



Summary for Policy Makers

CLIMATE CHANGE LOSS AND DAMAGE IN INDONESIA

Assessment on its Status of Knowledge, Governance, and Management Framework

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Mercy Corps Indonesia

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INTRODUCTION

Although mitigation efforts have been intensified to limit the global temperature rise below 2 degrees Celsius—as committed by countries under the Paris Agreement—and adaptation efforts have been pursued to the greatest extent possible to address avoidable climate change impacts, the reality is that some impacts remain unavoidable. As such, there is a need to address “loss and damage” resulting from climate change impacts that cannot be prevented or avoided. Loss and damage have become a crucial component in the global effort to tackle the consequences of climate change.

This Summary for Policy Makers (SPM) presents the key findings and highlights from the document *“Climate Change Loss and Damage In Indonesia: Assessment on its Status of Knowledge, Governance, and Management Framework”*, developed by Mercy Corps Indonesia as part of the Zurich Flood Resilience Alliance (ZFRA) program funded by the Zurich Foundation. The study was conducted to assess the current knowledge on climate change impacts in Indonesia, identify potential institutional gaps, review the scope of current adaptation and disaster risk reduction (DRR) efforts, and explore response framework options for addressing climate-related loss and damage. The SPM aims to support policy makers in better understanding climate-related loss and damage issues and in formulating more effective, evidence-based policies. The full study is accessible via the [following link](#).



UNDERSTANDING LOSS AND DAMAGE DUE TO CLIMATE CHANGE

The Paris Agreement uses the terms “averting, minimizing, and addressing” to frame the concept of loss and damage due to climate change:

Averting	Minimizing	Addressing
Averting or preventing the emergence of climate risks to reduce the likelihood of future loss and damage due to climate change, including by avoiding greenhouse gas emissions.	Minimizing climate risks and impacts to reduce loss and damage as a result of climate change by adapting social, economic, and environmental systems to lower vulnerability.	Addressing loss and damage of unavoidable impact, residual impacts and also those occurred because of the inability to implement adaptation measures.
<i>Examples:</i> renewable energy use, forest protection and rehabilitation, public transportation improvement	<i>Examples:</i> climate-resilient infrastructure strategies, utilization of seasonal and weather forecasts, climate-responsive farming method, technology development, ecosystem-based adaptation, disaster risk reduction	<i>Examples:</i> community relocation, risk transfer through climate insurance, social protection, reconstruction and repairs, socio-economic rehabilitation, preservation of culture and living resources

In reality, global strategies and actions aimed at averting and minimizing the impacts of climate change have proven insufficient, leading to the emergence of loss and damage. Inadequate mitigation efforts have exacerbated global warming, making it increasingly difficult to avoid current risks and impacts. While minimizing impacts through adaptation and disaster risk management is essential, many developing countries remain constrained by limited budgets and ineffective policies. As a result, adaptation efforts often remain fragmented, small-scale, and reactive to current and short-term risks.

Efforts to avert and minimize impacts can only partially address avoidable climate change impacts. The loss and damage that must be addressed stem from unavoidable impacts, residual impacts from adaptation, and impacts arising from the inability to adapt. The ‘loss and damage’ concept in the Paris Agreement specifically refers to these residual and unavoidable consequences of climate change.



Notes:

*) IPCC AR5 states that most adaptation in developing countries that are vulnerable to climate change is ‘partial, small-scale, designed to respond to existing impacts and short-term risks’

**) Relocation efforts due to permanent coastal inundation have not been fully regulated in disaster management schemes, nor in climate change adaptation. Schemes that are possible through area management must be carried out by semi-self-help, which means placing additional burdens on the affected communities

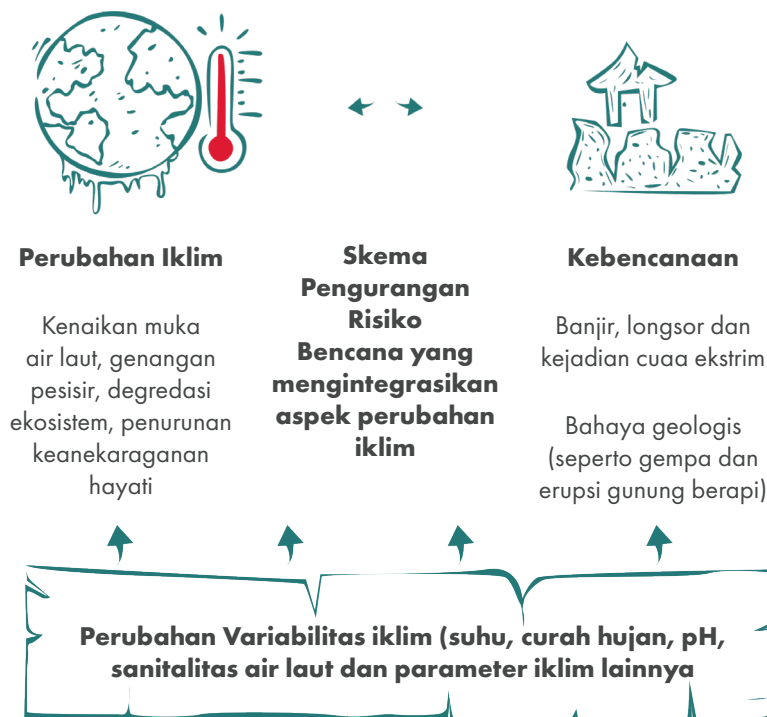
Ringkasan Kerangka Kerja Kebijakan, Dampak dan Celah pada Konsep Kehilangan dan Kerusakan (Zurich Flood Resilience Alliance, 2023)

Loss and Damage in the Context of Disasters and Climate Change

The concept of “loss and damage” in the context of disaster risk management and climate change are closely related, as climate change and its impacts can significantly increase disaster risks—particularly those triggered by climate-related events (hydrometeorological disasters). However, there are fundamental differences in how loss and damage are understood and addressed within each of these two contexts, especially in terms of focus, impacts, and the characteristics of the events.

- » In terms of focus and impacts, within the disaster risk management context, *loss* is defined as the change in economic flows (goods and services) due to a disaster event, while *damage* refers to the total or partial destruction of physical assets located in the affected area. In the context of climate change, *loss* encompasses irreversible impacts on human life, including fatalities, biodiversity loss, and indirect socio-economic effects on livelihoods, communities, cultures, and nations. Meanwhile, *damage* typically refers to direct and/or repairable impacts on livelihoods, infrastructure, and ecosystems (Mechler et al., 2019).
- » In terms of event characteristics, events or phenomena can be categorized as *rapid onset* or *slow onset*, depending on their duration and the progression of their occurrence. *Slow onset* phenomena arise from long-term, gradual changes in climate variability or parameters, taking place consistently over decades (e.g., sea level rise, permanent coastal inundation, ecosystem degradation, or the decline and/or loss of biodiversity due to rising surface temperatures). *Rapid onset* events occur when climate variability—exacerbated by climate change—affects the frequency and intensity of extreme weather, such as hydrometeorological disasters (e.g., floods, landslides, wildfires, strong winds). These events occur suddenly and over short durations. However, not all rapid onset disasters are triggered by changes in climate variability. Only those disasters driven by climate change are considered *climate-induced disasters*, forming the intersection between disaster risk reduction and climate change contexts.

Rapid and Slow Onset Events in the Context of Climate Change and Disaster



For events that lie at the intersection of disaster and climate change, the concept of loss and damage from the disaster perspective may still apply. However, if an event recurs or persists over the long term and results in residual and unavoidable impacts, then the loss and damage framework from the climate change perspective must be applied. This condition necessitates an adjustment of existing Disaster Risk Reduction (DRR) schemes to better integrate climate change aspects.

Hydrometeorological Disasters in Indonesia and Associated Loss and Damage

- » Indonesia's Disaster Data and Information (DIBI), managed by the National Disaster Management Agency (BNPB), recorded a significant increase in disaster occurrences over the last decade (2011 – 2021). In 2019, there were 3,868 disaster events, rising to 4,977 in 2020. An estimated 90–94% of these were hydrometeorological disasters.
- » The annual economic losses from disasters can reach up to 30.83% of the national GDP (MoEF, 2020)¹. Average losses per disaster event were approximately IDR 633 billion for floods, IDR 108 billion for landslides, and IDR 1.5 billion for droughts (BNPB, 2019 as cited in MoEF, 2020).
- » According to BNPB, between January 1 and December 13, 2020, approximately 6.1 million people were affected and displaced by disasters. There were 360 fatalities, 42 people reported missing, 532 injured, and 41,903 houses damaged.
- » The City and District of Pekalongan have long suffered from flood runoff and tidal flooding (rob). Between 2002 and 2020, a total of 66 flood events were recorded (BNPB, 2020)². In 2020 alone, economic losses due to flooding in the Greater Pekalongan area were estimated at IDR 1.55 trillion, with an inundated area covering 1,478 hectares (MCI, 2022)³
- » By 2035, it is projected that approximately 90% of the area of Pekalongan City and most coastal areas in Pekalongan District will be at risk of flooding. The total land area at risk is estimated between 5,200 and 5,700 hectares, with total potential losses reaching IDR 31.28 trillion (MCI, 2022).

DEVELOPMENTS IN THE GLOBAL CONTEXT OF LOSS AND DAMAGE DUE TO CLIMATE CHANGE⁴

Developing countries, particularly those with limited resources (financial, human, technological, institutional, and policy-related), face significant constraints in pursuing all three climate actions—mitigation, adaptation, and addressing loss and damage—simultaneously. Even undertaking one of these efforts effectively can place a considerable burden on national budgets.

Small Island Developing States (SIDS) and Least Developed Countries (LDCs) have consistently urged developed countries—whose emissions are historically responsible for climate change—to take responsibility and support efforts to address ongoing loss and damage.

- » Loss and damage were officially recognized at COP19 under the UNFCCC. The Warsaw International Mechanism for Loss and Damage (WIM) was established at COP19 to address loss

Potential Global Funding for Climate-Induced Loss and Damage

Currently, funding under the United Nations Framework Convention on Climate Change (UNFCCC) includes the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF), the Adaptation Fund (AF), and the Green Climate Fund (GCF).

Outside the UNFCCC framework, relevant financing mechanisms for addressing climate-induced loss and damage include disaster risk financing managed by the Global Facility for Disaster Reduction and Recovery (GFDRR), the Global Risk Financing Facility (GRiF), and multilateral development banks. Another emerging climate finance mechanism is the Global Shield initiative.

Most of these funds are focused on the first two pillars of climate action—averting and minimizing—while financing for addressing loss and damage remains scarce.

¹ KLHK. (2020). Roadmap Nationally Determined Contribution (NDC) Adaptasi Perubahan Iklim. Jakarta (ID).

² BNPB (2020), Indonesian Disaster Data and Information Website, BNPB

³ Mercy Corps Indonesia. 2022. *Kajian Risiko dan Dampak Iklim Daerah Aliran Sungai Kupang, Pekalongan*.

⁴ "Climate Change Loss and Damage In Indonesia: Assessment on its Status of Knowledge, Governance, and Management Framework" which serves as the reference for this document, was prepared in 2023; therefore, the discussion on global developments related to Loss and Damage refers to that baseline year.

and damage caused by climate change. **WIM served as an institutional foundation for global governance on loss and damage**, however its performance has been widely seen as inadequate, particularly due to insufficient attention to financing.

- » **To strengthen governance, the Santiago Network on Loss and Damage (SNLD) was established at COP25** as part of the WIM. The SNLD **aims to catalyze the mobilization of technical assistance to address loss and damage**. However, the issue of funding remained unresolved, with no consensus reached on financing for the network or implementation mechanisms for mobilizing technical support.
- » **At COP27, governance for loss and damage achieved a significant milestone. Agreements were reached not only on the need for financing but also on the establishment of a dedicated funding arrangement and a specific loss and damage fund, along with its implementation mechanisms.**

FRAMEWORK FOR THE ASSESSMENT OF CLIMATE CHANGE IMPACT AND LOSS AND DAMAGE IN INDONESIA

To manage loss and damage in a targeted and effective manner, it is essential to understand the continuum of climate impact response—when efforts fall within the scope of averting and minimizing, and when actions must shift toward addressing loss and damage.

In the context of loss and damage, identifying the magnitude of potential losses requires focusing on *adaptation limits*—thresholds beyond which adaptation is no longer sufficient. Determining these limits involves monitoring existing impacts and projecting risks resulting from climate change. Currently, the impacts and risks of climate change are not yet fully understood or addressed through appropriate response strategies, largely due to limitations in data and research. However, several existing approaches and tools are available to monitor hazards and assess climate impacts.

- » **Hazards Monitoring.** In terms of governance and institutional roles, regional disaster management agencies (BPBD) are primarily responsible for monitoring hazards by documenting and responding to hydrometeorological disaster events. The National Disaster Management Agency (BNPB) consolidates this information through the DIBI platform. Within the climate change framework, the Meteorological, Climatological, and Geophysical Agency (BMKG) and several universities play more active roles in monitoring climate parameters and related hazards. Hazard monitoring includes both long-term projections (10, 20, 30, or even 50 years ahead) and short-term forecasts based on historical climate data.

Existing Gaps: In the disaster response context, hazard monitoring is primarily retrospective, focusing on events that have already occurred, with limited attention to future risks; In the climate change context, climate projections at the provincial or district/city levels are only available for a limited number of regions in Indonesia, typically due to donor or development partner support; Maritime climate parameter projections are especially limited, handled by a small number of oceanography experts at ITB and BIG (weather monitoring stations and data on maritime climate parameters remain scarce compared to atmospheric parameters).

- » **Climate Change Impacts Monitoring.** Climate change impact monitoring includes both living (biological) resources (such as coral reef ecosystems, mangroves, marine fisheries, and biodiversity) and non-living (physical) environmental elements (such as coastline erosion, coastal inundation, and small island submersion). In contrast, disaster response systems monitor direct hazards—floods, landslides, tropical cyclones, and other threats that immediately endanger human lives and physical assets.

Existing Gaps: Indonesia's 2020–2045 Climate Resilient Development Plan (PBI) includes assessments of coastal inundation and corresponding mitigation measures, however the plan lacks consideration of climate change impacts on marine fisheries and coastal biodiversity; Data and studies on the effects of climate change on living or biological resources remain limited, making it difficult to understand the full scope of impacts at both ecosystem and species levels.

Currently, most available information on climate-induced loss and damage in Indonesia stems from hydrometeorological disasters (rapid onset). Monitoring of *slow onset* phenomena remains very limited.

- » **Instruments to Assess Loss and Damage from Climate Change.** Indonesia does not yet have a dedicated tool for assessing climate-related loss and damage. However, the Ministry of Environment and Forestry (MoEF) has issued Regulation No. 7 of 2018 on Guidelines for Assessing Climate Vulnerability, Risks, and Impacts. These guidelines can serve as a reference for assessing climate change vulnerability and risks, forming the basis for understanding the potential for climate-induced loss and damage. Meanwhile, the disaster management framework already includes several tools for assessing damage and losses caused by disaster events (rapid onset), applied at different disaster stages: Disaster Risk Assessments, Rapid Disaster Assessments, and Indonesia's Post-Disaster Needs Assessment (JITU PASNA). However, these tools have limitations in terms of the types of disasters analyzed, analytical parameters, and assessment periods. While disaster risk assessments can estimate potential future damage and loss, they rely on historical hazard data. In contrast, assessments of climate-related loss and damage must incorporate future climate projections (e.g., temperature, rainfall, sea level rise, and other climate parameters).



GAPS IN ADDRESSING THE IMPACT AND LOSS AND DAMAGE FROM CLIMATE CHANGE

As previously described, gaps remain in current efforts to address climate change and its associated loss and damage. Existing policies and institutional frameworks to tackle the climate crisis only address a portion of known climate change impacts. Many other potential impacts—particularly on natural (living or biological) resources—are still poorly understood. For example, in coastal ecosystems, long-term impacts of climate parameters on coral reefs and marine fisheries are neither well studied nor widely available.

Loss and damage to non-living or physical ecosystems are more visible. Coastal erosion and the permanent inundation of low-lying coastal and small island areas are already occurring and clearly observable. Nevertheless, Indonesia still lacks comprehensive calculations of the rates of inundation and erosion across all coastal areas. Current monitoring is limited to a small portion of the coast. Instead of systematically monitoring the rate of island submergence (for example, using satellite imagery), small islands are typically only monitored by the Ministry of Marine Affairs and Fisheries (KKP), once they have been fully submerged if there is a report from community. Furthermore, no government institution has formally designated this type of monitoring as part of its core mandate.

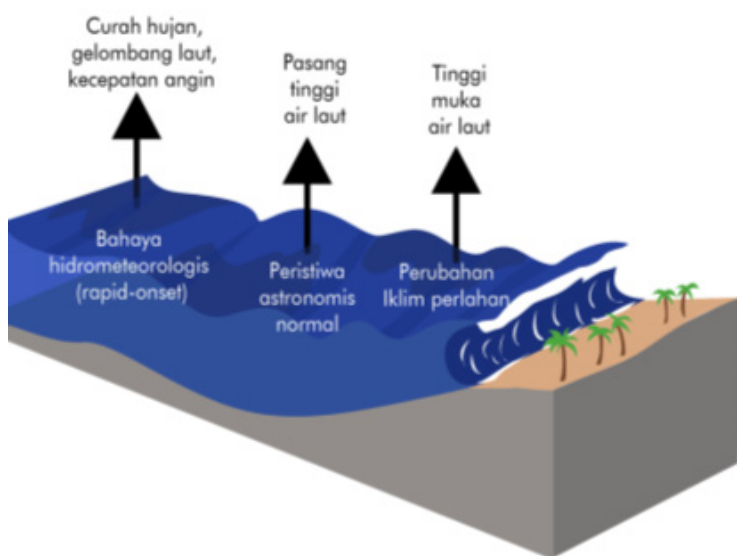
Weak Response to Slow Onset Phenomena: Case Study of Coastal Inundation

Tidal flooding (*rob*) and permanent coastal inundation have already caused significant loss and damage in several low-lying coastal areas of Indonesia. The impacts of such hazards are expected to increase and affect wider areas across the country.

High-tide flooding occurs several days each month throughout the year in low-lying coastal areas such as Pekalongan District and City, Semarang City, Demak District, Tegal City, and Jakarta. In addition to climatic and oceanic variability, these areas are also experiencing land subsidence, partly due to excessive groundwater extraction and underlying geological conditions.

However, permanent coastal inundation caused by *rob* has never been formally designated as a disaster. High-tide flooding rarely damages buildings, but it harms crops, disrupts livelihoods, and affects daily life. The quality of infrastructure and housing also deteriorates over time. Local governments typically declare a disaster only when the flooding is caused by heavy rainfall, river overflow, or storm surges, as stipulated in Indonesia's Disaster Management Law No. 24 of 2007.

Within the BPBD reporting system, the 'flood' category does not distinguish between causes such as sea level rise and rainfall. Likewise, the 'tidal wave/coastal erosion' category does not differentiate between waves, tides, and abrasion. Future disaster classifications and reporting must distinguish between *coastal flooding caused by sea-level rise, flooding due to rainfall and river overflow, combinations of both, and permanent coastal inundation*.



Penurunan Permukaan Lahan di Pesisir Dataran Rendah



FRAMEWORK FOR ADDRESSING THE LOSS AND DAMAGE FROM CLIMATE CHANGE

Some local governments have begun planning and implementing adaptation efforts based on the national climate adaptation action plan, which has evolved into the Climate Resilient Development Policy. However, despite these efforts by various actors, residual impacts are still being felt. Communities continue to face crop failures, maritime accidents, reduced income, climate-induced illnesses, ecosystem damage, property loss, and saltwater intrusion into agricultural land. These conditions are worse in areas with minimal adaptation measures.

A range of strategic options for addressing climate-related loss and damage have been identified and assessed in this study. These options consider the types of climate impacts and their feasibility, taking into account the availability of knowledge, human resources, and funding in Indonesia.

Options of Relevant Strategies to Address Loss and Damage from Climate Change

- 1. Adaptive Social Protection (ASP).** ASP schemes are suitable for rapid onset impacts and help reduce losses experienced by vulnerable groups post-disaster, such as through cash assistance. This strategy is relevant for addressing loss and damage such as death, illness, income loss, mental health challenges, and reduced earnings for farmers and fishers due to climate anomalies.
- 2. Management of affected areas,** through ecosystem rehabilitation, physical structure for coastal protection, settlement relocations and spatial planning. Regulating land use in high-risk areas should be part of responsible regional spatial planning. Inter-regional relocation programs should be considered as national initiatives that ensure suitable land and economic ecosystem support.
- 3. Environmental management policy** which covers conservation, genetic bank, moratorium of natural resources utilization. Coastal area management plans should integrate prevention and mitigation efforts for the loss and damage of natural resources. Reducing pressure on ecosystems and intervening at the species level—particularly for those affected by rising temperatures or other climate parameters—are actionable options.
- 4. Risk transfer,** among them through climate insurance. Insurance premiums should be determined based on an inventory of assets and their values. However, slow onset risks are difficult for the insurance industry to quantify, making product development challenging.

Key Stakeholders in Addressing Climate Change Loss and Damage

The Ministry of Environment and Forestry (KLHK), the National Development Planning Agency (Bappenas), and the Ministry of Finance (Kemenkeu) will play critical roles in implementing various strategies. The Ministry of Social Affairs (Kemensos), the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN), the National Disaster Management Agency (BNPB), and several sectoral ministries—such as the Ministry of Marine Affairs and Fisheries (KKP), Ministry of Agriculture (Kementan), and Ministry of Public Works and Housing (KemenPUPR)—will support the implementation of the loss and damage response framework. KLHK will be particularly involved in managing slow onset loss and damage.

To increase private sector engagement in addressing climate impacts, efforts can begin with raising awareness about climate-related hazards within their operational areas. Greater benefits can be achieved when companies collaborate with local communities facing similar climate risks.

A large number of civil society organizations and individuals are already running climate change adaptation programs at the village/community level, as well as disaster management activities



- 5. International diplomacy/dialogue.** This involves two key issues: climate change impacts on national borders and on transboundary natural resources, particularly marine fisheries and freshwater sources.
- 6. Fostering public private partnership through business continuity plan.** Medium and large-scale businesses often integrate disaster risk reduction into their BCPs, but few have considered climate change risks. The government can help identify and remove regulatory or policy barriers that hinder BCP implementation and offer incentives for BCPs that involve communities.
- 7. Strengthening the current climate adaptation measures.** Maximize efforts to minimize residual risks through enhanced adaptation strategies.

It is important to note that each of these policy and strategy options to address loss and damage comes with its own challenges—such as financing constraints, a restrictive framework of duties and functions, or limited availability of data and research. Therefore, strong commitment and actions to bridge these gaps are essential to enable effective implementation.

FOLLOW-UP RECOMMENDATIONS

Preparedness for addressing loss and damage caused by hydrometeorological disasters (*rapid onset events*) is relatively more advanced than for impacts from long-term, gradual climate change (*slow onset events*). Indonesia must develop a deeper understanding of the potential loss and damage that may occur across different regions as a result of slow onset climate impacts. Given the current gaps and anticipated needs, the following follow-up recommendations are proposed to strengthen Indonesia's capacity to address climate-related loss and damage:

- » Promote enhanced efforts for data collection, research, and response to long-term climate change impacts. Special focus should be placed on understanding slow onset phenomena and the associated loss and damage they cause.
- » Ensure climate projections are available for all districts and municipalities to enable the integration of climate change into spatial and development planning. This must be supported by strengthened stakeholder capacity to conduct and interpret climate projections.
- » Clarify institutional responsibilities for monitoring and analyzing climate-induced loss and damage, particularly in coastal and marine areas, and improve inter-agency coordination mechanisms.
- » Begin planning for a 'retreat from the coast' policy to reduce long-term loss and damage risks in vulnerable coastal zones.
- » Respond to the already visible permanent coastal inundation in various regions by conducting risk and impact assessments, including the potential for people displacement, and preparing relocation sites for affected communities.
- » Develop financing schemes to address slow onset climate change impacts and their consequences.

About Mercy Corps Indonesia

Mercy Corps Indonesia is a local organization that empowers Indonesian society to develop healthy, productive, and resilient communities. We help communities to recover from the crises they experienced and turn it into an opportunity to upgrade their life quality. Developed based on local needs, our program helps communities across Indonesia with the instruments and supports they really need.

In Indonesia, Mercy Corps has assisted more than 1 million people spread across various regions since 1999. Established as a local foundation in 2012, Mercy Corps Indonesia leveraged all expertises passed down by Mercy Corps to help poor and vulnerable communities in urban and rural areas. Mercy Corps Indonesia provides emergency aid and long-term programs to rebuild better by improving community governance, economic resilience and opportunity in various challenging and difficult regions across the country.

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