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Climate Transitions and Its Impacts in Asia

June 2025

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List of Abbreviations

AC	: Air Conditioner
AF	: Adaptation Fund
AR6	: Sixth Assessment Report (of the IPCC)
AOSIS	: Alliance of Small Island States
ASALs	: Arid and Semi-Arid Lands
BMKG	: Badan Meteorologi, Klimatologi, dan Geofisika (Indonesian Agency for Meteorology, Climatology, and Geophysical)
CH_4	: Methane
CO_2	: Carbon Dioxide
COP	: Conference of the Parties
CPRD	: Centre for Participatory Research and Development
CSOs	: Civil Society Organizations
DAC	: Development Assistance Committee (of the OECD)
DCA	: DanChurchAid
DRR	: Disaster Risk Reduction
ENSO	: *El Niño*-Southern Oscillation
ExCom	: Executive Committee (of the WIM)
FAO	: Food and Agriculture Organization
FRLD	: Fund for Responding to Loss and Damage
GAW	: Global Atmosphere Watch

GCF : Green Climate Fund

GHG : Greenhouse Gas

ICSC : Institute for Climate and Sustainable Cities

INECC : Indian Network on Ethics and Climate Change

IPCC : Intergovernmental Panel on Climate Change

IRID : Indonesia Research Institute for Decarbonization

LDCs : Least Developed Countries

MIEs : Multilateral Implementing Entities

N_2O : Nitrous Oxide

NAP : National Adaptation Plan

NGOs : Non-Governmental Organizations

NIEs : National Implementing Entities

ODA : Official Development Assistance

OECD : Organisation for Economic Co-operation and Development

pH : Potential of Hydrogen

ppb : parts per billion

ppm : parts per million

PUPR : Kementerian Pekerjaan Umum dan Perumahan Rakyat (Ministry of Public Works and Housing)

SIDS : Small Island Developing States

SSTs : Sea Surface Temperatures

TWh : Terawatt-hour

UN : United Nations

UNDRR : United Nations Office for Disaster Risk Reduction

UNFCCC : United Nations Framework Convention on Climate Change

USD : United States Dollar

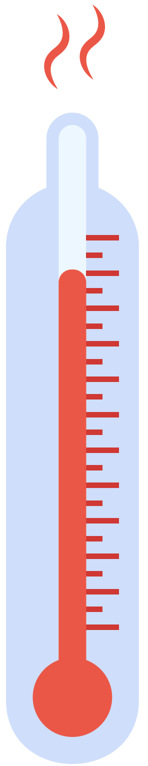
WIM : Warsaw International Mechanism (for Loss and Damage)

WMO : World Meteorological Organization

01. Background

The world already suffer the impacts of climate change. Some of the impacts can be recovered, although may not return completely to its original state, depending on the capacity to recover. While some impacts of climate change, such as extreme weather, are easily recognized, others are more difficult to recognize as it happens gradually. The gradually emerged events are called the slow-onset events, which must be addressed in the context of loss and damage due to climate change. As it is difficult to recognize, many of these impacts are not properly managed until they become destructive, causing significant economic and non-economic losses for the countries experiencing them.

The World Meteorological Organization (WMO) has released its State of the Global Climate report for 2024, confirming that the global average temperature has increased by 1.55°C, making 2024 the warmest year on record. Other key findings show that, although long-term warming remains below 1.5°C when averaged over decades, sea-level rise and ocean warming are happening and irreversible, which could significantly impact ocean biodiversity. The report highlights the importance of science in providing valuable information for all, including policymakers, particularly when developing climate-resilience plans.



The impacts of climate change in Asia are experienced in different ways. Some countries experience heavy rainfall that leads to flooding, heatwaves, and typhoons, while countries with forest cover experience forest fires. These impacts affect not only communities but also industries, including the energy sector. Hence, understanding the climate risks in each country is crucial for developing a climate-resilient development plan.

The Indonesia Research Institute for Decarbonisation (IRID), Germanwatch, the Institute for Climate and Sustainable Cities (ICSC), LAYA-INECC, and Greenovation Hub recognize the importance of understanding climate transition and its impacts, particularly in Asia. Hence, a session to understand what climate transition is and its impacts in Asia was conducted on June 12th, 2025, as a part of knowledge sharing session series by the consortium, leading up to COP30.

02. Climate Transition and Its Impacts in Asia

The accelerating pace of climate change is reshaping environmental, economic, and social landscapes across the globe, with Asia among the most affected regions. The region's diverse geographical characteristics make it particularly vulnerable to the impacts of rising temperatures, extreme weather events, and long-term shifts such as sea-level rise and ocean acidification. As climate risks intensify, understanding the current state of climate and translating it into development policies becomes essential for building resilience across Asia.

2.1 The State of the Climate in 2024

The assessment of the global state of the climate is carried out under the coordination of the WMO, particularly through its Services Commission and the Standing Committee on Climate Services. These bodies publish authoritative reports, including the *State of the Global Climate* and the *State of Greenhouse Gases*. These reports serve as key references in international climate negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) and other relevant forums.

2.1.1 The State of the Global Climate

The State of the Global Climate 2024 organizes its findings around five headlines of climate indicators: atmospheric composition, surface temperature, ocean heat and acidification, cryosphere[1] changes, and sea-level rise. Together, these indicators provide a comprehensive picture of the Earth's energy imbalance, primarily driven by the rise in greenhouse gas (GHG) concentrations. To monitor the concentration of GHG concentrations, WMO utilizes a global network of 30 Global Atmospheric Watch (GAW) stations, strategically located far from direct emission sources[2]. One of these stations is located at Bukit Kototabang in Indonesia, which is recognized for its high-quality atmospheric measurements.

1 Cryosphere is the portion of the Earth's surface where water exists in solid form, including glaciers and ice sheets (e.g., Greenland, Antarctica), sea ice (e.g., Arctic Ocean, Southern Ocean), snow cover, permafrost (permanently frozen ground), as well as ice caps and icebergs.

2 Stations far from local pollution sources can better capture baseline or global background levels of greenhouse gases or pollutants, rather than spikes from nearby cars, factories, or urban areas.

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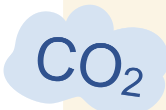
Monitoring atmospheric composition is central to understanding and tracking the Earth's energy imbalance, as elevated GHG levels disrupt surface temperatures, precipitation patterns, sea levels, and the health of both oceanic and cryosphere systems.



Despite the adoption of multiple international climate agreements under the UNFCCC – including the Kyoto Protocol (1997) and the Paris Agreement (2015) – global GHG concentrations continue to rise. According to observational data from WMO, GHG concentrations reached their highest level ever recorded in 2023, with real-time data indicating continued increases into 2024. The concentration of carbon dioxide (CO_2) increased from approximately 278 ppm in 1750 to 420 ppm in 2023, marking a 51% increase from pre-industrial levels. Over the past decade, the average growth rate of CO_2 has been 2.4 ppm per year, largely driven by fossil fuel emissions, which have remained the dominant source of human emissions since the 1950s. Although CO_2 comprises only 0.04% of the atmosphere, its role in global warming is substantial.

In addition, Methane (CH_4) levels also surged significantly, rising from 729 ppb in pre-industrial times to 1,934 ppb in 2023, an increase of 165%. Meanwhile, nitrous oxide (N_2O) concentrations reached 336.9 ppb in 2023, reflecting a 24% rise from 270 ppb in 1750. In 2021, the Intergovernmental Panel on Climate Change (IPCC) projected that the 1.5°C warming threshold might be breached between the year of 2032 and 2050. However, the State of the Global Climate 2024 stated the average of global temperatures increase in 2024 had already reached 1.55°C above pre-industrial levels, marking the first year this threshold has been exceeded.

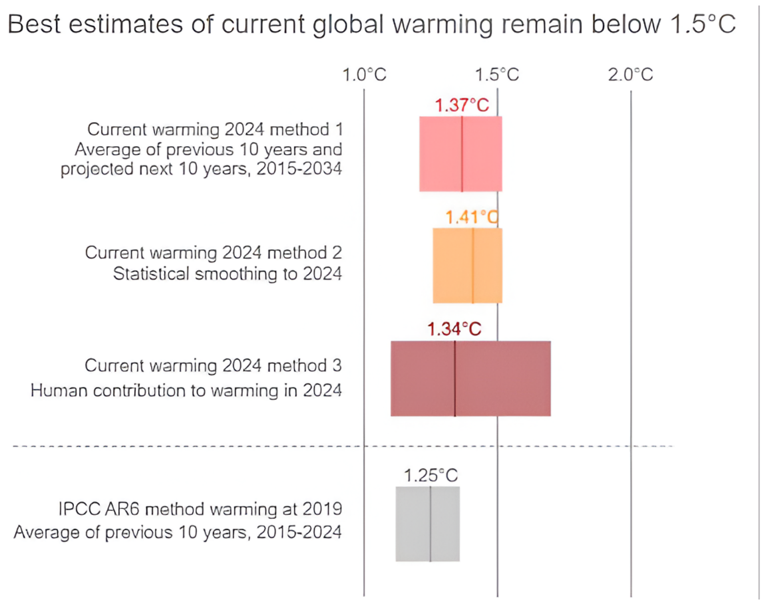


Figure 1. Three methods for establishing an up-to-date estimate of current global warming as of 2024 (WMO, 2025)[3]

Yet, it is important to note that a single year exceeding 1.5°C does not automatically mean that the long-term temperature goal of the Paris Agreement has been breached. According to the IPCC Sixth Assessment Report (AR6), global warming levels are assessed using 20-year averages relative to the 1850-1900 baseline. **A temperature level such as 1.5°C is considered "exceeded" when the midpoint of 20 years consistently averages above that level. This approach means that even if a particular year – such as 2024 – records a temperature increase above 1.5°C, formal confirmation of exceedance could be delayed by up to a decade.** In effect, global temperature increases could surpass agreed thresholds well before they are officially recognized. Current estimation in 2024 indicates global warming levels between 1.34°C and 1.41°C, depending on the methodology used, signaling that the world is dangerously close to breaching the limit. **This lag in recognition and response could undermine the timeliness and urgency of mitigation and adaptation efforts.**

3 *The presented graphic is compared with the IPCC AR6 method, which uses averages over the previous 10 years and is representative of warming to 2019. The best estimate resulting from each method is shown as a dark vertical line, and the uncertainty range is shown by the shaded area.*

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Other climate indicators further highlight the urgency of the situation. Sea ice extent in both the Arctic and Antarctic remained well below average in 2024, while global glaciers recorded their lowest cumulative mass balance in the same year. Ocean heat content continued to break records in 2023, with the oceans absorbing around 31 million TWh of heat, equivalent to 18 times of the world's total annual energy consumption. This means that a substantial amount of energy is absorbed by the ocean, and the intensifying GHG emissions effect is accelerating this process.

Ocean acidification also worsened, with around 25% of annual GHG emissions absorbed by ocean, leading to declining pH levels. This condition has negatively impacted the marine ecosystems, fisheries, and coastal protections. Meanwhile, the rise in global sea level's rate has more than doubled since the early 1990s.

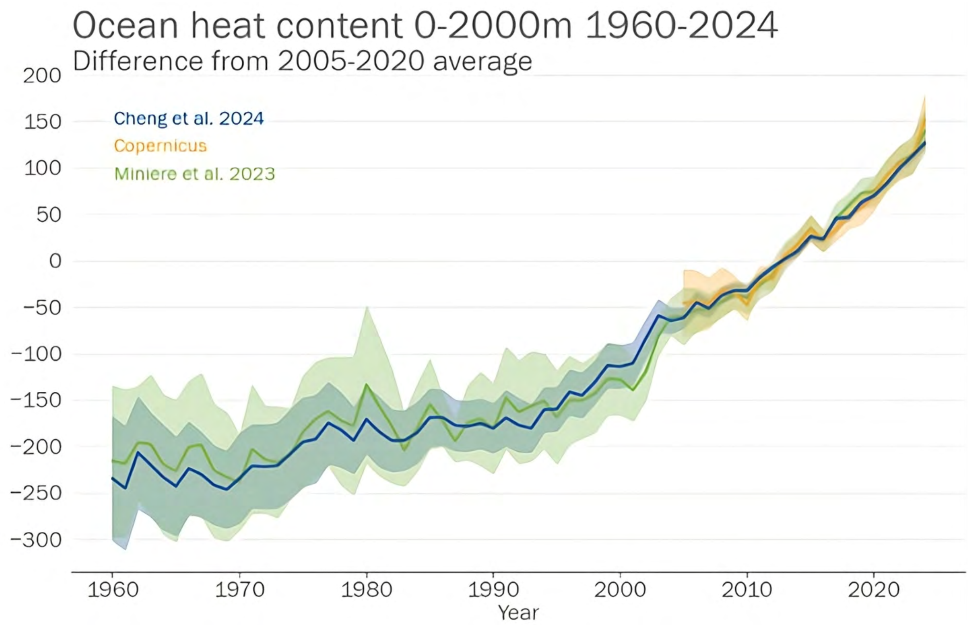

Figure 2. Global Oceans Heat Content Over Decades (WMO, 2025)

2.1.2 The State of the Climate in South-West Pacific

To complementing the global overview, the WMO also produces a detailed regional analysis for Southeast Asia and West Pacific, called the [The State of the Climate in South-West Pacific .]() The analysis offers localized insights on the world's most climate-vulnerable regions. The region of Southeast Asia and the Southwest Pacific also experience the year 2024 as the warmest year. The regions experienced varied rainfall patterns, with higher-than-average precipitation across the maritime continent, such as Indonesia, and drier-than-normal condition in Australia and New Zealand. These anomalies are consistent with the effects of broader climatic drivers such as the *El Niño*-Southern Oscillation (ENSO).

The Indonesia Agency for Meteorology, Climatology, and Geophysics (Badan Meteorologi, Klimatologi, dan Geofisika/ BMKG) has monitored the atmospheric CO^2 concentrations in Indonesia. The results show that the atmospheric CO^2 concentrations have increased by approximately 2 ppm per year, consistent with global patterns. One of the most visible impacts of climate change in the country is the rapid melting of the Puncak Jaya glacier in West Papua, Indonesia. The monitoring that has been conducted by the Indonesia Agency for Meteorology, Climatology, and Geophysics since 2010, projects that the glacier in West Papua will disappear entirely within the next one to two years. As one of the last remaining tropical glaciers, its loss would serve as an actual symbol of accelerating cryosphere decline in the Asia region.

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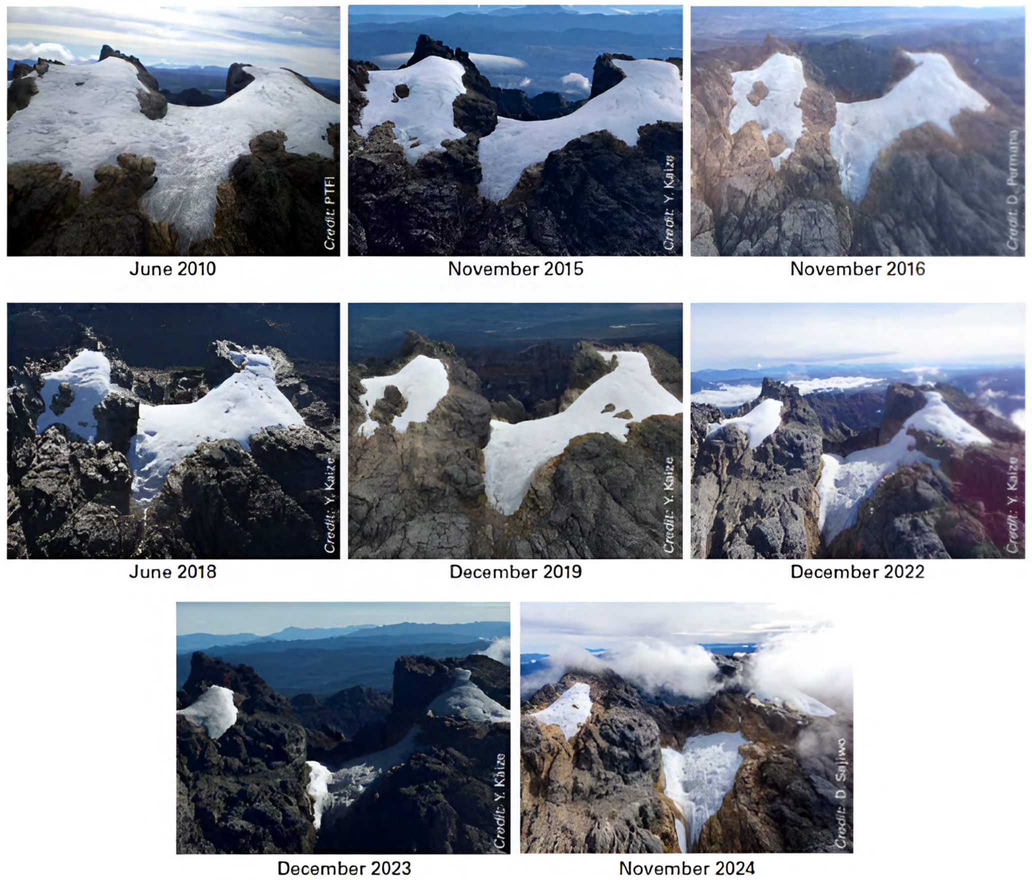

Figure 3. Cryosphere: Puncak Jaya Glacier from 2010 to 2024 (Indonesia Agency for Meteorology, Climatology, and Geophysics, 2025)

As Southeast Asia is largely composed of archipelagos and coastal regions, the region is heavily impacted by oceanic changes. The annual average sea surface temperatures (SSTs) in 2024 break the record across the time series starting in the early 1980s, continuing a persistent warming trend. The sea level rise was relatively uniform across the region, averaging 3.9 to 4 millimeters per year, on par with or slightly above the global average. One of the most alarming developments has been **the increase in frequency and severity of marine heatwaves,** defined as extended periods when SSTs exceed the 90th percentile of historical observations for a specific location and period[4]. In 2024, extensive areas of the South-West Pacific were affected by **marine heatwaves, posing serious risks to coral reefs, fisheries, and the livelihoods of coastal communities.**

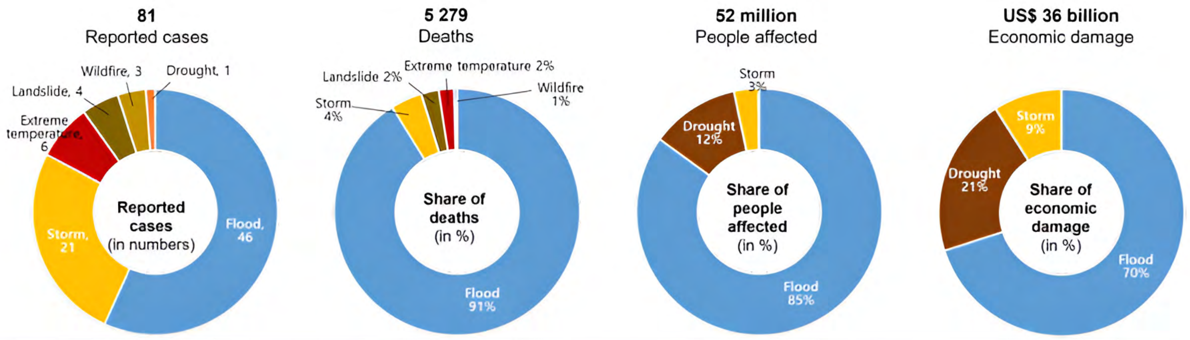

Figure 4. Impact Statistics in Asia: 2022 (WMO, 2022)

4 The 90th percentile of historical observations refers to the SST value that is higher than 90% of all daily SST values recorded over a defined historical baseline period, typically 30 years. When SSTs exceed this threshold for at least five consecutive days, the event is classified as a marine heatwave.

The social and economic costs of these climate impacts are becoming more evident. According to the WMO in 2022, Asia experienced widespread climate-related disasters, with flooding as the most frequently reported hazard, that resulted in significant fatalities, displacement, and financial losses. In the context of Indonesia, **while geophysical hazards such as earthquakes and tsunamis tend to cause more casualties, hydrometeorological disasters – including floods and droughts – have a disproportionately larger impact in economic terms.** The contrast in impacts reinforces the need for more robust disaster preparedness and climate resilience strategies.

	LOMBOK EQ 07/2018	SULAWESI EQ & TSUNAMI 09/2018	SUNDA STRAIT EQ & TSUNAMI 09/2018	INDONESIA EL NINO 2015	INDONESIA HYDROMENT 2021
Deaths	564	2.101	429	~20	580 (over ~3500 events)
Injuries	1.886	4.338	1.485	~100.000 (respiratory problem)	~13000
Relocated	11.510	221.450	16.082	... (mills?)	~7 mills
Loss and damage	1.3 Bn US$ (0.1% GDP)	1.21 Bn US$ (0.1% GDP)	35 Mil US$ (0.002% GDP)	25 Bn US$ (0.1% GDP)	1.4 Bn US$ (0.13% GDP)

Figure 5. Losses Experienced in Hydrometeorological and Geological Disasters in Indonesia (Indonesia Agency for Meteorology, Climatology, and Geophysics, 2022)

2.2 Integrating Science and Services to Support Climate Policy: Indonesia's Case

Responding to climate risks requires more than just reactive measures; it demands a science-based, and coordinated approach. In the climate change context the three-legged stool framework[5], consisting of three key pillars: policy, science, and services, must be applied. Good policy must be informed by credible science, supported by accessible and reliable services in its implementation.

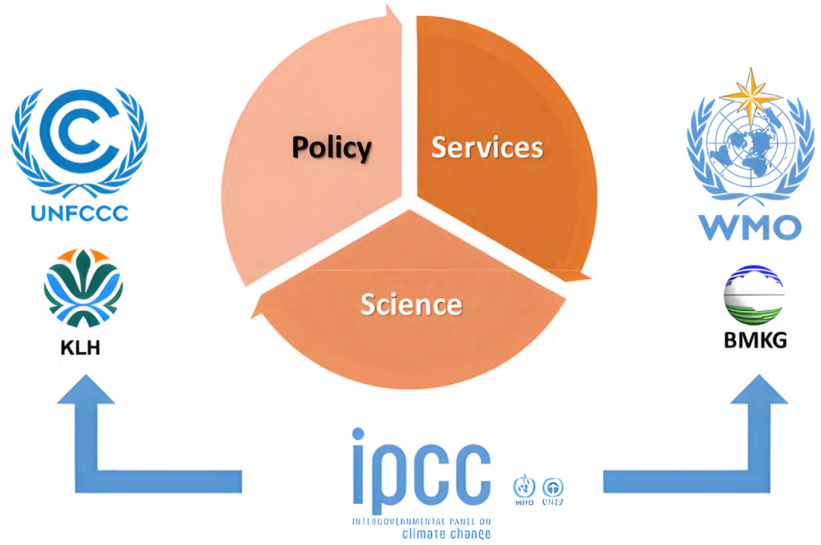

Figure 6. Science-Policy-Services Framework in Climate Change (Indonesian Agency for Meteorological, Climatological, and Geophysics, 2025)

In Indonesia, this integration is represented through the institutional roles of the Ministry of Environment, which leads the policy work; the IPCC, which serves as the global authority on climate science; and Indonesian Agency for Meteorological, Climatological, and Geophysics, which provides operational climate services under the WMO. Together, these institutions have supported the development of Indonesia's National Adaptation Plan (NAP), particularly in priority sectors such as water resources, food security, health, coastal areas, and ocean.

5 The "three-legged stool" framework is a metaphor commonly used to describe a balanced and integrated approach to climate governance. In the context of climate adaptation and risk management, it refers to the interdependence of policy, science, and services.

The Indonesia Agency for Meteorology, Climatology, and Geophysics plays a key role in operationalizing this science-policy interface in Indonesia. In the agriculture and food security sectors, for instance, Indonesia Agency for Meteorology, Climatology, and Geophysics provides climate information services that are available and tailored to specific user needs. These include seasonal climate forecasts, early warning for drought and floods, and long-term projections to support policy planning. Such services support decision-making across the full planning cycle – from short-term emergency responses, medium-term agricultural strategies, and long-term adaptation policies. These services can provide crucial guidance for farmers, local governments, and other stakeholders to be more resilient to changes in climate variables.

Climate services can also be leveraged to support the renewable energy sector. In this context, Indonesia Agency for Meteorology, Climatology, and Geophysics provides historical climate data, including solar radiation, and forward-looking climate projections at various timescales, from 10-minute resolution to decades ahead. **This information is vital for energy planners and developers in optimizing variable renewable energy systems, such as solar and wind, as well as ensuring their reliability in a changing climate.**

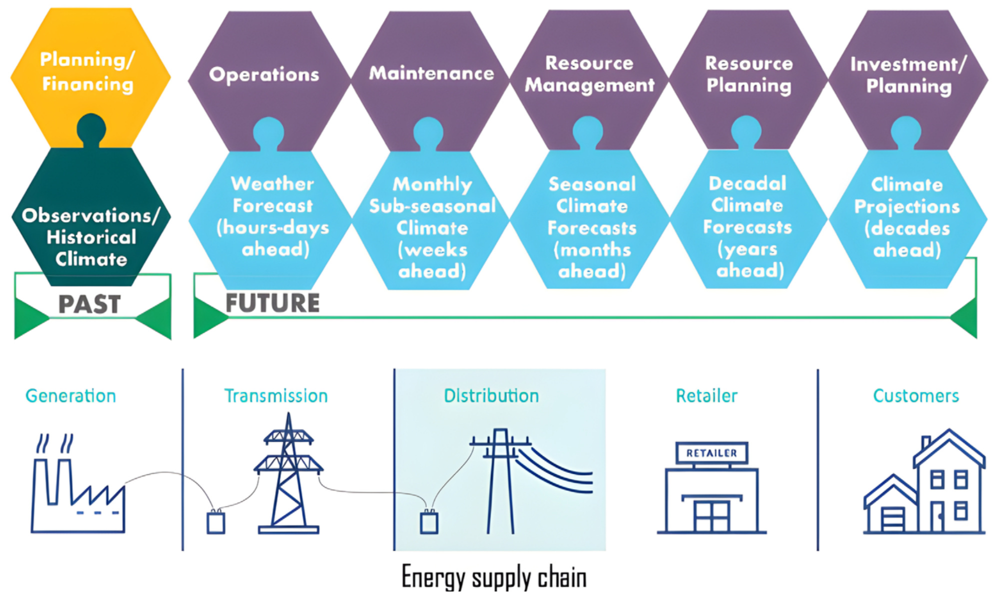

Figure 7. Weather and Climate Framework for Renewable Energy (Indonesia Agency for Meteorology, Climatology, and Geophysics, 2025)

A concrete example of the practical application of climate data and information is the collaboration between Indonesia Agency for Meteorology, Climatology, and Geophysics with the Ministry of Public Works and Housing (Kementerian Pekerjaan Umum dan Perumahan Rakyat/PUPR) in the development of low-carbon and climate-resilient housing. Using climate zone mapping and local microclimate services, Indonesia Agency for Meteorology, Climatology, and Geophysics has assisted in informing the design of buildings that utilize passive cooling strategies[6]. A pilot project in Tegal, Central Java, demonstrates how this approach can reduce indoor temperatures by up to 3°C during the day and 4.7°C at night. The building's passive cooling design is intended to capture and retain the cool morning sea breeze while preventing midday heat from entering. Therefore, maintaining thermal comfort does not require high energy consumption for air conditioner (AC) or fan, resulting in energy-saving. This initiative highlights how scientific data can directly inform infrastructure design and promote energy efficiency.

6 Passive cooling strategies are design approaches or techniques used to reduce indoor temperatures and enhance thermal comfort without relying on mechanical systems like air conditioning or fans. These methods harness natural processes such as ventilation, shading, thermal mass, and insulation to cool buildings.

Figure 8. Full-Scale Application – Low Carbon Building in Tegal, Indonesia (Indonesia Agency for Meteorology, Climatology, and Geophysics, 2025)

03. Loss and Damage Marker: Experience from the Ground

Climate change mitigation and adaptation are crucial in response to climate change. While mitigation refers to reducing the flow of heat-trapping GHG into the atmosphere, adaptation is closely linked to loss and damage responses in addressing the impacts of climate change. Although adaptation and loss and damage responses are often complementary in practice, it is important to distinguish between the two, as they frequently overlap. Adaptation refers to anticipatory actions taken before climate-related events occur. By investing in adaptation, we can ensure that people are able to minimize vulnerability and potential damage caused by the adverse impacts of climate change, hence enhance their resilience. For example, installing room coolers in houses to anticipate the impacts of heatwaves.

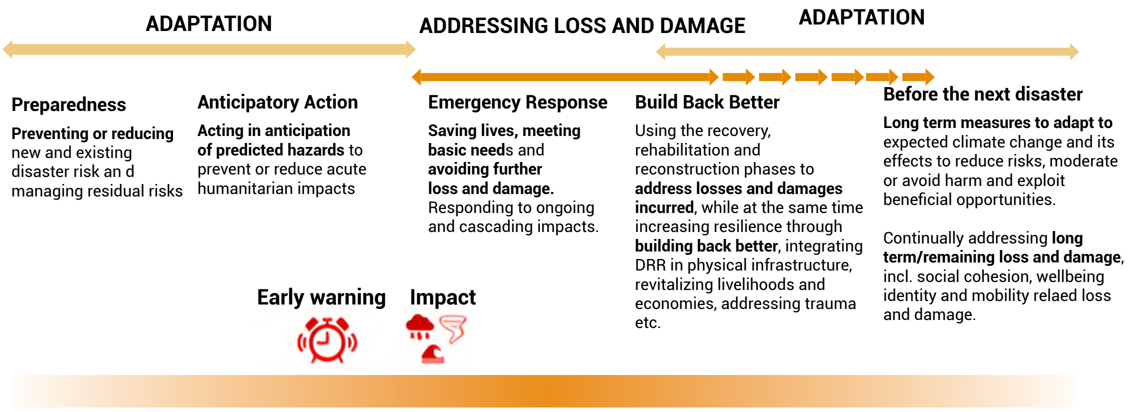

Figure 9. Difference between Adaptation and Loss and Damage (DCA, 2025)

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However, several limitations or restrictions have prevented people from becoming more adaptive to the negative consequences resulting from climate change. The limitations or restrictions include lack of adequate adaptation financing and cascading impacts of climate change which cannot be anticipated. This results in loss and damage, which refer to the effects that cannot be mitigated or adapted. In the case of disastrous events, loss and damage still affect communities even though adaptation efforts have been carried out.

Though loss and damage issues have been raised and discussed in the international fora, yet there is no international agreement regarding specific categories of loss and damage. Additionally, current reporting on climate action often fails to count on loss and damage-related interventions. Many interventions to address loss and damage are usually reported as adaptation efforts. This means that the real funding which is supposed to be disbursed for adaptation may be smaller than the actual amount because it is also used for loss and damage.

In the context of climate finance reporting, **loss and damage-related interventions are often not captured in the monitoring systems.** For example, the Rio Markers that is developed by the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD) has monitored the development finance flows to achieve the objectives of the Rio Conventions on biodiversity, climate change mitigation and adaptation, as well as desertification. However, this marker does not include the elements of addressing loss and damage, and often linked to disaster emergency response activities[7]. In Rio Markers, the emergency response which improves the capabilities to cope with future climate change can be marked as adaptation. However, emergency responses to ensure survival and recovery to a baseline scenario would not be counted as adaptation. The Rio Markers also does not cover reporting of the finance flows for non-economic loss and damage, slow-onset disasters, as well as relocation and resettlement.

7 Disaster emergency response refers to actions that are taken directly before, during or immediately after a disaster occurs. These actions are predominantly focused on immediate and short-term needs.

3.1 Developing a Loss and Damage Marker Indonesia's Case

In response to the insufficient monitoring of loss and damage interventions, the DanChurchAid (DCA) has developed a loss and damage marker. This tool is designed to capture post-event activities that address long-term impacts of climate change such as losses related to social cohesion, identity, well-being, and mobility, which are often overlooked in existing climate finance tracking systems. This marker covers:

Extreme weather events and slow-onset events, including changes in rainfall patterns, drought, tropical cyclones, floods and landslides, sea level rise, intensified wildfires, increased temperature, heatwaves, glacial retreat, and permafrost degradation;

Economic and non-economic losses and damages, such as social cohesion, well-being, identity and mobility;

Displacement and migration as a direct consequence of extreme weather events or changing climate.

This marker excluded non-climate disasters, such as earthquakes, volcanic eruptions, tsunamis, and non-tropical cyclones. The assessment to determine whether a project is eligible for the loss and damage marker is based on climate projections for the relevant context, peer-reviewed studies of extreme weather event attribution for the specific location or region, as well as context and needs assessment.

The DCA loss and damage marker supplements the OECD Marker for mitigation and adaptation, as well as monitoring their portfolio of projects. By combining adaptation and loss and damage actions, the marker ensures that the "Build Back Better"[8] aspect is captured. For example, to make communities more resilient to future climate-related calamities, it is crucial to ensure that they can relocate and rebuild adaptively.

3.2 Lessons Learned from the Ground

A broader range of impacts has been documented through on-the-ground experiences in addressing loss and damage by utilizing the DCA loss and damage marker. For example, floods and landslides that happened in Nepal in 2014, 2017, and 2020 have affected three communities, namely Barbardiya Municipality in Bardiya District, Panchadewal Binayak Municipality in Achham District, and Aathblis Municipality in Dailekh District. The disasters revealed both the financial and institutional gaps in recovery actions and preventive measures. In the absence of adequate support, affected communities were forced to take out loans to fund rehabilitation and reconstruction because of the effects of these extreme weather events, which hindered their ability to recover swiftly. Additionally, many people were compelled to be displaced and relocated permanently, which resulted in livelihood loss.

8 Build Back Better (BBB) is an approach for the post-disaster recovery that reduces vulnerability to future disasters and builds communities' physical, social, and environmental resilience.

In Kenya, climate hazards, such as floods, drought, water stress, and increased evapotranspiration, have impacted pastoralist communities, along with refugees, women, youth, and children. Turkana County is one of the Kenya's Arid and Semi-Arid Lands (ASALs) that is prone to environmental degradation. The Turkana people have been dependent on pastoralism as their main source of livelihood since the colonial times[9]. Based on their experiences, pastoralism has been a viable option considering their unstable environment. The pastoral economy provides 90% of the employment opportunities and 95% of household income and livelihood security in Kenya's ASALs. However, recurrent droughts have significantly disrupted their livelihoods, abandoned their culture, and forced them to relocate from rural to urban areas. The impacts of the droughts were highly significant that adaptation efforts have reached limits, leading to loss and damage. These droughts have caused reduced forage availability, increased disease outbreaks, and heightened livestock morbidity and mortality. Non-economic losses have also emerged, particularly related to the erosion of traditional pastoralist practices and identity tied to livestock since migration has become more unavoidable. The non-economic loss seen as the decreasing animal herds have led to emotional distress among Turkana's pastoralist communities, caused by the transition from pastoralists to a settled community in urban areas.

9 Turkana pastoralist have depended on their livestock for their livelihoods as it forms the basis of their diet and of their income. The dependency on livestock also important for their cultural heritage as it linked to traditional practices, including the use of animals for payment of dowry during marriages, food during ceremonies and celebrations, for kinship support, and for social status.

According to both case studies, loss and damage-related interventions on the ground usually are inseparable from adaptation actions. Diversifying livelihood activities in the new location can be seen as an adaptation strategy. However, it may also result in loss of tradition, knowledge, as well as psychological and social challenges. Another experience from the DCA loss and damage monitoring is that **attribution can be a challenge, which is frequently associated with liability and compensation.** It requires scientific processes of determining the extent to which human-caused climate change contributed to specific impacts of climate change, such as extreme weather events. Aside from that, **it is quite difficult to distinguish between climate-related disasters and non-climate disasters to determine appropriate actions on the ground.**

The lesson learned from DCA experience also shows that most loss and damage interventions are carried out in conflict-prone areas. Addressing it could be challenging since there are many factors contributing to the conflicts, and the efforts may worsen the conflict if implemented inappropriately. Thus, **it is necessary to have a conflict-sensitive approach when conducting loss and damage-related interventions.**

Gender responsiveness should also be considered in addressing loss and damage, since women often do not receive the same assistance as men. Women face disproportionate impacts of loss and damage compared to men. For instance, related to non-economic loss and damage, women are affected by climate impacts on labor burden, caregiving and domestic work, as well as exposure to gender-based violence. According to Food and Agriculture Organization (FAO), women increase their weekly labor hours when facing extreme weather events and exacerbate their disproportionate responsibility for unpaid caregiving and domestic work. **Climate shocks can expose women's vulnerability to exploitation, slavery, and trafficking, leading to long-term consequences, such as loss of health, safety, and well-being.**

Aside from those technical challenges, **the lack of adequate finance for climate change response remains a major barrier.** Addressing non-economic losses and damages, as well as those brought on by slow-onset events, is severely underfunded. Most disaster funding is used to address humanitarian funding and traditional official development assistance (ODA), instead of climate finance. Therefore, it is **crucial to distinguish between funding for adaptation and loss and damage-related interventions** to ensure appropriate and effective responses that meet the needs of affected communities.

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04. Identifying the Needs and Priorities of Developing Countries in the Context of Loss and Damage

In the UNFCCC negotiation, the issue of loss and damage was first formally raised in 1991 by the Alliance of Small Island States (AOSIS). Vanuatu, on behalf of the AOSIS, formally proposed the concept of compensation from developed countries for loss and damage caused by climate change. In 2007, the 13th Conference of the Parties (COP13) of the UNFCCC laid the groundwork for future discussions on loss and damage associated with climate change impacts. The Warsaw International Mechanism (WIM) for loss and damage was established then at COP19 in 2013, with its Executive Committee (ExCom) to provide technical guidance to address loss and damage. The Santiago Network on Loss and Damage was then established at COP25 in 2019 to catalyze technical assistance for developing countries on loss and damage.

The Article 8 of the Paris Agreement reflects that Parties agreed to recognize the importance of averting, minimizing, and addressing loss and damage associated with the adverse effects of climate change. However, Decision 1/CP.21 paragraph 51 says that the Article does not involve or provide a basis for any liability or compensation. The lack of clarity on how losses and damages due to climate change are addressed has caused lengthy global negotiation processes on loss and damage financing. One of the recent progressions is the decision to establish Fund for Responding to Loss and Damage (FRLD) in COP27. FRLD aims to assist developing countries in providing funds for addressing loss and damage caused by climate change. As per June 12th, pledges for FRLD was at USD 768.40 million. However, as per June 12th, FRLD has only received USD 321 million, in which USD 250 million will be allocated for the start-up phase of the FRLD. For this phase, grants ranging from USD 5 to 20 million per project will be disbursed to the developing countries, with a minimum allocation floor of 50% will be directed specifically to the Small Island Developing States (SIDS) and Least Developed Countries (LDCs).

Aside from the WIM ExCom, Santiago Network, and FRLD that are established under the UNFCCC to address loss and damage, there is also another mechanism under the UN bodies in relation to loss and damage. The United Nations Office for Disaster Risk Reduction (UNDRR) employs the Sendai Framework for Disaster Risk Reduction and focuses more on the prevention of new disaster risks and the reduction of existing risk. Despite their different mandates, the UNFCCC and UNDRR should be complementary to each other in laying out the operational framework and funding arrangements to assist developing countries in addressing loss and damage caused by climate change.

4.1 Translating Global Governance on Loss and Damage to National Actions

Having an international framework for loss and damage can help national actors, such as the government, in developing relevant loss and damage-related interventions based on the needs and priorities of each country. However, determining relevant loss and damage-related interventions is not easy as it is closely linked to adaptation. Center for Participatory Research and Development (CPRD) has demonstrated experience related to loss and damage intervention in Bangladesh through the case of riverbank eroded communities. The economic loss and damage or primary impacts of the erosion include loss of homesteads[10], loss of crops and livestock, damage to infrastructure, as well as loss of agricultural land. There are many actors involved in responding to loss and damage, such as the government, NGOs, as well as private sectors. However, most of the actions to support addressing loss and damage are centered on short-term recovery and relief.

There are also non-economic losses resulted from the riverbank erosion, making assistance to affected communities harder to accomplish due to difficulties in quantifying and building evidence-based aspects of non-economic losses. These include shifting to undignified occupation (e.g., rickshaw pulling, housemaid, beggar, and other undignified jobs), drop-out from school, increased child labor and child marriage, psychological trauma, loss of social identity, and damage of religious and social infrastructure. These uncounted and unpublished non-economic or the secondary and tertiary impacts[11] that are frequently overlooked in climate change discourse must be addressed.

10 A homestead is a house and surrounding land owned by a person. It often includes a farmhouse and land devoted to crops or animals.

11 Secondary impacts are the extended and residual impacts from the impacts of climate change. The examples of secondary impacts are unemployment, child labor, and child marriage. Secondary impacts can also lead to tertiary impacts including involuntary migration, gender-based violence, poverty, and inequality.

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As the lessons learned from riverbank erosion, CPRD highlights challenges related to the governance of loss and damage. First, the challenge to **allocate specific financing between loss and damage and adaptation, as well as humanitarian support**. International funding that is frequently received by developing countries, for example, funding for disaster risk reduction and adaptation, is tagged as loss and damage fund. While these streams may be complementary, it is important to clearly define the scope of loss and damage to ensure that it receives adequate and dedicated resources, covering both economic and non-economic aspects. From the perspective of affected countries such as Bangladesh, what matters most is timely funding, regardless of whether it is classified as adaptation or loss and damage. However, maintaining this distinction remains critical at the global level for finance tracking, transparency, and accountability, ensuring that resources specifically for loss and damage are not overlooked. Addressing loss and damage is aligned with post-disaster humanitarian response, and it may be necessary to incorporate the scope of loss and damage into the National Adaptation Plans (NAPs) and disaster risk reduction (DRR) plans, besides only emphasizing ex-ante measures and economic loss and damage. Accessing funding for loss and damage may be more difficult if the comprehensive scope of loss and damage is not incorporated in the national plans. Developing countries can **consider accounting for economic and non-economic loss and damage sector-based for a better mobilization of funding from the international level.**

Second, **initiating a loss and damage project usually requires a feasibility study to assess its long-term viability.** However, funding for feasibility studies is often lacking though it is crucial to assess not only the feasibility of the project, but also its social and economic dimensions. Without implementing research and feasibility studies, it may be challenging to identify the linkages between secondary and tertiary impacts as well as the overall impacts of climate change. This could also lead to difficulty in accessing funding for a broader scope of loss and damage interventions, including non-economic losses.

Third, **most countries have weak institutional arrangements and coordination among the governments.** For example, there is a strong coordination gap between the Bangladesh Ministry of Environment, Forest, and Climate Change and the Ministry of Disaster Management and Relief in addressing loss and damage due to climate change. Establish intersectoral coordination or platform, particularly for sectors that will be affected by loss and damage is critical. Improving coordination at the national and sub-national levels is necessary for both state and non-state actors. Strengthening the capacity of local Non-Governmental Organizations (NGOs) or Civil Society Organizations (CSOs) that have substantial on-the-ground experience in implementing post-disaster relief and rehabilitation activities is necessary to include loss and damage spectrum in their programs.

Identifying measures and encouraging finance for loss and damage interventions are critical in addressing loss and damage at different levels, ranging from individual to global. Combining those measures can be considered to develop holistic adaptation and loss and damage strategies, for example, combining social protection with anticipatory action, risk reduction with risk transfer, and offsetting loss and damage with long-term rehabilitation.

Table 1. Examples of Measures in Financing Loss and Damage Interventions (CPRD, 2025)

Level	Measures
Individual/ Household	Micro-saving/savings, micro-insurance/ insurance, micro-credit/credit, home insurance, business insurance
Community	Group insurance, group savings, community-level climate risk management fund
National	Disaster relief fund, social protection, catastrophe bonds, insurance schemes, climate bonds, climate risk management fund, sovereign risk transfer pool
Regional	Multi-country sovereign risk transfer pool, climate bonds, catastrophe bonds
Global	Loss and damage fund, global climate risk insurance initiative, climate bonds, catastrophe bonds

05. Discussions

Several issues that were further discussed in the session are related to the followings:

A. Challenges in Accessing Loss and Damage Finance

Although there has been notable progress in mobilizing international climate finance for mitigation and adaptation, funding for addressing loss and damage due to climate change is still limited and currently faces structural challenges. **The establishment of the FRLD marks a significant milestone, however there are still ongoing concerns about the fund's transparency, accessibility, and effectiveness,** particularly for communities in the Global South that are most vulnerable to climate impacts.

One of the critical issues raised was the lack of clarity regarding the fund's disbursement mechanism. While a total of USD 788.80 million[12] has been pledged to the FRLD, only USD 351 million has been delivered to date. Furthermore, a substantial portion of this funding is allocated to administrative and operational costs, including the newly established secretariat. In its latest decision (B5), the Board of FRLD committed to disburse USD 250 million directly to climate-vulnerable countries, with a guarantee that 50% will go to SIDS and LDCs. However, **there is still no precise mechanism on how this funding will reach climate-affected communities at the grassroot level.**

There are also concerns that the FRLD will rely on existing access structures, such as National Implementing Entities (NIEs) and Multilateral Implementing Entities (MIEs), similar to those used by the Green Climate Fund (GCF) and Adaptation Fund (AF). While these entities may facilitate large-scale project implementation, they often do not enable meaningful community engagement or local ownership. As a result, community voices and priorities may remain disconnected from the funding process.

12 As of June 30th, 2025, the amount has been pledged to the FRLD (https://www.frld.org/pledges).

Since there is still no clear mechanism on how the FRLD can effectively reach local communities, the associated systems for monitoring, reporting, and accountability remain unclear. Without a well-defined structure to guide how resources are disbursed and evaluated, it becomes difficult to determine whether funding meets local needs or contributes to climate justice. **This highlights the urgent need for more inclusive, community-centered approaches that prioritize direct access, empower civil society, and ensure that funding is both traceable and accountable to those most affected by climate impacts.**

B. Bridging Humanitarian Support and Non-Economic Loss and Damage

Humanitarian responses have traditionally focused on immediate relief for sudden disasters, such as floods or earthquakes. However, they are not well-suited to address long-term and less visible impacts, such as cultural displacement, the loss of traditional livelihoods, or the erosion of social identity, that often result from gradual climate stressors like drought, sea-level rise, or desertification. It was recognized that humanitarian efforts must evolve to include not just emergency relief, but also long-term interventions that reflect everyday challenges and transformations experienced by those on the frontlines of climate change.

For example, in Kenya, pastoralist communities have been forced to abandon their traditional way of life due to climate stressors. Livestock deaths caused by drought have not only undermined their economic stability but also disrupted their cultural identity and social status. In pastoralist societies, animal ownership represents more than economic asset: it is deeply tied to prestige, social recognition, and intergenerational identity. A person with many animals is considered wealthy and respected, while those without are often marginalized. When they collapse, families are compelled to shift alternate livelihoods, such as fishing. While this transition may provide economic survival, it also Some individuals have transitioned into new livelihoods, such as fishing – a shift that carries profound cultural consequences, particularly in societies where wealthas the role and status are traditionally tied to livestockanimal ownership are lost. **These kinds of transformations underscore the importance of addressing non-economic loss and damage as part of the humanitarian and climate response framework.**

This evolving reality has exposed significant institutional and financial gaps. Existing humanitarian financing frameworks – largely designed for short-term emergency relief – do not have a **clear responsibility to respond to slow-onset climate impacts or to address non-economic impacts (e.g., displacement and migration, child marriage, child labor).** Moreover, many humanitarian actors and climate finance practitioners operate in silos, even within the same country or government. The lack of coordination between different frameworks – such as the UNFCCC and the Sendai Framework for Disaster Risk Reduction under UNDRR – also has hindered efforts to design holistic solutions. These institutional divides are mirrored in government structures, where different ministries may handle humanitarian and climate responses separately.

Some humanitarian actors are already advocating for stronger integration between humanitarian assistance and climate finance systems, pushing for reforms in how funding is mobilized, monitored, and delivered. Ongoing internal discussions within humanitarian organizations seek to align loss and damage financing with humanitarian aid frameworks, promote awareness of climate impacts, and expand the definition of humanitarian need to include slow-onset and non-economic losses. **New tools, such as loss and damage markers, are also being introduced to better identify and track loss and damage-related interventions across funding portfolios.**

C. Bridging Humanitarian Support and Non-Economic Loss and Damage

The global rise in greenhouse gas emissions shows no sign of slowing down, pushing the climate system into uncharted territory where uncertainty is high and risks are escalating. In this context, the cost of inaction continues to grow, making immediate mitigation is essential. **The tools and knowledge to act are already available, yet the challenge lies in mobilizing them effectively.** Adaptation, too, can no longer remain at the planning stage. It must advance into concrete implementation, guided by robust scientific data and responsive climate services.

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A key issue in climate action implementation is the use of climate data, especially localized applications such as river basin monitoring. While national observation systems are designed primarily for broad meteorological purposes, they are not always suited to meet the specific spatial needs of various sectors. For instance, rainfall variability within a single district may significantly affect hydrological calculations. Nonetheless, historical climate data remains essential for designing sectoral interventions, particularly in water source management. One widely used approach involves blending ground-based (in situ) measurements with satellite-derived data to produce more reliable estimates of historical rainfall patterns. While both data sources have limitations, their combined use can improve coverage and accuracy. Furthermore, current practice emphasizes the need to move forward with sector-specific climate applications even in the absence of perfect data, as long as uncertainty remains within acceptable thresholds. In practice, it is important to keep developing climate-related solutions for different sectors – such as water, health, or agriculture – even if the data is imperfect. As long as the level of uncertainty is still within a reasonable range, these applications can provide useful guidance and benefits. Additionally, Hhistorical climate measurements that are provided from institutions such as Indonesia Agency for Meteorology, Climatology, and Geophysics, should continue to serve as a valuable foundation for decision-making across key sectors, including water, health, and forestry.

Current adaptation and climate-related projects often focus only on primary impacts, relying on a risk-based narrative. **However, a more comprehensive approach is needed, one that includes assessments of both adaptive capacity and the inability to adapt.** Understanding these dimensions allows for a more complete picture of vulnerability through a bottom-up assessment process. By conducting such assessments at the community and sectoral levels, it becomes possible to identify both economic and non-economic aspects of loss and damage.

Strengthening technical systems in climate-related information must be aligned with improving governance structures. Many countries continue to face institutional fragmentation, where ministries and sectors operate in silos. **Therefore, advancing efforts to address climate change impacts into an integrated national framework requires stronger coordination across all levels.** Central ministries should guide sectoral agencies to develop loss and damage response plans that are country-driven but also designed in a way that facilitates access to align with both national priorities and international support mechanisms, such as the Santiago Network and FRLD, so that international resources can directly support national priorities. At the same time, engaging directly with frontline sectors through bottom-up initiatives will ensure local context in implementing effective responses.

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Indonesia Research Institute for Decarbonization

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