally to reduce GHG emissions. However, local interventions in the form of more climate change related awareness, and the support of the government is needed to build more resilient communities to address and withstand the impacts of climate change in PNG.

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