

RDI Working Paper

Climate-Responsive Social Protection and Multidimensional Poverty: Lessons from Indonesia

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1 Introduction

In recent decades, climate change has emerged as a critical threat that not only causes severe environmental and biodiversity crises but also hampers sustainable development. Evidence shows that global economic productivity peaks at an annual average temperature of approximately 13°C and declines thereafter, implying that developing countries with “warmer” temperatures suffer disproportionate output losses (Burke et al., 2015). Global warming has also increased comparative inequality by almost 25% over the past half-century (Differbaugh & Burke, 2019). Yet, economic metrics alone cannot capture the full effects of climate shocks. For example, climate variability disrupts children’s schooling, reducing educational attainment (Randell & Gray, 2019), while climate-induced disasters, such as floods, increase the risks of hunger and malnutrition (Mirzabaev et al., 2023). These examples illustrate how climate change influences poverty and inequality in ways that income-only measures cannot fully capture.

The Multidimensional Poverty Index (MPI) offers a nuanced framework for examining the intersections of poverty, inequality, and climate change, even among households not classified as income-poor (Alkire & Santos, 2014). This approach, with dimensions of health, education, and living standards, is particularly relevant for disaster-prone regions where vulnerabilities are multidimensional (Roche, 2013). The literature emphasises the importance of incorporating MPI into poverty alleviation, as it captures factors beyond household income. Building on this, the paper argues that climate-responsive social protection should account for livelihoods and asset ownership as investment functions for the future.

Indonesia offers a critical case. With more than 2,300 disasters recorded annually, it is one of the most disaster-prone countries in the world, second only to the Philippines (BNPB, 2023; World Risk Report, 2024). Disasters disproportionately affect vulnerable groups, particularly those dependent on agriculture, fisheries, and informal services. For example, floods in Indonesia have damaged educational infrastructure, reduced teacher availability, and increased the risk of dropout (Lassa et al., 2022). Climate shocks, such as droughts and erratic rainfall, undermine food security, heightening the risks of stunting and wasting among children (Thiede & Gray, 2021). These multidimensional effects underscore how climate change deepens poverty and undermines development gains.

On the other hand, Indonesia has made notable investments in social protection, building one of the largest systems in Southeast Asia. Programs like the Family Hope Program (*Program Keluarga Harapan/PKH*) have yielded measurable gains in schooling uptake and health outcomes, demonstrating their potential during crises. However, most remains primarily reactive, providing relief only after disasters, with limited anticipatory triggers or pre-arranged financing to prevent short-term shocks from becoming long-term deprivations (OECD, 2019). Moreover, research on Social Protection in Indonesia has focused mainly on income-based poverty, leaving limited evidence on how social protection addresses multidimensional deprivations in the context of climate change.

In response, Indonesia has begun exploring Climate-Responsive Social Protection (CRSP), also termed Adaptive or Shock-Responsive Social Protection (ASP/SRSP). CRSP integrates anticipatory, scalable, and climate-aware mechanisms into existing programs, such as cash transfers, public works, and insurance, aiming to both protect households during shocks and build long-term resilience (World Bank, 2020; ODI, 2025). Yet, much of the literature remains largely conceptual, focusing on design principles while offering limited systematic evidence of impacts.

Two key research gaps emerge. First, existing literature does not comprehensively evaluate whether and how CRSP prevents losses across multiple dimensions of deprivation during crises. Second, little is known about the adaptiveness of CRSP interventions and their influence on household coping

strategies. Although initial studies have assessed Indonesia's social protection system for climate adaptability (Gasior, Wright, Barnes, & Noble, 2024), further research is required to determine impacts on health, nutrition, and living standards.

This paper seeks to answer the question of "How does Climate-Responsive Social Protection (CRSP) reduce multidimensional poverty and inequality in climate-prone contexts?" It makes three primary contributions. First, it advances academic debates by linking the MPI framework with research on climate risks and social protection, an underexplored nexus in Southeast Asia. Second, it provides policy-relevant evidence on how CRSP can mitigate climate shocks that exacerbate multidimensional deprivation. Third, it positions Indonesia as a critical case study, drawing lessons for other climate-exposed countries and contributing to global discussions on inclusive, climate-resilient poverty reduction strategies.

The structure of the paper is organized as follows: Section 2 outlines the methods and data, Section 3 reviews key frameworks, including MPI, from literature, Section 4 presents the Indonesia's climate risk and social protection system, Section 5 assess current programs' and policies adaptability to be climate-responsive within the MPI framework, Section 6 proposes the pathway to embed climate-responsive into MPI and Section 7 concludes.

2 Methodology

To address the research question, this study employs a qualitative approach to explore the effectiveness of Indonesia's Climate-Responsive Social Protection (CRSP) framework in reducing multidimensional poverty in climate-prone settings. Specifically, this study combines a comprehensive desk review, content analysis, and case study approach to investigate how social protection programs function as safety nets in mitigating the socio-economic impacts of the interconnected nature of disasters and climate change. The study begins with a comprehensive literature review that serves as the foundation of the research. The review draws from a wide range of peer-reviewed journal articles to establish the theoretical foundations of climate-responsive social protection and the multidimensional poverty framework. It also includes international documents from major development institutions that examine the evolution of social protection systems responsive to global risks. In addition, Indonesian national policy and planning documents were analysed to assess how the government has integrated climate-responsive approaches into its social protection agenda. Earlier literature from the 1990s to 2000s was used to explain foundational theories and conceptual frameworks, while references from 2010 to 2025 were reviewed to capture more recent evidence, empirical findings, and policy developments. The scope of the literature review covers four main themes: (1) CRSP-related policy and program framework, (2) climate risk impact, (3) poverty alleviation and multidimensional poverty, and (4) social protection system in the context of climate change.

These documents include, but are not limited to, various types of sources relevant to the research. Policy and legal frameworks encompass laws, presidential decrees, and national development plans, such as the National Long-Term Development Plan (*Rencana Pembangunan Jangka Panjang Nasional/ RPJPN*). Government reports include program evaluations, official statistics, and publications from ministries and agencies, notably the National Disaster Management Agency (*Badan Nasional Penanggulangan Bencana/BNPB*) and the Central Bureau of Statistics (*Badan Pusat Statistik/BPS*). Academic and research publications on climate change and its impacts, Indonesia's social protection systems, social protection programs, and poverty reduction include peer-reviewed articles and reports from research institutions and non-governmental organisations (NGOs). Additionally, several international studies and relevant grey literature provide valuable insights,

including reports from organisations such as the World Bank, the United Nations Development Programme (UNDP), and various United Nations bodies focused on climate-related issues.

The analysis applies a multi-layered approach that integrates content and descriptive analysis methodology with a case study. The content and descriptive analysis are used to examine whether and how CRSP prevents climate shocks from exacerbating multiple deprivations, particularly in health, education, living standards, livelihoods, and assets, and further analyse the adaptability of existing social protection programs, as well as generate policy lessons to strengthen climate-resilient poverty reduction strategies in Indonesia and other countries vulnerable to climate change. To strengthen the validity of the findings, the research will incorporate triangulation by cross-referencing data from multiple sources. For example, information on program outcomes from government reports will be compared with findings from academic studies and NGO evaluations. This multi-source analysis, combined with the examination of programs in diverse contexts across Indonesia, will ensure the study captures the complexity and varied impacts of CRSP implementation on vulnerable populations, thereby providing a robust and well-supported conclusion.

3 Theoretical Framework

3.1 The concept and policy development of social protection in addressing climate risks

This study looks at how social protection has evolved, moving from addressing regular poverty to incorporating climate-responsive policies. It takes into account both monetary and multidimensional poverty, emphasising how climate risk affects the population's vulnerability and investigating how Climate-Responsive Social Protection (CRSP) might mitigate these effects.

Regular social protection approach

One important tool of public policy is social protection, which aims to ensure the satisfaction of basic needs, reduce vulnerability, and protect against socioeconomic risks. Originally intended to serve as safety nets, they evolved in the 1980s and 1990s into tools for improving income and temporarily reducing poverty (Costella et al., 2023; Kuriakose et al., 2013). According to Davies et al. (2009) and Devereux & Sabates-Wheeler (2004), social protection has four purposes: protection, prevention, promotion, and transformation. Three categories can be used to categorise the scope of social protection programs in relation to this function:

- **Social Assistance.** Non-contributory support in the form of cash transfer, food, housing, subsidies, and other basic service access, which has a protective function to guarantee minimum consumption of the family and prevent worse poverty (Barrientos, 2010; Devereux & Sabates-Wheeler, 2004).
- **Social Insurance.** Contributory programs, such as health insurance, accident coverage, pension, and unemployment support, respond to individual risks along the human life cycle, ensuring decent living standards. As such, social insurance has a preventive function: to prevent the possibility of new vulnerability arising from that individual risk (Amaral et al., 2019; Barrientos, 2010; Holmes and Scott, 2016; Putri, 2014).
- **Social Empowerment.** Improve the capacity of poor and vulnerable communities to be freed from poverty through skill training, small business support, and community strengthening. The

empowerment function is not only promotive but also transformative, as it aims to build competitiveness and reduce social exclusion (Supriyanto et al., 2014).

Regular social protection mainly addresses individual risks (idiosyncratic risks) throughout the life cycle, such as demographic risks (pregnancy, illness, ageing without savings), economic risks (job loss, low productivity), and social risks (exclusion, discrimination) (Holzmann & Jorgensen, 2000; Devereux & Sabates-Wheeler, 2004; ILO, 2018; Laws, 2016; Putri, 2014).

Climate vulnerability and the needs of a more responsive and adaptive social protection scheme

Climate vulnerability reflects sensitivity, limited adaptive capacity, and structural inequities that intensify the negative impacts of climate hazards, thereby transforming climate change into a strong risk multiplier (IPCC, 2023). Risks that occur due to climate change cause risks that last as long-term trends impacting society and systems with weak adaptive, socio-economic, and institutional capacity. The impact of climate change is significant on many sectors, including:

- Health: increasing infectious disease (e.g., malaria, dengue) and heat-related disease, malnutrition, and mortality (Watts et al., 2021).
- Employment: decreasing economic productivity due to heat stress, loss of jobs in agriculture, fisheries, and nature tourism (ILO, 2019).
- Food: variability of rainfall and drought reduces crop yields, worsening the food security of poor households (FAO, 2016).
- Housing & infrastructure: floods and storms destroy physical assets, trigger internal and cross-border migration (Warner & Afifi, 2014).

Addressing these issues forced social protection programs to move beyond individual risks to include structural threats to livelihood sustainability, especially for poor and vulnerable communities, since extreme events not only decrease productivity and income but also damage basic livelihood assets (IPCC, 2022; FAO, 2016). Climate risks exacerbate poverty for vulnerable groups by eroding assets and consumption, thereby weakening adaptive capacity and increasing the likelihood of falling into new poverty (Clarke & Dercon, 2016). Vulnerable groups such as the poorest, women, children, persons with disabilities, and informal workers are disproportionately affected, deepening multidimensional poverty and widening inequality, with evidence showing that climate impacts are particularly severe for these groups (UNDP & OPHI, 2024).

To address this, social protection systems must evolve beyond individual risks to also consider covariate risks, which affect larger populations over longer periods and with greater intensity, requiring adaptive mechanisms (Holzmann & Jorgensen, 2000). A climate-responsive social protection framework should therefore not only react to crises but also proactively reduce long-term vulnerabilities by meeting four key needs: accelerating the speed of response, enabling scalability of coverage during widespread shocks, ensuring inclusivity for vulnerable communities through assistance and insurance, and securing fiscal sustainability through ex ante financing, disaster risk financing, and contingency planning (Clarke & Dercon, 2016).

Climate vulnerability and the needs of a more responsive and adaptive social protection scheme

Climate-Responsive Social Protection (CRSP) integrates climate risk management and social protection, thereby aligning with objectives related to adaptation, disaster risk reduction, and the development of resilience (Kuriakose et al., 2013). CRSP's approach transcends mere reactivity to systemic shocks, situating social protection as an integral component of climate resilience, which is achieved by means of an explicit integration of climate-aware planning, adaptive financing, and investments in long-term resilience (McCord et al., 2025) encompassing preventive, protective, promotive, and transformative functions.

Kuriakose et al. (2013) established three CRSP core principles.

- Climate-aware planning integrates projected climate risks into long-term strategies.
- Livelihood-based approaches with interventions to bolster the full array of human, financial, social, and natural resources.
- Structural resilience is imperative to not only provide temporary relief but also enable communities to adapt structurally to a changing climate.

According to the work of McCord et al. (2025), the CRSP includes scalable programs with flexible coverage, climate-responsive targeting systems, livelihood programs, and financing mechanisms that link social protection to climate finance. As such, CRSP offers a comprehensive conceptual framework for prevention, protection, and promotion (Loewe & Schüring, 2021).

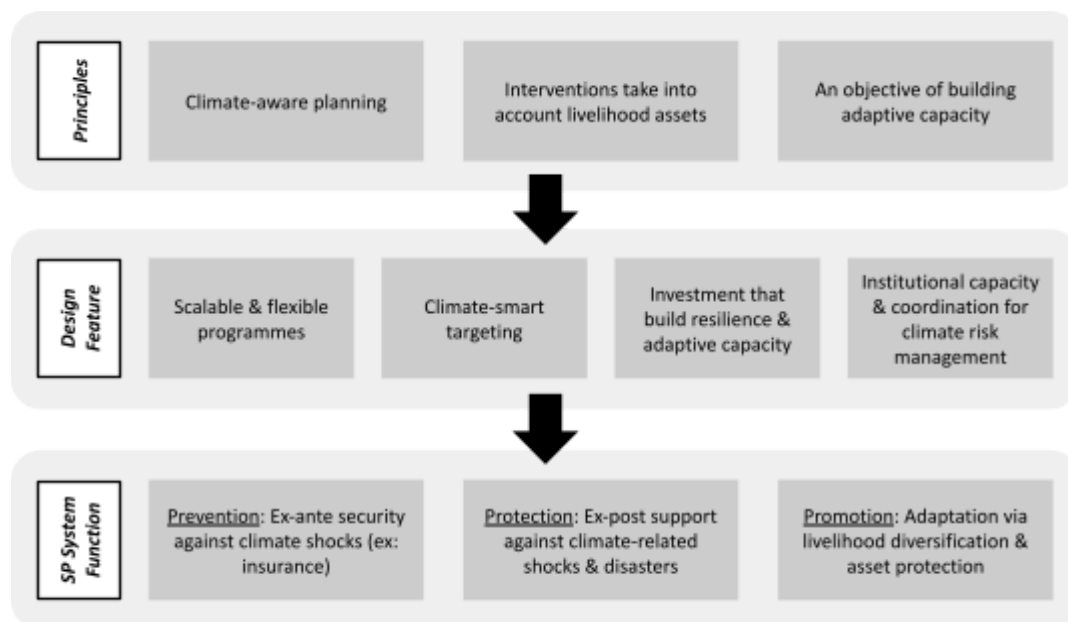


Figure 1. CRSP Framework (Modified)

Adapted from (Kuriakose et al., 2013)

Ownership of movable assets such as livestock, savings, or production tools buffers households against climate shocks while their absence pushes negative coping strategies such as reducing food intake, pulling children out of school, or selling long-term productive assets (Béné et al., 2014; Carter et al., 2007). Productive cash transfers, credit, and skills or business support enhance adaptive capacity, protect livelihoods, and build climate-resilient assets, emphasising long-term asset building and livelihood diversification (Banerjee et al., 2015). Thus, responding to climate vulnerability is not only short-term consumption protection, but also long-term asset building and livelihood diversification.

3.2 Multidimensional poverty approach

Poverty measurement often relies on a monetary approach, using poverty lines to represent minimum basic needs. However, this approach has several limitations: it overlooks non-financial factors like safety, education, and health; household income distribution might not account for basic necessities; and it is challenging to measure income accurately in developing nations (Alkire et al., 2023; Asselin, 2009; Thorbecke, 2013). As a result, focusing only on income may misclassify poverty and mask true deprivation (Alkire et al., 2023). First, measuring poverty based solely on income or consumption has limitations because it fails to capture various non-monetary aspects that are not always available in the market, such as health, education, and safety. Second, the allocation of income is highly dependent on individual preferences, so sufficient income does not necessarily mean that basic household needs are met. For example, instead of improving their living conditions, some household heads may choose to spend their income on cigarettes, alcohol, or gambling. Another technical reason that adds to the limitations of this approach is the fact that it is difficult to accurately measure individual income levels, mainly in developing countries (Asselin, 2009). Therefore, using income as the sole proxy for welfare has the potential to produce biased poverty classifications that do not reflect actual deprivation in the community (Thorbecke, 2013).

The capacity approach by Amartya Sen (1990), on the other hand, considers the freedom of individuals to choose and achieve functions that they value, such as living a healthy life, obtaining an education, and living in a safe environment. According to this framework, poverty is understood not merely as a lack of income, but as a deprivation of capabilities that limits a person's life choices. This is the reason why multidimensional poverty measures are needed—to overcome the blind spots of money-metric methods and better capture overlapping deprivations.

The Multidimensional Poverty Index (MPI) was first developed by Alkire and Santos (2014) for the 2010 Human Development Report as an effort to measure poverty that is not merely based on income. The MPI framework utilises the Alkire-Foster method with the dual cut-off principle. This index is calculated by multiplying the headcount ratio (H), which is the proportion of the population classified as multidimensionally poor, by the intensity of deprivation (A), defined as the average proportion of deprivation experienced by poor households. Compared to traditional approaches, the MPI not only identifies who is living in poverty but also reveals the breadth and depth of deprivations they experience. This makes it a more comprehensive and policy-relevant tool for designing targeted poverty reduction strategies (Dotter & Klasen, 2017).

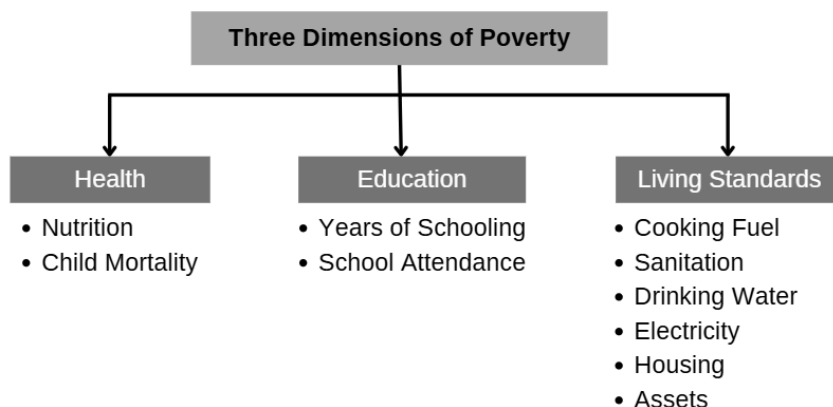


Figure 2. Dimensions and indicators of MPI (Modified).

Adapted from (Oxford Poverty & Human Development Initiative, 2018)

Figure 2 illustrates three key dimensions used in measuring the Multidimensional Poverty Index (MPI) to represent basic human needs: health, education, and standard of living, each given a weight of one-third (Oxford Poverty & Human Development Initiative, 2018). The MPI's advantage lies in its decomposable nature, which enables analysis of the contribution of each dimension as well as comparisons between regions and social groups (Dotter & Klasen, 2017). The condition of deprivation in each MPI indicator has not been derived purely theoretically, but rather through a process of normative and practical adjustments based on the availability of survey data and the selection of relevant proxies. As explained in the global MPI methodology, several indicators have been revised due to data limitations in many countries, and in cases where additional information is not available, adjustments have been made to the definition of deprivation (Alkire, Kanagaratnam, & Suppa, 2020; OPHI, 2020; Suppa & Kanagaratnam, 2025).

The MPI has been used in many countries and through national adaptations, including in Indonesia. In the Indonesian context, it is clear that the indicators and deprivation thresholds in the MPI often undergo normative and technical adjustments to suit the availability of local data and the relevance of proxies (OPHI, 2024). These adjustments include revising the definitions of indicators or cut-offs to ensure that the measured deprivation truly reflects conditions on the ground. Consequently, while MPI has the strength to consistently capture multidimensional poverty, indicators are required to be continuously updated, added to, or reduced to keep pace with socio-economic changes and national data capacity.

Vulnerability is strongly correlated with multidimensional poverty because deprivation in basic attributes exacerbates the impact of shocks and generates long-term cumulative effects. For instance, child malnutrition not only leads to stunting, lower educational performance and reduced future productive capacity. In a dynamic framework, many dimensions are complementary and reinforce each other (Thorbecke, 2013). This explains the emergence of the poverty trap, where temporary shocks can have permanent consequences, such as the loss of human capital. Debate has emerged as to whether vulnerability is a separate dimension or part of poverty. Vulnerability derived from chronic poverty and vulnerability arising from temporary risks or shocks. Nevertheless, both are often interrelated in practical terms since poor households tend to have a portfolio of attributes that make them more vulnerable to shocks, making it difficult to clearly separate poverty and vulnerability.

3.3 Conceptual framework: climate-responsive social protection and its role in addressing multidimensional poverty

From the monetary perspective, social protection reduces poverty through three main mechanisms: stabilising consumption via cash or in-kind transfers (Bastagli et al., 2016), managing life-cycle risks through health insurance, old-age security, and pensions (Putri, 2014), and enhancing human capital through social empowerment programs (Supriyanto et al., 2014). Evidence from a systematic review across 30 countries shows that cash transfers lower poverty while improving food consumption, education, health access, and savings (Bastagli et al., 2016). Similarly, the graduation approach that integrates transfers, assets, training, and financial access has increased consumption, income, and livelihood diversification in six countries (Banerjee et al., 2015).

Social protection also plays an important role in reducing multidimensional poverty through protective, preventive, promotive, and transformative functions. Public insurance schemes reduce the risk of catastrophic spending and improve health access (OECD, 2019), while conditional cash transfers increase school participation and child nutrition (Fiszbein & Schady, 2009). Food assistance, energy subsidies, and housing programs reduce deprivation in living standards (Devereux & Sabates-Wheeler, 2004; Davies et al., 2009). The promotive function encourages investment in education and skills, while the transformative function reduces structural inequality and social exclusion (Holzmann & Jorgensen, 2000). Overall, social protection has been proven effective in reducing multidimensional poverty and has become an important pillar of inclusive and sustainable development (UNDP & OPHI, 2024).

Looking at the impacts of climate change that strongly influence various sectors, we assess that there are additional dimension components that need to be considered to adapt the climate-responsive social protection approach capable of addressing community vulnerability due to climate risks. As mentioned in various literature, climate risks have strategic impacts on health, employment, food, housing, and infrastructure (FAO, 2016; ILO, 2019; Warner & Afifi, 2014; Watts et al., 2021). In general, most of these components have been addressed in the MPI approach by categorising multidimensional poverty from health, education, and living standards. However, there are two aspects that have not been much discussed regarding MPI from the side of climate risk impacts, namely livelihood sustainability and ownership of movable assets.

Livelihood sustainability in this case is not only seen from the monetary or income side, but it is also an important part of human life concerning identity, self-capacity, competitiveness, and even socio-cultural values of a community group. Sustainable livelihoods are a crucial foundation for the adaptive capacity of households and communities to shocks, where this sustainability is highly influenced by the availability, diversification, and security of sources of livelihood (Chambers & Conway, 1992; Béné et al., 2014). In the context of climate change, threats to livelihood sustainability are evident in natural resource-based sectors, where crop failure, environmental degradation, and decreased labour productivity due to extreme heat directly imply loss of income, forced migration, and the disruption of socio-economic networks (FAO, 2016; ILO, 2019; Warner & Afifi, 2014; Watts et al., 2021).

In addition, ownership of movable assets, such as savings, livestock, production tools, or small investments, has also been proven to determine household adaptive capacity, because these assets

can be mobilised to maintain basic consumption and support recovery after shocks. The absence of assets often leads to negative coping strategies, including selling productive assets, reducing food consumption, or withdrawing children from school, which in turn deepens the cycle of poverty (Carter et al., 2007; Clarke & Dercon, 2016). In MPI literature, asset ownership has not been explicitly mentioned as movable assets or assets that have investment functions. Therefore, including livelihood sustainability and asset ownership dimensions in the multidimensional poverty framework based on climate risks becomes important so that social protection is not only reactive, but also proactive in building long-term resilience of communities.

By combining the CRSP approach and adding dimensions in multidimensional poverty caused by climate risks, this paper formulates a conceptual framework that places social protection as a strategic instrument to prevent, protect, and promote household adaptive capacity. This framework emphasises that CRSP not only targets poverty dimensions already included in the Multidimensional Poverty Index (health, education, and living standards), but also explicitly integrates livelihood sustainability and asset ownership as critical components vulnerable to climate risks (Chambers & Conway, 1992; Bebbington, 1999; Kuriakose et al., 2013; McCord et al., 2025). In climate-induced disaster emergency situations, the provision of emergency provisions, either in the form of cash or in-kind assistance, has proven crucial to help households meet basic needs and prevent negative coping strategies, as implemented in the shock-responsive social protection system (O'Brien et al., 2018; IFRC, 2022). Thus, CRSP is positioned as a social protection strategy that strengthens resilience through climate-sensitive planning, adaptive financing mechanisms, and long-term investment in human, social, financial, and productive asset portfolios. This approach allows social protection to function in two ways: as a short-term buffer to maintain household consumption and as a long-term catalyst for more inclusive and sustainable multidimensional poverty reduction (Loewe & Schüring, 2021; Banerjee et al., 2015; Béné et al., 2014; Carter et al., 2007).

Figure 3 shows an illustration of the climate-responsive social protection framework and its role in addressing multidimensional poverty.

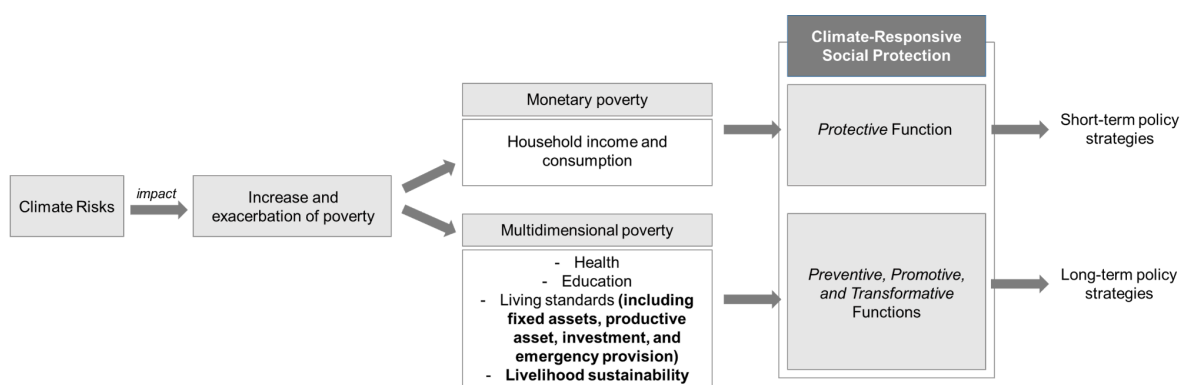


Figure 3. Conceptual framework of the climate-responsive social protection and its role in overcoming multidimensional poverty

Source: Authors, 2025

4 Indonesian Context: Climate Risk and the Social Protection System

4.1 Climate Risks and Socio-Economic Impacts in Indonesia

Indonesia faces significant vulnerability to climate change due to its distinctive geographical position, encompassing over 17,500 islands with diverse climates and topographies, compounded by the risk of earthquakes and tsunamis. According to the National Agency for Disaster Management (BNPB) website (<https://data.bnpb.go.id>), Indonesia recorded 2,467 disaster events from January to September 2025. The sheer scale of these events resulted in 354 lives lost, 589 injured, and ~4.9 million people affected and displaced. However, the official disaster data from agencies like the BNPB and the Central Bureau of Statistics (Badan Pusat Statistik/BPS) primarily focuses on rapid-onset events, such as floods and earthquakes. This lacks comprehensive data coverage for slow-onset climate impacts like sea level rise and gradual coastal erosion, which are significant climate hazards, according to the World Bank (2025). As a result, the long-term, cumulative effects of climate change on vulnerable populations and infrastructure are underrepresented, hindering effective long-term adaptation planning, especially for impoverished communities that often depend directly on natural resources for their livelihoods (Miller et al., 2020).

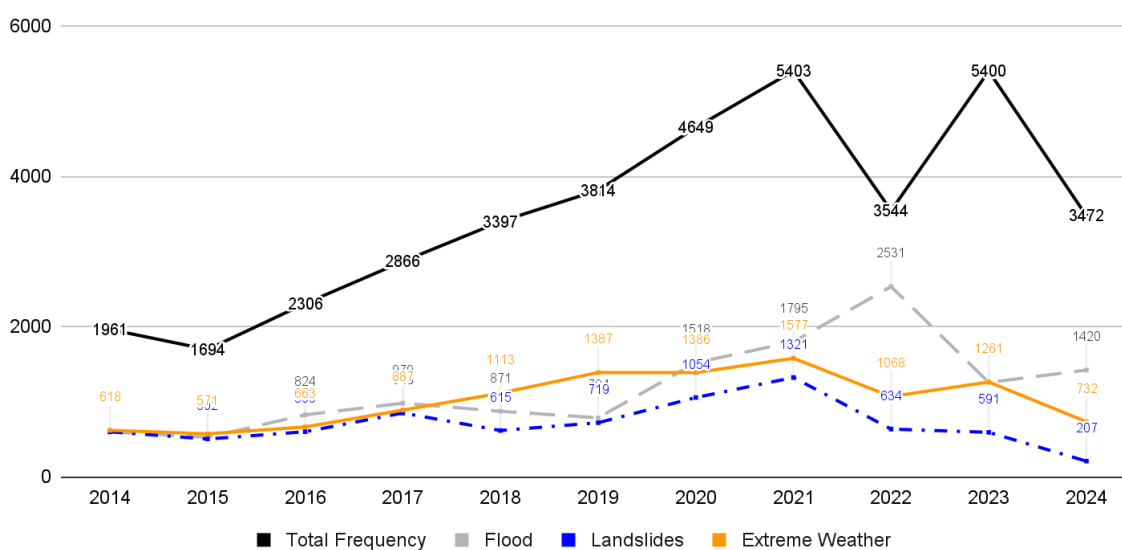


Figure 4. Indonesia's Hazard Trend 2014-2024

Source: BNPB

Coastal communities, which contribute USD 26.9 billion annually through fishing and agriculture, are particularly at risk (World Bank, 2023). The regency of Demak on Java's north coast serves as a crucial case study, facing a devastating confluence of rising sea levels and land subsidence that has led to significant land loss and population displacement. The World Bank (2025) reports that Indonesia has experienced an approximately 13-centimetre rise in sea level since 1993. This rise, intensified by coastal flooding, is already causing significant population displacement, with the local

government of Demak Regency reporting that tidal flooding in Demak alone displaced around 10,000 people in 2022. A study by Mahya et al. (2021) assessed that land loss would be the most significant economic impact, primarily affecting agricultural land, with 4,867 hectares projected to be lost by 2040.

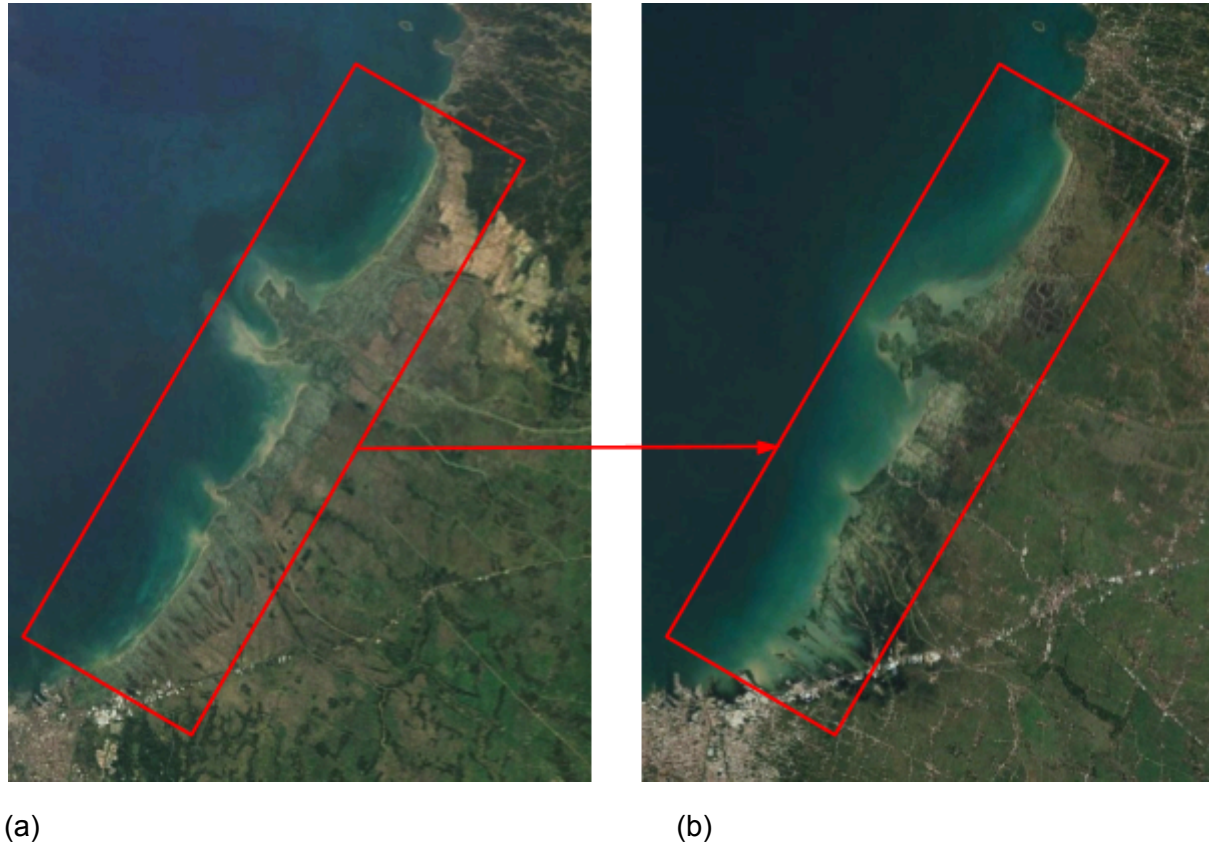


Figure 5. Map of Demak Regency in 1992 (a) and 2020 (b)

Source: Google Earth, n.d.

Furthermore, the agriculture sector, highly dependent on climate, is facing reduced yields due to rising temperatures and shifting rainfall patterns (World Bank, 2025). Rising temperatures heightened the risk of pest and disease outbreaks, exacerbating the impact alongside other risks such as drought, flood, and saltwater intrusion (World Bank, 2023), leading to crop failure and income loss. The resulting economic instability, particularly from a decline in agriculture and fisheries, deepens poverty for marginalised communities who lack the financial means to cope. This creates a vicious cycle where climate risks increase vulnerability, in turn diminishing the capacity to adapt and recover from future shocks.

4.2 Social Protection Programs as a Mechanism for Climate Resilience

Social protection is a vital development instrument that helps communities prevent, adapt to, and recover from shocks while strengthening household assets and resilience (TNP2K, 2023). It comprises three main components: social assistance, social insurance, and labour market programs

(Bowen et al., 2020). Social assistance, funded by government budgets, provides non-contributory support—cash or in-kind transfers—primarily targeting vulnerable populations at higher risk of poverty (Norton et al., 2001; Sagala et al., 2025). Social insurance encompasses contributory schemes such as health, pensions, and unemployment benefits, offering a safety net during crises, including illness, retirement, or income loss (Bappenas, 2014; Sagala et al., 2025). Complementing these, labour market programs aim to enhance skills, productivity, and work experience, fostering economic empowerment and long-term self-sufficiency (Sagala et al., 2025).

Indonesia's development commitment is enshrined in the National Long-Term Development Plan (RPJPN) 2025–2045, which explicitly emphasises the importance of achieving social transformation through the strengthening of the social protection system (Bappenas, 2023). Further, Indonesia's social protection roadmap, as articulated in existing development policy documents, already points toward efforts to strengthen Adaptive Social Protection (ASP). ASP is not merely a poverty-reduction instrument but is also designed to build the resilience of poor and vulnerable households against various types of shocks, including disasters and climate change (Bowen et al., 2020; Davies et al., 2009).

Over the past fifteen years, Indonesia has significantly expanded its social assistance programs to provide protection for the poor and vulnerable (Holmemo et al., 2020). This commitment has been realised through the development and implementation of both social assistance and social insurance programs. Regular social assistance initiatives, such as the Family Hope Program (PKH), Non-Cash Food Assistance (BPNT/Sembako), Rice Assistance, and the Integrated Prosperous Housing Program (RST), have played an essential role in fulfilling the basic needs of poor households. In parallel, the government has advanced adaptive social assistance schemes that are more responsive to disasters and climate change. Prominent examples include Adaptive PKH, Social Rehabilitation Assistance (ATENSI), the National Economic Heroes Program (PENA), Subsistence Allowances (Jadup), Direct Cash Transfers (BLT) for Food Risk Mitigation, Social Granaries, as well as community-based initiatives such as Disaster Preparedness Villages (KSB) and Disaster Preparedness Cadets (TAGANA). These programs are specifically designed to enhance the adaptive capacity of vulnerable communities, whether through support for basic consumption, post-disaster recovery, or long-term economic empowerment.

Alongside social assistance, the government has also developed social insurance programs under the framework of the National Social Security System (SJSN). This system encompasses the National Health Insurance (JKN), Old-Age Savings (JHT), Pension Benefits (JP), Employment Injury Benefits (JKK), and Death Benefits (JKM). Complementing these, insurance-based protection schemes—such as those for fishermen, farmers, and livestock breeders—offer coverage against crop failures, livestock mortality, and business losses induced by climate variability. Although their scope remains limited, these initiatives constitute an important step toward the integration of climate adaptation considerations into the broader social protection system.

Looking ahead, the policy direction of social protection emphasises several strategic priorities. First, strengthening the one-data system to ensure accuracy in targeting, particularly through the integration of the Unified Social Welfare Data (Data Terpadu Kesejahteraan Sosial/DTKS) with the National Identification Number (Nomor Induk Kependudukan/NIK). Second, fostering integration between social assistance and social insurance programs to increase their adaptability to shocks, including the expansion of Adaptive PKH and BLT for Food Risk Mitigation. Third, broadening the reach of programs such as ATENSI, PENA, KSB, and Social Granaries to reinforce community capacity in addressing disaster and climate risks. Fourth, improving access to social insurance for informal

workers, farmers, and fishermen, who remain highly vulnerable yet insufficiently covered by formal protection schemes.

The social protection approach in Indonesia, in general, has already accommodated the protection function against individual risks comprehensively throughout the human life cycle. Existing programs have targeted individual vulnerabilities based on age groups, namely toddlers, school children, children who have just graduated and are about to continue to the next level, people of productive age, and the elderly. In addition, existing social protection programs have sought to provide protection for vulnerable groups, such as the poor, persons with disabilities, children, and the elderly (Rahayu et al., 2018; TNP2K, 2020). However, these programs still tend to be fragmented across separate sectors. Likewise, programs related to climate adaptation have not yet been fully integrated with social protection programs, so Indonesia can be said not to have an integrated program as climate-responsive social protection (Krismiyaningsih et al., 2024). In relation to this, the existing social protection programs still do not provide protection for middle-class groups and those who are at the borderline of the poverty line. In fact, the impact of climate risks has a strong influence on them, which, if not given the right protection, will cause them to lose assets and reduce their level of well-being (Krismiyaningsih et al., 2024; Larasati et al., 2025).

5 Findings

To reduce poverty, Indonesia offers a variety of social assistance, social insurance, and social empowerment initiatives. The degree to which these initiatives integrate climate risks varies; some are still not adaptive, while others are making progress toward climate responsiveness, and a smaller group is already climate responsive.

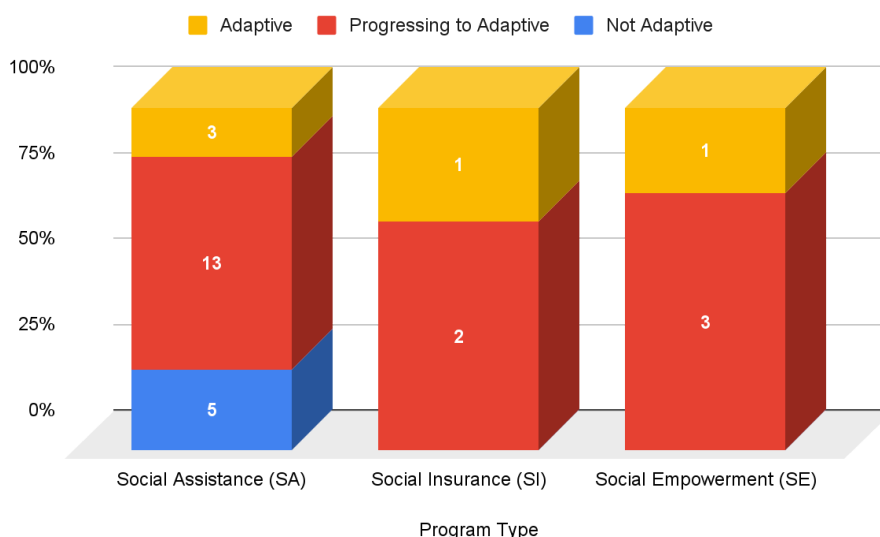


Figure 6. Social Protection Program's Climate Adaptivity based on the Type of Program
Source: Authors, 2025

The results show that there are 28 programs in Indonesia's social protection landscape that are associated with the three MPI dimensions: 3 social insurance programs, 5 social empowerment initiatives, and 21 social assistance schemes. This indicates that the system is primarily focused on

providing short-term coping support and poverty alleviation rather than long-term risk sharing. Four social assistance programs are not adaptive, thirteen are moving toward adaptation (e.g. PKH and Social Granary), and four are already adaptive and incorporate climate factors like renewable energy. There are fewer social insurance programs, with one being adaptive (e.g. Paddy Farming Insurance) and two progressing to adaptive. Lastly, social empowerment programs emphasise community readiness. Three of these programs advance to adaptive status by enhancing local emergency response and disaster preparedness, and one is fully adaptive (Climate Village Program/Proklam), illustrating locally operationalised community-driven climate risk reduction.

When viewed as a whole, these programs show social safety nets that are slowly adapting to climate change, but are still primarily focused on addressing immediate poverty and post-disaster needs. A clear tool for identifying gaps and opportunities for mainstreaming climate risk is within the accompanying table (see Table 2), which summarises each program's contribution to poverty reduction and climate adaptivity.

5.1 Dimensions of Poverty: Health

Nutrition

Nutrition is a vital dimension of poverty reduction, as inadequate intake directly affects child growth, health, and long-term human capital. Social protection and health services play an important role by easing household costs and improving access to basic care, ensuring poor families can secure essential nutrition and maternal-child health services. Preventive aspects are also present, as requirements for regular health visits encourage immunisation, growth monitoring, and healthier practices, contributing to reductions in child stunting (Kusuma et al., 2017; Hadna, 2022). Support mechanisms for vulnerable households, including emergency or rehabilitative assistance, can further help secure additional food or basic nutritional needs, indirectly supporting nutritional intake and household resilience. However, the promotion function remains underdeveloped. Programs rarely address structural drivers, such as household food security, nutrition education, or community-based support systems that could enhance long-term capacity. Climate adaptivity is weak, as assistance often responds reactively to shocks without proactive strategies to prevent nutrition insecurity from floods, droughts, or other climate-related disruptions. Overall, nutrition-related interventions, including rehabilitative and emergency support, provide short-term protection and some preventive gains but are limited in promoting resilience or adapting to climate risks. Future progress requires integrating nutrition strategies with food security and disaster risk management to sustain child and household nutrition amid environmental pressures.

Child Mortality

Reducing maternal and child mortality is a core priority in social protection and health services, as limited access to safe deliveries and neonatal care directly threatens survival. Protection functions are visible through mechanisms that reduce the cost of childbirth and emergency care, enabling poor households to access health facilities with trained personnel. Preventive effects are also significant, as conditional requirements for antenatal care, immunisations, and growth monitoring increase the use of maternal and child health services, lowering risks of unsafe deliveries and infectious diseases (Nugraheni et al., 2020; Cahyadi et al., 2020). Nevertheless, promotional aspects remain limited. Most interventions are curative and do not systematically build household or community capacity to cope with long-term reproductive and child health risks. From a climate perspective, responses are still reactive—covering treatment for complications or disease outbreaks during disasters—rather than anticipatory. Mechanisms to ensure continuous access to maternal and child health services during

floods, droughts, or other disruptions are not yet embedded. Overall, current efforts effectively reduce short-term mortality risks and strengthen prevention, but are weak in promoting resilience or adapting to climate pressures. Integrating climate-sensitive strategies into maternal and child health protection will be essential for sustaining progress.

5.2 Dimensions of Poverty: Education

Years of Schooling

Extending years of schooling is one of the most important efforts in improving human capital, as inadequate access to sustained learning directly contributes to poverty by limiting opportunities for economic and social mobility. By easing economic barriers, interventions strengthen the protection role, ensuring that children from poor households are not forced to leave school early. Preventive effects are also visible, as support during key transition points lowers dropout risks and improves the chances of progression. Over the long term, additional years of learning promote upward mobility by equipping students with skills and credentials that increase future income and resilience (Mulyaningsih et al., 2022). Despite these benefits, climate adaptation within the education dimension remains limited. Most mechanisms are not designed to anticipate disruptions such as floods or heatwaves that can damage facilities and restrict attendance. Evidence shows that, while years of schooling rise under normal conditions, they remain vulnerable when shocks occur (Kartasasmita & Sulistyaningrum, 2021). To sustain progress, education support must embed resilience so that continued learning is guaranteed even under intensifying climate risks.

Child Mortality

School attendance is a key foundation for building human capital, as children must first be present to benefit from learning. Social protection in education has been effective in strengthening the protection function by lowering economic barriers that would otherwise force children out of school. A preventive role is also visible, as sustained support reduces the risk of prolonged absenteeism and ensures smoother progression through the school cycle. Over time, higher attendance contributes to a promotional effect, laying the groundwork for improved educational outcomes and future livelihoods. Most attendance-focused interventions are designed for stable conditions and do not anticipate school closures caused by floods, haze, or other climate-related disruptions. Evidence indicates that while participation rises under normal circumstances, continuity is easily disrupted during shocks (Hartarto & Wardani, 2023). Mechanisms such as flexible assistance, digital learning, or contingency funding are not systematically embedded. As a result, protection and prevention are effective in regular contexts, but adaptation remains limited. Future progress requires embedding resilience so that attendance is maintained even in times of environmental stress.

5.3 Dimensions of Poverty: Living Standards

Cooking Fuel

Several relevant social assistance programs have provided direct and indirect support for access to clean cooking fuel. Indirectly, housing programs and cash transfers increase access by empowering households to buy cleaner fuel and create safe kitchen environments that support cleaner cooking. By substituting subsidised LPG cylinders for kerosene, targeted interventions have stabilised fuel consumption and decreased indoor pollution (World LP Gas & Pertamina, 2012; Thodei et al., 2019). While electrical cooking programs provide contemporary, low-emission substitutes, they rely on grid

stability, energy efficiency, and low-carbon electricity (Kusdiana et al., 2022; Damayanti et al., 2023; Hakam et al., 2022). By turning animal waste into fertiliser and cooking fuel, renewable biogas interventions lower energy costs, reliance on firewood, and greenhouse gas emissions (Bedi, Sparrow, & Tasciotti, 2017). The functional efficacy and climate responsiveness of interventions vary overall, with electronic and renewable cooking technologies having a higher potential for long-term climate adaptivity than methods that rely on fossil fuels.

Sanitation

Even though few social protection programs specifically address sanitation, some do so indirectly by reducing costs or facilitating access to other services. While other social programs provide free resources for sanitation-related needs, cash transfers that require compliance with health and education regulations promote better hygiene practices and may support sanitation improvements (World Bank, 2017). Initiatives run by the community have had a more immediate, transformative impact. The implementation of community-led national sanitation strategies, such as the promotion of handwashing, safe water management, waste management, and the elimination of open defecation, has improved hygiene outcomes and decreased open defecation. There is evidence that the incidence of diarrhoea has significantly decreased as well (UNICEF, 2016; Ministry of Health Indonesia, 2024). Similar to this, community-based water supply and sanitation programs increase water access by 12 percentage points in participating areas by funding local water schemes, promoting household sanitation, and building institutional capacities (World Bank, 2021). However, sustainability is dependent on local budgets and technical capacity (Daniel, Prawira, Al Djono, et al., 2021). Although the primary goal of these initiatives is not climate adaptation, they are moving closer to climate adaptability as resilient design elements and climate-sensitive technical guidelines are increasingly included. In general, the direct effectiveness of interventions varies; community-led and capacity-building approaches have a higher potential for climate resilience and a stronger functional impact than indirect social protection support.

Drinking Water

Although they don't supply water directly, traditional social protection programs help households obtain safe drinking water by relieving financial strains and enhancing WASH services. The effectiveness of community-managed, demand-driven interventions has been more direct: nationwide programs offering grants and technical assistance for small-scale water systems have increased household use of private sanitation and improved water sources, reaching millions across thousands of villages. However, insufficient funding for operation and maintenance or weak technical capacity can sometimes limit functionality (World Bank, 2018, 2019; Septiani et al., 2022; Syahrial et al., 2022; Kusuma et al., 2023). However, issues with informal settlements, governance, and financial sustainability still exist (World Bank, 2017; Hadipuro, 2010; Surya, 2019; Fadillah & Rahmawati, 2021). Urban water utility reforms and piped water expansion have improved access for low-income households and strengthened utility performance. However, climate resilience depends on utilities' ability to secure sustainable raw water and implement adaptive measures like source diversification and watershed protection. Output-based grant schemes that connect impoverished households to piped networks improve affordability and reduce reliance on unsafe or drought-vulnerable sources (World Bank, 2016; IUWASH Plus, 2020; ADB, 2021). With the incorporation of climate-responsive technical, financial, and institutional safeguards, these interventions are generally successful in increasing access to safe water and advancing climate adaptivity.

Electricity

Access to reliable electricity is a critical component of the MPI electricity dimension, as energy deprivation directly constrains household welfare, productivity, and resilience. When evaluated

through the CRSP framework, the indicator demonstrates effectiveness in addressing poverty by reducing reliance on costly and environmentally harmful energy sources, such as kerosene and fossil fuel generators. In terms of functionality, electricity access fulfils a variety of roles. As a form of protection, it enables households to sustain a minimum standard of living during periods of crisis by ensuring the fulfilment of fundamental energy requirements. As a preventative measure, it has been demonstrated to reduce exposure to energy-related shocks by facilitating the transition of communities towards cleaner, more sustainable, and less volatile energy sources. In regard to the promotion of human capital and livelihoods, access to electricity has been demonstrated to engender long-term improvements. This is evidenced by the augmented opportunities for education, small business development, and the preservation of household assets that result from electricity access. These functions demonstrate that electricity access transcends the provision of basic services, thereby enhancing adaptive capacity in the face of climate change. Nevertheless, progress toward full climate adaptability is constrained by systemic challenges. In the absence of reliable infrastructure, adequate technical support, and sustained financing, households face the prospect of reverting to a state of energy deprivation, thereby jeopardising both the reduction of poverty and the enhancement of resilience outcomes. Consequently, while the electricity indicator contributes meaningfully to poverty alleviation and demonstrates pathways toward climate adaptation, its long-term effectiveness is contingent upon the enhancement of system sustainability and the more firmly embedding of climate risk considerations into energy access strategies.

Housing

Adequate housing is a central element of the MPI housing dimension, as substandard or disaster-damaged dwellings directly contribute to poverty by undermining health, safety, and resilience. From a CRSP perspective, the primary function of this indicator is to fulfil the protection function, as interventions are typically focused on the restoration or rehabilitation of homes so that households can regain a basic standard of living following shocks. Furthermore, housing has been shown to possess a considerable preventive effect. Such measures include the integration of flood-adaptive designs, the usage of durable materials, and the incorporation of spatial planning strategies. These elements have been found to mitigate vulnerability prior to the occurrence of disasters. However, in practice, preventive features are often underdeveloped, and housing remains susceptible to recurring damage from climate hazards. The promotion function, which would entail the implementation of long-term strategies such as the integration of adaptive infrastructure, community-based planning, and training in resilient construction, is similarly constrained. Consequently, housing continues to be regarded as a matter of immediate recovery rather than as a foundation for sustained adaptation. Nonetheless, the housing dimension exhibits indications of progress toward climate adaptability. Certain programs incorporate disaster-safe standards, particularly in relation to seismic risks, thereby offering a step toward adaptive protection. To achieve its full potential, however, housing must be redefined not only as a place of shelter but also as a foundation of resilience. This redefined housing must include considerations of climate risk and be promoted at the community level.

Assets

The MPI Asset Dimension is a metric used to assess household access to, protection of, and resilience regarding productive assets. Within the CRSP framework, the asset indicator demonstrates contributions across all three functions. In the context of economic crises, access to assets functions as a form of protection for households, thereby enabling them to maintain their consumption levels and avoid falling into extreme deprivation. Asset ownership has been demonstrated to be a primary mechanism for mitigating exposure to climate-related risks. This is due to the fact that asset ownership provides a resource base that can be mobilised in the event of shocks. For instance,

diversified assets such as land, livestock, or financial capital can spread risk and limit dependency on a single vulnerable livelihood source. The promotion function is equally significant: asset accumulation supports long-term adaptation through business development, livelihood diversification, and intergenerational wealth transfer. Evidence from Indonesia indicates that diversification initiatives linked to asset strengthening can increase household income by 20–40% (Fahrudin et al., 2025), underscoring their role in resilience building. Despite this potential, the asset dimension remains constrained by climate risks that have the capacity to erode or destroy household holdings, leaving families indebted or impoverished. Absent integrated protection measures, assets have the potential to become liabilities in the face of recurrent disasters. Consequently, while the asset indicator contributes significantly to poverty reduction and resilience, its advancement towards climate adaptability is uneven, necessitating the establishment of more robust connections between asset-building strategies and climate risk management.

Livelihood Sustainability

Social protection programs have been put into place with the goal of improving sustainable livelihoods, which help to protect households from the effects of climate change. These initiatives protect households from economic shocks associated with climate-related hazards by bolstering income-generating capacities and offering social security coverage to vulnerable workers. Although some interventions specifically improve livelihoods as a resilience measure, there is still little integration of these interventions with more comprehensive climate adaptation strategies. Although efforts to increase worker coverage show that climate risks are recognised, there is still a lack of systematic integration of climate-responsive planning and adaptation strategies (World Bank, 2023; Pratama & Fadhli, 2023). Though more integration of climate adaptation mechanisms is needed to improve long-term resilience, these livelihood-focused programs are generally making progress toward climate adaptivity.

Emergency Provision

In Indonesia, there are numerous community-based programs that improve climate adaptation and disaster resilience. In order to increase long-term resilience and decrease vulnerability to climate hazards, some programs are fully adaptive, incorporating community-led climate mitigation and adaptation strategies like sustainable agriculture, low-carbon practices, and environmental education (Adaptation Fund, 2023; Transparency Partnership, 2020). While other programs are making strides in adaptivity, improving community preparedness for disasters through volunteer disaster response, emergency response training, and early warning systems, they are still unable to fully integrate long-term climate adaptation strategies (World Food Programme, 2020; CARE, 2015). Other initiatives support community resilience and localised disaster risk reduction, but they are not yet fully adaptive and are moving toward adaptivity, as evidenced by their lack of alignment with more comprehensive climate adaptation policies (PMC, 2021). All things considered, these programs successfully handle urgent disaster needs and are progressively incorporating climate considerations; some have reached adaptive status, while others are still moving toward climate responsiveness.

With many interventions offering short-term protection and some preventive benefits but little promotion and long-term climate resilience, Indonesia's social protection system demonstrates inconsistent efficacy across the multifaceted dimensions of poverty. While conventional social assistance and infrastructure programs continue to be primarily reactive, community-led, demand-driven, and renewable energy-oriented programs show stronger functional impact and greater potential for climate adaptivity. It is clear that climate risk is being gradually integrated into all sectors through resilient design, technical guidelines, and capacity-building initiatives; however, full adaptivity is limited by issues like funding, governance, and infrastructure reliability. The table below

summarises each program's contribution to poverty reduction and climate responsiveness, highlighting areas where interventions are effective, moving toward adaptation, or are fully climate adaptive.

Table 1. Summary of Social Protection Program's Climate Adaptivity based on the Type of Programs

Source: Authors, 2025

Type (SA/SI/SE) Program	Program	Multidimensional Poverty Response	Monetary Poverty Response	Climate Adaptivity	Rationale
Social Assistance	Subsistence Allowance (Jaminan Hidup – Jadup)	Health	Yes	Adaptive	Provides protection by supporting basic food and living needs in post-disaster situations.
	Indonesia Domestic Biogas Program (Biogas Rumah – BIRU/IDBP)	Living Standard (Cooking Fuel)	No	Adaptive	Renewable household energy reduces emissions and costs. Locally adaptive but scale-limited.
	Solar-Powered Light Program (Lampu Tenaga Surya Hemat Energi – LTSHE)	Living Standard (Electricity)	No	Adaptive	Renewable household energy reduces reliance on kerosene and fossil fuel-powered generators. Adaptive but maintenance-limited.
	Indonesia Smart Program (Program Indonesia Pintar – Kartu Indonesia Pintar / KIP)	Education	Yes	Not adaptive	Supports human capital but lacks climate-sensitive design and climate awareness
	School Operational Assistance (Bantuan Operasional Sekolah – BOS Regular, Afiriasi & Kinerja)	Education	Yes	Not adaptive	Sustains education access in normal times but lacks awareness and resilience to climate shocks
	Kerosene-to-LPG Conversion Program (Konversi Minyak Tanah ke LPG)	Living Standard (Cooking Fuel)	No	Not adaptive	Reduced energy poverty and CO ₂ , but promoted fossil-fuel dependent (LPG)
	Supplementary Feeding Program (Pemberian Makanan Tambahan – PMT)	Health	No	Not adaptive	Provides additional meals to improve child nutrition but operates under normal conditions, with no mechanisms to ensure continuity during climate shocks.
	Integrated Health Service Post (Pos Pelayanan Terpadu – Posyandu)	Health	No	Not adaptive	Provides regular maternal and child health services with preventive benefits; some flexibility exists, but climate risk integration is limited.
Family Hope Program (Program Keluarga Harapan – PKH)	Health; Education; Living Standards (Indirectly)	Yes	Progressing adaptive	to Potential to be leveraged as a foundation for more climate-responsive social protection, supporting adaptive	

Social Granary (Lumbung Sosial)	Living Standard (Emergency Provision)	No	Progressing adaptive	capacity indirectly but lacking explicit climate integration.
Social Rehabilitation Assistance (Asistensi Rehabilitasi Sosial – Health ATENSI)		Yes	Progressing adaptive	to Potential to progress toward climate adaptivity with a focus on highly vulnerable groups if reforms are made to integrate climate awareness and the objective to build adaptive capacity.
Nusantara Economic Heroes (Pahlawan Ekonomi Nusantara – PENA)	Living Standard (Sustainable Livelihood)	Yes	Progressing adaptive	to Enhances livelihood as a buffer against climate shock with the potential to be integrated with climate risk and adaptation capacity.
Induction Stove Conversion Program (Program Konversi Kompor Induksi)	Living Standard (Cooking Fuel)	No	Progressing adaptive	to Supports decarbonization if the power sector transitions, but is still vulnerable to grid outages during extreme weather.
Integrated Welfare Housing Program (Rumah Sejahtera Terpadu – RST)	Living Standard (Housing)	Yes	Progressing adaptive	to Improves housing quality and enhances basic protection, yet lacks integration of climate-resilient design and community-level adaptation strategies.
Cash Assistance for Disaster Victims (Bantuan Tunai Korban Bencana)	Living Standard (Housing)	Yes	Progressing adaptive	to Addresses urgent housing needs, but has yet to integrate climate-resilient construction standards to ensure long-term adaptation.
Stimulus Assistance for Damaged Houses (Bantuan Stimulus Rumah Rusak Pasca-Bencana)	Living Standard (Housing)	Yes	Progressing adaptive	to Advances protection through disaster-safe housing, yet remains limited by its focus on seismic risks and lack of broader climate-resilience
Credit for People’s Enterprises (Kredit Usaha Rakyat – KUR)	Living Standard (Asset)	Yes	Progressing adaptive	to Strengthens household assets and incomes through credit access, yet remains constrained by weak integration with climate policy and the absence of ex-post protection mechanisms.
Community-Led Total Sanitation (Sanitasi Total Berbasis Masyarakat (Sanitation)	Living Standard (Sanitation)	No	Progressing adaptive	to Promotes hygiene behavioural change to tackle as well as mitigate climate-risk impact, but lacks uniform, systematic

Disaster Preparedness Cadets Living Standard	(Taruna Siaga Bencana – TAGANA)	(Emergency Provision)	No	Progressing adaptive	Trained volunteers for rapid disaster response, yet its to focus on emergency relief limits its role in sustained climate adaptation.
Disaster Resilient Village (Desa Living Standard No	Tangguh Bencana – DESTANA)	(Emergency Provision)		Progressing adaptive	to Promotes localised disaster risk reduction and resilience, but requires stronger alignment with broader climate adaptation policies and practices.

6 Discussion

Drawing upon an overview of climate-related risks, recent policy developments in Indonesia's social protection landscape, and an analysis of existing programs addressing social protection and climate adaptation, this discussion section explores the multifaceted impacts of climate risks on poverty in Indonesia. It further examines the extent to which these existing programs are aligned with the principles of CRSP. Building on this assessment, the section advances recommendations for strengthening Indonesia's social protection system to enhance its responsiveness to climate risks. The insights derived from this analysis are expected to provide valuable lessons for other climate-vulnerable countries, offering replicable approaches that can inform policy and practice in similar contexts.

Climate risks significantly affect the increase in the incidence and severity of poverty

Climate risks that occur in Indonesia, including floods, tidal floods, droughts, and heat waves, have caused a significant increase in the incidence and severity of poverty. The impacts can be observed both in the increase of poverty from the monetary side and from the multidimensional side. From monetary poverty, climate risks, as also happened in many regions of the world, have caused disruption of income channels due to loss of working hours and productivity, especially in the agriculture, livestock, and fisheries sectors. Not only are income channels disrupted, but climate risks also cause an increase in household expenditures for food, water, and energy consumption, rising health costs, and home repairs after climate disasters occur. In addition, the value of assets also experiences deprivations due to asset sales and the use of savings for emergency consumption. These impacts push households to fall below the monetary poverty line (ILO, 2019; Romanello et al., 2024; ADB & World Bank, 2021).

From multidimensional poverty, climate risks worsen deprivations in health (malnutrition, water- and vector-borne diseases), education (school absenteeism due to disasters or the need to work), as well as living standards (decent housing, sanitation, clean energy) as identified in the Multidimensional Poverty Index (UNDP & OPHI, 2024). As seen in some regions in Indonesia, such as the northern coastal area of Java, sea level rise, tidal floods, and coastal erosion push an increase in forced migration, which further disrupts community access to basic services and social networks (Warner & Afifi, 2014). In cases of drought and uncertain planting seasons, as frequently happens in West Nusa Tenggara and East Nusa Tenggara, the impact can directly affect child nutrition due to increasingly limited food availability (FAO, 2016).

From the livelihood side, climate change has strongly hit the sustainability of livelihoods in the northern coast of Java, one of which is in the Demak District. Sea level rise and increasingly frequent tidal floods not only damage settlements but also flood shrimp and milkfish ponds that are the main source of community income (Marfai et al., 2013; ADB & World Bank, 2021). The damage to ponds reduces productivity, pushes up high repair costs, and forces some communities to switch jobs or migrate, which is not always successful due to limited skills and access to capital. This loss of livelihood worsens household vulnerability and also shows how climate risks directly erode productive assets while narrowing adaptation options of coastal communities.

Existing social protection programs in Indonesia are fragmented, but some have been able to respond to climate risks and address both monetary and multidimensional poverty

The social protection system in Indonesia continues to evolve by adopting the principle of life-long protection and adapting to various risks, as stated in the national development plan 2025–2045. The dominance of social assistance programs such as the Family Hope Program (PKH) and Non-Cash Food Assistance (BPNT) shows a strong orientation toward short-term consumption protection, while social insurance programs such as National Health Insurance (JKN) and Rice Farming Insurance (AUTP) are relatively more limited in coverage (OECD, 2019; ADB & World Bank, 2021). This fragmentation limits the effectiveness of social protection in responding to climate risks that are systemic and recurrent, even though literature emphasises that effective social protection should combine protective, preventive, promotive, and transformative functions to address both monetary and multidimensional poverty (Devereux & Sabates-Wheeler, 2004; Loewe & Schüring, 2021).

Nevertheless, several programs have shown adaptive capacity relevant to the principles of Climate Responsive Social Protection. PKH and BPNT have proven to contribute to health and nutrition dimensions in the MPI, while JKN significantly reduces catastrophic health spending that could otherwise push poor households into deeper vulnerability (Fiszbein & Schady, 2009; UNDP & OPHI, 2024). In addition, PKH itself, which is a strategic social assistance program in Indonesia, actually has additional promotive components, namely family development sessions for its beneficiaries. This shows strategic potential for the future, that PKH family development activities can be accompanied by household capacity building to face climate risks, including efforts to maintain livelihood sustainability, protect assets, and improve understanding of investment.

In the agriculture sector, AUTP becomes an example of a preventive mechanism that integrates climate risks into the insurance scheme by protecting against crop failure due to floods or droughts (ADB & World Bank, 2021). However, most other programs are still oriented toward protective functions, so the capacity to build long-term resilience through promotion of productive assets and livelihood diversification is not yet optimal (Bastagli et al., 2016; Banerjee et al., 2015). In the case of an emergency caused by a climate-induced disaster, the Lumbung Sosial program may help the community to fulfil its logistical needs during the emergency phase.

Interpretations from global literature reinforce this analysis. Evidence from graduation program evaluations shows that interventions combining productive cash transfers, skill training, and small business support increase asset accumulation and household resilience in the long run (Banerjee et al., 2015). Studies on climate vulnerability also highlight the importance of productive assets such as savings, livestock, and production tools that function as buffers against shocks, because the absence of assets often forces households to adopt negative coping strategies that deepen multidimensional deprivations (Carter et al., 2007; Béné et al., 2014). On the other hand, the existence of emergency provisions programs, such as Lumbung Sosial, is crucial to help households meet basic needs and prevent negative coping strategies (O'Brien et al., 2018; IFRC, 2022). In the context of Indonesia, social protection programs still rarely explicitly target asset protection or promotion, leaving an important gap in linking social protection with the climate adaptation agenda.

Thus, Indonesia's experience shows that while social protection has successfully reduced monetary poverty and improved several dimensions of well-being, integration with CRSP principles remains limited. Literature suggests the need for a system that can combine consumption protection, climate risk prevention through social insurance, promotion of productive assets, and structural transformation

to reduce social exclusion (Kuriakose et al., 2013; McCord et al., 2025). By building this connection, social protection will not only function as a safety net after disasters, but also as an adaptation catalyst that can reduce the risk of falling into new poverty, narrow MPI deprivations, and strengthen long-term resilience.

CRSP-related programs must address both monetary and multidimensional poverty by adapting to the impacts of climate change on livelihoods and by emphasising the importance of productive assets, investments, and emergency provisions

Climate change in Indonesia affects poverty through income, expenditure, and asset erosion channels, which then worsen both monetary and multidimensional poverty. Therefore, CRSP programs must be designed not only to protect short-term consumption, but also to anticipate long-term risks by protecting livelihoods and strengthening household assets. Literature emphasises that poverty cannot be understood only from income shortage, but also from deprivations in health, education, and living standards that are interconnected (UNDP & OPHI, 2024). Because of this, CRSP needs to be oriented toward strategies that integrate monetary protection with the reduction of multidimensional deprivations to withstand the systemic impacts of climate change (Kuriakose et al., 2013; Loewe & Schüring, 2021).

The main focus of CRSP is to protect livelihoods that are vulnerable to climate change. Impacts such as tidal floods in Demak that damage ponds or prolonged drought in East Nusa Tenggara that cause crop failure show how climate can directly erode household sources of livelihood. Literature on sustainable livelihoods explains that a sustainable livelihood includes a combination of human, financial, social, physical, and natural assets that form the foundation of a community's adaptive capacity (Chambers & Conway, 1992; Scoones, 1998). Therefore, CRSP must ensure interventions that protect those sources of livelihood, either through productive cash transfers, agricultural insurance, or food security programs, so that communities are not only protected from monetary poverty due to income loss, but also from multidimensional poverty due to disruption of access to education, health, and living standards.

Ownership of productive assets has a central role in the CRSP framework. Assets such as savings, livestock, and production tools function as buffers that can be liquidated or mobilised when shocks occur, while households without assets tend to adopt negative coping strategies that deepen deprivations, such as reducing food consumption or pulling children out of school (Carter et al., 2007; Béné et al., 2014). In this context, the availability of emergency provisions in Indonesia, such as *Lumbung Sosial*, *Bantuan Sosial Tunai*, or temporary top-ups of existing schemes during disaster periods, is also crucial as an immediate coping support that helps households sustain basic consumption and avoid distress asset sales (World Bank, 2020; O'Brien et al., 2018). Literature also emphasises the importance of adaptive investments through programs such as the graduation approach that combines financial assistance, training, and small business support to build asset portfolios more resilient to climate shocks (Banerjee et al., 2015). By emphasising the protection and promotion of productive assets, CRSP can function not only as short-term consumption support but also as a catalyst for transformation toward long-term resilience.

The integration of asset and livelihood dimensions into CRSP design is also consistent with the global adaptive social protection agenda that emphasises the importance of flexibility, scalability, and interconnection with disaster risk finance (World Bank, 2020; McCord et al., 2025). By prioritising protection of movable assets and productive investments, CRSP can achieve two goals at once:

preventing households from falling into poverty due to monetary shocks, and reducing multidimensional deprivations by strengthening access to basic services, inclusive social protection, and sustainable livelihood opportunities. This shows that climate-responsive social protection functions not only as a protective instrument, but also as promotive and transformative in building resilience of vulnerable communities in Indonesia.

Strategic steps for strengthening Indonesia's social protection system toward CRSP and lessons learned for other climate-vulnerable countries

The main recommendation for strengthening Indonesia's social protection system toward CRSP is by ensuring integration of regular social protection policies with adaptation approaches to climate risks that involve cross-sector coordination and collaboration. Climate-sensitive planning must become a basic element in program design so that climate change is not treated as a temporary disturbance, but as a structural factor that affects monetary and multidimensional poverty (Kuriakose et al., 2013). This means that every intervention of social assistance, social insurance, and empowerment programs needs to be aligned with medium- and long-term climate risk projections. In the Indonesian context, this includes the preparation of climate-based trigger indicators, such as extreme rainfall or sea level rise, which can activate temporary vertical and horizontal expansion of social assistance programs (World Bank, 2020).

The second step is strengthening promotive and transformative functions by emphasising livelihood sustainability and asset protection. Social protection programs in Indonesia need to go beyond consumption protection and start integrating interventions that support the accumulation of productive assets, livelihood diversification, emergency provisions, and empowerment of vulnerable groups. Literature shows that graduation programs combining cash transfers, training, and small business support can significantly improve the resilience of poor households (Banerjee et al., 2015). In the context of climate risks, focus on movable assets such as savings, livestock, and production tools is crucial to prevent negative coping strategies that worsen multidimensional deprivations (Carter et al., 2007; Béné et al., 2014).

Finally, Indonesia's experience can provide important lessons for other climate-vulnerable countries. CRSP integration requires strong cross-sector governance, interoperability of social and climate data, as well as coordination between technical ministries, social protection agencies, and disaster management bodies. This approach ensures that social protection not only protects household consumption but also acts as an adaptation catalyst that strengthens community resilience in the long term. Thus, Indonesia can serve as a good practice model for other developing countries facing similar climate risks, especially in showing how social protection systems can evolve from reactive safety nets into strategic instruments for climate adaptation and multidimensional poverty reduction (Devereux & Sabates-Wheeler, 2004; Loewe & Schüring, 2021; UNDP & OPHI, 2024).

7 Conclusion

Climate risks are a major contributor to multifaceted poverty, impacting living standards, health, and education. Vulnerable populations, including women, children, informal workers, and people with disabilities, are particularly hard hit. An examination of 28 social protection programs, including social assistance, social insurance, and social empowerment, shows that although some programs are starting to incorporate climate responsiveness, the system is still primarily focused on providing reactive support and short-term poverty alleviation. Through protective and preventive measures,

health and nutrition programs lower maternal-child mortality and child stunting, but they hardly ever actively address climate-related disruptions or foster long-term resilience. Although educational interventions reduce absenteeism and lower economic barriers, school continuity is still susceptible to shocks like heat waves or floods. The efficacy and climate adaptivity of programs aimed at improving living standards—such as clean cooking fuel, sanitation, drinking water, electricity, housing, and asset protection—vary, with community-driven, renewable energy, and capacity-building projects exhibiting the highest potential for long-term resilience. In spite of these developments, systemic constraints limit social protection's efficacy. Long-term adaptive outcomes are limited by fragmented program design, uneven climate risk integration, funding constraints, governance issues, and infrastructure dependability. Additionally, the analysis's quantitative evaluation of the effects at the household and community levels was constrained by its primary reliance on program documentation and secondary sources. Little is known about how social protection, local government, and climate variability interact, especially when it comes to fostering lasting and transformative effects.

Future studies should investigate the integration of transformative and promotive functions across sectors, develop quantitative indicators of climate adaptivity, measure real-world effectiveness at the household and community levels, and evaluate resilience outcomes over the long term through longitudinal research. In order to ensure that programs transition from reactive safety nets to tools that support multifaceted poverty reduction and climate adaptation, strengthening Indonesia's social protection system calls for cross-sector coordination, climate-sensitive planning, and inclusive governance. Other climate-vulnerable developing nations looking to strengthen social protection systems as tactical instruments for resilience and sustainable development can benefit from Indonesia's lessons.

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