LILIANE AND ROLAND FOUNDATION

Humanitarian and Ecological Developments

2025 Report on Climate Change

by
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Climate change

What is climate change?

- Climate change is when the earth's environment goes through long-term changes in temperature and weather patterns
- Temperature shifts can be natural (e.g: Solar activity, volcano eruptions) or manmade
- Since the 1800's, human activity has contributed significantly to the rise of climate change effects (e.g: burning fossil fuels like coal, oil and gas)

How do fossil fuels contribute to climate change?

- When you burn fossil fuels, you generate greenhouse gas emissions
- Greenhouse gas emissions cover the earth like a towel and envelope all of the sun's heat and rising temperatures-
- Greenhouse gases trap all of the heat in the earth's atmosphere- making it hotter and hotter by the day
- Main greenhouse gases: methane and carbon dioxide

Where do Greenhouse gases come from?

- Greenhouse gases come from using gasoline for drive a car or machines
- Coal for heating a building
- Cutting down trees and clearing land releases carbon dioxide
- Largest contributors to methane emissions: agriculture, oil, gas

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How are Humans responsible for Global Warming?

- Climate Scientists have shown that humans are responsible for almost entirely of all global heating over the last 200 years
- A lot of human activity is causing greenhouse gases to make our planet warmer at a much faster rate than in the last 2000 years
- Proof? The earth's surface is about 1.2°C warmer than is was in the 1800's (before the industrial revolution)
- The warmest decade ever recorded in History was from 2011-2020

Consequences of climate change?

- Intense droughts, Water scarcity, Severe fires, Rising sea levels, Flooding, Melting polar ice, Catastrophic storms and declining biodiversity.
- Can affect our health, growing crops for food, housing, safety and work
- People living in small island nations and other developing countries

Which countries are the biggest emitters of global greenhouse gas emissions in 2023 were:

- China, The United States of America, India, The European Union, The Russian Federation, and Brazil

Refer: https://www.un.org/en/climatechange/what-is-climate-change

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The climate crisis disproportionately hits the poor. HOW?

- *Unequal Emissions and Unequal Burdens:*
  - The countries that are least responsible for emissions often bear the heaviest consequences. Low-income nations, despite contributing a minuscule share of global greenhouse gas emissions (1/10th), are the most exposed to climate-related disasters such as floods, droughts, and extreme heat.
  - These nations are already experiencing significant damage to infrastructure, economies, and ecosystems, with little capacity to respond or recover due to financial and technological limitations.
- *Forced Migration:*
  - By 2050, climate change could displace over 200 million people globally, with 130 million potentially falling into poverty. Displacement is caused by the loss of livelihoods, such as crop failures, destruction of homes, and natural disasters, forcing people to migrate within their countries or across borders.
  - Climate refugees are particularly vulnerable and often lack access to basic needs like shelter, water, and food, exacerbating global tensions and inequality.

Refer: https://www.weforum.org/stories/2023/01/climate-crisis-poor-davos2023/

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6 Ways the Climate Crisis Affects Vulnerable Populations

- ***Health:***
  - Heat-Related Illnesses: The increase in extreme temperatures due to climate change poses serious health risks, including heat strokes and dehydration, particularly in areas with limited healthcare infrastructure.
  - Disease Spread: Warmer temperatures facilitate the spread of diseases such as malaria, dengue fever, and Zika virus. Malaria is expected to affect 150 million more people, especially in tropical regions, putting immense strain on already fragile healthcare systems.
  - Childhood Illnesses: Increased waterborne diseases such as diarrhea could result in 48,000 more deaths in children under the age of 15 by 2030. Poor sanitation and lack of clean water amplify these health challenges.
- ***Hunger:***
  - Decline in Agricultural Productivity: Climate-induced changes in rainfall, temperatures, and weather patterns negatively affect crop yields, especially in developing countries that depend on agriculture. For example, wheat and maize yields in sub-Saharan Africa could fall by 25% by 2050.
  - Food Insecurity: Increased food prices, which could rise by 12% in sub-Saharan Africa, and frequent crop failures lead to food insecurity and nutritional deficiencies, especially among children and the elderly
  - Rural Communities at Risk: For millions in rural areas, climate change poses a serious risk to their livelihoods, with crops failing due to changing weather patterns, forcing families deeper into poverty.

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- ***Water Scarcity:***
  - Droughts and Reduced Water Supply: As temperatures rise and rainfall patterns become more unpredictable, regions that are already vulnerable to water scarcity will face further declines in water supply. By 2025, 5 billion people will be affected by water scarcity, including parts of Africa, the Middle East, and Asia.

  - Rural Communities: Those who rely on local water sources for agriculture, drinking, and sanitation will be hit the hardest, and many will be forced to migrate to urban areas in search of clean water.

- ***Impact on Education:***
  - Interrupted Schooling: Families affected by climate-induced economic shocks may withdraw children from school to help make up lost income. Many children, particularly girls, are at risk of missing out on education entirely, further perpetuating the cycle of poverty.

  - Lower Education Outcomes: As climate impacts on agriculture and infrastructure worsen, education systems, already under-resourced in many countries, will face even greater challenges in providing quality education.

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- ***Climate-Induced Refugees:***
    - Internal Migration: Communities living in climate-vulnerable areas, such as flood-prone coastal regions, will be forced to leave their homes. By 2050, an estimated 216 million people will become climate refugees across the world.
    - Conflict and Instability: Climate-induced migration exacerbates existing tensions, especially in areas already facing political instability. The displacement of populations could lead to conflicts over land, water, and other resources.
- ***Workplace Hazards and Economic Losses:***
    - Heat Stress: Rising temperatures are expected to reduce global working hours by 2.2%, which will significantly impact labor productivity. Heat stress directly affects outdoor laborers, farmers, construction workers, and others exposed to extreme temperatures, reducing their ability to work efficiently and earn an income.
    - Economic Impact: The loss of working hours due to heat stress is predicted to cost the global economy $2.4 billion by 2030. This disproportionately affects lower-income workers who rely on physical labor for income.

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The Urgent Need for Action

- ***Integration of Climate and Poverty Solutions:***
    - Addressing climate change and poverty together is not only necessary but also a unique opportunity to create long-term, sustainable solutions. Poor countries, which are often the most vulnerable to climate impacts, have the opportunity to implement climate-resilient development policies. These policies can help them reduce carbon emissions and adapt to the changing climate while also addressing poverty and inequality.
    - Inclusive Development Policies: Investments in green infrastructure, renewable energy, and sustainable agriculture can help reduce the impacts of climate change while providing economic opportunities for vulnerable populations.
- ***Resilient Economies:***
    - Rural Transformation: Building more climate-resilient rural economies is critical for reducing the vulnerability of agricultural workers. Moving away from agriculture-based economies and investing in alternative livelihoods can help build resilience.
    - Climate-Smart Agriculture: Using climate-smart farming techniques and technologies can help farmers adapt to changing weather conditions, protect food security, and reduce emissions.

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The Urgent Need for Action

- Public Infrastructure Investments: Long-term investments in sustainable infrastructure, including energy-efficient housing, water systems, and resilient transportation networks, will protect vulnerable populations and create new economic opportunities.

- ***International Financial Support:***

  - Developing nations may lack the financial resources to implement necessary climate mitigation and adaptation strategies. International support through climate finance is essential for helping vulnerable countries transition to low-carbon economies, improve their infrastructure, and adapt to climate impacts.

  - Institutional Capacity Building: Strengthening governance and institutions in developing countries to effectively manage climate risks and disaster responses is critical.

- ***Mitigation and Adaptation Strategies:***

  - Renewable Energy: Expanding access to renewable energy, such as solar and wind, in off-grid and rural areas can help mitigate climate change, reduce emissions, and improve energy access for vulnerable populations.

  - Social Protection Systems: Expanding social protection programs, such as cash transfers, will protect vulnerable communities from the immediate impacts of climate change and help them recover from extreme events.

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The Urgent Need for Action

- Protecting Natural Ecosystems: Reforestation, sustainable land management, and protecting ecosystems can mitigate climate change while preserving livelihoods and ensuring food and water security.

- Conclusion: Collective Global Action is Critical
- Climate change is a global challenge that demands immediate, collective action to protect vulnerable populations and promote sustainable development.

- Through mitigation, adaptation, and climate-resilient development, we can reduce the impact of climate change on the most vulnerable communities while achieving a more equitable, sustainable world for all.

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Rising sea levels

- Sea levels are rising at an intensifying rate
- In recent decades, sea levels have been rising increasingly within the recent decades

- Higher sea levels means more frequent flooding to increase from 300% to 900% from 50 years ago

- Two major causes of rising sea levels
- Thermal expansion
- Ice caps melting: land-based ice, such as glaciers and ice sheets

- The ocean is absorbing more than 90 percent of the increased atmospheric heat associated with emissions from human activity

- In the United States, almost 40 percent of the population lives in relatively high-population-density coastal areas, where sea level plays a role in flooding, shoreline erosion, and hazards from storms
- Globally, eight of the world's 10 largest cities are near a coast, according to the U.N. Atlas of the Oceans.

- In urban settings, rising seas threaten infrastructure necessary for local jobs and regional industries. Roads, bridges, subways, water supplies, oil and gas wells, power plants, sewage treatment plants, landfills-virtually all human infrastructure-is at risk from sea level rise.

Refer: https://oceanservice.noaa.gov/facts/sealevel.html

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How does climate change Transform our Pacific islands

- Threatens the environment through warmer ocean temperatures
- Sea levels rising above global average
- Acidification that harms ecosystems

Future of pacific islands:

- Rising Sea Levels and Marine Heatwaves in the Pacific: A Climate Crisis

- ***Sea Levels Rising Faster in the Pacific:***
    - According to the World Meteorological Organization (WMO) 2023, sea levels in the Pacific region have risen nearly three times faster than the global average. This is primarily due to the absorption of excess heat by the oceans, a consequence of increased greenhouse gas emissions warming the planet.
    - Key Causes: Human activities such as fishing, tourism, and the blue economy (industries dependent on ocean resources) contribute significantly to the changing ocean dynamics, exacerbating the rising sea levels around Pacific islands.
- ***Marine Heatwaves Intensifying:***
    - Marine heatwaves in the Pacific have nearly doubled since 1980, with the duration of these heatwaves increasing from an average of five to sixteen days (1980-2000s) to eight to twenty days (since 2010). In 2023, the most persistent marine heatwave lasted six months near New Zealand.

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How does climate change Transform our Pacific islands

- Impacts: Marine heatwaves disrupt fish stocks, coral reefs, and ecosystems, affecting the livelihoods of Pacific islanders and local economies. A significant mass bleaching of coral reefs occurred across the South Pacific in 2023, including in Australia’s Great Barrier Reef and other key areas like Fiji, Tuvalu, and Vanuatu.

- ***Ocean Acidification and Impact on Marine Life:***

  - The oceans absorb about 25% of all carbon dioxide emissions, causing ocean acidification to increase globally. Between 1988 and 2020, the acidity of the ocean increased by 12%. This acidification disrupts marine ecosystems, impacting coral reefs, fish stocks, and the broader marine food chain.
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  - Since 1998, there have been significant decreases in phytoplankton and chlorophyll levels, which are critical for the marine food web. This threatens the long-term sustainability of marine resources vital for the island nations' economies and food security.

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How does climate change Transform our Pacific islands

- ***Consequences of Rising Sea Levels and Marine Heatwaves***
  - ***Coastal Flooding and Shoreline Retreat:***
    - Rising sea levels are submerging coastal areas, leading to the retreat of shorelines. Communities along the Pacific's coastlines are at increasing risk of flooding, which damages homes, infrastructure, and livelihoods.
  - ***Saltwater Contamination:***
    - The encroachment of saltwater into freshwater supplies has jeopardized drinking water access for vulnerable island communities. This contamination affects agriculture, drinking water, and overall health.
  - ***Tropical Cyclones and Extreme Weather:***
    - Typhoon Doksuri in July 2023 devastated the Philippines, causing widespread flooding and torrential rainfall, displacing over 313,000 people and causing at least 45 deaths. Typhoons, exacerbated by warmer ocean waters, are becoming more frequent and intense in the Pacific, causing severe human and economic losses.
  - ***Impact on Marine Ecosystems:***
    - Marine heatwaves negatively impact fish stocks and marine biodiversity, leading to long-term effects on the region's fishing industry. The disruption of coral ecosystems from bleaching also has cascading effects on marine food chains and local economies dependent on healthy reefs for tourism and fishing.

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Key Statistics: Pacific Climate Change Effects

- Sea Level Rise:
  - Western Tropical Pacific: 10-15 cm
  - Central Tropical Pacific: 5-10 cm

- Marine Heatwaves:
  - Heatwaves now last 8-20 days (since 2010), a significant increase from previous decades.
  - In 2023, the longest marine heatwave lasted 6 months off the coast of New Zealand.

- Ocean Acidification:
  - Between 1988 and 2020, ocean acidity has increased by 12% at Hawaii's Station ALOHA.
  - In the Pacific Islands region, phytoplankton size and surface ocean chlorophyll have decreased significantly since 1998.

- The rising sea levels, increasing marine heatwaves, and ocean acidification will have long-lasting impacts on Pacific Island nations, particularly their ecosystems, economies, and livelihoods. Local populations, already grappling with limited resources, face the threat of displacement, loss of freshwater, and food insecurity.

- Global Action is essential to mitigate these effects through both emission reductions and sustainable ocean management. Supporting Pacific nations in adaptation measures is crucial to their survival and resilience

Refer : https://wmo.int/news/media-centre/climate-change-transforms-pacific-islands

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Climate Change at the Point of No Return

- **Global Consensus on Climate Change:**
  - In 2009, the international community reached a global consensus on climate change: the scientific debate over whether global warming is real is over.
  - Raymond Wolfe, the Permanent Representative of Jamaica to the United Nations, emphasized that those still questioning the impacts of global warming are ignoring overwhelming evidence.
- **Climate Change as a Security Issue:**
  - Climate change has transitioned from an environmental issue to a security issue, with its effects being real and immediate.
  - The Caribbean region, in particular, faces intensifying hurricanes that pose clear and present dangers to the region's stability.
- **Hurricanes' Growing Impact:**
  - Hurricane Ivan (2004) devastated Grenada, destroying 90% of infrastructure, which was nearly double the country's annual GDP.
  - This disaster highlights the disproportionate economic damage caused by climate events in vulnerable regions, exacerbating the region's economic fragility.
- **Triple Crisis in the Caribbean:**
  - In addition to hurricanes, the Caribbean has been hit by a triple crisis: food, energy, and financial crises, all of which have been amplified by climate change.

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- Climate change acts as a catalyst for these crises, deepening vulnerabilities and making it harder for affected regions to recover.

3 Main Points:

- Climate change is no longer a debate, but a real and immediate threat, with hurricanes and other extreme weather events causing disproportionate damage in vulnerable regions like the Caribbean.
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- The economic toll of disasters, like Hurricane Ivan, underscores the need for urgent climate adaptation and mitigation efforts.
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- Countries facing the triple crises of food, energy, and financial instability are at risk of further instability due to climate-induced disasters.
- Vulnerabilities of Small Island Developing States (SIDS) to Climate Change: In-Depth Overview

What Are Small Island Developing States (SIDS)?

- Small Island Developing States (SIDS) are a collection of 39 countries spread across the Caribbean, East Atlantic, and Pacific and Indian Oceans.

- These nations are home to about 70 million people, many of whom live in vulnerable coastal areas.

- SIDS are especially susceptible to climate change due to their geographical isolation, small land masses, and fragile ecosystems, such as coral reefs and mangrove forests. These resources play a vital role in supporting their economies, which are often heavily reliant on fisheries, tourism, and agriculture.

- A number of these nations are also among the world's least developed countries (LDCs), with limited access to financial resources, making them less equipped to deal with the impacts of climate change.

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- **Climate Risks for SIDS: Coastal Flooding, Land Loss, and More**
  - SIDS are especially vulnerable to the effects of sea level rise, extreme weather events, and marine heatwaves. These risks have far-reaching consequences, not only for the environment but also for the social and economic stability of these nations.

1. ***Coastal Flooding:***
   - Coastal flooding is one of the most immediate and dangerous risks facing SIDS. As sea levels rise, large portions of the coastal infrastructure—homes, roads, ports, and agricultural land—are at risk of being submerged.

   - Countries like Belize, Kiribati, Tuvalu, and the Marshall Islands face existential threats as rising seas encroach on their land.

   - Economic Costs: Coastal flooding already leads to annual damage estimated at €1.54 billion ($1.69 billion) across all SIDS. This includes damages to homes, businesses, roads, and agriculture.

   - Future Projections: By mid-century, without adaptation, these damages could increase by 9 to 11 times, potentially accounting for 1.2% to 5.1% of SIDS' GDP, depending on the emissions scenario. Under the worst-case emissions scenario, by the end of the century, the economic damage from flooding could amplify by nearly 25 times.

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2. ***Land Loss:***
   - Rising sea levels result in land loss, which can severely impact the livelihoods of people who rely on coastal resources, such as fishing and agriculture.
   - Coral reefs and mangroves, crucial for coastal protection and maintaining the biodiversity of marine ecosystems, are particularly at risk. As global temperatures rise, coral bleaching and ocean acidification threaten these ecosystems, leaving coastal areas more vulnerable to erosion and flooding.
   - The decline of ecosystems like mangroves and coral reefs not only accelerates the physical loss of land but also disrupts local economies. This loss can also reduce the natural buffer that protects people from storms, tidal surges, and tsunamis.

3. ***Population Exposure:***
   - Currently, about 118,000 people in SIDS are directly exposed to coastal flooding.
   - However, by 2070, this number is expected to rise to over 1 million people, even if the world meets the Paris Agreement climate goals. This increase in exposure means that more people will be forced to relocate, displacing communities and creating a climate refugee crisis in some of the world's most vulnerable regions.
   - The social vulnerability associated with this displacement is immense, as the cost of relocation and adaptation places an additional strain on the economies and public services of these countries.

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- ***Economic Impact and Costs of Adaptation***

- ***Economic Burden:***

  - SIDS rely heavily on tourism, agriculture, and fisheries, all of which are particularly susceptible to climate change. Damage from coastal flooding and storms directly impacts infrastructure and livelihoods.

  - By the mid-21st century, without climate adaptation, the economic costs of coastal flooding alone could reach 9 to 11 times the current damages. This could range from 1.2% to 5.1% of SIDS' GDP.

  - Even with mitigation efforts, such as keeping global warming below 1.5°C, SIDS will still face significant economic losses, which could prevent them from achieving sustainable development goals (SDGs) and hinder their capacity to invest in other critical sectors, such as health and education.

- ***Adaptation Measures:***

  - Adaptation strategies are critical to protect both the physical environment and the socioeconomic stability of SIDS. These strategies include:

  - Building resilient infrastructure: Ensuring that buildings, roads, and ports can withstand rising seas and extreme weather events.

  - Protecting ecosystems: Efforts to preserve mangroves and coral reefs can provide natural protection against flooding and storm surges.

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- Diversification of economies: SIDS need to transition away from over-reliance on vulnerable sectors like agriculture and tourism by investing in green economies and sustainable industries.

- International climate finance: Countries with limited resources will need financial assistance, both public and private, to fund these adaptations.

- **Social Impacts: Vulnerability of Communities**

  - Displacement and Migration: As coastal areas become uninhabitable, populations will be forced to migrate internally or across borders, creating climate refugees. These migrations can lead to further social tensions and inequality as already vulnerable groups are displaced and left without access to essential services.

  - Loss of Livelihoods: Many SIDS rely on the blue economy (fisheries, tourism, marine resources) for employment. Coral reef degradation and ocean acidification threaten these industries, directly impacting jobs, income, and food security.

  - The impacts of climate change on Small Island Developing States (SIDS) are severe, encompassing economic losses, land degradation, population displacement, and social vulnerability. These nations, despite their small size, have large populations at risk from coastal flooding, land loss, and marine heatwaves. If global warming continues unchecked, the economic and social costs of climate change will become unsustainable for these countries, which are already facing significant developmental challenges. International climate finance, adaptive strategies, and global cooperation are critical to safeguarding the future of SIDS and ensuring their resilience against climate impacts.

- Refer: https://www.un.org/en/chronicle/article/small-islands-rising-seas