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Adapting to Climate Change in ASEAN+3

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Adapting to Climate Change in ASEAN+3

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Abstract

The ASEAN+3 region faces several hazards due to changing climate patterns. More frequent and/or intense climate-related disasters are likely in the future, which will threaten the region's natural capital and populations. In response, most economies have, or are developing, strategic plans for climate change adaptation and disaster risk reduction. Adapting to climate change is estimated to cost the region over USD6 billion annually over the next three decades. Various forms of adaptation assistance—technical, policy, and financial—are available to ASEAN+3 economies from multilateral development banks and other international bodies. The region's economies also have several financing options that they can tap in the aftermath of a natural disaster, and experience shows that they rely most on *ex post*—rather than *ex ante*—financing instruments. With adaptation and disaster risk management likely to become more expensive, fiscal policymakers will need to increase their influence in accelerating the climate adaptation process and monetary authorities will need to prepare against physical risks to ensure climate-resilient financial systems. Regional financing arrangements specially designed for the ASEAN+3 climate risk profile may have a role to play in expanding its adaptation financing instruments.

JEL classification: E61, F33, F53, Q54, Q58

Keywords: Adaptation finance, climate change adaptation, disaster risk, disaster risk financing, financial safety nets

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I. Introduction

1. **Changes in the physical climate system are growing more salient.** These changes—including increasing temperatures, rising sea levels, and changes in precipitation patterns—adversely affect natural and human systems by contributing to loss and degradation of ecosystems, water and food insecurity, damaged livelihoods, damage to infrastructure, and increased mortality and morbidity, among others (IPCC 2022).

2. **Concern with climate change has increasingly motivated actions by ASEAN+3 governments, private sectors, and civil society.** Approaches for dealing with climate change fall into two complementary categories: (1) mitigation, i.e., curtailing the emissions of greenhouse gases and/or taking greenhouse gases out of the atmosphere; and (2) adaptation, i.e., adjusting to current and expected effects of climate change. The potential economic implications and growth opportunities related to climate change mitigation in the region were the focus of the thematic chapter of AMRO's *ASEAN+3 Regional Economic Outlook* this year (AMRO 2023).

3. **This paper focuses on climate change adaptation in ASEAN+3.**[2] Section II provides context by outlining the main climatic characteristics of and projected climate system changes in the region, potential impacts of climate change, and vulnerabilities to climate risks. From the economic point of view, adapting to climate change and its negative impacts involves two elements: structural protection, e.g., investment in climate-resilient infrastructure and technology; and financial protection, i.e., insurance against climate disasters. Sections III and IV discuss adaptation options, costs, and financing and Section V focuses on disaster financing. Section VI contains some policy conclusions.

II. How is Climate Change Likely to Impact the ASEAN+3 Region?

4. **The ASEAN+3 region faces several hazards due to changing climate patterns.** Geographically, the ASEAN+3 region refers to the land and territories of 14 economies in East Asia (Plus-3) and Southeast Asia (ASEAN). With many parts considered tropical or subtropical, monsoonal winds and associated precipitation are prevalent climate characteristics in the region. Especially in Southeast Asia, extreme precipitation events and related flooding occur frequently due to the predominance of coastal and low-lying areas; tropical cyclones also affect the region with torrential rain, strong winds, and storm surges. East Asia is also greatly impacted by the rising occurrence and duration of drought periods, particularly in arid and semi-arid areas of China (Zhang and Zhou 2015).

5. **The region can expect more frequent and intense precipitation and associated flooding, as well as more powerful tropical cyclones** (Table 1). According to the Intergovernmental Panel on Climate Change (IPCC), warming trends, increasing temperature extremes, and monsoon rainfall variability have been observed across most of Asia over the past century. In the next two to three decades, all regions of the world are projected to experience further increases in surface temperatures and extreme heat events. Sea-level rise will continue throughout this century, leading to more frequent and severe coastal flooding in low-lying areas and coastal erosion (IPCC 2021).

[2] ASEAN+3 refers to the 10 members of ASEAN (Brunei Darussalam; Cambodia; Indonesia; Lao PDR; Malaysia; Myanmar; the Philippines; Singapore; Thailand; and Vietnam) plus China; Hong Kong, China; Japan; and Korea. For brevity, Brunei Darussalam is referred to as Brunei and Hong Kong, China is referred to as Hong Kong in the text and figures.

Table 1. ASEAN+3: Past Trends and Projected Changes in Physical Climate System Conditions

Climate System Condition	Plus-3 (East Asia)		ASEAN (Southeast Asia)	
	Past trend	Projected change	Past trend	Projected change
Heat and cold				
Mean surface temperature	△	▲	△	▲
Extreme heat	△	▲	△	▲
Cold spell	▽	▼	▽	▼
Frost	▽	▼		
Wet and dry				
Mean precipitation		▲		▲
River flood		▲		▲
Heavy precipitation and pluvial flood	△	▲	△	▲
Landslide		▲		▲
Aridity		▲		
Fire weather		▲		
Wind				
Mean wind speed	▽	▼		
Tropical cyclone	△	▲	△	▲
Snow and ice				
Snow, glacier, and ice sheet		▼		
Lake, river, and sea ice	▽	▼		
Heavy snowfall and ice storm		▲		
Coastal				
Relative sea level	△	▲	△	▲
Coastal flood		▲		▲
Coastal erosion		▲		▲
Marine heatwave	△	▲	△	▲
Ocean acidity		▲		▲
Others				
Atmospheric carbon dioxide at surface	△	▲	△	▲
Radiation at surface		▲		

Source: Gutierrez and others (2021).

Note: Past trend refers to existence of evidence of increasing or decreasing trends: △ = increasing trend; ▽ = decreasing trend. Projected change refers to existence of evidence of increases or decreases in specific climate conditions at either high, medium, or low confidence. ▲ = increase (high confidence); ▲ = increase (medium confidence); ▼ = decrease (high confidence); ▼ = decrease (medium confidence). Projected changes refer to a 20- to 30-year period centered around 2050 and/or consistent with 2 degrees Celsius global warming compared to a similar period in 1960–2014 or 1850–1900. Information is representative of average changes over the indicated region. Tropical cyclones are projected to decrease in number but increase in intensity.

6. **The region's natural capital, ecosystems, populations, and livelihoods are highly exposed to threats from these physical climate system changes**. Extreme weather events endanger the region's terrestrial, coastal, and marine ecosystems—and populations whose livelihoods depend on them—and compound stresses caused by urbanization, industrialization, and economic growth. For example:

- Extreme temperatures and heatwaves will affect agricultural productivity and crop yields. Ocean warming (and ocean acidification) leads to degradation and loss of coral reefs, which would negatively affect fisheries in Southeast Asia. Increased frequency of heatwave days will also have a significant impact on health and labor productivity in cities across the region (ADB 2017). ASEAN+3 is home to many of the world's largest urban agglomerations and 13 of the world's megacities (with more than 10 million inhabitants) (UNDESA 2019).[3]

- Precipitation extremes increase the likelihood of floods, with the attendant loss of lives, infrastructure, and agricultural output. Among the more vulnerable areas is the Vietnam Mekong River Delta where almost 40 percent of the total rice-growing area is exposed to sustained flood risks (Wassmann and others 2019).

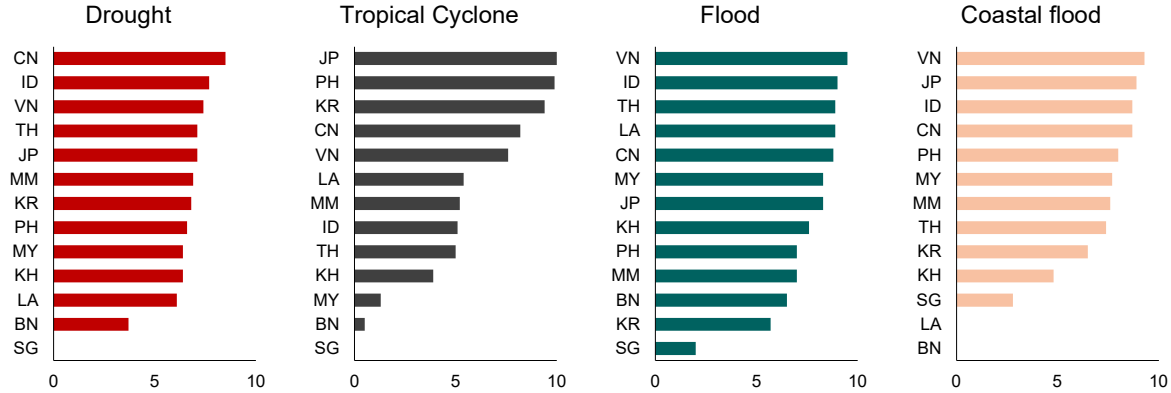
[3] The megacities are Beijing, Chongqing, Guangzhou, Shanghai, Shenzhen, Tianjin (China); Jakarta (Indonesia); Tokyo, Osaka (Japan); Seoul (Korea); Manila (the Philippines); Bangkok (Thailand); and Ho Chi Minh City (Vietnam). Six more—Chengdu, Nanjing, Wuhan, Xi'an (China); and Kuala Lumpur (Malaysia)—are projected to become megacities by 2030 (UNDESA 2019).

- Sea-level rise and coastal flooding causes loss of land and natural capital, infrastructure and physical capital, livelihoods and social capital. China, Indonesia, and Vietnam are estimated to have the highest total coastal population exposure to sea-level rise and associated flood events; together with Japan, the Philippines, and Thailand, they are among the world's countries most exposed to sea-level rise and land subsidence (Shaw and others 2022) (Figure 1). Without adaptation, China could lose up to USD118.4 billion in *direct* damages by 2080 (depending on the scenario modeled) compared to the 2007 baseline, with Korea, Japan, and Indonesia not far behind (Pycroft, Abell, and Ciscar 2016). Tourism-reliant economies could also suffer a loss of competitiveness with the erosion of beaches and reduced freshwater supplies.

- With more intense tropical cyclones, typhoon-prone economies would experience more storm surges and flooding, with the attendant loss of life and material damage to infrastructure and agricultural crops. Globally, 4 of the top 10 places in the world with the highest average annual loss associated with tropical cyclones are in ASEAN+3: China, Japan, Korea, and the Philippines. The average annual loss associated with storm surge is primarily concentrated in China, Hong Kong, and Japan (Shaw and others 2022). The storm surges brought by Typhoon Haiyan to the Philippines in November 2013 were primarily responsible for the extreme loss of lives and widespread damage to property, with the economic loss valued over USD12 billion (Lagmay and others 2015).

7. **Intensifying climate change risks are likely to increase disaster vulnerabilities in the region.** An economy's vulnerability to climate risk includes not just its *exposure*—i.e., the presence of people, livelihoods, ecosystems, and other assets in places imperiled by climate hazards—but also its *sensitivity* to the negative impacts of climate change and its *ability and readiness* to adapt to them. Some economies are more vulnerable to the impacts of climate change than others, due to their geographical location and socioeconomic conditions. Some economies are more ready and equipped to take on adaptation actions than others, e.g., through government action and the ability to facilitate private sector responses. Among the ASEAN+3, Brunei and Singapore are generally considered less vulnerable from an adaptation standpoint, while Myanmar and the Philippines are considered more vulnerable (Figure 2).

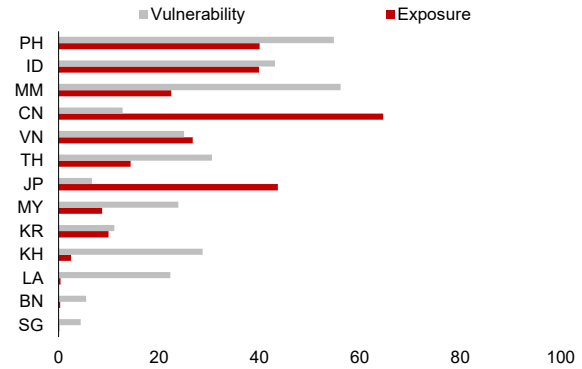
Figure 1. ASEAN+3: Exposure to Natural Hazards
(Index, 0 = lowest risk; 10 = highest risk)



Source: European Commission INFORM Climate Change Tool.
Note: The hazard and exposure dimension of the INFORM Climate Change Risk Index reflects the probability of physical exposure associated with specific natural and human-induced hazards. The index ranges from 0 (lowest risk) to 10 (highest risk). BN = Brunei, CN = China, ID = Indonesia, JP = Japan, KH = Cambodia, KR = Korea, LA = Lao PDR, MM = Myanmar, MY = Malaysia, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam. Hong Kong is excluded from this index.

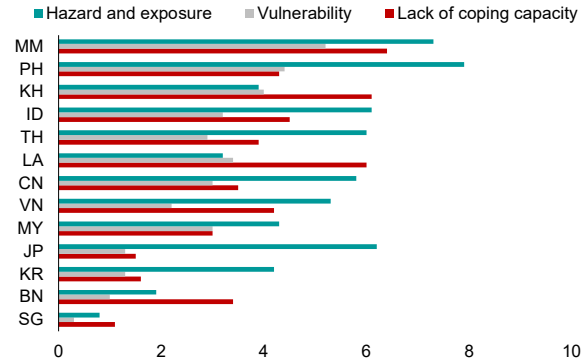
Figure 2. ASEAN+3: Climate Risk Indexes

World Risk Index, 2022
(0 = lowest risk; 100 = highest risk)



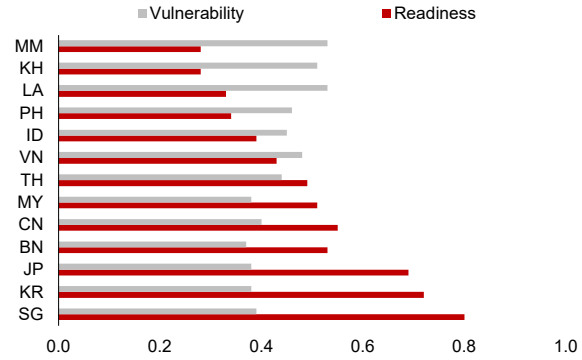
	Global rank	Country Risk Index	
PH	1	46.82	Very high risk
ID	3	41.46	Very high risk
MM	6	35.49	Very high risk
CN	8	28.70	Very high risk
VN	12	25.85	Very high risk
TH	23	20.91	Very high risk
JP	28	17.03	Very high risk
MY	35	14.36	Very high risk
KR	50	10.51	High risk
KH	65	8.42	High risk
LA	124	2.91	Low risk
BN	165	1.34	Very low
SG	187	0.81	Very low risk

INFORM Climate Change Risk Index, 2022
(0 = lowest risk; 10 = highest risk)



	Country index	
MM	6.2	High risk
PH	5.3	High risk
KH	4.6	Medium risk
ID	4.4	Medium risk
TH	4.1	Medium risk
LA	4.0	Medium risk
CN	3.9	Medium risk
VN	3.7	Medium risk
MY	3.4	Low risk
JP	2.3	Low risk
KR	2.1	Low risk
BN	1.9	Very low risk
SG	0.6	Very low risk

Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index, 2020
(0 = worst; 100 = best)



	Country index	Global rank
MM	37.6	156
KH	38.7	149
LA	40.1	137
PH	43.9	113
ID	46.8	100
VN	47.1	97
TH	52.4	68
MY	56.6	49
CN	57.9	39
BN	58.1	37
JP	65.5	19
KR	67.2	15
SG	70.6	6

Source: Bündnis Entwicklung Hilft; European Commission INFORM Climate Change Tool; Notre Dame Global Adaptation Initiative.
Note: The World Risk Index indicates the disaster risk from extreme natural events and negative climate change impacts for 193 countries in the world. It is calculated per country as the geometric mean of exposure and vulnerability. Exposure represents the extent to which populations are exposed to and burdened by the impacts of earthquakes, tsunamis, coastal and riverine floodings, cyclones, droughts, and sea level rise. Vulnerability maps the societal domain and is composed of three dimensions: susceptibility; coping; and adaptation. The index ranges from 0 (lowest risk) to 100 (highest risk), where 0–1.84 = very low risk; 1.85–3.2 = low risk; 3,21–5.87 = medium risk; 5.88–12.88 = high risk; and 12.89–100 = very high risk. The INFORM Climate Change Risk Index provides quantified estimates of the impacts of climate change on the future risk of humanitarian crises and disasters. The index has 3 dimensions: hazard and exposure to natural and human risks (e.g., droughts, cyclones, floods, earthquakes, epidemics, and conflicts), based on projected climate and socio-economic trends; vulnerability of households and individuals to crisis situations; and lack of coping capacity (as measured by factors of institutional strength). The INFORM Climate Change Risk Index is calculated as (Hazard and exposure)$^{1/3}$ x (Vulnerability)$^{1/3}$ x (Lack of coping capacity)$^{1/3}$. The index ranges from 0 (lowest risk) to 10 (highest risk), where 0–1.9 = very low risk; 2.0–3.4 = low risk; 3,5–4.9 = medium risk; 5–6.4 = high risk; and 6.6–10 = very high risk. The Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. A country's ND-GAIN index score is composed of a Vulnerability score and a Readiness score. Vulnerability measures a country's exposure, sensitivity, and ability to adapt to the negative impact of climate change. ND-GAIN measures the overall vulnerability by considering vulnerability in 6 life-supporting sectors: food, water, health, ecosystem service, human habitat, and infrastructure. Readiness measures a country's ability to leverage investments and convert them to adaptation actions. ND-GAIN measures overall readiness by considering 3 components: economic readiness, governance readiness, and social readiness. Vulnerability is rated on a scale of 0 (best) to 1 (worst). Readiness is rated on a scale of 0 (worst) to 1 (best). The ND-GAIN index is calculated as (Readiness index – Vulnerability index + 1) x 50, and ranges from 0 (worst) to 100 (best). BN = Brunei, CN = China, ID = Indonesia, JP = Japan, KH = Cambodia, KR = Korea, LA = Lao PDR, MM = Myanmar, MY = Malaysia, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam. Hong Kong is excluded from these indices.

III. How Can ASEAN+3 Adapt to Climate Change?

8. **Climate change adaptation is the process of preparing for environmental conditions that are resulting from, or will result from, a changing climate.** While adaptation policies will not reduce the likelihood of climate change and associated hazards, they can enable economies to build resilience and reduce the exposure and vulnerability of affected populations and ecosystems to these risks. These policies include, among others, making infrastructure more climate-resilient, managing water resources better, improving dryland agriculture, and strengthening early warning systems for weather hazards. For example, countries at high risk of flooding can build more flood defenses; countries sensitive to drought can use water more efficiently and develop more drought-resistant crops; coastal cities threatened by rising sea levels can build sea walls, relocate buildings to higher ground, or construct artificial floating islands (Global Commission on Adaptation 2019, Gonguet and others 2021).

9. **All ASEAN+3 economies have developed, or are developing, strategic plans for adapting to climate change** (Table 2). Most of them have prepared National Adaptation Plans (NAPs), which are linked to their Nationally Determined Contributions (NDCs) to achieve the Paris Agreement goals. The main objectives of the NAPs are to reduce vulnerability to climate change, and to mainstream climate change adaptation in all levels of planning (Box 1).

Table 2. ASEAN+3: National Adaptation Plans

Economy	National Adaptation Plan	Priority Areas/Sectors
Brunei	Under development	
Cambodia	Under development	Agriculture; coastal zones; energy; health; industry; infrastructure; livelihoods, poverty, and biodiversity; tourism; water resources
China	National Climate Change Adaptation Strategy 2035 (June 2022)	Agriculture; climate change monitoring, early warning, and risk management; health; industry (including energy, tourism, and transportation); infrastructure; marine and coastal zones; terrestrial ecosystems; urban environment; water resources
Hong Kong	Hong Kong's Climate Action Plan 2050 (October 2021)	Coastal zones and marine protection; flood prevention; infrastructure; water supply; urban environment
Indonesia	Indonesia's Adaptation Communication (October 2022)	Disaster management; ecosystems; energy; food production (including agriculture and aquaculture); health; water supply
Japan	Climate Change Adaptation Plan (October 2021)	Agriculture, forestry, and fisheries; health; natural disasters and coastal areas; natural ecosystems (including terrestrial and coastal ecosystems); urban environment; water environment and water resources
Korea	Third National Adaptation Plan 2021–25 (December 2020)	Agriculture and fisheries; ecosystem conservation and recovery; energy; health; industry; infrastructure; water management
Lao PDR	Under development	Agriculture; forestry and land-use change; health; energy; transport and urban development; water resources
Malaysia	Under development	Agriculture and food supply; coastal resources; forestry and biodiversity; public health; urban and infrastructure resilience; water resource management and security
Myanmar	Under development	Agriculture; natural resources; health; disaster risks; urban planning
Philippines	National Climate Change Action Plan 2011–28 (November 2011)	Climate-smart industries and services; ecological and environmental stability; food security; human security; knowledge and capacity development; sustainable energy; water sufficiency
Singapore	First Adaptation Communication Pursuant to the Paris Agreement (November 2022)	Biodiversity and greenery; essential services (including energy and transport); flood resilience; infrastructure; public health and food security; urban heat; water sustainability
Thailand	National Adaptation Plan 2018-37 (December 2018)	Agriculture and food security; human settlements and security; natural resources management; public health; tourism; water resources management

Vietnam	National Adaptation Plan (July 2020)	Agriculture; environment and biodiversity; infrastructure; management of state and resources; natural disaster prevention; public health, labor, society, culture, sports, and tourism; water resources; and

Source: United Nations Framework Convention on Climate Change (UNFCCC); national authorities; and AMRO staff compilation.

Box 1. National Adaptation Plans and Nationally Determined Contributions

National Adaptation Plans (NAPs) and the NAP process were formally established under the Cancun Agreements in 2010 to enable countries to identify and address their medium- and long-term priorities for adapting to climate change. Led by national governments, the process involves analyzing current and future climate change and assessing vulnerability to its impacts; identifying and prioritizing adaptation options; implementing these options; and tracking progress and results.

Nationally Determined Contributions (NDCs) are pledges countries make toward achieving the objectives of the Paris Agreement of 2015. They include the targets, policies, and actions a country will pursue principally to mitigate climate change (i.e., limit global temperature increase) and, as appropriate, to adapt to climate change. Information on mitigation efforts is mandatory in an NDC whereas information related to adaptation is provided voluntarily. However, most countries that have submitted NDCs have chosen to include information on their adaptation actions.

The goals and priorities identified through a country's NAP process can be—and, in many cases, are—included in its NDC, and the NAP process itself can be a means of operationalizing adaptation commitments that appear in the NDC.

10. **There is a wide range of resources to support ASEAN+3 economies in developing and implementing climate change adaptation plans.**

- Guidelines for NAP formulation were first issued by the UN Framework Convention on Climate Change (UNFCCC) in November 2011. Support for developing countries in the NAP process is provided by the United Nations Development Programme (UNDP) through the National Adaptation Plan Global Support Program, which helps countries mainstream climate into planning and budgeting and develop a plan of action; and the Green Climate Fund Readiness Program, which provides funding for country-driven initiatives to strengthen institutional capacities, governance mechanisms, and planning and programming frameworks towards a long-term climate action agenda. In the region, Indonesia, the Philippines, Thailand, and Vietnam have benefited from one or both of these resources.
- The World Bank's Adaptation Principles contains tools, examples, and other information to guide decisionmakers and help governments formulate effective strategies to adapt to climate change (Hallegatte, Rentschler, and Rozenberg 2020).
- The Asian Development Bank (ADB) and the World Bank jointly produce Climate Risk Country Profiles to facilitate country diagnostics, policy dialogue, and strategic planning. To date, country profiles have been published for Cambodia (2021), China (2021), Indonesia (2021), Lao PDR (2021), Malaysia (2021), Thailand (2021), the Philippines (2021), and Vietnam (2020). The World Bank has also begun publishing Country Climate and Development Reports—diagnostic reports that help countries

prioritize actions that can reduce greenhouse gas emissions and boost adaptation.[4] Reports on China, the Philippines, and Vietnam were published in 2022.

- ASEAN's Climate Vision 2050 lays out specific actions at the sectoral, national, and regional level that should be implemented to enhance climate change adaptation in the region (ASEAN 2021).

11. **Climate change adaptation also includes an element of disaster risk reduction.** Climate change increases disaster risks through the likely increase in weather and climatic hazards and effects of sea-level rise—but it is typically the combination of a hazard event with a vulnerable and ill-prepared population or community that results in a disaster. Investment in adaptation can reduce damage and economic disruption from climate-related disasters, lower disaster recovery spending, and provide a quicker rebound in economic activity.

12. **Disaster risk reduction is the process of analyzing and reducing the causal factors of risk brought about by natural (climatic and non-climatic) hazards and finding ways to prevent or reduce their damage.** Disaster risk reduction and climate change adaptation overlap in the types of hazards that are addressed—both would be involved in preventing or minimizing damage from large floods and cyclones, for example, because they are natural hazards that will also be made more intense because of climate change. Global guidance for the multi-hazard management of disaster risk in developing economies is provided by the Sendai Framework for Disaster Risk Reduction (Box 2).

Box 2. The Sendai Framework for Disaster Risk Reduction 2015–30

The Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) focuses on the adoption of measures to reduce existing risk, prevent the creation of new risk, and increase resilience. It applies to the risk of disasters caused by natural or manmade hazards as well as related environmental, technological, and biological hazards and risks. The Framework was adopted at the Third United Nations (UN) World Conference in Sendai, Japan, in March 2015, and works hand in hand with the other UN 2030 Agenda agreements, including the 2015 Paris Agreement on Climate Change.

The SFDRR outlines seven global targets to be achieved by 2030 (Figure 2.1). It identifies four priority areas of action: (1) understanding disaster risk; (2) strengthening disaster risk governance at the national, regional, and global levels; (3) investing in disaster risk prevention and reduction; and (4) enhancing disaster preparedness for effective response, recovery, rehabilitation, and reconstruction.

The Asia Regional Plan for Implementation of the SFDRR provides broad policy direction to guide the implementation of the Framework and a long-term (15-year) road map for implementing priorities to achieve the seven global targets, accompanied by specific action plans. Three action plans have been developed to date, for 2017–2018; 2018–2020; and 2021–2024. The current action plan aims to increase investment in prevention, risk reduction, climate change adaptation, and anticipatory approaches to enhance resilience, among other things.

[4] The World Bank's Country Climate and Development Report supersedes the joint IMF-World Bank Climate Change Policy Assessment (CCPA) which was introduced on a pilot basis in 2017 (IMF 2023). The CCPA assessed countries' climate strategies, as articulated in their NDCs and other government documents, with the purpose of helping them build coherent macro-frameworks for responding to climate change. Six small (mostly island) economies participated in the CCPA, none from ASEAN+3.

Figure 2.1. The Sendai Framework: Global Targets

Increase

- Number of countries with national and local disaster risk reduction strategies
- International cooperation to developing countries
- Availability of and access to multi-hazard early warning systems

Reduce

- Global disaster mortality
- Number of affected people globally
- Direct economic loss in relation to GDP
- Disaster damage to critical infrastructure and disruption of basic services

Source: United Nations Office for Disaster Risk Reduction.

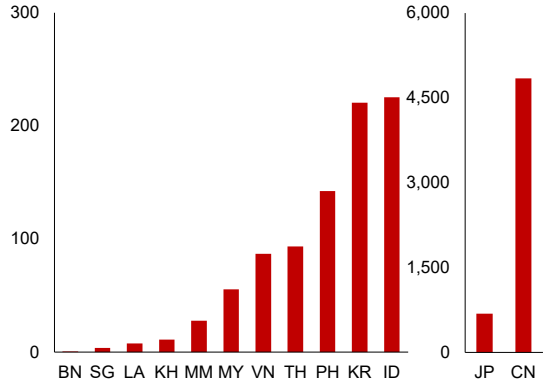
13. **ASEAN+3 economies have a framework for cooperation on disaster management and emergency response.** The ASEAN Agreement on Disaster Management and Emergency Response (AADMER), which entered into force in 2009, is currently on its third work program (for 2021–2025). The current work program, implemented with technical support from the Plus-3 economies and aligned with relevant global agreements, including the Sendai Framework for Disaster Risk Reduction, the Paris Agreement on Climate Change, and the UN 2030 Agenda on Sustainable Development, focuses on incorporating climate change adaptation into the ASEAN disaster risk reduction strategy by scaling up existing regional programs through capacity building and knowledge sharing with climate and environment-related sectors (ASEAN 2020).[5] The Plus-3 economies also support the implementation of the ASEAN Vision 2025 on Disaster Management through capacity building and innovation sharing, among others (Japan-ASEAN Cooperation 2020).

IV. How Can ASEAN+3 Finance Adaptation Costs?

14. **The ASEAN+3 region is estimated to require over USD6 billion annually for its climate adaptation needs over the next three decades.** According to the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), total climate adaptation cost estimates for ASEAN+3 are in the order of USD250 billion between 2020 and 2059 (ESCAP 2021). China and Japan are projected to face the highest adaptation costs in value terms, followed by Indonesia, Korea, and the Philippines (Figure 3). However, in comparison with the size of the economy, the Philippines will face the highest burden, followed by ASEAN neighbors Cambodia, Lao PDR, Myanmar, and Vietnam (Figure 4).

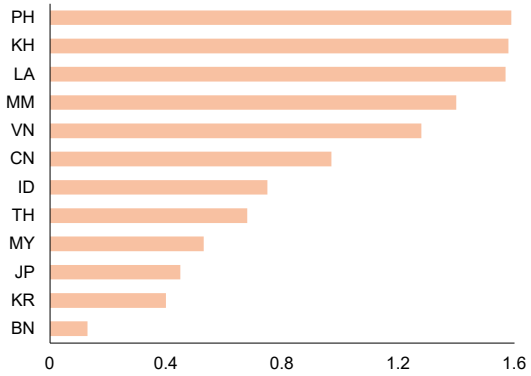
[5] Specific steps are: (1) continuing and widening collaboration between disaster management and environment sectors to include think tanks, academic institutions, technical agencies and others; (2) enhancing capacity building initiatives for planning and implementing climate change adaptation and disaster mitigation measures and strategies for both slow- and sudden-onset hazards; (3) developing a platform to share knowledge, policies, data, and skills on climate change impacts, implementation of river basin management, and countermeasures for climate change impacts; and (4) sharing, collecting, and publishing online existing laws and regulations and best practices on integrating disaster risk reduction and climate change adaptation.

Figure 3. ASEAN+3: Estimated Annual Climate Adaptation Costs, 2020–59
(Millions of US dollars)



Source: ESCAP (2021); AMRO staff calculations.
Note: Annual adaptation costs are approximated by the projected total adaptation costs (including costs of adapting to biological hazards) under a very high greenhouse gas emissions scenario, divided by the number of years in the projection period. BN = Brunei, CN = China, ID = Indonesia, JP = Japan, KH = Cambodia, KR = Korea, LA = Lao PDR, MM = Myanmar, MY = Malaysia, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam. Data for Hong Kong are not available.

Figure 4. ASEAN+3: Total Climate Adaptation Costs, 2020–59
(Percent of GDP)



Source: ESCAP (2021); AMRO staff calculations.
Note: Only refers to climate adaptation costs (excluding costs of adapting to biological hazards). BN = Brunei, CN = China, ID = Indonesia, JP = Japan, KH = Cambodia, KR = Korea, LA = Lao PDR, MM = Myanmar, MY = Malaysia, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam. Data for Hong Kong and Singapore are not available.

15. **These adaptation costs will mostly be in the form of spending on climate-resilient, low-carbon infrastructure.** "Climate-proofing" new infrastructure is the top adaptation priority in the ASEAN+3 region, followed by strengthening early warning systems (Figure 5). Improving agricultural practices and water resources management for resilience also ranks high for several ASEAN economies, albeit less so for the Plus-3.

16. **To meet these infrastructure spending needs, economies can tap various options for adaptation finance**, including:

- *Domestic budgets*. Budget revenues are one option for responding to adaptation needs (Allan and others 2019). For example, the Philippine government has allotted about 8.6 percent of its 2023 national budget for climate change adaptation and mitigation, specifically, water sufficiency projects and construction and rehabilitation of flood-mitigation structures and drainage systems (Philippine Department of Budget and Management 2022). In most economies, however, budget revenues are rarely utilized as the primary financing option for climate change adaptation due to other competing (mainly short-term) economic priorities and/or lack of coordination between national agencies involved in climate change adaptation and those involved in budget planning and management.

- *Investment project financing from multilateral development banks (MDBs).* In 2021, MDBs—including ADB, the Asian Infrastructure Investment Bank (AIIB), and the World Bank—provided more than USD17 billion to low- and middle-income economies and USD1.6 billion to high-income economies for climate change adaptation (EIB and others 2022) (Figure 6). Still, the share devoted to adaptation is only about half the share devoted to mitigation in MDB climate finance and MDBs are looking to ramp up lending in this area (Kaya 2022) (Figure 7).

- *Investment project financing from other international bodies*. The UN-backed Green Climate Fund (GCF), which catalyzes climate finance for developing countries, has co-financed more than 10 climate adaptation-related projects in the region to date (Table 3).[6] The Adaptation Fund, which finances climate change adaptation projects in developing countries which are party to the Kyoto Protocol, has approved grants for 12 projects in the region to date (Table 4).[7]

- *Donor assistance.* Some bilateral official aid flows can be earmarked for climate-related objectives. Nine ASEAN+3 economies are recipients of official development assistance from the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD): Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand, and Vietnam. In 2020, three-quarters of this aid was committed for adaptation projects, primarily in transportation and storage, as well as water supply and sanitation.

- *Financing from capital markets*. Governments are increasingly recognizing the importance of encouraging private investment in adaptation. However, this type of investment gravitates towards projects with attractive risk-return profiles and may not be interested in those most vulnerable to climate risks or be effective in reducing those risks (UNEP 2022).

Figure 5. ASEAN+3: Priority Areas of Climate Adaptation
(1 = lowest score; 5 = highest score)

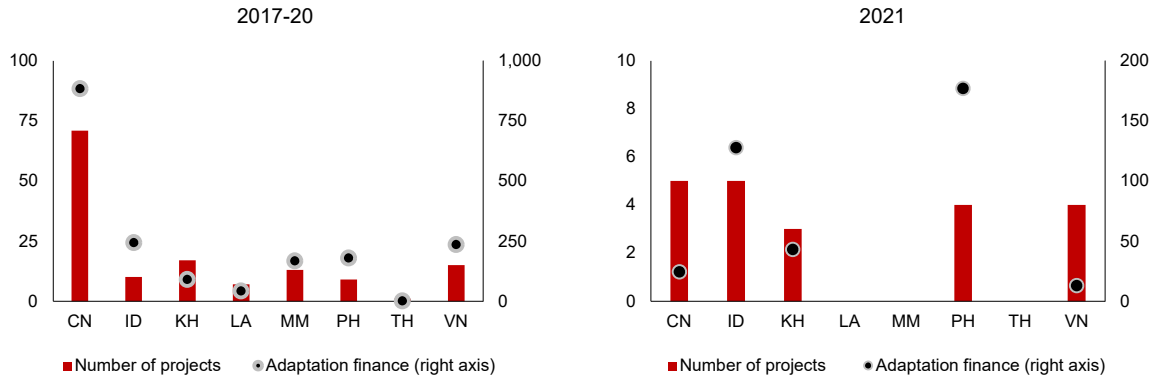
	CN	JP	KR	*Plus-3 average*	BN	KH	ID	LA	MY	MM	PH	SG	TH	VN	*ASEAN average*
Improving dryland agriculture crop production	3	1	2	***2.0***	1	4	3	5	2	5	3	1	4	4	***3.2***
Making new infrastructure resilient	5	5	5	***5.0***	2	3	5	3	4	4	5	2	4	4	***3.6***
Making water resources management more resilient	4	2	1	***2.3***	1	5	4	5	2	5	3	1	2	4	***3.2***
Protecting mangroves	1	4	0	***1.7***	5	3	1	0	5	2	1	5	2	1	***2.5***
Strengthening early warning systems	5	4	3	***4.0***	1	4	4	4	2	4	5	1	5	4	***3.4***

Source: ESCAP (2021).
Note: BN = Brunei, CN = China, ID = Indonesia, JP = Japan, KH = Cambodia, KR = Korea, LA = Lao PDR, MM = Myanmar, MY = Malaysia, PH = Philippines, SG = Singapore, TH = Thailand, VN = Vietnam. Data for Hong Kong is not available.

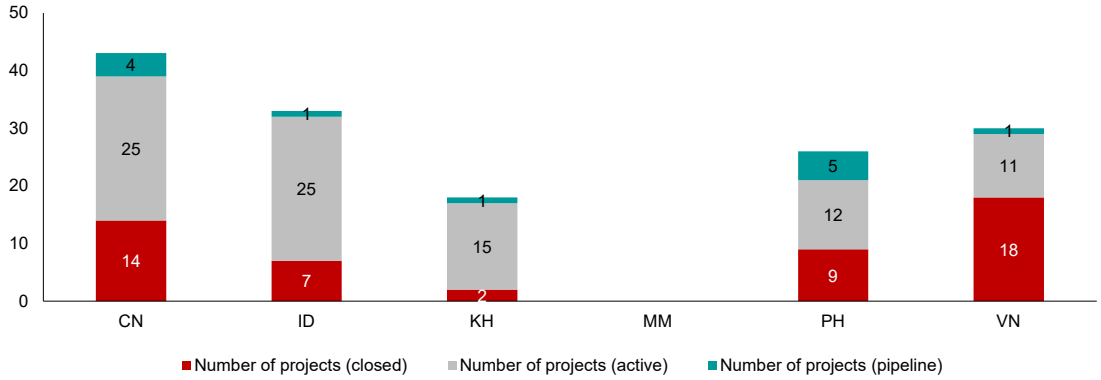
[6] The GCF was established by the UNFCCC in 2010. It is the world's largest climate fund serving the Paris Agreement.
[7] The Adaptation Fund is primarily financed through 2 percent levy on the Clean Development Mechanism.

Figure 6. Selected ASEAN+3: Multilateral Development Bank Projects with Climate Adaptation Finance

Asian Development Bank (ADB)
(Number of projects; millions of US dollars)



World Bank
(Number of projects)



Source: ADB; World Bank.
Note: Does not include multi-country projects. CN = China, ID = Indonesia, KH = Cambodia, LA = Lao PDR, MM = Myanmar, PH = Philippines, TH = Thailand, VN = Vietnam.

Figure 7. Climate Finance Commitments of Major Multilateral Development Banks Operating in the ASEAN+3 Region

Asian Development Bank (ADB)

- In October 2021, ADB committed to elevating its lending to USD100 billion in cumulative climate financing from its own resources to its developing member countries for the period 2019–30.
- Per ADB's Strategy 2030, at least 75 percent of the number of ADB's committed operations (on a 3-year rolling average) will be supporting climate change mitigation and/or adaptation by 2030.

Asian Infrastructure Investment Bank (AIIB)

- Per AIIB's Corporate Strategy for 2021–30, at least 50 percent of overall approved financing will be directed towards climate finance by 2025.
- Cumulative climate finance approvals are estimated to reach USD50 billion by 2030.

World Bank Group

- Per the World Bank Group's Climate Change Action Plan for 2021–25, 35 percent of Bank Group financing, on average, will be committed to climate, with at least 50 percent of World Bank climate finance supporting adaptation.

Source: ADB; AIIB; World Bank Group.

Table 3. ASEAN+3: Adaptation Projects Co-financed by the Green Climate Fund

Project (Co-financer)	Status	Instruments	Total financing (USD million)
Cambodia			
• Climate-friendly agribusiness value chains sector project (ADB)	Under implementation	Grant, loan, in-kind	101.08
• Public-social-private partnerships for ecologically-sound agriculture and resilient livelihood in northern Tonle Sap basin (FAO)	Approved (March 2023)	Grant, in-kind	42.85
China			
• Catalyzing climate finance—Shandong Green Development Fund (ADB)	Under implementation	Loan, equity	1,403.37
Lao PDR			
• Building resilience of urban populations with ecosystem-based solutions (UNEP)	Under implementation	Grant, other	11.5
• Scaling up the implementation of the Lao PDR Emission Reductions Program through improved governance and sustainable forest landscape management (GIZ)	Approved (March 2023)	Grant, loan, in-kind, results-based management, other	79.31
Philippines			
• Multi-hazard impact-based forecasting and early warning system (Landbank of the Philippines)	Under implementation	Grant, in-kind	20.19
• Adapting Philippine agriculture to climate change (FAO)	Approved (March 2023)	Grant, in-kind	39.25
Thailand			
• Enhancing climate resilience through effective water management and sustainable agriculture (UNDP)	Approved (October 2021)	Grant, in-kind	33.91
Vietnam			
• Improving the resilience of vulnerable coastal communities to climate change related impacts (UNDP)	Under implementation	Grant	40.53
• Strengthening the resilience of smallholder agriculture to climate change-induced water insecurity in the Central Highlands and South-Central Coast regions (UNDP)	Under implementation	Grant, loan, in-kind	156.3

Source: Green Climate Fund.
Note: Excludes multi-country projects. ADB = Asian Development Bank; FAO = Food and Agriculture Organization; GIZ = Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH; UNDP = United Nations Development Programme; UNEP = United Nations Environment Programme.

Table 4. ASEAN+3: Projects Financed by the Adaptation Fund

Project	Status	Grant amount (USD million)
Cambodia		
• Climate change adaptation through protective small-scale infrastructure interventions in coastal settlements	Under implementation	5.0
• Enhancing climate resilience of rural communities living in protected areas	Under implementation	4.9
Indonesia		
• Embracing the sun: Redefining public space as a solution for the effects of global climate change in Indonesia's urban areas	Proposal approved (October 2021)	0.8
• Safekeeping-surviving-sustaining towards resilience: 3S approach to build coastal city resilience to climate change impacts and natural disasters in Central Java Province	Under implementation	6.0
• Adapting to climate change through sustainable integrated watershed governance in indigenous people of Ammatoa Kajang Customary Area in South Sulawesi Province	Under implementation	1.1
• Enhancing the adaptation capability of coastal communities in facing the impacts of climate change in Maluku Province	Proposal approved (October 2021)	1.0
• Community adaptation for forest-food based management in Saddang Watershed Ecosystem	Under implementation	0.8
Lao PDR		
• Building climate and disaster resilience capacities of vulnerable small towns	Under implementation	5.5
• Enhancing the climate and disaster resilience of the most vulnerable rural and emerging urban human settlements	Under implementation	4.5

Malaysia • Nature-based climate adaptation program for the urban areas of Penang Island	Under implementation	10.0
Myanmar • Addressing climate change risks on water resources and food security in the dry zone of Myanmar	Completed	7.9
Vietnam • Enhancing the resilience inclusive and sustainable eco-human settlement development through small scale infrastructure interventions in the coastal regions of the Mekong Delta	Under implementation	6.3

Source: Adaptation Fund.

17. **MDBs are increasingly incorporating disaster risk reduction and management components in adaptation financing as they put a greater emphasis on building resilience.** Many of these initiatives focus on capacity building and strengthening fiscal management and governance.

- ADB finances disaster risk management in areas such as flood control, early warning systems, nature-based solutions, integrated water resource management, resilient infrastructure, and disaster risk financing.
- The AIIB has provided USD207 billion in funding for flood management in the Philippines and USD1 billion to strengthen capacity in integrated flood risk management and flood emergency response in China's Henan Province (Polycarp 2023).
- The World Bank's multi-donor Global Facility for Disaster Reduction and Recovery (GFDRR) provides funding and expertise for policy advice to low and middle-income countries on improving disaster risk management at national and local levels, as it relates to land use, building codes, public health, transport, and education, agriculture, environmental protection, energy, water resources management, poverty reduction, fiscal risk management, and climate change adaptation, among others.

V. How Can ASEAN+3 Finance Disaster Risk?

18. **While investment in adaptation can help reduce the impact of natural disasters, it cannot eliminate disaster risk completely.** Dealing with the consequences of a natural disaster entails major financial efforts to compensate for losses, as well as to facilitate recovery and reconstruction. For a given economy's disaster risk, there is a range of budgetary and financial instruments available to the government to finance the cost of responding to and recovering from disasters (Clarke and Dercon 2016) (Figure 8). The instruments can be categorized into ex ante versus ex post financing, where the former refers to financing arranged before a disaster strikes and the latter refers to financing arranged after a disaster strikes. As no single instrument may be optimal to address all disaster events, using a blend of both sets of instruments via a "layered approach" is widely advocated to address various layers of risk—from small-scale disasters to catastrophic events—and strengthen financial resilience (Figure 9). The choice of instrument is affected by many policy considerations, including the frequency and severity of disaster events, as well as the urgency and size of the financial need (OECD 2015).[8]

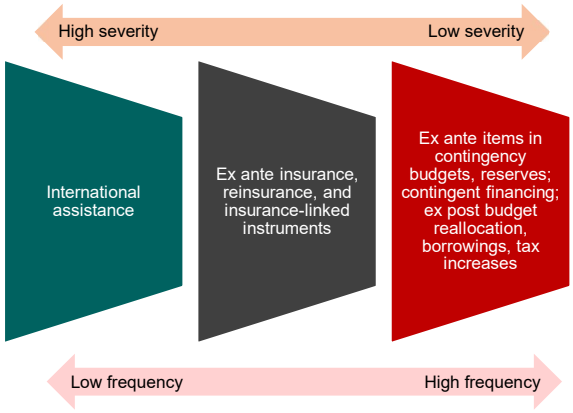
[8] For example, low-impact and high-frequency events (such as flooding from tropical cyclones) may be more effectively addressed by ex post financing (for example, post-disaster aid), while high-impact and rare events (such as tsunamis) could be best dealt with catastrophe bonds or regional risk pooling instruments.

Figure 8. Instruments for Financing Disaster Risk

Ex ante financing (Arranged *before* a disaster)	Ex post financing (Arranged *after* a disaster)
• Contingency/reserve fund or budget allocation • Line of contingent credit • Traditional insurance or reinsurance • Indexed insurance, reinsurance, or derivatives; capital market instruments, e.g., catastrophe bonds • Regional risk-pooling instruments	• Budget reallocation • Tax adjustments; post-disaster credit • Discretionary post-disaster aid • International borrowing • International aid

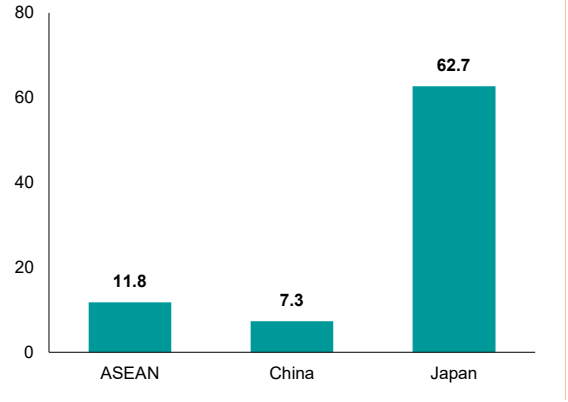
Source: AMRO staff, adapted from Clarke and Dercon (2016).

Figure 9. Disaster Risk Finance: Layered Approach—An Example



Source: ADB (2019).

Figure 10. Selected ASEAN+3: Insured Natural Hazard Losses, 1986–2018
(Percent of total losses)



Source: AMRO (2020).
Note: ASEAN = Association of Southeast Asian Nations.

19. **Many economies in the ASEAN+3 region rely on ex post financing and support from the international community to pay for rebuilding after a disaster.** Economies with sound fiscal positions and good access to financial markets may opt to rely on ex post financing from their own budgets or from private capital markets in the event of a disaster. Less well-off economies in the region have made use of regional financial safety nets (e.g., ADB's Emergency Assistance Loans and grants from the Asia Pacific Disaster Response Fund) and global financial safety nets (e.g., the World Bank's Immediate Response Mechanism and Crisis Response Window and the IMF's Rapid Credit Facility) for quick financing in the aftermath of a disaster (Table 5). The AIIB is also working on a new crisis response facility to provide financial assistance to member countries affected by natural disasters and climate change (Yiu and Ihara 2023).

20. **Given the increasing frequency and severity of climate-related disaster events, ex ante financing—including insurance—is increasingly being explored across the ASEAN+3.** Within the region, only Japan can be considered well-insured; between 1986 and 2018, less than 15 percent of natural hazard losses in China and ASEAN were insured (Figure 10) (AMRO 2020, Renaud and others 2021). While awareness of the value and usefulness of these instruments against disaster risk have increased in the last five years, the level of coverage in member economies has not risen in tandem (ASEAN 2021). Options for ex ante financing include:

- *Country self-insurance*. This refers to accumulating fiscal reserves and contingency funds for use in emergencies such as financing post-disaster relief and reconstruction. ASEAN+3 economies with some form of disaster self-insurance are Brunei, Hong Kong, Indonesia, Lao PDR, Malaysia, the Philippines, and Vietnam:

these economies (except Brunei) have dedicated disaster reserve funds, although some of them have been criticized for slowness in disbursement.[9] Japan was able to tap on its contingency reserves—designed for use as a cushion against unforeseen events—during the Great East Japan Earthquake in 2011 (OECD 2015).

- *Traditional disaster insurance and/or reinsurance*. Several ASEAN+3 economies employ traditional insurance schemes that can be broad or targeted—the latter mostly focused on the agricultural sector. To address the implementation challenges of traditional indemnity-based agricultural insurance against typhoons, droughts, and floods, Indonesia, Myanmar, the Philippines, and Thailand are piloting or expanding weather-index agricultural insurance that bases payouts on a rainfall or temperature index rather than on direct damage assessments (Surminski and Oramas-Dorta 2014).[10]

- *Country group insurance, including sovereign parametric insurance.* Regional catastrophic insurance allows vulnerable countries to cushion climatic shocks by diversifying the risks beyond country boundaries (Martinez-Diaz and McClamrock 2019). Well-known examples include the Pacific Catastrophe Risk Insurance Foundation for the Pacific islands and the Caribbean Catastrophe Risk Insurance Facility for the Caribbean islands. Within the region, the Southeast Asia Disaster Risk Insurance Facility (SEADRIF) provides participating ASEAN economies with insurance and risk management solutions against climate shocks and natural disasters. Established in 2019 with initial capitalization from Japan and Singapore and technical support from the World Bank, SEADRIF's first regional catastrophe risk insurance product provides cover against flood risks in Lao PDR.

- *Contingent financing from international financial institutions for addressing disaster risks*. These include the IMF's Resilience and Sustainability Facility, ADB's Contingent Disaster Financing; and the World Bank's Catastrophe Deferred Drawdown Option (Cat-DDO) (Table 6).

[9] Brunei provides an annual budget allocation to the Ministry of Home Affairs for natural disaster response (OECD 2015).
[10] However, constraints to the scaling up of weather index insurance include lack of reliable weather data, low density of weather stations leading to high basis risk, and limited data on damage and hazards for parametric modeling of the insurance.

Table 5. Regional and Global Financial Safety Nets: Ex Post Disaster Financing Available to ASEAN+3 Economies

Instrument	Purpose/scope	Eligibility	Terms	Recipients
Asian Development Bank (ADB)				
Asia Pacific Disaster Response Fund	Provides fast-tracked grants to developing member countries for life-saving purposes in the immediate aftermath of major disasters triggered by natural hazards.	Any ADB developing member country where a natural disaster has occurred; an emergency has been officially declared that is of a scale beyond the capacity of the country and its own agencies to meet the immediate expenses necessary to restore life-saving services to the affected populations; and the United Nations (UN) humanitarian/resident coordinator has confirmed the scale and implications of the disaster and has indicated a general amount of funding that would be required to assist in alleviating the situation.	Assistance is in the form of a grant totaling up to USD3 million per event.	• Cambodia 2011: USD 2.8 million [0.5%] • Indonesia 2009: USD 3.0 million [0.1%] 2018: USD 3.0 million [0.2%] 2020: USD 3.0 million [N.A.] • Philippines 2009: USD 1.6 million [0.3%] 2013: USD 3.0 million [0.03%] 2020: USD 3.0 million [N.A.] 2022: USD 3.0 million [0.2%] • Thailand 2011: USD 3.0 million [0.01%] • Vietnam 2016: USD 2.9 million [0.04%] 2020: USD 2.5 million [0.2%]
Emergency Assistance Loan (EAL)	Provides emergency support in the aftermath of disasters triggered by natural hazards, health emergencies, food insecurity, technological and industrial accidents, and post-conflict situations. The focus of the EAL is on immediate short-term requirements that can be completed within a fixed maximum implementation period. This includes early recovery activities, such as rehabilitating critical infrastructure and meeting basic needs, as identified by a post-disaster needs assessment.	Any ADB developing member country where a disaster event has occurred that involves significant economic dislocation.	An EAL financed by concessional ordinary capital resources will carry interest of 1 percent per year and a maturity of 40 years, including a grace period of 10 years, with repayment of the principal at 2 percent per year for the first 10 years after the grace period and 4 percent per year thereafter. An EAL financed by regular ordinary capital resources will be subject to the same loan terms as regular investment projects, although a grace period and a maturity extension may be granted. ADB financing under an EAL may exceed the country's cost-sharing limit because of exceptional circumstances.	• Cambodia 2008: USD 61.0 million [N.A.] 2012: USD 141.9 million [27.2%] • China 2009: USD 400.7 million [0.5%] • Indonesia 2005: USD 321.0 million [7.2%] 2018: USD 500.0 million [22.3%] • Myanmar 2016: USD 10.0 million [8.4%] • Philippines 2013: USD 500.0 million [5.2%] 2018: USD 408.0 million [N.A.] 2020: USD 200.0 million [N.A.] • Vietnam 2006: USD 76.5 million [25.1%]
International Monetary Fund (IMF)				
Rapid Credit Facility (RCF)	Provides concessional, rapid, and low-access financial assistance in a wide variety of circumstances, including natural disasters.	Low-income (Poverty Reduction and Growth Trust-eligible) member countries facing an urgent balance of payments need. Access is determined on a case-by-case basis.	Access is subject to annual and cumulative limits. Financing takes the form of a one-off disbursement, with scope for repeat use. No ex post program-based conditionality or reviews, although prior actions sometimes apply. Financing currently carries a zero-	• Myanmar 2020: USD 118.8 million [N.A.] 2021: USD 118.8 million [N.A.]

			interest rate, has a grace period of 5½ years, and a final maturity of 10 years.	
Rapid Financing Instrument (RFI)	Provides rapid and low-access financial assistance to meet a broad range of needs, including those arising from natural disasters.	Any qualifying member country facing urgent balance of payments needs that, if not addressed, would result in an immediate and severe economic disruption. Access is determined on a case-by-case basis.	Access is subject to annual and cumulative limits. Financing takes the form of a one-off disbursement, with scope for repeat use. No ex post program-based conditionality or reviews, although prior actions sometimes apply. Financing is subject to the same terms as the Stand-By Arrangement and should be repaid within 3¼ to 5 years.	• Myanmar 2020: USD 237.7 million [N.A.] 2021: USD 237.7 million [N.A.]
World Bank				
Immediate Response Mechanism (IRM)	Provides immediate financing in support of recovery efforts after crises (notably, natural disasters and economic shocks), such as the activation or scaling up of safety nets to mitigate the impact on vulnerable groups, repair or restoration of basic physical assets, protection of critical development spending such as on health and education, and creation of programs to jump-start economic activity.	World Bank International Development Association (IDA) countries experiencing a crisis such as a natural disaster.	Rapid access of up to 5 percent of member country's undisbursed IDA investment project balances following a crisis. Small states and countries with small undisbursed balances will be able to access up to USD5 million.	• Myanmar 2015: USD 65.0 million [54.6%]
Crisis Response Window (CRW)	Provides additional resources to respond, as a last resort, to the impact of severe natural disasters, public health emergencies, and economic crises. CRW early response financing (ERF) is intended for slower-onset events, namely disease outbreaks and food insecurity.	While all IDA countries are in principle eligible for CRW support, a country's access to the CRW depends on specific circumstances including the magnitude of the impact of the crisis, the country's access to alternative sources of financing (including alternative World Bank sources), and its ability to use its own resources.	CRW will provide USD2.5 billion in crisis response financing, including up to USD500 million in resources dedicated to ERF. To be eligible for ERF, a country must have in place a credible preparedness plan for disease outbreaks or food insecurity prior to crisis (or develop such a plan subsequently) and develop a credible and costed response plan upon the disease outbreak or food insecurity event materializing.	• Myanmar 2016: USD 100.0 million [50.0%]

Source: ADB; IMF; World Bank; AMRO staff compilation and calculations.

Note: The International Development Association (IDA) is the part of the World Bank that helps the world's poorest countries. Eligibility for IDA support depends first and foremost on a country's relative poverty, defined as gross national income per capita below an established threshold and updated annually (USD 1,255 in fiscal year 2023). IDA also supports some countries, including several small island economies, that are above the operational cutoff but lack the creditworthiness needed to borrow from the International Bank for Reconstruction and Development (IBRD), the lending arm of the World Bank Group. ASEAN+3 economies that are currently eligible to receive IDA resources are Cambodia, Lao PDR, and Myanmar. For comparability, estimated damages were sourced from the EM-DAT International Disaster Database, and refers to the value of all damages and economic losses directly or indirectly related to the disaster, unadjusted for inflation. Figures in brackets refer to the share of the borrowing to total estimated disaster damages. N.A. = not applicable. These are indicated for disbursements/borrowings that were not related to natural disasters (e.g., COVID-19-related borrowing). For Myanmar, RCF and RFI amounts are converted from the original SDR amounts (RCF: SDR 86.1 million; RFI: SDR 172.3 million), while for the CRW, the USD 100 million was made available for use under an IDA-financed flood and landslide recovery project worth USD 200 million (thus the share is indicated as 50 percent).

Table 6. Regional and Global Financial Safety Nets: Ex Ante (Contingent) Disaster Financing Available to ASEAN+3 Economies

Instrument	Purpose/scope	Eligibility	Terms	Recipients
Asian Development Bank (ADB)				
Contingent Disaster Financing (CDF)	Provides quick and flexible source of funds for developing member countries affected by disasters that are triggered by natural hazards only. Supports essential policy reforms to strengthen disaster preparedness that are to be completed before a natural disaster occurs.	All developing member economies are eligible upon meeting the requirements of policy-based lending (PBL), including satisfactory completion of a set of substantive legal, institutional, and policy reforms to disaster risk management captured in a policy matrix, based on prior actions.	Once a CDF is approved for a country, it remains active until a disaster occurs. The CDF program is processed as a single-tranche stand-alone PBL, with one set of binding policy actions (prior actions), and a post-program partnership framework (PPPF), as set out in the policy design and monitoring framework. The PPPF presents the medium-term reform objectives that will be supported by ADB and is used to monitor program performance during the CDF availability period and to justify a loan renewal, if needed.	• Indonesia 2020: USD 500 million • Philippines 2020: USD 500 million
International Monetary Fund (IMF)				
Resilience and Sustainability Facility (RSF)	Provides policy support and affordable longer-term financing to help low-income and vulnerable middle-income countries address longer-term challenges, including those related to climate change and pandemic preparedness.	Low-income and vulnerable-middle income countries, including small states. Eligible member countries requesting access to the RSF need: (1) a package of high-quality policy reforms that will help reduce critical risks related to climate change or pandemic preparedness; (2) a concurrent IMF-supported program; and (3) sustainable debt and adequate capacity to repay.	The RSF has streamlined conditionality linked to reform progress, with each measure connected to one RSF disbursement. The overall cumulative access cap for eligible members under the RSF is set at the lower of 150 percent of quota or SDR1 billion, whichever is smaller. The minimum duration of an RSF arrangement is 18 months. RSF arrangements have a 20-year maturity and a 10 ½ -year grace period during which no principal is repaid. A tiered interest structure differentiates financing terms across country groups, with low-income members benefiting from more concessional terms.	• None
World Bank				
Development Policy Loan with a Catastrophe Deferred Drawdown Option (Cat DDO)	Provides immediate liquidity to eligible member countries to address shocks related to natural disasters and/or health-related events. Allows borrowers to prepare in advance by securing access to finance before a disaster strikes.	Middle and lower-middle income member countries (IBRD), and low-income member countries (IDA). To gain access to the DPL Cat DDO, the recipient must: (1) have an adequate macroeconomic policy framework; and (2) be preparing, or already have, a satisfactory disaster risk management program, which the World Bank will monitor periodically.	The country limit is set at USD500 million or 0.25 percent of GDP (whichever is less). The Cat DDO has a pre-specified drawdown trigger, typically the member country's declaration of a state of emergency. The three-year drawdown period may be renewed (with a fee) up to four times, for a maximum of 15 years in total. The repayment schedule for the Cat DDO is defined at the time of withdrawal. Repayment terms must be determined upon commitment and may be modified upon drawdown within prevailing maturity policy limits.	• Philippines 2011: USD 500 million • Philippines 2015: USD 500 million

Source: ADB; IMF; World Bank; AMRO staff compilation.

VI. Policy Conclusions

21. **For ASEAN+3, adapting to climate change is equally as pressing as mitigating climate change**. The region's economies are highly exposed to various physical and transition risks arising from climate change, with several economies recording the highest fatalities and economic losses globally due to weather-related disasters in recent decades (AMRO 2018, AMRO 2022). Achieving the region's broader goal of climate resilience requires that adaptation efforts—including macro-financial policies—be aligned, cohesive, and consistent with economywide commitments under the Paris Agreement.

22. **Fiscal policymakers have an important role to play in implementing the NAPs and accelerating the broader climate adaptation process.** Fiscal policy is a key lever to effect economywide adaptation efforts, whether to support investment in climate-smart infrastructure or to facilitate post-disaster risk relief and recovery. Ideally, the management of adaptation spending, and of financial assistance for it, should be undertaken within a medium-term financial framework consistent with available resources, macroeconomic stability, and debt sustainability (Bellon and Massetti 2022a, Bellon and Massetti 2022b). Yet in some ASEAN+3 economies, adaptation plans are not fully considered in national planning and budgeting processes or public investment cycles and identifying realistic financing methods and strategies also appears to be a particular challenge (Coalition of Finance Ministers for Climate Action 2023, Coalition of Finance Ministers for Climate Action 2022). Stronger international knowledge-sharing and exchanges on these issues would be crucial to help identify best practices from successful financing strategies and learn important lessons from unsuccessful mechanisms.

23. **Monetary and financial policymakers are key to achieving financial systems that are resilient against climate-related disasters.** To accelerate this ambition, physical risks to the financial sector from climate change and natural disasters should be robustly assessed, crisis management frameworks adopted, and financial institutions' internal technical capacities enhanced. For example, standards for financial institutions' climate-related reporting and scenario analysis would need to encompass physical as well as transition risks, and to make these climate-related financial risk disclosures mandatory. This would help facilitate credible and transparent risk assessment and information sharing across ASEAN+3 economies, which would be especially critical for designing regional risk-pooling initiatives for climate-related disasters.

24. **Regional financing arrangements may have a role to play in expanding the region's adaptation financing instruments.** Without a substantial reduction in greenhouse gas emissions, many scientific studies suggest that rapidly changing weather patterns are expected to bring about more frequent and even more intense climate-related disasters, rendering climate adaptation and disaster risk management "impossibly expensive" for individual economies (Georgieva, Gaspar, and Pazarbasioglu 2022). Many economies in the region have tapped international financial safety nets for ex post disaster financing, but disbursement could be lengthy, especially for large amounts. Only two economies have tapped ex ante arrangements (see Table 6), which tend to be costlier to obtain (Ghesquiere and Mahul 2010). A regional financing arrangement that specifically takes into account ASEAN+3's climate risk profile and financing needs could help increase members' flexibility and ability to guard against varying disaster shocks. AMRO is exploring new facilities to respond to sudden shocks like natural disasters. Discussions are ongoing on the creation of a rapid financing facility, which will allow the members to access financing to meet urgent balance of payment needs that arise from such catastrophic events. AMRO's proposal on

the specific modalities of the rapid financing facility—and a roadmap on other possible financing facilities—is expected by the end of this year (ASEAN 2023).

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