

ASEAN Climate Change Response



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Foreword

Southeast Asia, a politically and economically vibrant region, is especially vulnerable to climate change. Its current climate action will have far reaching implications on the global efforts on climate change.

The region is already bearing the brunt of rising global temperature. The Philippines is facing more and more intense cyclones year-by-year; and the erratic rainfall is affecting food production in the Mekong region; These are only a few notable examples showing the urgency for Southeast Asia to steel itself for climate change.

Thus, ASEAN, as the major regional organisation of Southeast Asia, showed its commitment to combat climate change right after COP 26 in Glasgow by adopting its own green recovery framework at the 37th ASEAN Summit. The framework lays out plans and programs to be commenced in the next few years to combat and adapt to climate change as well as sustaining these actions. Furthermore, ASEAN launched a State of Climate Change Report in October 2021. It is outlining the regional target to achieve net-zero in 2050 and is detailing short-term and long-term strategies building towards it.

It is also important that climate actions are continuous and sustainable in the long run since climate change will not be reversed overnight. However, this has often been overlooked in Asia before and governments have been overburdened as a result. The concept of climate finance has been created to alleviate such burden by improving the financial sustainability of climate mitigation and adaptation efforts. Now the ASEAN region is putting more effort into “durable, long-lasting, and inclusive” climate actions. As examples their green recovery framework mentions various funding mechanisms and climate finance instruments such as emission trading schemes.

Therefore, this study aims to explore the climate actions within the entire ASEAN region in all three major aspects: mitigation, adaptation, and finance.

I would like to thank all contributing authors and the Asian Vision Institute (AVI) for the excellent cooperation. I wish you may find this study insightful.

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Foreword

Climate change is a pressing global issue. When it comes to its ramifications, Southeast Asian countries are undoubtedly the most vulnerable due to their inadequate capacity to respond and recover from the devastating repercussions. The effect of climate change poses a threat to the social component and the economic loss, making it obligatory for policymakers to strategize on preparation and response measures. However, the solution cannot rely solely on policy; all relevant stakeholders require cross-section collaboration to implement effective climate change adaptation.

This publication is an outcome of a collaboration between the Asian Vision Institute (AVI) and the Regional Project Energy Security and Climate Change Asia-Pacific (RECAP) of the Konrad Adenauer Stiftung (KAS). The book demonstrates the initiatives of ASEAN to address the impact of climate change at the domestic and regional level by incorporating the case studies and lessons learned from the actual implementation of the climate change strategies and policies in ASEAN. Researchers and intellectuals from Cambodia, Indonesia, Vietnam, and Thailand wrote this fascinating book. The book provides a great insight into the issues that ASEAN nations confront in dealing with climate change, ranging from the topic of climate change mitigation, adaptation, and the climate change funding apparatus. It serves as a piece of documentation for policymakers and practitioners. Incorporated in the book are the policy recommendations and future directions toward a more effective climate change adaptation and response plan.

The book also examines financial resources, capacity building, technology transfer, investment opportunities, and the role of forestry in climate change adaptation, all of which are significant elements in strengthening the region's climate change response.

I want to acknowledge the following authors for their generous contributions, including Dr. Piseth Keo, Ms. Chakriya Pheap, Dr. Yanto Rochmayanto, Ms. Mithona Mey, Mr. Chansophea Sok, Mr. Aris Ristiyana, Dr. Nyda Chhinh, Dr. Rattana Chhin, Dr. Nuttavikhom Phanthuwongpakdee, Dr. Yanin Chivakidakarn Huyakorn, Mr. Phaothai Sin-ampol, Dr. Le Thi Ha Thu, Dr. Try Thuon, Dr. Rath Sethik, Dr. Serey Sok, Dr. Pheakdey Nguonphan, and Dr. Sopheat Seak.

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Introduction

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With 4,340,700 km², Southeast Asia is home to about 678 million people, approximately 8.58 per cent of the global population (Worldometers 2022). Compared to the 1960s, the population has grown more than threefold from slightly above 214 million to 670 million in 2021, 50 per cent of whom are urban settlers (Worldometers 2022). With abundant resources from marine to rivers and land, a large majority of the population rely on their local resources for subsistence and income generation ranging from agriculture and fisheries to non-timber forest product collection. Forest cover in Southeast Asia accounts for nearly 15 per cent of the world's tropical forests, and supports millions of lives of the ASEAN population and serves as at least four of the 25 globally important biodiversity hotspots (Estoque, et al. 2019).

The frequency and intensity of climate change-related natural disasters are rising, and are having significant impacts on the economy and society in Southeast Asia. Southeast Asia's vulnerability to climate change impacts is largely due to its long coastline and concentration of economic activities in the coastal areas, high level of poverty, resource-based sectors, particularly agriculture, which are prone to the impacts of climate change, and exposure to frequent natural disasters including typhoons, floods, and droughts (ASEAN Cooperation on Environment 2022a). Among the 20 most affected countries in the world, five of them are from Southeast Asia, including Myanmar (3), the Philippines (5), Vietnam (9), Thailand (13), and Cambodia (19) (Sandu, et al. 2009). The collective effects on agriculture, tourism, energy demand, labour productivity, catastrophic risks, health, and ecosystems are severe (Sandu, et al. 2009).

With tremendous pressures and existential threats posed by climate change, there have been sustained political will and commitment at the national level of the ASEAN Member States (AMS) to address climate change. ASEAN's regional climate response and cooperation have been steadily strengthened. Nature and biodiversity conservation, coastal marine environments, water resources management, environmentally sustainable cities, climate change, environmental education and sustainable consumption and production have been prioritised as strategic areas

for intervention for environmental management and climate change responses (ASEAN Cooperation on Environment 2022b). The ASEAN Joint Statement on Climate Change to the 26th Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in 2021 stressed the need to strengthen support for AMS and other developing country Parties to analyse climate risks, formulate and implement adaptation measures, and enhance ambitions for climate change mitigation (ASEAN Secretariat 2019).

Remarkable action has been taken at the domestic and regional levels. AMS have developed frameworks to coordinate, monitor, and evaluate the agreed National Determined Contributions (NDC) progress. According to NDC targets, Brunei plans to have reduced its total energy consumption by 63 per cent by 2025, Cambodia plans to reduce its GHG emissions by 27 per cent by 2030, Indonesia aims to reduce its GHG emissions by 29 per cent by 2030, Lao PDR intends to reduce CO₂ from transportation by the amount of 191 ktCO₂e/year, Malaysia is to reduce its GHG emissions per GDP by 35 per cent by 2030, Myanmar targets to realise an electricity saving potential of 20 per cent by 2030, the Philippines' target is to reduce its GHG emissions by 75 per cent by 2030, Singapore plans to reduce its GHG emissions per GDP by 36 per cent by 2030, Thailand is aiming to reduce its GHG emissions by 20 per cent by 2030, and Vietnam is to reduce its GHG emissions by 9 per cent by 2030 (ASEAN Cooperation on Environment 2022a).

Moreover, the institutional structure has been designed to address climate change, including the ASEAN Ministerial Meeting on the Environment, the ASEAN Senior Officials Meeting on the Environment, and ASEAN Working Group on Climate Change (ASEAN Cooperation on the Environment 2022a). The ASEAN Working Group on Climate Change Action Plan focuses on adaptation, mitigation, long-term planning and assessment of National Determined Contributions, climate modelling and assessment, Measurement, Reporting, and Verification (MRV), Green House stocktaking, climate financing, technology transfer, and cross-sectoral collaboration.

Some flagship initiatives include the ASEAN Climate Finance Strategy, ASEAN Climate Change Partnership Conference, the ASEAN Heritage

Parks Programme, ASEAN SDG Frontrunner Cities Programme, and ASEAN Eco-Schools and Youth Eco-champion Award Programmes. ASEAN also produces ASEAN State of Environment Reports and ASEAN State of Climate Change Reports to support the evidence-based policymaking process in ASEAN. The ASEAN State of Climate Change Report (ASCCR) provides an overall outlook of the state of play of climate change issues in the ASEAN region. The ASCCR is also a forward-looking report, which includes recommendations on making the transition toward 2030 and 2050 for both adaptation and mitigation, considering ASEAN's development context and the long-term goals of the Paris Agreement (ASEAN Secretariat 2021). In addition, at the 16th ASEAN Ministerial Meeting on the Environment and the 16th Meeting of the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution, ASEAN agreed in principle to establish the ASEAN Centre for Climate Change in Brunei Darussalam (ASEAN Secretariat 2021).

Recently, most of the AMS made commitments to decarbonise their economies by mid-century and slightly beyond. For instance, Cambodia has set a clear target for carbon neutrality by 2050, while Indonesia has set a net-zero ambition by 2060 (United Nations Framework Convention on Climate Change 2022). In addition, Thailand pledges to reach carbon neutrality in 2050 and net zero emissions by 2065, Thailand is committed to achieving the carbon-neutral goal by 2050, and Singapore has set a goal to halve its emissions by 2050 and achieve net-zero by the second half of the century (United Nations Framework Convention on Climate Change 2022).

With the progress being made, there remain a myriad of challenges for AMS to achieve the commitments as there remain major challenges, from the limited financial and human resources to public behavioural change in regard to waste management and energy conservation practices and technological availability. This may require more assistance from developed countries through multilateral and bilateral mechanisms in relation to financial and technical support and technology transfer, effective interventions and


assistance for climate change adaptation and other climate actions. Additionally, collaborations with development partners, international and national non-government organisations, research institutions, transnational and national corporates, and local communities are crucial for Cambodia to achieve its climate goals and develop into a carbon-neutral and resilient society.

The "ASEAN Climate Change Response" book aims to investigate ASEAN efforts in response to climate change and to propose possible future pathways for a carbon-neutral and climate-resilient society. The book will look into the existing legal instruments, existing policies, mainstreaming strategies, funding mechanisms, challenges, and opportunities in Southeast Asia. The book is intended to serve as a solid piece of policy-oriented research, which provides diverse perspectives from policy advisers, researchers, investors, and practitioners.

The book is divided into five parts. Part I has one introductory chapter, setting out the context and providing an outline of the book. Part II focuses on Climate Change Mitigation, consisting of three main chapters, including Chapters 2, 3, and 4. Chapter 2 provides an overview of ASEAN Climate Change Mitigation with the lessons learnt from the forestry sector for global environmental governance, while Chapters 3 and 4 investigate case studies of climate change mitigation in Cambodia and Indonesia. Next, Part III consists of Chapters 5, 6, 7, and 8, focusing on ASEAN Climate Change Adaption. Similar to Part II, Chapter 5 provides an overview of ASEAN climate change adaptation, followed by the case studies of Southeast Asia nations, including Cambodia (Chapter 6), Thailand (Chapter 7), and Vietnam (Chapter 8). Then, Part IV examines the financial mechanism of climate change, and it contains three main chapters, namely Chapters 9, 10, and 11). Chapter 9 reviews the funding mechanisms for climate change at the global and regional level, and the roles of Cambodia's Chairmanship in 2022, Chapter 10 focuses on the funding mechanism in Cambodia, and Chapter 11 specifically addresses sustainable finance and European Taxonomy. Finally, Chapter 12 concludes the existing efforts, challenges, and opportunities for carbon-neutral and climate resilience in Southeast Asia.

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Overview of ASEAN Climate Change Mitigation

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**Lessons from the Forestry Sector for
Global Environmental Governance**

Introduction

Currently the global community is facing the escalating impacts of climate change, biodiversity crisis, and the coronavirus (COVID-19) pandemic. Forests are highly expected to be an important part of the solution, since forests have been provided socio-economic safety nets for people and communities in times of crises (UN 2021; Angelsen and Wunder 2003). Around 1.6 billion people (25% of the global population) rely on forests for their subsistence needs, livelihoods, employment, and income (UN 2021). There are also vulnerable segments of society, such as women, children, and other landless farmers, who look to the forests to provide them with their cash and non-cash income.

ASEAN countries, especially those with their long coast lines, are particularly vulnerable (Streck 2009; RECOFTC 2020). Many countries are experiencing an increase in the severity and number of extreme climate events, such as flooding, heatwaves, droughts, typhoons and monsoons. With the exception of Singapore and Brunei, ASEAN countries are among the 50 countries worldwide reporting the most serious weather-related events (RECOFTC 2020). Many ASEAN countries lack the means, technology and institutions to effectively adapt to these changing climatic conditions and the heightened risk of extreme weather events further increases Southeast Asia's exposure to the changing climate (Streck 2009).

As an environmental solution for these climate risks and socio-economic safety net, forests in the ASEAN region play an important role in enhancing ecosystem adaptive capacity. The Center for People and Forests (RECOFTC) (2020) reported that forests in the ASEAN region cover more than 193 million hectares, (44% of the land area). ASEAN forest accounts for about 20 per cent of global biodiversity, approximately 35 per cent of global mangrove forests and 30 per cent of coral reefs (Jeon, Sarker, and Giessen 2019). They play a vital role in the lives of many people and contribute to national economic development and environmental stability. The region's forests help reduce the impacts of extreme weather events

(Wang et al. 2019). They lessen the severity of flooding, storm impacts, heat waves and drought, and provide natural resources that aid recovery.

While Southeast Asia's forests play important roles in biodiversity conservation and global carbon (C) balance, unfortunately, the region is also a deforestation hotspot and facing multiple challenges arising from global trade and land conversion due to local factors (Estoque et al. 2019; Paradis 2020). Deforestation, due to land-use change, is the most significant source of greenhouse gas emissions in the ASEAN region (RECOFTC 2020). Furthermore RECOFTC (2020) noted that Member States generated 3,774 megatonnes of CO₂ in 2014, the most recent year for which data are available. Of these total emissions, land-use change accounted for 43 per cent, energy generation 37 per cent, and agriculture 12 per cent. This illustrates the important role that the forest sector plays in climate change mitigation. Land-use change and forestry emissions have been relatively static in the past 20 years. Emissions from other sources have been steadily rising. ASEAN Member States were responsible for 7.7 per cent of all global emissions in 2014 and 52 per cent of global emissions from land use change and deforestation. Therefore, it is important to revisit climate change mitigation measures in the ASEAN region.

The paper is expected to gain insights for better global environmental governance (GEG) in the ASEAN region in the forestry sector. Using a simple framework, the analysis was started by evaluating the drivers of deforestation and its mitigation policies and initiatives. The next step was to analyse the effectiveness of GEG to identify institutional gaps in forestry and the land-based sector. Lastly, the study offered lessons in improving the state of the environment and achieving the goals of sustainable development.

Drivers of Deforestation in ASEAN

Deforestation and forest degradation of natural forests for agricultural plantations or mining, and other commercial uses persists. Forests in the ASEAN region have declined by almost 7 million hectares, or 3.4 per cent, since 2013 (RECOFTC 2020). Deforestation and forest degradation potentially release millions of metric tonnes of carbon into the atmosphere. RECOFTC (2020) has assessed the forest cover change in ASEAN countries 2010–2019 as shown in Table 1.

RECOFTC (2020) also reported that Cambodia, Indonesia, Malaysia and Myanmar have undergone significant reductions in forest cover since 2013. In Cambodia, forest cover fell sharply between 2013 and 2016, but the rate of change appears to have slowed since 2016 (RECOFTC 2020). Since 2013, forest cover has decreased by about 4 million

hectares, or 4.5 per cent, in Indonesia; by nearly 2.7 million hectares, or 8.4 per cent, in Myanmar; and by 2.3 million hectares, or 11 per cent, in Malaysia. In 2014, the most recent year for which data are available, 43 per cent of greenhouse gas emissions from the ASEAN region came from land-use change and forestry (RECOFTC 2020). The region accounted for 52 per cent of global emissions from this source (RECOFTC 2020). Clearly, ASEAN forests and how they are managed are of critical importance at the national, regional and global levels.

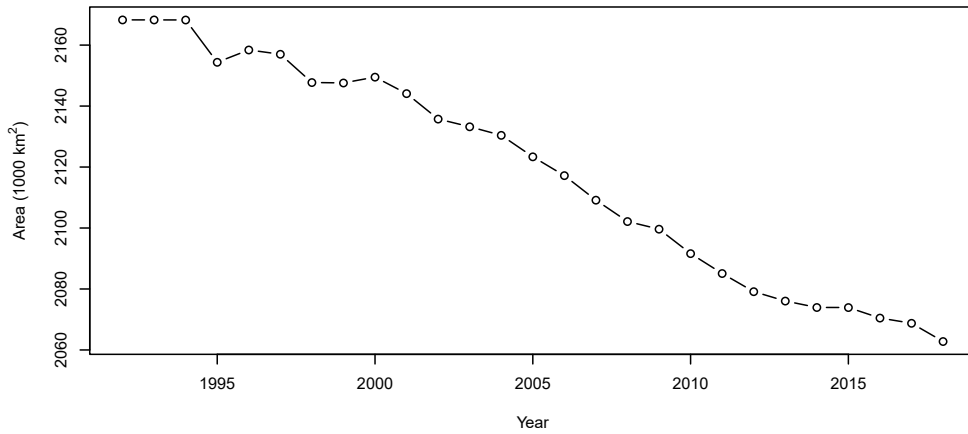
Another assessment has been studied by Paradis (2021). Figure 1 shows the dynamic of forest change in the ASEAN region from 1992–2018. The study found a decline of forest cover during such period, and there is no indication of net positive forest change in recent years (Figure 2). The amount of forest loss is relatively higher than forest gain.

Table 1: Forest Cover 2010–2019

Country	Baseline 2010 (ha)	Situational analysis 2019 (ha)	Annual deforestation (ha)	Share of annual deforestation in the region (%)	Rate of deforestation (%/year)
Brunei Darussalam	380,000	322,195	9,634	0.4	2.5
Cambodia	10,094,000	8,742,401	150,178	6.8	1.5
Indonesia	94,432,000	85,622,000	978,889	44.5	1.0
Lao PDR	15,751,000	13,732,282	224,302	10.2	1.4
Malaysia	20,456,000	18,123,501	259,167	11.8	1.3
Myanmar	31,773,000	29,041,000	303,556	13.8	1.0
Philippines	7,665,000	7,014,154	72,316	3.3	0.9
Singapore	2,300	16,347	- 1,561	- 0.1	- 67.9
Thailand	18,972,000	16,398,128	285,986	13.0	1.5
Vietnam	13,797,000	14,491,295	- 77,144	- 3.5	- 0.6
Total	213,322,300	193,503,303	2,202,111	100.0	1.0

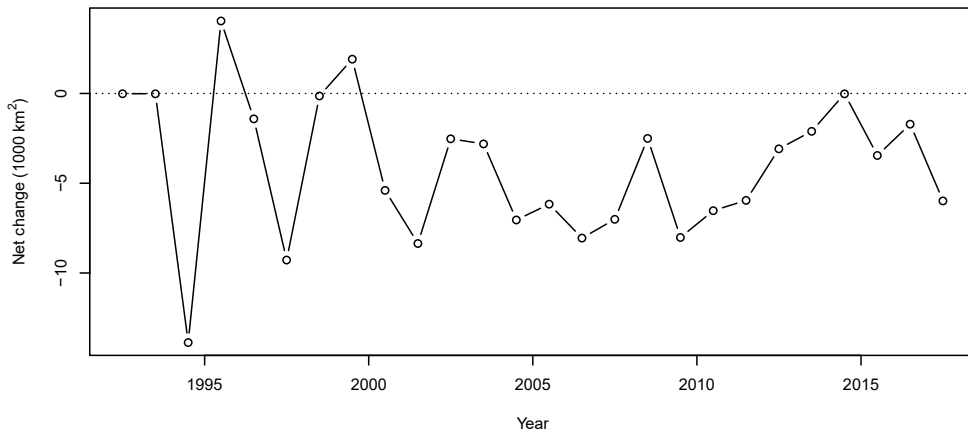
Source: Adopted from RECOFT (2020)

Figure 1: Forest Cover Area in Southeast Asia 1992-2018



Source: Paradis (2021)

Figure 2: Net Changes in Forest Cover Area between Successive Years



Source: Paradis (2021)

Findings from a previous study (Paradis 2020) showed that recent forest dynamics in Southeast Asia have been characterised by different phases, some being synchronised among countries: a phase of relative stability (1992 to 1998), a sharp decrease in forest area (1998 until the mid-2000s), and a period of relative stability in some countries (until 2018), except in some countries where forests continued to decline (Cambodia and Vietnam). The last few years (from 2013) are characterised by stability or even an increase in forest cover in Thailand.

Agricultural production is the main driver of deforestation in Southeast Asia countries (Paradis 2021). This finding is in line with Imai et al. (2018) and Tenneson et al. (2021) (as presented in Table 2). The changes in cultivated land have been shown to be the main driver of forest losses in several countries, especially herbaceous crops. Another driver is national economic policies. Such economic policies are also an important driver of forest cover dynamics (Paradis 2021). Indonesia and Malaysia have a marked negative relationship between changes in forest cover and changes in GDP. These two countries have a forestry mainly oriented towards exportations.

In the context of population growth, the present study of Paradis (2020) and Estoque et al. (2019) show that the rate of deforestation correlates with population density (see Figure 3). However, there is a difficulty to find a clear relationship between population and forest transition, since other studies indicate different findings. For instance, Imai et al. (2018) found a negative correlation between remaining forest area with population density among eight Southeast Asia countries, while being positively correlated with per capita wood production. This implies that countries rich in accessible and productive forests, and higher population pressures are the ones that have experienced forest transition. Food production and agricultural input are negatively and positively correlated, respectively, with forest area change during 1980–2009 (Imai et al. 2018). This indicates that more food production drives deforestation, but higher efficiency of agriculture is correlated with forest gain. The finding is consistent with other studies, as conducted by Garrett et al. (2018) as well as Angelsen and Kaimowitz (2000). Agriculture intensification could help spare forests and increase food availability (Garrett et al. 2018). In addition, smallholders maintain agricultural production systems by means of technological progress and the more intensive systems may shift scarce resources away from extensive ones, leading to a reduction in the overall demand for agricultural land (Angelsen and Kimowitz 2000). However, increasing land demand will occur when there is surplus income for smallholders and will encourage further investment in expansive systems (Angelsen and Kimowitz 2000).

In addition, timber trade is also considered as an important factor influencing forest transitions in the Asian region in general (Youn et al. 2017). Furthermore, Youn et al. (2017) noted that the type of forest ownership reflects the extent to which forest owners will respond to external conditions, such as the market, forest policies, and institutions. The causal effect of forest ownership on land use decisions seems to be ambivalent. Private ownership appears to be more responsive to market changes than public ownership. Economic theory predicts that if the marginal benefits of converting forest land to other land uses are greater

than the benefits of maintaining forest land, then forests will be converted to other land uses. This conversion can lead to deforestation under stable market conditions, but as agricultural technologies advance, intensive cultivation of more productive and accessible agricultural land will become more profitable.

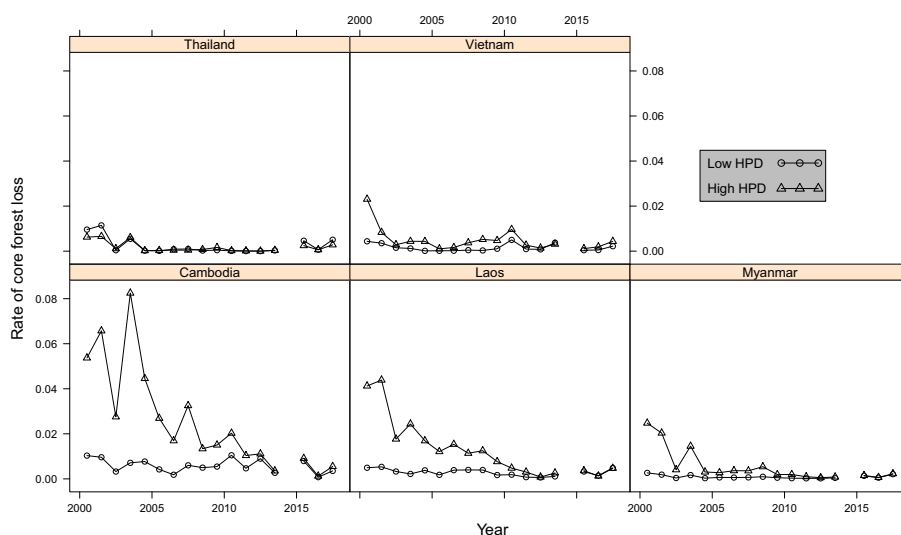
In comparison with global trends, as reported by the UN (2021), fortunately, Asia, Europe, and Oceania have seen net increases in forest area since 1990. The forest area of this group of regions increased by 1.1 per cent between 2010 and 2020. This implies that increasing the forest carbon stock of Asia, Europe, and North and Central America has compensated for reductions in Africa and South America. Forest ecosystems are the largest terrestrial carbon sinks, absorbing roughly 2 billion tonnes of CO₂ each year. Between 1990 and 2010, the total global forest carbon stock fell from 668 gigatonnes (Gt) in 1990 to 662 Gt in 2010, mainly due to loss of forest area. In 2020, it remained at 662 Gt, with Europe, North and Central America, and South America housing two-thirds of this total (UN 2021).

Table 2: Driver of Forest Change in ASEAN Countries

Country	Main driver of deforestation
Cambodia	Agriculture (herbaceous crops), tree crops
Indonesia	Agriculture (herbaceous crops), tree crops, palm crops
Lao PDR	Agriculture (herbaceous crops)
Myanmar	Agriculture (herbaceous crops), tree crops (pulp wood, rubber)
Philippines	Agriculture (herbaceous crops), tree crops, palm crops
Thailand	Agriculture, tree crops (pulp wood, oil palm, rubber)
Vietnam	Agriculture, pulpwood, rubber, coffee

Source: Tenneson et al. (2021)

Figure 3: Rate of Core Forest Loss in Five Countries between 2000 and 2018 in Low- and High-density Populated Areas



Source: Paradis (2020)

Mitigation Policies and Climate Initiatives in ASEAN Countries

As part of the global community, ASEAN has committed to participating in the combat against deforestation and forest degradation. This is in line with point 3 of the ASEAN Joint Statement to the United Nations Climate Action Summit 2019 which declared that ASEAN was committed to be actively involved in global climate action at global and regional levels. At the global level ASEAN strongly supports global efforts to address climate change under the UNFCCC.

All ASEAN Member States (AMS) have ratified the Paris Agreement and communicated their Nationally Determined Contributions (NDCs), while at the regional level, ASEAN Socio-Cultural Community (ASCC) Blueprint 2025 is evidence of this commitment (ASEAN Secretariat 2019). The Blueprint concerns four key environmental issues: biodiversity and natural resources, environmentally sustainable cities, sustainable climate, as well as sustainable consumption and production (Seah and Martinus 2021). Seven strategic priorities have been translated following these key areas and relevant working groups have been formed to guide practical recommendations. The Blueprint also calls for enhancing the capacity of sectoral institutions and ASEAN governments to improve GHG inventories, strengthen global partnerships, and advance the implementation of the global framework on climate change (Seah and Martinus 2021).

ASEAN, as a regional body, plays a crucial role in ensuring commitments agreed at a global level can be effectively implemented on the ground. ASEAN can help coordinate neighbouring countries' policies regarding cross-border issues to be discussed and common solutions to be agreed (Sagoo 2020). Table 3 lists other ASEAN commitments to climate change mitigation in support of forest mitigation policies.

Indeed, the land-use sector of each ASEAN country has been influenced by a unique history, varied natural resources, peculiar development patterns, and special economic circumstances, as well as

property rights structure and the state of forests (Streck 2009). Despite these differences, ASEAN countries have some situational similarities. ASEAN countries are rich in biodiversity, natural and cultural heritage, and positioned as Non-Annex I countries, and the forestry sector (with the exception of Singapore) is essential to the national economies of ASEAN countries, and is important for sustaining the livelihood of the population (Streck 2009).

In recent years, emission reduction commitments at country level are included in the NDCs. All ASEAN countries have submitted their NDCs as country targets to be achieved by climate mitigation actions. The NDCs of the ASEAN countries are outlined in Table 5. The total GHG emission reduction target of the ASEAN countries by 2030 (based on the Updated NDC) of 1,460.74 MtCO₂-eq (as reported by Merdekawati 2021, Malaysia and Singapore are excluded due to the unknown total emission reduction targets in their NDCs). Meanwhile, the total global GHG emission level (without LULUCF) taking into account implementation of the latest NDCs of all Parties to the Paris Agreement, is estimated to be around 55.1 (51.7–58.4) GtCO₂-eq in 2030 (UNFCCC 2021). Therefore, the share of emission reduction of the AMS compared to the global emission resulting from the Updated NDC is estimated to be 6.8 per cent.

The commitments outlined in the NDCs are an important starting point for the ASEAN countries to contribute to the global mitigation measures. The NDCs of Brunei Darussalam, Cambodia, Lao PDR, Myanmar, the Philippines and Vietnam include pledges and emission reduction targets related to their forestry sectors. Indonesia, Myanmar and Thailand include social forestry as part of their priorities for mitigation and adaptation to enhance the resilience of ecosystems to climate change. In this context, social forestry refers to a broad range of forest management models that place local people at the centre of decision-making processes. In the ASEAN region, social forestry is officially referred to as community forestry, village forestry, community-based forestry or community-based forest management (RECOFTC 2020). It comprises both legally recognized systems and informal forms,

including farm forestry or swidden-agroforestry systems, practised by communities, households and individuals (RECOFTC 2020).

Although RECOFTC (2020) indicated that the NDCs are currently not sufficient to limit warming to the threshold of 1.5° degrees Celsius to 2 degrees Celsius above pre-industrial levels, they highly contribute to the change of environmental governance. Climate change mitigation has been mainstreamed in the related policies and environmental development in ASEAN

countries (RECOFTC 2020; ASEAN Secretariate 2019; Merdekawati 2021). Strengthening climate mitigation policies and aligning with the existing climate strategic initiatives are the next challenge in NDC implementation. Considering national circumstances, many ASEAN countries (Cambodia, Indonesia, Myanmar, Philippines, Thailand, and Vietnam) represent more domestic policies and initiatives. Brunei Darussalam, Malaysia, Lao PDR and Singapore are seen to have more simple approaches on climate policy representation (Table 6).

Table 3: ASEAN Declarations and Commitments in Regard to Climate Change and Forest

Year	Policy Commitment
2007	Singapore Declaration on Climate Change, Energy and Environment
2008	Common Position on Reducing Emissions from Deforestation and Forest Degradation (REDD+) to UNFCCC on Climate Change COP 14
2009	Singapore resolution on Environmental Sustainability and Climate Change
2010	Statement on Joint Response to Climate Change
2011	Statement on Joint Response to Climate Change
2012	ASEAN Action Plan on Joint Response to Climate Change
2014	ASEAN Joint Statement on Climate Change
2015	ASEAN Joint Statement on Climate Change to COP 21
	Declaration on Post 2015 Environmental Sustainability and Climate Change
	Declaration on Institutionalizing the Resilience of ASEAN and its Communities and Peoples to Disasters and Climate Change
2016	ASEAN Joint Statement on Climate Change to COP 22
2017	ASEAN Joint Statement on Climate Change to COP 23
2018	ASEAN Joint Statement on Climate Change to COP 24
	ASEAN Multisectoral Framework for Climate Change: Agriculture and Forestry toward Food and Nutrition Security and Achievement of the SDGs

Source: RECOFTC (2020)

Table 4: NDCs and Supporting Policies in ASEAN Countries

Country	Highlight of the NDC	Supporting policies and targets on related LUCF sector
Brunei Darussalam	<ul style="list-style-type: none"> - Brunei Darussalam commits to a reduction in GHG emissions by 20% relative to Business-As-Usual levels by 2030. - The first NDC also has an adaptation component. 	<ul style="list-style-type: none"> - Sectors covered: Energy, Industrial Processes and Product Use, Agriculture, Forestry and Other Land Use, and Waste. - Brunei Darussalam aims to increase its forest reserves from 41% to 55%. - A further 400,000 trees are proposed leading up to 2035.
Cambodia	<ul style="list-style-type: none"> - Cambodia has proposed a 42% reduction in GHG emissions below BAU by 2030. The estimated 2030 emission reductions of an NDC scenario are listed below and the majority of targets identified are conditional on international support. - FOLU: -50% reduction below BAU by 2030. Cambodia also set an ambitious target in the FOLU sector for halving the deforestation rate by 2030, in line with REDD+ strategy. 	<ul style="list-style-type: none"> - Sectors covered: Forest and other Land Use (FOLU), Energy, Agriculture, Industry (IPPU), Waste. - Reduce emissions to 3,100 gigatonnes of carbon dioxide by 2030, compared to baseline emissions of 11,600 gigatonnes of carbon dioxide - Increase forest cover to 60%, or 4.7 tonnes of carbon dioxide per hectare per year, by 2030 - Reclassify 2 million hectares of forest as community forest as part of measures to reduce emissions in the forestry sector
Indonesia	<ul style="list-style-type: none"> - Indonesia has committed to unconditionally reduce its greenhouse gas emissions by 29% against the business-as-usual scenario by 2030. Indonesia could increase its contribution up to a 41% reduction of emissions by 2030, subject to availability of international support for finance, technology transfer and development and capacity building. - Along with the Updated NDC, Indonesia submitted its Long Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR) 2050 with net sink FOLU 2030 as one of the targets in the forestry sector. 	<ul style="list-style-type: none"> - Sectors covered: Energy, Waste, Industrial Processes and Product Use, Agriculture, FOLU - Set up an ambitious target by 2030 in peat lands' restoration of 2 million ha and rehabilitation of degraded land of 12 million hectares. - Government Regulation No. 79/2014 on National Energy Policy, set out the ambition to transform, by 2025 and 2050, - Targets available at national laws: (1) Targets found in National Medium Term Development Plan 2015–2019 (RPJMN 2015–2019), and (2) Decree 62/2013 Regarding a Managing Agency for the Reduction of Emission (sic) from Deforestation and Degradation of Forest and Peat lands - Enforce a moratorium on new forest clearance permits in primary forests and peat soils, strengthen forest protection and reduce deforestation and forest degradation.
Lao PDR	<ul style="list-style-type: none"> - Lao PDR commits to national level 2030 unconditional target of 60% GHG emission reductions compared to baseline scenario, or around 62,000 ktCO₂e in absolute terms through sectoral targets; as well as 2030 conditional sectoral mitigation targets towards net-zero emissions in 2050. 	<ul style="list-style-type: none"> - Sectors covered: Energy, industrial processes, agriculture, land-use change and forestry, and waste - 2030 unconditional mitigation targets on reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, buffer zones of national parks and other preserves, and enhancement of forest carbon stocks; - 2030 conditional mitigation targets of LUCF: Increased forest cover to 70% of land area (i.e. to 16.58 million hectares).

Malaysia	<ul style="list-style-type: none"> - Malaysia intends to reduce its GHG emissions intensity per unit of GDP by 45% by 2030 relative to the emissions intensity per unit of GDP in 2005. This consists of 35% on an unconditional basis and a further 10% is conditional upon receipt of climate finance, technology transfer and capacity building from developed countries. 	<ul style="list-style-type: none"> - Sectors covered: Energy, Industrial Processes, Waste, Agriculture, Land Use, Land Use Change and Forestry (LULUCF).
Myanmar	<ul style="list-style-type: none"> - Myanmar's total emissions reductions contributions as a part of its NDC are 244.52 million tCO₂-eq unconditionally, and a total of 414.75 million tCO₂-eq, subject to conditions of international finance and technical support by 2030. 	<ul style="list-style-type: none"> - Sectors covered: Energy, Agriculture, FOLU, Transport - Set a conditional target of reducing deforestation by 50% by 2030, and unconditional target of 25% by 2030. - Increase the area of land under Reserved Forest and Protected Public Forest jurisdiction to 30% of the total national land area by 2030. - Increase the Protected Areas Systems to cover 10% of the total national land area by 2030. - Include restoring degraded and sensitive forest areas through community-based reforestation in current and planned adaptation efforts
Philippines	<ul style="list-style-type: none"> - The Philippines commits to a projected GHG emissions reduction and avoidance of 75%, of which 2.71% is unconditional and 72.29% is conditional, representing the country's ambition for GHG mitigation for the period 2020 to 2030 for the sectors of agriculture, wastes, industry, transport, and energy. 	<ul style="list-style-type: none"> - Sectors covered: Agriculture, Waste, Industry, Transport, Energy - Recognize that forests contribute to both adaptation and mitigation, but specific actions in the forest sector are not outlined in detail
Singapore	<ul style="list-style-type: none"> - Singapore intends its emissions to peak at 65 MtCO₂-eq around 2030. Based on current projections, this will allow it to achieve 36% reduction in Emissions Intensity (EI) from 2005 levels by 2030. 	<ul style="list-style-type: none"> - Sectors covered: Energy, Industrial Processes and Product Use, Agriculture, Land Use, Land-Use Change and Forestry, Waste.
Thailand	<ul style="list-style-type: none"> - Thailand intends to reduce its greenhouse gas emissions by 20% from the projected business-as-usual (BAU) level by 2030. The level of contribution could increase up to 25%, subject to adequate and enhanced access to technology development and transfer, financial resources and capacity-building support. - Thailand is formulating its Long-term Low Greenhouse Gas Emission Development Strategy (LT-LEDS) which will guide Thailand towards climate-resilient and low greenhouse gas emissions development and serve as a basis for enhancing its subsequent NDCs. 	<ul style="list-style-type: none"> - Sector covered: Economy-wide (excluding land use, land-use change, and forestry) - Reduce greenhouse gas emissions by 20% from the projected business-as-usual scenario by 2030 and by up to 25% with international assistance. - Include sustainable management of community forests to promote food security at the community level. - Increase forest cover to 40% through local community participation, especially in headwater and mangrove forests, to enhance adaptive capacities of related ecosystems
Vietnam	<ul style="list-style-type: none"> - With domestic resources, by 2025 Vietnam will have reduced total GHG emissions about 7.3% compared to the BAU scenario (equivalent to 52.9 million tonnes of CO₂e), and by 2030 Vietnam will have reduced total GHG emissions about 9% compared to the BAU scenario (equivalent to 83.9 million tonnes of CO₂e). - The above-mentioned 9% contribution can be increased to 27% by 2030 (equivalent to 250.8 million tonnes of CO₂e) with international support. 	<ul style="list-style-type: none"> - Sectors covered: energy, agriculture, LULUCF, water, industrial processes - LULUCF: forest land; cultivation land; grassland; wetland and others. - Reduce greenhouse gas emissions by 8% from the projected business-as-usual scenario by 2030 and by up to 25% with international assistance. - Increase forest cover to 45%

Table 5: National Mitigation and Adaptation Strategies and Initiatives Supporting NDC Targets

Country	Strategies / policies / programs	Relevance to forest and climate change mitigation
Brunei Darussalam	National Forestry Policy	Increase the gazetted forest reserve from 41% to 55% of total land area
Cambodia	Climate Change Strategic Plan 2014–2023	Enhance carbon sinks and recognise the need for community-based approaches such as PES and participatory land use planning
	National Adaptation Programme of Action	Includes a proposal for community agroforestry in deforested watersheds, community mangrove restoration and sustainable use of natural resources, and community-based agroforestry in coastal areas
	Draft REDD+ National Strategy	Entails three REDD+ demonstration projects supporting more than 27 community forests and protecting more than 300,000 hectares of forests
	National Forest Programme 2010–2029	Increases forest cover to 60%, increases area of community managed forests to 2 million hectares by 2030
Indonesia	National Action Plan for Mitigation	Recognises sustainable forest management, biodiversity conservation and forest rehabilitation
	Forest Clearance Moratorium, 2011, 2013, 2015	Temporarily prevented new forest clearance permits being granted in primary forests and peat swamps
	National Action Plan for Reducing Greenhouse Gas Emissions, 2011–2014	Entails 13 action plans in the forest sector, including increasing the social forestry area to 2.5 million hectares by 2014; reducing forest fires; improving the management of essential ecosystems; conserving protected forests; promoting forest plantation businesses; and creating business partnerships in 250,000 hectares of community forests
	National Action Plan on Adaptation, 2013	Includes a target to increase the quantity and quality of forest cover in priority areas
	National REDD+ Strategy, 2012	Cites at least 35 demonstration and pilot projects that are underway
Lao PDR	National Strategy on Climate Change, 2010	Includes forestry as a sector for mitigation and adaptation
	National Adaptation Programme of Action	Includes projects on strengthening the capacity of village foresters in forest management
Malaysia	National Policy on Climate Change, 2009	Mentions forests as a theme for policy harmonisation, research and development, and for promoting a low-carbon economy; does not include detailed strategies or actions
Myanmar	National Climate Change Strategy and Action Plan, 2001–2030	Cites actions to protect forests and enhance their contribution to climate resilience, including in Theme 2, Management of natural resources for healthy ecosystems, and Theme 4, Increase access to climate resilient and low-carbon technologies and practices
	National Climate Change Policy, 2019	Cites the commitment to enhance greenhouse gas sinks and reduce emissions due to deforestation and forest degradation, through the sustainable management of forests and land-use planning
	National Programme on Reforestation and Restoration of Degraded Forests	Promotes community forestry, agroforestry and livelihoods generally; promotes community forestry, restoration planting, livelihood improvement, cyclone shelters and income generation in mangrove areas
	National Forest Master Plan, 2002–2031	Aims for preservation of natural forest cover; reduction of deforestation; increases reserved forest and protected public forest to 30% and protected areas to 10% of total land area
	National Land-Use Policy, 2016	Protects customary land rights; promotes people-centred development, participatory decision-making and sustainable land management

Philippines	National Framework Strategy on Climate Change, 2010–2022	Represents a road map to address climate change; includes strengthening adaptation of natural ecosystems and human communities
	Philippines Strategy for Climate Change Adaptation, 2010–2022	Aims to increase the adaptive capacity of communities and resilience of natural ecosystems; focuses on biodiversity, forestry, coastal and marine resources, fisheries, land and agriculture
	National Greening Program	Aims to plant 1.5 billion trees from 2011–2016 for mitigation, poverty reduction and alternative livelihoods; 50% of the trees are to be forest species for timber production and protection, with the remaining 50% agroforestry species
	Enhanced National Greening Programme	Aims to rehabilitate all the remaining unproductive, denuded and degraded forest lands, estimated at 7.1 million hectares, from 2016 to 2028
	Master Plan for Climate Resilient Forestry Development	Proposes programmes and strategies to strengthen the resilience of forest ecosystems and communities to climate change and to respond to demands for forest ecosystem goods and services and promote responsive governance
Singapore	National Climate Change Strategy, 2012	Not available
Thailand	Master Plan on Climate Change, 2013–2050	Outlines short-, medium- and long-term measures to address mitigation, adaptation and crosscutting issues; refers to ecosystem-based adaption and community participation; promotes the rights of community forest groups
	National Strategy for Climate Change Mitigation, 2008–2012	Outlines an initial framework for measures to reduce emissions from deforestation and degradation
	National Forestry Policy, 1985	Maintains and expands national forest cover to 40% of the country's land area, consisting of 25% protected forest and 15% production forest
Vietnam	National Target Programme on Climate Change	Cites potential priority for increasing forest cover from 37% in 2005 to 47% in 2015 to increase carbon dioxide absorption
	National Climate Change Strategy	Increases forest cover to 16 million hectares, or 47%, by 2020; enhances community capacity for adaptation
	Action Plan for Adaption and Mitigation in Agriculture and Rural Development	Increases forest cover to 16 million hectares, or 47% by 2020; calls for the planting of trees to protect dyke systems
	Socio-Economic Development Plan, 2011–2015	Increases forest cover to 47% by 2020; emphasises the response to sea-level rise and vulnerability of low lying coastal regions
	National Green Growth Strategy	<ul style="list-style-type: none"> - Accelerates afforestation and reforestation and promotes investment to increase forest cover to 45% by 2020 - Improves forest quality, enhances carbon sequestration capacity by forests and increases standing biomass and secure timber production and consumption; calls for programmes to reduce greenhouse gas emissions through REDD+ and sustainable forest management in conjunction with diversifying the livelihoods of rural people
	National REDD+ Action Programme, 2012	<ul style="list-style-type: none"> - For 2011–2015, calls for developing and operationalising pilot mechanisms, policies, organisational systems and technical capacity to ensure effective management, coordination and operation of REDD+; Prime Minister approves the National REDD+ Action Programme in 2012; - For 2016–2020, calls for effective management, coordination and operation of projects and activities under the National REDD+ Action Programme; reduction of emissions through REDD+; increase of sequestration by forests; achievement of the target of 20% emission reduction in the agricultural sector by 2020; sustainable management and development of forest resources; increase of national forest cover to 44–45%; conservation of biodiversity; and diversification and improvement of livelihoods
	Law on Natural Disaster Prevention and Control, 2013	Prohibits activities that increase the risk of natural disasters, especially cutting down protected forests

Lessons and Implications for Global Environmental Governance

Forest carbon stocks must be conserved if greenhouse gas emission targets agreed upon at the 2015 Paris Agreement conference are to be realised. The Paris Agreement builds upon the United Nations Framework Convention on Climate Change (UNFCCC), which was ratified in 1994. The UNFCCC unites all nations in a common cause to undertake ambitious efforts to combat climate change and adapt to its effects (RECOFTC 2020). This commitment leads to implementing global environmental governance (GEG) in the ASEAN region on forestry and climate change mitigation. Therefore, this global environmental governance, where forest governance is part of environmental governance, will be used as a context for viewing climate change mitigation in the ASEAN region.

In a simple way, global environmental governance can be understood as the sum of organisations, policy instruments, financing mechanisms, rules, procedures and norms that regulate the processes of global environmental protection (Najam, Papa, and Taiyab 2006). Within the context of the evolution of global environmental politics and policy, the end goal of global environmental governance is to improve the state of the environment and to eventually lead to the broader goal of sustainable development. One of the potential mechanisms to support GEG in the forestry sector is REDD+ (Reducing Emissions from Deforestation and Forest Degradation). There are five elements of potential emission reduction from REDD+, namely reducing emissions from deforestation, reducing emissions from degradation, conservation of forest carbon stocks, sustainable management of forests, and enhancement of carbon stocks (UNFCCC 2010). REDD+ financing mechanisms may come from both market and voluntary mechanisms, either through bilateral, regional, or international cooperation (P3SEKPI 2016). Seven of ASEAN's ten member countries are involved in at least one of the three major global REDD programmes: The World Bank's FCPF, The World Bank's Forest Investment Programme (FIP), and UN-REDD (IWGIA and AIPP 2011). The potential emission reduction from REDD+ varies from country to country. It is

highly dependent on the area of forest owned and the historical deforestation that has occurred. As an example, there were between 44 and 77 REDD+ projects and provincial REDD+ pilots identified in Indonesia (Miang et al. 2014). The REDD+ policy could decrease deforestation in Indonesia by 0.66 million hectares (17.45%) over the 5-year study period (2005–2010), and reduce emissions by 1.09 million tCO₂-eq/5 years or a 24.75 per cent change of emissions (Nahib et al. 2018).

The study found key challenges to how to make climate mitigation in the ASEAN region effective as global environmental governance (refer to Najam, Papa, and Taiyab 2006). They are: (1) proliferation of Multilateral Environmental Agreements (MEAs) and fragmentation of GEG, (2) lack of cooperation and coordination among regional organisations, (3) lack of implementation, compliance, enforcement and effectiveness, (4) inefficient use of resources, (5) GEG outside the environmental arena, and (6) non-state actors in a state-centric system.

As stated in the ASEAN Charter (ASEAN Secretariat 2008), ASEAN comprises institutional organs: ASEAN Summit, ASEAN Coordinating Council (consists of the ASEAN Foreign Ministers and meets at least twice a year), ASEAN Community Council (consists of the ASEAN Political Security Community Council, ASEAN Economic Community Council, and ASEAN Socio Cultural Community Council), as well as ASEAN Sectoral Ministerial Bodies. Each ASEAN Sectoral Ministerial Body has relevant senior officials committees (known as Senior Officials Meetings or SOM) and technical bodies to assist it in its work. There are quite a lot of sectoral ministerial bodies, two of which are highly relevant to the climate mitigation policy in the forestry sector, namely the ASEAN Ministers Meeting on Agriculture and Forestry (AMAF) and ASEAN Ministerial Meeting on the Environment (AMME). The other important organs are Secretary General of ASEAN and ASEAN Secretariat, Committee of Permanent Representatives to ASEAN, ASEAN National Secretariat, ASEAN Human Rights Body, and ASEAN Foundation. Institutional gaps are potentially found in the global environmental governance of the ASEAN region. Ineffective governance in relation to complicated environmental issues highly relates to

lack of coordination and funding, including lack of basic information-sharing protocols between the different ASEAN sectoral bodies, between sectoral bodies and ASEAN entities, among sectoral bodies, and between ASEAN entities and the ASEAN Secretariat (Seah and Martinus 2021; Robertua and Bainus 2018). Practically, there is the Asian Solidarity Economy Council (ASEC) established in 2011 in order to deal with this issue. The ASEC meets yearly to share experiences and learn from each other, and undertakes case study writing, policy research and advocacy for development policies to address poverty, inequality and injustice in society (Jayasooria 2020). The ASEC provides interactive platforms for conversations, discussions and deliberations. However, community partnerships, local development initiatives, and private sector participation is a part which requires further improvement.

Borrowing the legitimacy framework developed by Karlsson-Vinkhuyzen and McGee (2013) for analysing different types of international norms, ASEAN countries' mitigation policies and initiatives could be reviewed as to what extent they make contributions in the region. Sourced-based and process-based legitimacies are believed to have been obtained. The policy and initiative documents have been established by appropriate experts by considering relevant traditions and discourses, including high country (and their relevant entities) participation and the transparency in regional and global climate forums. However, outcome-based legitimacy might need to be improved, since some ASEAN countries indicate a high contribution to LUCF emissions (Table 6). Cambodia, Indonesia and Lao PDR have around a 20–36 per cent share emission reduction of their unconditional target. LUCF emissions in 2018 contributed more than 40 per cent of total emissions in Cambodia, Indonesia, and Myanmar (in each country), while LUCF emissions in 2018 in Malaysia and Lao PDR contributed 21 per cent and 24.2 per cent, respectively.

As a consequence of the diversity and differences of national circumstances, policy fragmentation is inevitable. It is a rational choice that every country has different approaches and concerns in their climate mitigation options. Therefore, there is a

need for regional forest governance regimes for the ASEAN region, at least, to find consensus regarding the perception of several technical matters (such as definitions of forest, social forestry, cross-border watershed management, etc), and reveal the importance of regional negotiation positions. In order to optimise the role of ASEAN in the context of regional environmental governance, regional mitigation policies should focus on the potential of the ASEAN region and prioritise the pathways that significantly contribute to reducing emissions and carbon sequestration.

One of the significant pathways is avoiding forest conversion, since it has emission reduction potential twice as effective as reforestation in tropical countries (Griscom, et al. 2000). In order to achieve projected forest cover gains, efforts should focus on both the protection and conservation of the remaining forests, and the expansion of forest cover through reforestation and/or afforestation (Estoque et al. 2019). Innovative schemes should be developed to encourage private and community participation in accelerating reforestation activities. PES in ecosystem restoration is one of the examples applied in Ecuador in the Pimampiro Payment for Watershed Services Scheme (Mansourian Vallauri, and Dudley 2005). Landowners of the sub-watershed are being paid to manage the forest to protect water sources. Another is outgrower schemes, as an option promoting forest restoration and rehabilitation through community participation. In outgrower schemes, a company provides marketing and production services to farmers to grow trees on their land under specific agreements (Mansourian, Vallauri, and Dudley 2005). Bio-rights are also a good example of a microfinance model supporting local people to be actively involved in forest restoration and rehabilitation. The scheme combines poverty alleviation and conservation efforts through the provision of microcredit for sustainable development (Eijk and Kumar 2008). Furthermore, forest policies facilitating reforestation need to be aligned with land tenure and trade policies. Moreover, promoting business models for reforestation, afforestation, restoration and conservation are highly necessary to invite private companies, communities and other entities to participate.

The next potential pathway is expanding investment in social forestry as a typical model of cropping systems and co-management of forests in the region. Social forestry delivers a wider range of benefits by securing environmental services such as carbon storage, water regulation and biodiversity conservation, as well as being a safety net for rural livelihoods. RECOFTC (2020) reported that there are almost 14 million hectares of forest managed under the various forms of social forestry practised in ASEAN countries, especially Cambodia, Indonesia, Myanmar, the Philippines, Thailand and Vietnam.

The development of a forest governance monitoring system (including forest monitoring itself), and initiatives that support informed decision-making (Gritten et al. 2019) in the region also needs to be improved. Capacity development programmes for non-state actors (e.g. civil society, news media) are needed to ensure that they are more able to support the diverse forest governance initiatives. Monitoring systems are crucial instruments for the ASEAN region to enhance regional legitimacy in global entities.

Table 6: Emission Performance in ASEAN Countries

Country	Total emissions in 2018 (CO ₂ -eq)	LUCF emissions in 2018	Unconditional emission target by 2030
Brunei Darussalam	16.95Mt	327.83kt	23.60Mt
Cambodia	69.15Mt	31.69Mt	155.00Mt
Indonesia	1,70Gt	734.28Mt	2.03Gt
Lao PDR	38.63Mt	9.36Mt	41.6Mt
Malaysia	388.11Mt	81.44Mt	966.40Mt
Myanmar	231.62Mt	111.97Mt	—
Philippines	234.82Mt	2.48Mt	324.98Mt (excluding LUCF)
Singapore	66.67Mt	32.64kt	65.00 Mt
Thailand	431.22Mt	14.27Mt	444Mt (excluding LUCF)
Vietnam	364.43Mt	-12.09Mt	844.40Mt

Source: <https://www.climatewatchdata.org/countries>

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ASEAN Climate Change Responses

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Case Study in Cambodia

Introduction

Southeast Asia is one of the most threatened regions because of its high vulnerability to climate change in terms of social and economic loss and damage. According to the 2021 Survey Report from the ASEAN Studies Centre at ISEA Yusof ISHAK Institute, the region has suffered from floods, followed by loss of biodiversity and sea level rise caused by climate change which were among the top three concerns of the region in 2020. Action in response to climate change is useful to eliminate the negative impacts. Climate change is a severe and immediate threat to the well-being in the region (Sharon Seah, Hoang Thi Ha, Melinda Martinus, Pham Thi Phuong Thao 2021).

However, ASEAN is one of the most dynamic and fast-growing economic regions globally. Rapid economic growth and urbanisation require energy, which is one of the main contributors to greenhouse gas (GHG) emissions. According to the Climate Risk Index 2019, five out of the ten ASEAN Member States were ranked as the top 20 of the world's countries most affected by extreme weather events. They include Myanmar (3), the Philippines (5), Vietnam (9), Thailand (13), and Cambodia (19). Moreover, GHG emissions in the region are predicted to double by 2040, to approximately 2.3 billion tonnes, if there is no appropriate decarbonisation technology that will potentially affect the socioeconomics of the area (M.Y. and S.S.; Methodology, S.S., T.M.I.M. and S.M. 2019).

A recent report from the Conference of the Parties or COP 26 shows that weather extremes caused by climate change are predicted to cause the ASEAN's Gross Domestic Product (GDP) to drop by up to 35 per cent by 2050, mainly impacting agricultural activities, tourism, and fishing, along with labour productivity and human health. Meanwhile, drought, changes in rainfall patterns, and increasing global temperatures in addition to the rising sea level will also be significant issues for the ASEAN's ecosystem and agricultural activities as well (Renaud et al. 2021).

In response to climate change which is threatening humanity and the whole planet, world leaders from 196 parties adopted the Paris Agreement at COP 21 in Paris on 12 December 2015 which entered into force on 4 November 2016 to tackle climate change and its negative impacts, which covers climate change mitigation, adaptation, and finance. The main goal of this agreement is to prevent the increase of average temperatures to well below 2 degrees Celsius worldwide and to limit the rise to 1.5 degrees Celsius, compared to the pre-industrial level.

To achieve its goal, two frameworks with capacity-building programmes have been established. First is a financial framework for countries to support one another in which developed countries financially support less developed and developing countries such as Cambodia, Lao PDR, Myanmar, and Vietnam (CLMV) to achieve climate change mitigation and adaptation. Secondly, the Technology Framework guides the well-functioning technological mechanism intended for technological development and transfer to improve climate resilience and GHG emission reduction. Last but not least, as the level of development and capacities to deal with many of the challenges brought about by climate change among countries are different, the Paris Agreement requests all developed countries to contribute to enhancing the climate-related capacities of developing countries (United Nation, 2015)

However, to achieve the long-term goals, the Paris Agreement works on a five-year cycle basis of increasingly ambitious climate actions carried out by countries. Each country is mandated to submit its updated national climate action plan, namely National Determined Contribution (NDC) every five years. The main content of the NDCs aims to emphasise national actions that will be taken to reduce GHG to achieve the goals of the Paris Agreement. In addition, the Paris Agreement also invites countries to formulate and submit their long-term low greenhouse gas emission development strategies (LT-LEDS) although this is not yet mandatory (MoE 2020).

Climate change is one of the immediate issues to be addressed in the ASEAN's development agenda. Holding the Chairmanship of ASEAN 2022, Cambodia has played a very important role in working with its members to reduce the negative impacts of climate change in the region. Accordingly, the same publication aims to provide more understanding of the ASEAN Climate Change Response, emphasising that the current status of climate change and mitigation and adaptation measures is aligned with national policy by taking lessons from the case study of Cambodia.

Climate Change Mitigation in Cambodia

With one of the highest vulnerabilities to climate change in the region, Cambodia has made extensive efforts to deal with this issue. To support the global efforts to combat climate change, the Royal Government of Cambodia (RGC) became one of the parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 2016. Since then, Cambodia has actively participated with the international community to address climate-related issues (NCCC 2013). However, Cambodia is vulnerable to extreme climatic events, including floods, droughts, windstorms, and seawater intrusion caused by changes in rainfall patterns and global warming. For example, damage loss from flash floods caused by heavy rainfall in 2013 was USD356 million, of which damage to physical assets accounted for USD153 million while the rest was lost from production and economic flow. Similarly, in 2012, 11 out of 24 provinces in Cambodia experienced droughts, which caused a negative impact on the rice production of 10,000 hectares (RGC 2014). Cambodia was ranked 12th among the most susceptible countries to climate change in the Climate Risk Index (CRI) for 1999–2018 (Beirne et al. 2021). The impact of climate change remains a big challenge for the country's economic development due to the livelihoods of the majority of its population depending on climate-sensitive sectors such as agriculture, water resources, forestry, fisheries, tourism, etc. (NCCC 2013).

According to the Climate Economic Growth Impact Model (CEGIM) on Climate Change impact, GDP grew annually at an average of 6.9 per cent between

2017 and 2050 before climate change arose, but sadly with the existence of climate change, the GDP declined by 0.4 per cent in 2020 and will rise to 2.5 per cent by 2030 and will increase to 9.8 per cent by 2050. Thus, the GDP growth rate is estimated to fall from 6.9 per cent to 6.6 per cent by 2050 due to the adverse impact of climate change (MEF and GSSD 2019).

In this regard, for the climate change response to be inter-related with the country's economic growth as well as contribute in the pathway to achieve the long-term goals of the Paris Agreement, Cambodia has built institutions such as the Climate Change Department under the Ministry of Environment and the National Climate Change Committee which comprises 19 ministries and government agencies (see Table 1) to respond to climate change and mainstream climate change mitigation into national policy, public investment, and sectoral and sub-national development plans (GSSD 2017).

From 2013 onward, the RGC has shown remarkable progress towards climate change policy by developing and adopting the Cambodia Climate Change Strategic Plan (CCCSP) 2014–2023, which aims to build climate resilience and, on the other hand, put the country on a green development path by promoting public awareness and participating in climate change response actions. The CCCSP covers eight strategic objectives: (1) promoting climate resilience through improving food, water and energy security; (2) reducing the vulnerability of sectors, regions, gender and health to climate change impacts; (3) safeguarding the climate resilience of critical ecosystems (i.e. the Tonle Sap, Mekong River, and coastal ecosystems), protected areas, biodiversity, and cultural heritage sites; (4) promoting low-carbon planning and technologies to improve the sustainable development of the country; (5) improving capacities, knowledge and awareness for climate change responses; (6) promoting adaptive social protection and participatory approaches in reducing loss and damage; (7) strengthening institutions and coordination frameworks for national climate change responses; and (8) strengthening collaboration and active engagement in regional and global climate change processes which aim to be the first comprehensive national policy

document that shows the priority adaptation needs of the country and provides roadmaps toward de-carbonisation development which is related to the key economic sectors and the enhancement of carbon sinks (NCCC 2013).

Moreover, according to the Rectangular Strategy for Growth, Employment, Equity, and Efficiency: Building the Foundation toward Realizing the Cambodia Vision 2050, Phase IV, ensuring environmental sustainability and readiness to respond to climate change is one of the priority for the RGC, which aim to minimise environmental impacts, advance the capacity to adapt to climate change and contribute to reducing global climate

change to ensure sustainable development. Two specific policies were initiated to achieve its vision 2050 of ensuring environmental sustainability. Firstly, the Environment and Natural Resources Code (ENRC) seeks to enhance the management of Cambodia's vast forests and waterways by safeguarding the environment and conserving, managing, and restoring natural and cultural resources. Secondly, the Cambodia Climate Change Strategic Plan 2014–2023 (CCCSP) reflects the RGC's political will, as well as its firm commitment and readiness, to reduce the impacts of climate change on national development and to contribute to global efforts to reduce GHG emissions under the UNFCCC (RGC 2019).

Table 7: National Climate Change Committee

No	Committee Member	Position
1	Minister of Environment	Chairman
2	Secretary of State of the Ministry of Agriculture, Forestry and Fisheries	Vice-Chairman
3	Secretary of State of the Ministry of Industry, Mines and Energy	Vice-Chairman
4	Secretary of State of the Ministry of Water Resources and Meteorology	Vice-Chairman
5	Secretary of State of the Ministry of Commerce	Member
6	Under-Secretary of State of the Council of Ministers	Member
7	Under-Secretary of State of the Ministry of Interior	Member
8	Under-Secretary of State of the Ministry of Economy and Finance	Member
9	Under-Secretary of State of the Ministry of Public Works and Transport	Member
10	Under-Secretary of State of the Ministry of Planning	Member
11	Under-Secretary of State of the Ministry of Foreign Affairs and International Cooperation	Member
12	Under-Secretary of State of the Ministry of Education, Youth and Sports	Member
13	Under-Secretary of State of the Ministry of Health	Member
14	Under-Secretary of State of the Ministry of Land Management, Urban Planning and Construction	Member
15	Under-Secretary of State of the Ministry of Rural Development	Member
16	Under-Secretary of State of the Ministry of Information	Member
17	Deputy Secretary-General of the National Committee for Disaster Management	Member
18	Deputy Secretary-General of the Council for the Development of Cambodia	Member
19	Deputy Secretary-General of the Cambodian National Mekong Committee	Member

Source: RGoC (2006)

In addition, in the sixth legislature of the National Assembly, the RGC prioritised four national strategies and action plans to continue to be implemented. First, the Cambodia Climate Change Strategic Plan 2014–2023 is mentioned in the above paragraph. Secondly, the National Strategic Plan on Green Growth 2013–2030 focuses on four pillars: the economy, environment, society, and culture to promote green growth, public health, quality of the environment, people’s livelihoods, and uphold a national cultural identity. Thirdly, the National Environment Strategy and Action Plan 2016–2023 aims to be used as a strategy for all stakeholders, including the National Council for Sustainable Development (NCS), governmental ministries and institutions at the national and sub-national levels, the private sector, civil societies, donors, and local communities, to integrate environmental considerations into policies, programmes, and investments. More importantly, fourthly, the National Reducing Emissions from Deforestation and Forest Degradation (REDD+) Strategy aims to contribute to national and global climate mitigation through the enhancement of the functioning of national and sub-national institutions for the effectiveness of the implementation of policies, laws, and regulations of natural resources and forest land management, and biodiversity conservation and sustainable development. Thus, critical priorities for Cambodia are to continue effectively implementing the Cambodia Climate Change Strategic Plan 2014–2023, the National Adaptation Plan (NAP), and Cambodia’s Nationally Determined Contribution (NDC) by providing ongoing support to 14 relevant ministries and institutions that have developed action plans to mobilise resources and build partnerships, as well as to a wide range of other actors who are critical to the implementation of a comprehensive climate change response, to strengthen institutional and technical capacities for programme preparation; to identify the impacts of climate change in all aspects of Cambodia’s economy, as well as to define the potential to reduce greenhouse gas emissions by introducing new technologies, particularly in critical national economic sectors such as energy, transportation, and so on; to increase climate change awareness, capacity building, and education; and to harness resources from external

sources of finance, such as the Green Climate Fund, to contribute to the implementation of key projects in Cambodia; and continue to participate in international climate change debates to address this major global problem (NCS 2019).

REDD+ is a climate change mitigation mechanism developed by the parties to the UNFCCC since 2005 to respond to impacts of climate change caused by deforestation and forest degradation. It aims to incentivise developing countries like Cambodia to contribute to climate change mitigation action in the forest sector by keeping forests standing to reduce carbon emissions from deforestation and forest degradation, conserve forest carbon stocks, sustainably manage forests, and enhance forest carbon stocks. The UNFCCC categorises REDD+ into three phases, namely (1) Phase 1: REDD+ Readiness refers to a stage of building capacity for demonstrating and implementing REDD+ with UNFCCC REDD+ requirements while (2) Phase 2: REDD+ trial demonstration of national strategies, policies, and action plans designed in phase 1, which may result in required additional capacity building and technology development and transfer, and (3) Phase 3: REDD+ Implementation, implemented at the national level with the result-based payment (RBP) approach fully measured and verified by the UNFCCC (UN-REDD Programme 2016).

Through financial and technical support, developing countries are to develop their National REDD+ Strategy/Action Plan (NRS), Safeguard Information System (SIS), Forest Emission Reference Level (FERL or FRL), and National Forest Monitoring System (NFMS), which were set out in the Warsaw framework for REDD+ as rules and modalities for developing countries to access the Result-Based Payment (RBP) for REDD+ activities.

In 2007, at the UNFCCC’s COP organised in Bali, Indonesia, the RGC considers REDD+ as an influential global initiative and provides vital support to the development, adaptation, and implementation of REDD+ to mitigate the impacts of climate change and reduce greenhouse gas emissions from the forestry sector (LEILA MEAD, HABIBA GITAY, IAN NOBLE 2008)

After Cambodia began to plan its REDD+ Readiness process in 2008, two REDD+ pilot projects were established in Cambodia, and the national roadmap of REDD+ was finalised for implementation in 2010. Cambodia initiated its REDD+ Readiness in 2012, completed and submitted its Forest Emission Reference Level (FRL) to the UNFCCC in 2016. During 2008–2016, the Cambodia REDD+ Programme achieved significant milestones, and lessons were learned to fully understand the importance of sustainable management of forest resources contributing to local livelihoods, generating co-benefits and building resilience against extreme climate-change-induced events.

Cambodia began developing its National REDD+ Strategy (NRS) 2017–2026 in 2014. Considering the Cancun Agreement, the Warsaw Framework for REDD+, the Paris Agreement, and RGC policies, Cambodia produced and submitted its FRL to the UNFCCC and established a safeguarded information system and a grievance process. Through an extensive, inclusive, and participatory consultation, the Ministry of Agriculture, Forestry, and Fisheries and the Ministry of Environment developed the National REDD+ Strategy (NRS) with the collaboration and commitment of key stakeholders such as local communities, indigenous peoples, national and sub-national government institutions, and support from national and international non-governmental organisations (NGOs) and donors to provide a framework and action plan to respond to the effects of climate change, as well as the consequences of deforestation and forest degradation, which pose significant challenges to Cambodia's key development sectors, including agriculture, forestry and fisheries, biodiversity, and environmental management. The implementation approach of the NRS has been divided into two phases to ensure efficiency and effectiveness. Phase 1 (2017–2021) covers the institutional arrangement, evaluation of NRS implementation, summary of result mobilisation of upfront non-results finance, and transition of the implementation phase. Phase 2 (2022–2026) refers to the completion of the transition from readiness to implementation and prioritises the achievement of measurable results.

In line with the NRS, Cambodia has developed various projects for future mitigation efforts that are anticipated with international donors and multilateral funds, and has made national contributions and implemented several actual REDD+ projects.

In 2010, the Reduced Emissions from Deforestation and Degradation in the Keo Seima Wildlife Sanctuary (KSWS REDD+ Project) was initiated and implemented under the collaboration between the Forest Administration (FA) and Wildlife Conservation Society (WCS) and other local NGOs. The KSWS was formerly known as the Seima Protection Forest (SPF) and was officially transformed into the KSWS by the RGC under Sub-Decree No. 83 dated 9 May 2016 to be managed by the Ministry of Environment. Since 2016, the KSWS REDD+ Project has been implemented under strong collaboration with the WCS, and the Ministry of Environment aims to support demonstration activities and development of REDD+ strategies in the KSWS. With 60 years crediting period, the project covers 166,983 hectares of forest in the KSWS out of 292,690 ha, predominantly in the Mondulkiri Province with a small area extending into Kratie Province. Under the Verified Carbon Standard (VCS) and the Climate, Community, and Biodiversity Standards (CCBA) methodology, the project estimates to avoid GHG emissions of more than 14 million metric tonnes of CO₂-eq. over the first 10-year period between 2010 and 2019. Furthermore, the project preserves forest areas that provide the basic needs and traditional cultural identity for over 2,500 households (approximately 12,500 people) within the 20 REDD+ participating villages and provides agricultural extension and infrastructure support to increase food security, incomes, and resilience to climate change which is intended to be accomplished by reducing deforestation (Wildlife Conservation Society 2015).

In 2015, the Southern Cardamoms REDD+ Project (SCRP) started to be implemented under the collaboration between Wildlife Alliance and the Ministry of Environment. The SCRP aims to promote climate change mitigation and adaptation, maintain biodiversity and create alternative

livelihoods under the United Nations scheme of Reducing Emissions from Deforestation and forest Degradation (REDD+). With a total period of 30 years the project's life cycle is running from 1 January 2015 to 31 December 2044, the SCRIP covers 445,339 hectares of forest within parts of the Southern Cardamom National Park and Tatai Wildlife Sanctuary. It intends to protect a critical part of the Cardamom Mountains Rainforest Ecoregion — one of the 200 most important locations for biodiversity conservation on the planet. The Project supports the livelihood development of 21 villages in nine communities around the perimeter of the project area. Additionally, another eight villages in four communities are eligible to receive educational scholarships. These communities represent approximately 3,841 families and 16,319 individuals. Under both the Verified Carbon Standard (VCS) and Climate, Community, and Biodiversity (CCB) standards, the project estimates to prevent the emission of an average of 3,580,834 tonnes of CO₂-eq annually by preventing deforestation and forest degradation (Wildlife Works 2018).

From 2016 to now, Cambodia has received USD11.6 million from the carbon trading of two REDD+ projects in voluntary markets to international companies, including Disney, Kering, Intuit, Shell, and Gucci. In addition, Cambodia is piloting other carbon trading located in Prey Lang Wildlife Sanctuary, Steung Treng Province, with a Japanese Company, namely Mitsui. The budget from trading has been spent on conserving and protecting natural resources and improving the livelihoods of local communities which inhabit protected areas. Cambodia has established more than 70 protected areas and biodiversity corridors with a total area of 7.3 million hectares, equivalent to 41 per cent of the land area of Cambodia (Ministry of Environment, MoE 2021).

Despite the global Covid-19 pandemic slowing down the process of more or less all development sectors, Cambodia still manages to be number 1 among all in terms of percentage of vaccination, and on the other hand, the RGC had also developed and submitted an ambitious intended nationally determined contribution (NDC) in 2020 before COP

26 which the UK hosted in partnership with Italy from 31 October to 12 November 2021 in the Scottish Event Campus (SEC) in Glasgow, UK. Cambodia's Intended National Determined Contribution (INDC) includes both mitigation and adaptation actions aligned with national circumstances.

Holding the ASEAN Chairmanship 2021, Cambodia is committed to facing challenges by taking the lead in the discussion of post-COVID-19 economic recovery and climate change which are most likely to be included in ASEAN's agenda 2021 as important and immediate issues. At the same time, Cambodia will take this great opportunity to show the ASEAN state members of its politics, diplomacy, economics, peace operations and international humanitarian efforts. According to its Nationally Determined Contributions (NDC), the RGC has shown strong commitment to reducing GHG emissions by 21 million tonnes per year to combat climate change even though the country is classified as having low GHG emissions compared to the global level. This commitment is to contribute to climate change actions for the good of Cambodia and the ASEAN region to overcome their vulnerability to the impacts of climate change. On the other hand, Cambodia is working toward a forest covering of 60 per cent of the total land area, and as of now, Cambodia is conducting research on expanding and piloting the REDD+ project in other protected areas under collaboration with international non-governmental organisations and transnational corporates. With more REDD+ projects, Cambodia will benefit from carbon credits.

However, the climate change adaptation capacity and finance limitation still remain significant challenges for Cambodia to achieve its goals under its NDC commitment. Hence, support from developed countries through multilateral and bilateral mechanisms to provide financial and technical assistance, as well as technology transfer, for Cambodia to implement REDD+ and gain access to European carbon markets, as well as achieve other climate actions, would assist Cambodia to meet its commitments under its NDC, as well as long-term efforts to decarbonise and achieve green, sustainable, and inclusive development. As Cambodia is ready for major

international engagement support, there are some implications for Cambodia to raise its position in relation to international climate change actions such as (1) strengthening collaboration with all major players, including international and national non-governmental organisations, financial institutions, transnational and national corporations, and the local community; (2) mobilising funds from multilateral funds and facilities and market mechanisms including, but not limited to, the Global Climate Fund, Global Environment Facility, Adaptation Fund, Least Developed Country Fund, and European or voluntary carbon markets; (3) building strong coordination with ASEAN counterparts to strengthen regional ambitions.

Conclusion

Cambodia has made significant strides in climate change action over several decades, integrating mitigation and adaptation measures with long-term development and poverty eradication. Climate resilience should be fully considered in all development trajectories. Meanwhile, Cambodia has overcome the readiness stage and has been implementing several REDD+ projects in various locations.

With massive potential in deforestation and forest degradation opportunities due to large forest land covering an area of 8.742.401 hectares, equivalent to 48.14 per cent of the country's total land area, including both natural and planted forest (MoE 2018), together with a strong will of the RGC to combat climate change, Cambodia can be expected to make a significant contribution to the global climate change objectives.

However, climate policy alone cannot solve all the climate change problems. It requires stakeholder engagement at all levels, including national and sub-national government agencies, institutions, international and local NGOs, regional policymakers, and investment agencies, to consider the climate change concerns and ensure that all developmental pathways are climate resilient

and environmentally friendly. In addition to this, it is essential to integrate climate policies into the related multilateral environmental agreements.

By doing so, capacity building and technology development and transfer are needed with incentive support from international funding in addition to the national budget expenditure for climate mitigation and adaptation for Cambodia to be smoothly developed as a green society and economy. Innovative financing mechanisms, such as carbon taxes, "green" procurement, or a regional technological development fund, must be established to commercialise current low-carbon technologies and create funding mechanisms to acquire and deploy low-carbon technologies.

Finally, Cambodia must continue to strengthen multilateral and bilateral agreements to implement the Paris Agreement under the United Nations Framework Convention on Climate Change in order to build a green and resilient economy with sustainable environmental and natural resources that provide sustainable and inclusive development.

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Overview of Indonesia Climate Change Mitigation

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Lessons from the Forestry Sector in Indonesia

Introduction

Deforestation and forest degradation remain challenging on a global scale. Forests cover 31 per cent of the global land area, although forests are not evenly distributed around the world (FAO & UNEP, 2020). Around half of the forest area is still relatively intact. Unfortunately, the world lost more than 26 million hectares of forest annually during 2014–2018. This represents a 43 per cent jump in global tree cover loss rates compared to the period 2001–2013 (Rowling, 2020). In absolute terms, the global forest area decreased by 178 million hectares between 1990 and 2020 (FAO and UNEP, 2020).

Global deforestation of tropical forests accounted for about 90 per cent of total deforestation during the period 2001–2015 (Rowling, 2020). Deforestation of tropical forests have continued at an increasingly high and alarming rate. Globally, tropical forest loss has reached 8.3 million hectares per year during 1990–2000 to 5.2 million hectares per year during 2000–2010 (FAO, 2010). Tropical deforestation released 1.5 billion metric tonnes of carbon (GtC) into the atmosphere annually throughout the 1990s and accounted for nearly 20 per cent of anthropogenic greenhouse gases (Gullison et al. 2007).

As tropical countries, the Association of Southeast Asian Nations (ASEAN) has an important role in

reducing deforestation and forest degradation, including preserving the mega biodiversity of tropical forests. Since the vulnerability to and impact of climate change is a major concern for ASEAN, ASEAN Member States (AMS) are fully committed to reducing global emissions under the Paris Agreement and have demonstrated the political will to set up intersectoral climate governance, including of forest and land use protection and biodiversity conservation (Seah and Martinus, 2021). Climate change does not adhere to geopolitical boundaries; therefore, close cooperation among ASEAN countries is required (Wijaya, 2017).

However, challenges remain. There is a limitation of regional organisations. As they are likely to be subjected to political influence from the AMS it is questionable whether these organisations, with their political, economic and functional resources and experiences, can expand their activities to cover climate change (Seah and Martinus, 2021).

That is why it is necessary to revisit climate mitigation to evaluate the progress, to find the need for improvement, and to share experiences among economies. In line with this, this paper aims to examine an update of climate change mitigation policies and measures on forestry sectors by learning lessons from the Indonesian case.

Table 8: Extent of Land Cover Types in Forest Area and Non-forest Area in Indonesia (2019)

Land cover	Forest area* (in million hectare)							Non-Forest Area (APL)	Grand Total	%
	Permanent Forest					HPK	Total			
	HK	HL	HPT	HP	Total					
(1)	(2)	(3)	(4)	(5=1+2+3+4)	(6)	(7=5+6)	(8)	(9=7+8)	(10)	
A. Forest	17.4	24.0	21.4	17.8	80.6	6.3	86.9	7.2	94.1	50.1
- Primary Forest	12.5	15.9	9.8	4.7	42.7	2.5	45.3	1.5	46.8	24.9
- Secondary Forest	4.8	7.8	11.3	9.7	33.6	3.7	37.3	4.9	42.2	22.5
- Plantation Forest	0.1	0.3	0.4	3.5	4.3	0.0c	4.3	0.8	5.1	2.7
B. Non-forested	4.5	5.6	5.4	11.4	26.8	6.5	33.4	60.3	93.6	49.9
Total Terrestrial Area	21.9	29.6	26.8	29.2	107.4	12.8	120.3	67.5	187.8	100.0
% Forested Area	79.6	81.0	80.0	61.0	75.0	49.1	72.2	10.7	50.1	

Notes: **HK** — Conservation Forest; **HL** — Protection Forest; **HPT** — Limited Production Forest; **HP** — Permanent Production Forest; **HPK** — Convertible; Production Forest; **APL** — Other Use Area/Non-Forest Area

Source: MoEF (2020a)

Indonesia's Forest and Climate Profile

Indonesia's national forest area accounts for 64 per cent of its total terrestrial land. The national forest area is categorised into three different functions: production forest (68.8 million hectares), protection forest (29.6 million hectares), and conservation forest (22.1 million hectares) (MoEF, 2020a).

The paper refers to the definition of forest in the formal law of the Government of Indonesia. There is the Minister of Forestry Regulation No. 14/2004 on Procedures for Afforestation Reforestation in the Framework of Clean Development Mechanisms. In this sense, forest is defined as land spanning more than 0.25 hectares with trees higher than five metres at maturity and a canopy cover of more than 30 per cent, or trees able to reach these thresholds in situ (MoEF 2015). Such definition has been used by Indonesia's National Forest Reference Emission Level (FREL) for Deforestation and Forest Degradation and is approved by the United Nations Framework Convention on Climate Change (UNFCCC) (MoEF, 2016). The definition is different from that of the FAO (2015) which defines forest as a land area of more than 0.5 hectares containing trees with a canopy cover of more than 10 per cent, or trees that can reach this threshold in situ. The use of this forest definition has a significant impact on forest governance and practices. One of the impacts is that the statistics of global forest area increased by 300 million hectares. The Food and Agriculture Organization of the United Nations (FAO) redefined forests in the Forest Resources Assessment between 1990 and 2000 by reducing the minimum height (from 7 m to 5 m), the minimum area (from 1.0 hectare to 0.5 hectares), and canopy cover (from 20% in developed countries and 10% in developing countries to 10% for both) (Neeff et al., 2006).

Indonesia's forest is home to mega biodiversity and endemism of tropical flora and fauna due to its geographical location. They fall into two major types, with the two types reflecting similarities in the respective regions. Indonesia's biodiversity is greater than that of any other country in the world except Brazil and Colombia. Indonesia contains 13 land-based ecosystems and six aquatic ecosystems (including both freshwater and marine

ecosystems). Within these 19 ecosystems, there are 74 systems of vegetation (MoEF, 2020a).

Indonesia's National Planning Agency noted that the nation is blessed with 1,605 recorded bird species; 723 species of reptiles; 385 species of amphibians; 720 species of mammals; 1,248 species of freshwater fish; 197,964 species of invertebrates; 5,137 species of arthropods; 151,847 species of insects, including 30,000 Hymenoptera (wasps, bees and ants). In terms of flora, there are 91,251 species of spore-based plants (Bappenas, 2016). Of plants that produce seeds (spermatophytes), there are 120 species of vascular plants that produce exposed seeds (gymnosperms) and an estimated 30,000 to 40,000 species of flowering plants (angiosperms) of which only 19,112 species have been identified so far (Bappenas, 2016).

These forests and environmental resources directly and indirectly contribute to the quality of Indonesian human life. The primary roles of forest and environmental resources in supporting human life, especially rural livelihoods, are: supporting current consumption, providing safety nets in response to shocks and gap-filling of seasonal shortfalls, and providing the means to accumulate assets and provide a pathway out of poverty (Angelsen & Wunder, 2003). Therefore, Indonesia is a very rich country that consists of natural resources, and those resources have high potential to contribute to increasing future Indonesian socio-economic growth. Table 9 illustrates the key facts of Indonesia's socio-economic parameters in general.

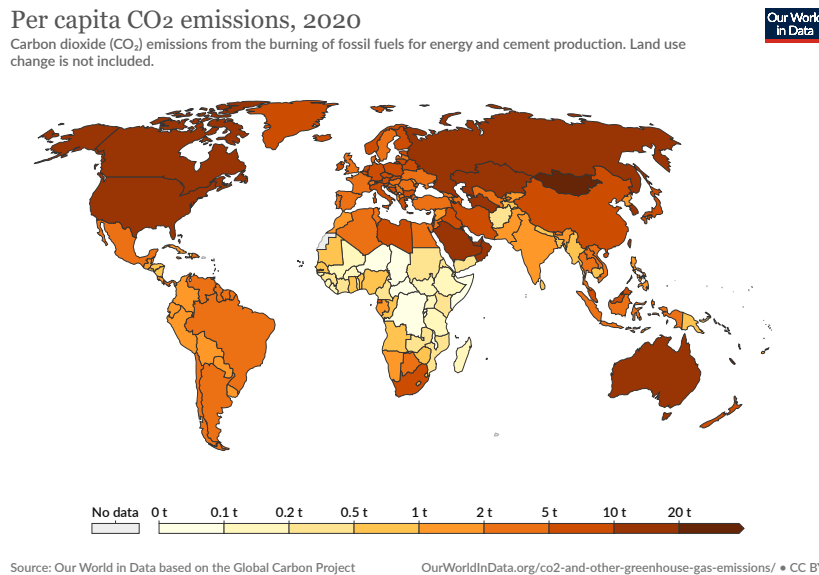
It is important to revisit the profile of Indonesia's forest and climate vulnerability to find the linkage between the two. Indonesia's climate risk index score of 74.00, ranked 72 out of 180 countries by 2018 (note: a lower score indicates a high level of climate risk). Indonesia's position was lower than Malaysia's (index score of 105.67; rank of 116 out of 180 countries); however, it was better than Cambodia's (index score of 36.17; rank 14 out of 180 countries), the Philippines (index score of 18.17; rank 4 out of 180 countries), and Vietnam (index score of 35.67; rank 13 out of 180 countries) (<https://www.climatewatchdata.org/>)

Table 9: Key Facts of the Socio-Economic Parameters of Indonesia

Key Fact	Time Reference	Unit
GDP (PPP) per capita	2016	USD 11,612.1
	2019	USD 4,136 (ranked 110th globally)
Population	July 2017	263,991,379
	2019	270,625,568 (1.1% annual growth)
Projected population	2050	321,551,000
Population density per km ²	2016	144
Human Development Index	2016	113 out of 188 countries
Gender Inequality Index	2016	105 out of 188 countries

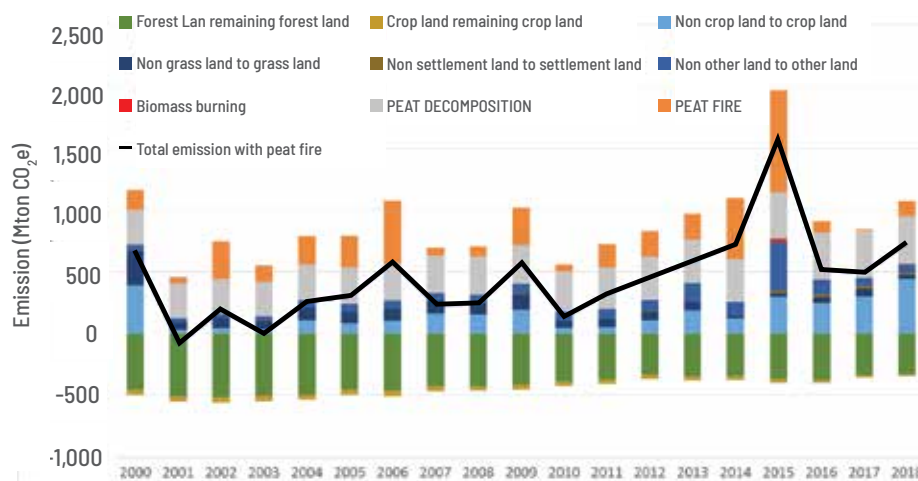
Source: MoFA (2018)

Figure 4: Indonesia's CO₂ Emissions per Capita for 2010, 2013, and 2018 of 1.87, 1.97, and 2.16 Metric Tonnes, Respectively



Source: Ritchie & Roser (2021)

Figure 5: National Emissions from the Forestry Sector and Peatlands (2000–2018)



Ritchie and Roser (2021) provided an interactive map describing per capita greenhouse gas emissions. This is measured in tonnes per person per year. Here we see that many of the world's smaller countries are the largest per capita emitters. These countries, such as Guyana, Brunei, Botswana, the United Arab Emirates, and Kuwait, tend to be large oil and/or gas producers. Indonesia produces lower per capita CO₂ emissions, which were 2.16 metric tonnes in 2018, compared to global average (see Figure 4).

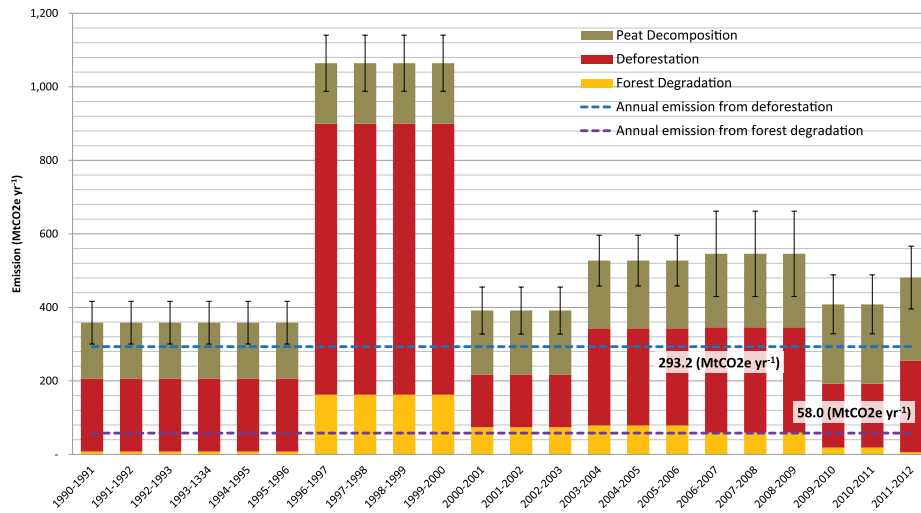
The map follows The Intergovernmental Panel on Climate Change (IPCC) guidelines for estimating GHG emissions and removal and includes information from five sectors, notably forestry and other land use, energy, waste, IPPU, and agriculture. In the specific case of emissions from the forestry sector and peatlands, for the period from 2000 to 2018, the average annual level of emissions stood at 439.8 MtCO₂-eq/year. If emissions from peat fires were to be excluded, the average annual level of emissions would be 213.95 MtCO₂-eq. Figure 5 shows the emission levels of the forestry sector and peatlands. The implementation of mitigation measures has resulted in a reduction in the level of emissions, particularly in the case of emissions from peat fires. Post-El-Nino in 2016, the level of emissions from peat fires declined to 90.27 MtCO₂-eq, after 712.6 MtCO₂-eq was recorded in 2015. In 2017, the level of emissions from peat fires dropped further to 12.5 MtCO₂-eq. But in 2018, the level of emissions from peat fire increased to 121.32 MtCO₂-eq (MoEF, 2020a).

Historical emissions from deforestation, forest degradation, and the associated peat decomposition from 1990 to 2012 have been developed as the main source of Indonesia's Forest Reference Emission Level (FREL) submitted to the UNFCCC (MoEF, 2016). The FREL from deforestation and degradation was set at 0.351 GtCO₂-eq yr⁻¹ (Above Ground Biomass) for the reference period 1990–2012. Emissions from deforestation are dominant (accounting for 51% of the total emissions), followed by emissions from peat decomposition (contributing 39%), and the rest is emissions from forest degradation (Figure 6).

Using different timeframes, MoEF (2020b) generated the baseline emissions from the average emissions of 2006/2007 – 2015/2016 for Result-Based Payment estimation (see Figure 7). Based on this approach, Indonesia reduced its emissions by 17,278,345 tCO₂-eq from both avoided deforestation and forest degradation in 2017 (see Figure 7). Avoided emissions from 2016/2017 deforestation were 8,597,888 tCO₂-eq (3.6% from the baseline), while emission reduction from forest degradation was about 8,680,457 tCO₂-eq (21.2%).

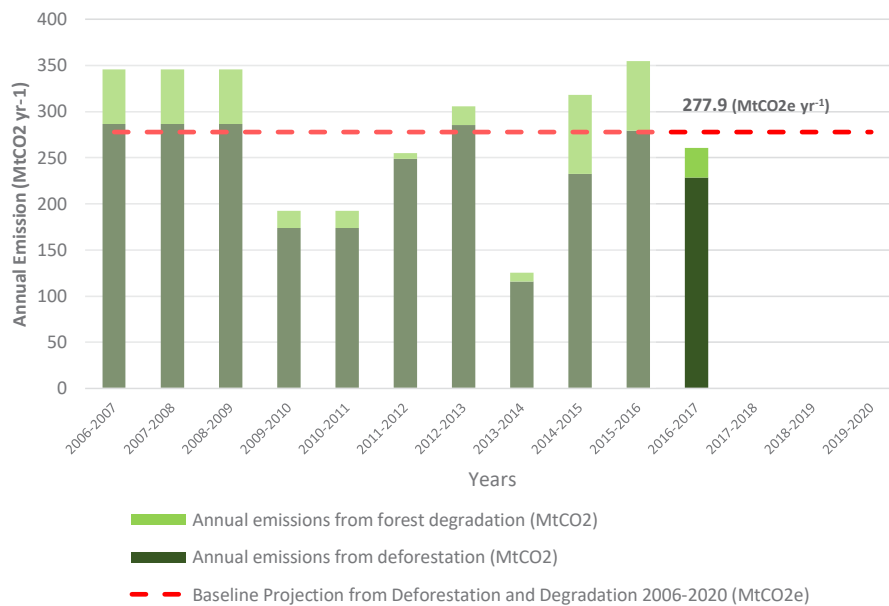
This emission profile is highly related to historical deforestation. The highest deforestation occurred in the 1996–2000 period, and tended to slow down until 2014. Deforestation increased again from 2014–2015, but fortunately then could be controlled by 2016 and onward (Figure 8).

Figure 6: Historical Emissions from Deforestation, Forest Degradation, and the Associated Peat Decomposition (in MtCO₂)



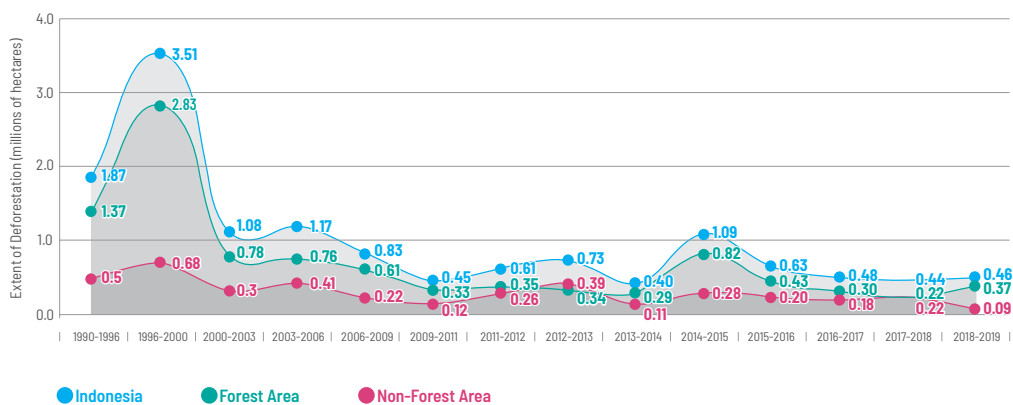
Source: MoEF (2016)

Figure 7: Annual Emissions from Deforestation and Forest Degradation



Source: MoEF (2020b)

Figure 8: The Trend of Deforestation in Indonesia



Source: MoEF (2020a)

MoEF (2020a) officially noted the causes of deforestation, among others, as intensification of the felling of natural forests under timber concessions; the conversion of forest areas for use by other sectors (agricultural expansion, estate crops, mining, plantations, and transmigration), unsustainable forest management, illegal logging, encroachment, and fires. This is in line with scholarly findings on the drivers of deforestation in Indonesia that include direct and underlying causes. Most of the deforestation was driven by the expansion of crop plantation, agriculture (small and commercial scales), including industrial plantation and mining (Rowling, 2020; Austin et al., 2019). Deforestation was also driven by structural factors, market failure, policy failure, as well as insecure property rights (Motel et al., 2011).

Overview of Forest Mitigation Policies in Indonesia

In a global context, Indonesia has shown a strong commitment to tackling forest conversion by ratifying three Rio conventions. The three conventions include: (1) Law number 6 of 1994 which ratified the United Nations Framework Convention on Climate Change (UNFCCC), (2) Law number 5 of 1994 which ratified the Convention on Biological Diversity (CBD), and 3) Presidential Decree No. 135/1998 which ratified the United Nations Convention to Combat Desertification (UNCCD). At the national level, Indonesia issued various programmes to combat deforestation and forest degradation, including forest landscape restoration, watershed revitalisation, Social Forestry, and land rehabilitation national movements, as well as improving the management of Conservation Areas and Essential Ecosystem Areas (Rochmayanto et al., 2020).

Indonesia has also committed, as stated in the Indonesian Nationally Determined Contribution (NDC), to reducing greenhouse gas emissions (mitigation) by 29 per cent through its own domestic efforts and up to 41 per cent with

international support by 2030, compared to the business-as-usual (BAU) scenario. Climate change mitigation and adaptation actions are designed as integrated actions to build resilience in maintaining food, water, and energy resources. There are five sector categories and the proportions of their contribution to efforts to reduce GHG emissions by 29 per cent from BAU 2030 are namely 17.2 per cent from forestry, 11 per cent from energy, 0.32 per cent from agriculture, 0.10 per cent from industry, and 0.38 per cent from waste. Mitigation actions in the forestry sector include: reducing emissions from deforestation and forest degradation, industrial plantation development, sustainable forest management (reduced impact logging (RIL) and enhanced natural regeneration), rehabilitation, and peatland management.

It has been indicated by many analyses and assessments related to land use that the drivers of land-use change programmes and policies are to prevent deforestation and forest degradation. However, it turns out that there are still challenges that need to be resolved, including tenure issues (P3SEKPI, 2017). Tenure is an enabling condition in the implementation of land use regulations (such as moratoria, One Map Policy, and other land-related policies). Indonesia also does not yet have a data management system for spatial information and critical statistics related to land tenure to support programmes to reduce emissions from deforestation and land degradation.

In order to achieve the NDC target, Indonesia prepared an NDC Implementation Strategy. The document outlines a technocratic approach to how its NDC will be achieved through systematic programmes, including the prevention of deforestation and forest degradation pathways (Ditjen PPI, 2017). Total emission reduction from the forestry sector (including peatlands) is 497 million tonnes of CO₂-eq and 650 million tonnes of CO₂-eq respectively for unconditional targets and for conditional ones (Table 10).

Table 10: Projected BAU and Emission Reduction from Each Sector Category

No	Sector	GHG Emission Level 2010* Mton CO ₂ e	GHG Emission Level 2030 (Mton CO ₂ e)			GHG Emission Reduction				Annual Average Growth BAU (2010–2030)	Average Growth 2000–2012*
			BaU	CM1	CM2	(Mton CO ₂ e)		% of Total BAU			
						CM1	CM2	CM1	CM2		
1	Energy*	453.2	1,669	1,355	1,271	314	398	11%	14%	6.7%	4.50%
2	Waste	88	296	285	270	11	26	0.38%	1%	6.3%	4.00%
3	IPPU	36	69.6	66.85	66.35	2.75	3.25	0.10%	0.11%	3.4%	0.10%
4	Agriculture	110.5	119.66	110.39	115.86	9	4	0.32%	0.13%	0.4%	1.30%
5	Forestry**	647	714	217	64	497	650	17.2%	23%	0.5%	2.70%
Total		1,334	2,869	2,034	1,787	834	1,081	29%	38%	3.9%	3.20%

* including fugitive

** including peat fire

Notes: CM1 = Counter Measure (unconditional mitigation scenario)

CM2 = Counter Measure (conditional mitigation scenario)

Source: Republic of Indonesia (2016)

Integrated policies to prevent deforestation and forest degradation have been issued and promoted by the Government of Indonesia. Several significant policies are, among others, a moratorium on the use of the primary forest by concession holders (Presidential Instruction Number 5 of 2019), as well as preventing illegal logging of primary natural forests within logging concession areas as a mandate of Law Number 18 of 2013.

- a. The other programmes and intervention have been initiated, while ecosystem restoration focuses on peatlands. Indonesia, as stated in its NDC, set a peat restoration target of 2.5 million hectares (including 684,638 hectares of protected peat ecosystems, 1,410,943 hectares of cultivated peat ecosystems, and 396,943 hectares of community cultivated peat ecosystems) (KLHK, 2018). Priority areas covered seven fire-prone provinces (Riau, South Sumatra, Central Kalimantan, Jambi, West Kalimantan, South Kalimantan, and Papua) through rewetting, revegetation, and rural livelihood revitalisation activities.
- b. Forest and land rehabilitation is carried out by the central and local governments, concession permit holders, NGOs, and local communities.

From 2015–2019, the programme rehabilitated 995,253 hectares, with an average productivity of around 200,000 hectares per year. In addition, the civil-technical rehabilitation built 35,743 units of soil and water conservation infrastructure during the same period (Rochmayanto et al., 2020).

- c. Indonesia established the National Forest Monitoring System (called Simontana) as a forest monitoring tool on a national scale. The system is a remote sensing-based monitoring system complemented with terrestrial information. Focusing on fire prevention, the Ministry of Environment and Forestry launched SIPONGI in March 2015, an integrated system to monitor forest and land fires including near real-time hotspot information, combining hotspot data from NOAA, Terra/Aqua, SNPP, and field data derived from regional governments. Additionally, since 2018, a monitoring system using Thermal CCTV has been added at 15 fire-prone locations. This programme aims at making the monitoring system more reliable in particular areas, while officers are able to provide faster responses to support the ground check activities (MoEF, 2020a).

- d. Social forestry is another national priority programme in sustaining forests for community welfare, where people generate an income from forest products, agricultural inter-cropping, and plantations. Of the 4.1 million hectares in the social forestry programme, the potential areas of food security cover 285,530 hectares located in 30 provinces (MoEF, 2020a).
- e. Indonesia has developed important instruments related to climate change policy, including Strategy and Road Map of Climate Change Mitigation, Strategy and Road Map of Climate Change Adaptation, GHG Inventory System (SIGN SMART), National Registry System (SRN), vulnerability index data information system (SIDIK), Climate Village Programme, Safeguards Information System for REDD+, and other relevant instruments.

Currently, Indonesia has just submitted an updated NDC to the UNFCCC Secretariat. The important point of the updated document is that the updated NDC did not change the GHG emission reduction target by 2030; moreover, the document contains new commitments to increasing the ambition to implement mitigation and adaptation interventions, including those related to the oceans, wetlands, and human settlement in regard to adaptation elements. There was also updated information on current conditions, for example, related to the Vision and Mission of the 2019 Forward Indonesia Cabinet, as well as extended explanation of matters that still need detailed information, for instance, elements of adaptation and means of implementation as well as the transparency framework.

Along with the submission of the updated NDC, Indonesia also submitted the Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR). The LTS-LCCR document (as mandated by Article 4.19) comprised communication of the vision of climate change efforts and actions up to 2050. It was not a commitment (or not mandatory) and is non-legally binding so far, but possible to be tracked and reported.

Indonesia expects to accelerate GHG emission reductions towards Net Sink FOLU, as outlined in the LTS-LCCR document. Its main programme towards net sink FOLU by 2030 covers reducing emissions from deforestation and peatlands (peat decomposition and peat fires), increasing the capacity of natural forests for carbon sequestration (through reducing degradation and increasing regeneration), restoration and improvement of the peat water system, forest restoration and rehabilitation (plant enrichment/increased carbon sequestration), sustainable forest management, optimisation of unproductive land for the development of forest plantation and law enforcement.

Through ten NDC Mitigation Actions for the FOLU sector, it is projected that GHG emissions in 2030 from the FOLU sector will be 217 MtCO₂-eq (CM1) and 64 MtCO₂-eq (CM2). Avoiding deforestation, conservation and sustainable forest management (SFM), peatland protection and restoration, and sink enhancement are net sink pathways to support the LTS-LCCP. Table 11 illustrates the target of each pathway.

Table 11: The Target of Net Sink FOLU 2030

Activity	Target
Avoiding deforestation	<ul style="list-style-type: none"> - Only non-forested Production Forests may be converted to non-forest area - Maximum deforestation is 6.8 million hectares, deforestation rate of 241,000 hectares/year (2010–2030) and 99,000 hectares/year (2031–2050)
Conservation and SFM	<ul style="list-style-type: none"> - Forest degradation rate 2010–2030 of 131,000 hectares/year, and 2031–2050 of 49,000 hectares/year - By 2050, all concessions shall have obtained Sustainable Forest Management Certification (currently only 76%) - Industrial Forest Plantation development will reach 12.8 million hectares by 2050 - Reduced Impact Logging (RIL) and Production Forest Restoration/ Enrichment will reach 1.7 million hectares by 2030 and 8.8 million hectares in 2050
Peatland protection and restoration	<ul style="list-style-type: none"> - LCCP: targets for improving peat management and peat water management, covering an area of 0.95 million hectares by 2030 and 1.05 million hectares by 2050. - LCCP: peat restoration target of 2.7 million hectares by 2030 and 4.22 million hectares by 2050
Sink enhancement	<ul style="list-style-type: none"> - LCCP: forest rehabilitation target of 5.3 million hectares by 2030 and 10.6 million hectares by 2050 or 265,000 hectares/year - Rehabilitation targets are achieved by Social Forestry, Rehabilitation Programmes, and Multi-Business Forestry Permits

Source: Rochmayanto et al. (2020)

Next Challenges and Way Forward

Indonesia may face some challenges in achieving its NDC targets. The first challenge is the emergence of new policies, such as Law No 11/2020 on Job Creation, which to some extent indicates a risk of increasing deforestation and forest degradation. The Job Creation Law is designed to facilitate investment in order to simplify the licensing mechanism. One of the consequences is that the law cuts out a number of things, including the adjustment of environmental impact analysis. Furthermore, the government (Ministry of Environment and Forestry) has a further task to monitor and control the quality standards that must be set in environmental quality.

The second is new policy promoted by the Government of Indonesia in regard to food estate development to support food security and community welfare. However, this policy requires a large area of land. Therefore, the risk is an increasing need for land, including forest areas allocated for food estate establishment. Positive arguments have been made to avoid forest conversion to food estate programmes. Food estate programmes within forest areas do not take the form of monoculture of seasonal crops. It is more relevant in the form of agroforestry under the social forestry mechanism. Social forestry in support of food security is allowed to be carried out in production and protected forest areas.

On the other hand, Indonesia has a couple of reasons to be optimistic about achieving the NDC targets. As reported by the MoEF (2020a, 2020b), a good experience from the Indonesia-Norway Partnership revealed that Indonesia reduced emissions by 17.28 MtCO₂-eq through both avoided deforestation and forest degradation in 2017. Avoided emissions from reduced 2016/2017 deforestation were 8.6 MtCO₂-eq (3.6% from the baseline), while emission reduction from reduced forest degradation was about 8.68 MtCO₂-eq (21.2%). The baseline emissions in this partnership framework were generated from the average emissions of 17.28 MtCO₂-eq during the 2006/2007 – 2015/2016 period.

Another reason to be optimistic is the results of the Earth Overshoot Day assessment. The Earth Overshoot Day is an important marker to remind all mankind (as an alarm) of how important the future of the earth's limited natural resources is, but the human population is increasing every year. The ecological footprint for Indonesia accounted for 1.7 hectares globally per person (30th percentile) which can correct the view of deforestation in Indonesia, which is always described as being the highest in the world. The analysis found that Earth Overshoot Day 2021 for Indonesia fell on 18 December, 2021. This means that Indonesia is very efficient in using natural resources since there are only 13 days left in 2021, so the natural resources that will be used cannot be returned. The Earth Overshoot Day 2021 assessment provided good insights, indicating that Indonesia is a country with huge reserves of natural resources, a large amount of natural resources to be recovered, large population (around 270 million in the 2020 population census) but very efficient use of natural resources compared to other countries.

However, deforestation is predicted to continue in the future. This is because investment in the mining sector, such as coal through open-pit mining, is still highly attractive along with oil palm plantations. The transmigration programme may not be a government priority, but forest clearing by local residents is suspected to still happen. Therefore, the driving forces of deforestation and degradation in the future are expected to remain relatively the same. Therefore, the government needs to opt for a new economic paradigm with land efficiency prioritised.

Historical land-use change analysis (MoEF 2020) and plantation expansion potential (Gaveau et al. 2021), as well as next priority policies such as food estate policy and the plan for relocation of the national capital, indicate that Kalimantan and Papua Region are likely to continue carrying out deforestation in the future.

The big islands such as Sumatera and Kalimantan should be a focus for avoiding deforestation, while Papua should be concerned about avoiding forest degradation efforts, at the same time as anticipating deforestation for a couple of years. There is a

lot of land available. The increase of land-use change from forest to other land uses is expected to be concentrated in areas targeted as Special Economic Zones in Papua. In East Kalimantan, as a consequence of the New State Capital master plan, the development at the sub-national level will be difficult to control. Such a situation leads to the need for spatial priority in addressing the avoidance of deforestation and forest degradation policies.

Increasing ambitions to achieve the NDC targets as stated in the updated NDC and the LTS-LCCR 2050 documents have been a very important first step. However, the efforts demonstrate a supply approach. It is also important to consider to have a demand approach to avoiding forest conversion and forest degradation.

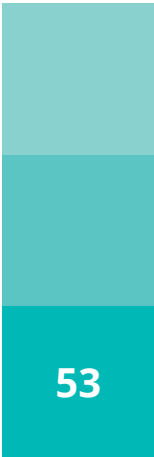
In the context of the demand approach, there is shifting concern about the production system of forests to sustainable consumption by the population which has a major influence on forests' sustainability. The importance of this shifting production approach is reinforced by indications of the impact of population and plantation commodities growth (such as palm, rubber, coffee, and cocoa) that imply the risk of increasing emissions from deforestation and forest degradation.

It is time to change the production capacity indicators of forests from being from a supply perspective (such as land area and increased productivity of forest products, both timber, and non-timber) and shift to demand-based indicators driving the sustainability of forests from a sustainable consumption perspective. Sustainable consumption means the use of products and services in a way that minimises the impact on the environment; in this case, the question is how to create consumption and demand whilst achieving forest sustainability. By assigning sustainable forest as an output, the forest should not be seen as a timber commodity. Furthermore, forests should be positioned as a source of biopharmaceuticals, biomaterials, forest microbial bio-prospecting, and future energy (bioenergy, micro-hydro, and any other new renewable energies), food, tourism, forest healing, and other ecosystem services.

Finally, experiences of Indonesia concerning forest and climate change mitigation policies such as tree planting, community forest development, industrial forest, and community forest have become an example for other countries in the region, especially those which have similar national circumstances. All entities within the country, including government agencies, the private sector, non-government organisations, and other development partners, should pay attention to supporting net sink FOLU 2030 and LTS-LCCR 2050, as well as other approaches that are needed to accelerate the achievement of the NDC targets. Harmonising cross-sectoral policies and programmes, coordination between governance levels, and additional investment in forest and climate mitigation technologies, at least, need to be strengthened.

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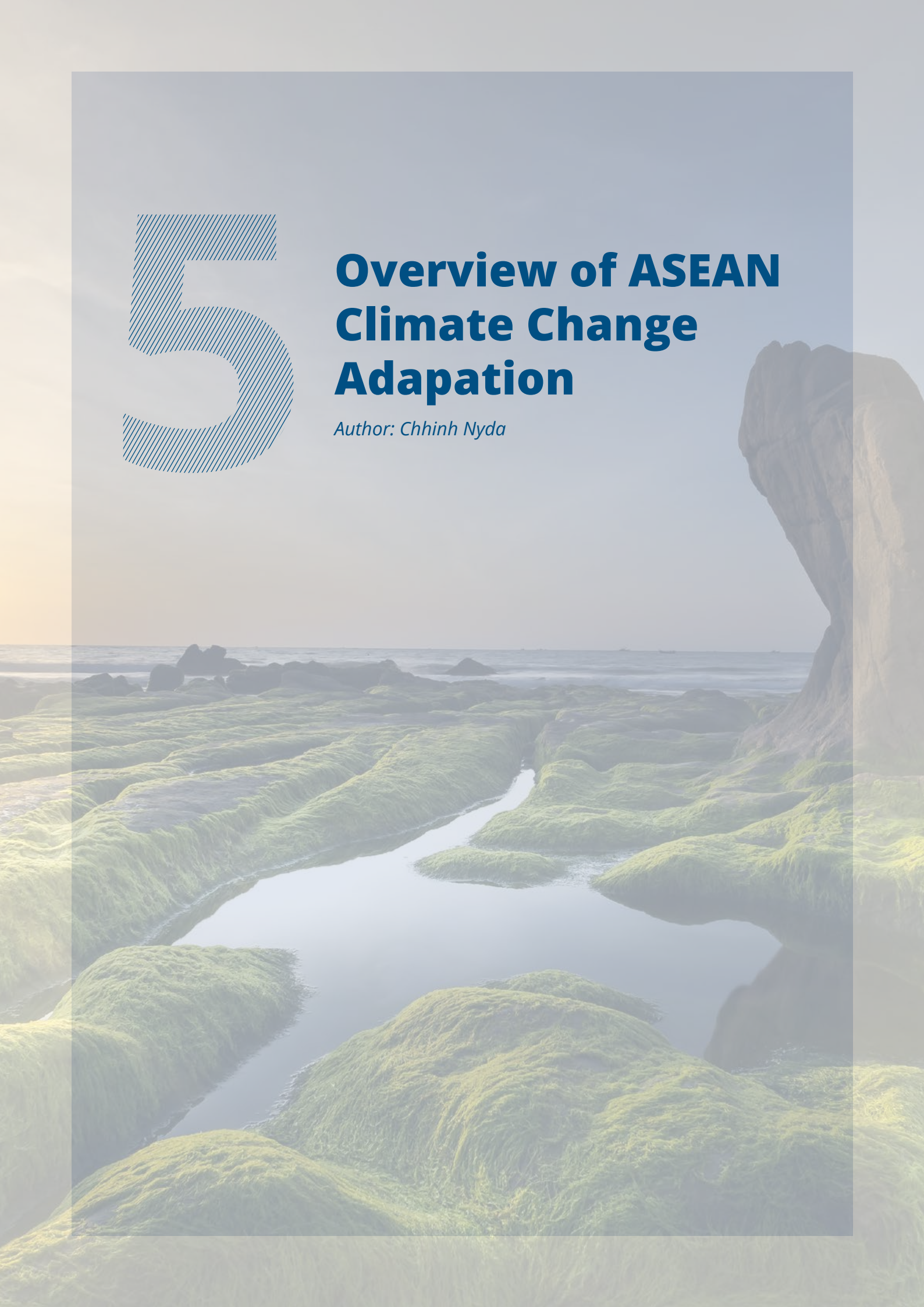
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Overview of ASEAN Climate Change Adapation

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Introduction

Climate change adaptation among Association of Southeast Asian Nations (ASEAN) Member States has come with different forms, development priority sectors, and climate hazards. The Intergovernmental Panel on Climate Change (IPCC) defines climate change adaptation as “the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects” (IPCC 2014, 40).

With the diversities of ASEAN nations, climate change has imposed different threats such as floods, droughts and sea level rise. The early assessment of climate change vulnerability in Southeast Asia conducted by Yusuf and Francisco (2010) found that some nations are more vulnerable than others due to different factors, such as Cambodia due to low adaptive capacity, the Philippines due to high exposure to tropical cyclones, and Vietnam and Thailand due to sea level rise. The latest assessment using time-series data (1998–2017) by Eckstein et al. (2019) at the global scale also includes some countries in ASEAN that experience different levels of exposure and economic losses (Table 12). ASEAN member states such as Singapore, Brunei Darussalam, and Malaysia are far from Myanmar, the Philippines, and Thailand in regard to their Climate Risk Index (CRI). The smaller the CRI, the higher the risk that a country experiences. So, it is expected that different ASEAN countries would take different approaches to adapt to climate change.

This chapter aims to provide an overview of ASEAN Climate Change Adaptation by reviewing the ASEAN Member States (AMS) regarding their adaptive capacity and resilience to climate change. The central question of the chapter is how AMS mainstream climate change into national/state development, what are the key climate change strategies, to what extent do AMS construct climate-resilient infrastructure, and how do AMS share and communicate their knowledge on climate change adaptation.

Overview of Climatic Hazards of ASEAN Member States

The review is based on content analysis of the existing published national documents from AMS, governments’ reports, journal articles, books, and many forms of electronic sources such as the World Bank and the Asian Development Bank (ADB). The quantitative and qualitative comparison between AMS regarding climate change adaptation is to understand how AMS act to reduce climate change vulnerability for their people and to ensure climate change resilience. Some major development sectors of the AMS are highlighted in Table 12.

Given that the risk is different among AMS, some nations may face the same hazards while other face unique calamities for example, Cambodia, Thailand, and Vietnam which face droughts. Based on mainly Second National Communication (SNC) under the United Nations Framework Convention on Climate Change (UNFCCC), Table 13 shows the shared and unique climate-related hazards among the AMS. Each cell of Table 13 shows ‘yes’ or ‘no’. If yes, it means that the AMS experience impacts from climatic-related hazards. It should be noted that the SNCs of some AMS do not explicitly state their climate-related hazards such as Malaysia, the Philippines, and Singapore, while others describe the climate hazards that they face by comparing their frequencies such as Indonesia and Lao PDR or by the severity of impact such as Cambodia. The most common climatic hazards are flooding (all AMS), followed by windstorms and droughts. The term ‘windstorm’, moreover, could be referring to cyclones, typhoons, or strong wind. Table 13 shows that Indonesia and Vietnam experience more climatic hazards among the AMS while Singapore and Brunei Darussalam experience less.

Table 12: Climate Risk Index of ASEAN Nations

No.	CRI Rank	Country	CRI Score	Fatalities in 2019 (Rank)	Fatalities per 100 000 inhabitants (Rank)	Losses in Million US\$ (PPP) (Rank)	Losses per unit GDP in % (Rank)
1	176	Brunei Darussalam	167.50	167	151	178	179
2	14	Cambodia	36.17	38	35	53	28
3	72	Indonesia	74	14	91	18	115
4	52	Lao PDR	60.5	82	66	73	38
5	116	Malaysia	105.67	64	108	66	114
6	2	Myanmar	10	1	1	19	19
7	4	Philippines	18.17	7	16	8	31
8	179	Singapore	172	172	172	162	177
9	9	Thailand	29.83	22	60	3	17
10	13	Vietnam	35.67	15	47	11	47

Source: Eckstein et al. (2019)

Table 13: Climatic Hazards among AMS

No.	Country	Flood	Landslide	Strong Wind	Drought	Vector-Borne Diseases	Forest Fire	High tide /surge	Heat Stress
1	Brunei Darussalam	Yes	Yes	Yes	No	No	No	No	No
2	Cambodia	Yes	No	Yes	Yes	Yes	No	No	No
3	Indonesia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
4	Lao PDR	Yes	No	Yes	Yes	Yes	No	No	No
5	Malaysia	Yes	Yes	Yes	Yes	No	No	Yes	No
6	Myanmar	Yes	No	Yes	Yes	Yes	Yes	No	No
7	Philippines	Yes	Yes	Yes	Yes	No	No	Yes	No
8	Singapore	Yes	No	No	No	No	No	No	Yes
9	Thailand	Yes	No	Yes	Yes	No	No	Yes	No
10	Vietnam	Yes	Yes	Yes	Yes	Yes	No	Yes	No

Note: the bolded row headings are the most common climate hazards.

Source: Extracted from Countries Communication to UNFCCC (year of publication by AMS and number followed the year is the order of National Communication): 2017/2nd, 2015/2nd, 2017/3rd, 2013/2nd, 2018/3rd, 2012/1st, 2014/2nd, 2018/4th, 2018/3rd, 2019/3rd)

ASEAN Development Challenges by climate Change

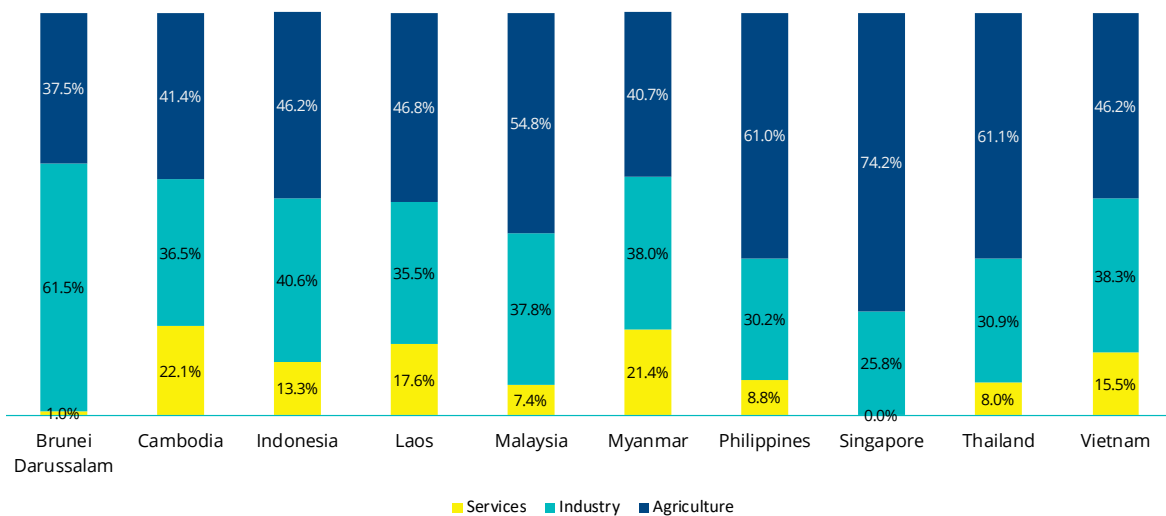
The adaptation plan usually depends on the sectoral development of countries or states. For example, if a government is heavily dependent on agriculture and is heavily faced with droughts, one would expect that there will be intensive development of irrigation systems. Figure 9 shows the shares of AMS' main economic sectors reported as Gross Domestic Product (GDP), namely Agriculture, Industry, and Services. The Figure suggests that some AMS still depend heavily on economic sectors that are sensitive to climate change, especially the agricultural sector in Cambodia, Myanmar, Lao PDR, and Vietnam (CLMV). For example, in Myanmar, the country is experiencing a reduction in rice production due to changes in rainfall patterns (Mar et al., 2018). In Cambodia, Ly (2020) argued that climate change is going to reduce the streamflow of Cambodia's water systems and lead to an impact on the irrigation system, droughts, and reduction of the cultivated rice area. There are multiple threats from climate change in Vietnam, including increased flooding in the Delta of the Red River or Mekong Delta, sea level rise, and drought (Schmidt-

Thome et al., 2015). These threats will cause loss and damage to agricultural production in Vietnam (Yu et al. 2010; Trinh 2018). Similar to Vietnam and Cambodia, Lao PDR will also face water shortages and floods (Jayasekera 2013).

While climate change impact on CLMV countries is mainly focused on the agricultural sector, other AMS refer to different impacts, such as Singapore and Malaysia point to an increase of energy consumption due to air conditioning (Yau and Pean 2011; Lundgren and Kjellstrom 2013; Aban, Duane, and Yit 2011). It could be argued that the major economic sectors of Brunei Darussalam, Malaysia, and Singapore are not very sensitive to climate change impacts.

The case of Indonesia could be unique in terms of climate change impacts. Peat fires and forest fires in Sumatra and Kalimantan are being quoted as the major threats in Indonesia due to climate change (Alisjahbana and Busch 2017). At the same time, Indonesia was experiencing and is projected to face food security issues in some areas (Murniati et al. 2019, Syaukat 2011, Murniati 2020).

Figure 9: Shares of Primary Economic Sectors of GDP in AMS in 2019



Source: ADB (n.d.)

Thailand is the biggest rice exporter after Vietnam (Wales and Chavez 2012), given that the share of GDP of the Agricultural Sector in Thailand is relatively small compared to Industry and Services. The existing data show that the climate change impact in Thailand is dominant in the water sector and rice production (Felkner, Tazhibayeva, and Townsend 2009; Tapsuwan and Rongrongmuang 2015; Okwala et al. 2020; Boonwichai et al. 2018). Due to urban heat, the island is also a threat to urban dwellers (Arifwidodo and Chandrasiri 2020) and causes more energy consumption. The case of the Philippines is very similar to that of Thailand regarding the climate change impacts, which focus on agricultural product loss and damage (Buan et al. 1996; Escarcha et al. 2020). Still, some researchers have even attributed it to civil conflicts (Crost et al. 2018). The unique case of climate change impacts on the Philippines is the increase of typhoons which has led to different outcomes from crop damage to loss of property and lives (Ezra 2016).

In a nutshell, the AMS' economic sectors are not facing the same sensitivities to climate change impact. It has been argued that CMLV would be more vulnerable to climate change than other AMS. Thailand, Indonesia, and the Philippines are facing impacts similar to those of CMLV but their adaptive capacity is higher.

ASEAN Climate Change Vulnerability Assessment

As there are a few different vulnerability assessment frameworks, this report reviews AMS' Vulnerability Assessment Reports and scholarly articles based on, where possible, the IPCC Third Assessment Report (McCarthy et al. 2001): "The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity" (p. 21). This is to ensure the consistency of the finding of the level of vulnerability among AMS. It should be noted that there is a guideline on 'ASEAN Regional Risk and Vulnerability Assessment' (Bell et al. 2017), but this framework in the document is focused more on

Disaster Risk Management. So, the outcomes from this assessment may not necessarily contribute to adaptation option recommendations for AMS. Also, there is a lack of assessment reports produced by AMS for review.

Given the climatic hazard exposure as mentioned in Table 13 and different sensitivities among AMS as discussed in Figure 9, the circumstances of some AMS which make their country susceptible to climate change are different. In an early vulnerability assessment, Yusuf and Francisco (2010) posited that Cambodia and Lao PDR have low exposure to climatic hazards but are comparatively highly vulnerable due to low adaptive capacity compared to other AMS. Because of this low adaptive capacity and dependence on climate-sensitive livelihoods, natural disasters trap more people in poverty (World Bank 2006). Poverty rates are found to be high where people live in an area with poor soil and limited potential for irrigation (World Bank 2007). Some AMS, such as the Philippines, Vietnam, and Thailand, are vulnerable to climate change because they are exposed to a high intensity of climatic hazards such as typhoons and sea level rise. The study of the Asian Development Bank (2015) also confirmed the finding of Yusuf and Francisco (2010).

ASEAN Joint Effort for Climate Change Adaptation

Before going into the details of Climate Change Adaptation in the ASEAN context, here is a brief description of the ASEAN mechanism. It could be said that ASEAN has three central pillars or communities, namely ASEAN Political-Security Community (APSC), ASEAN Economic Community (AEC), and ASEAN Socio-Cultural Community (ASCC). Each assembly within a country or state comprises many different government institutions (sectoral ministerial/bodies). For example, there are 15 Sectoral Bodies under the ASCC Community, including the ASEAN Committee on Disaster Management (ACDM) and ASEAN Senior Officials on the Environment (ASOEN). Different sectoral bodies have different Work Plans, and some have more activities, initiatives, or programmes than others. In Cambodia, the ACDM is under the management of

the National Committee of Disaster Management (NCDM), and ASOEN is coordinated by the Ministry of Environment (MoE).

The ASEAN 2025: Forging Ahead Together (also known as ASEAN Blueprint 2025) is among the significant documents that map relevant sectoral bodies in climate change adaptation. In the blueprint, climate change adaptation can be found in two different characteristics among the five, namely Engages and Benefits the People, Inclusive, Sustainable, Resilient, and Dynamic. First, it is found in Sustainability, and the sectoral bodies that are expected to take the lead in this ASCC Blueprint 2025 objective are ASOEN, COM, and SOMRDPE. The second is Resilient. The sectoral bodies that are expected to take the lead in this ASCC Blueprint 2025 objective are ACDM, SOMHD, and SOMSWD. Other government institutions are responsible for disaster risk reduction (DRR) and climate change adaptation (CCA).

In the case of Cambodia, there are 15 Ministries/ Government Institutions (as in Table 14) that have developed their Climate Change Action Plan (CCAP), including the CCAP for the Disaster Management Sector. The different sectors have other objectives to address climate change issues. The NAP-DRR is very well aligned with the Blueprint Objective on Resilience, especially the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) Work Programme. The priorities in AADMER almost match one-to-one with the NAP-DRR 2014–2018 with the goal to “Build resilient national and local communities to pursue sustainable development” by implementing strategic programmes.

As illustrated in Table 13, floods, droughts, and windstorms are the most common climate hazards among AMS. There are some forms of encouragement of AMS to address these hazards together, mainly by incorporating these issues into the ASEAN Declaration on the Strengthening of Adaptation to Drought which contributes to the Regional Plan of Action. For example, the study of the United Nations (2020) proposed that their research can foster an integrated and collaborative drought management plan for the governments

and as part of the ASEAN Agreement on Disaster Management and Emergency Response (AADMER). AADMER, however, is focusing more on disaster management while the ASEAN Strategic Plan on the Environment (ASPEN) contains a Climate Change Component with a comprehensive Work Plan on adaptation, including AMS cities.

The AADMER Work Programme (AWP) has two generations/periods, namely 2010–2015 and 2016–2020. The first generation of AWP 2010–2015 highlighted the importance of ‘Building Partnerships between DRR (disaster risk reduction) and Climate Change Adaptation (CCA) Institutions and Programmes’ (ASEAN Secretariat 2011). In this activity, the AMS identify the areas for integration of CCA into DRR national action plans (NAPs) and DRR in Climate Change National Adaptation Plans of Action (NAPAS) or national strategies among the Member States. It is anticipated that the AMS will support the development of DRR action plans, including climate change adaptation in the city’s planning so that the town is climate resilient. The second generation of AADMER includes more programmes to ensure a disaster-resilient and climate-adaptive ASEAN Community (ASEAN Secretariat 2016) with four major activities: 1) Strengthening of institutional capacity and policy frameworks for effective implementation of disaster risk reduction (DRR) and climate change adaptation (CCA); 2) Establishment of ASEAN youth leadership in DRR and CCA; 3) Increasing the number of replicable programmes and models for building community resilience, and 4) Strengthening awareness-building programmes for a disaster-resilient and climate-adaptive ASEAN Community. Based on the two generations of AADMER, it could be concluded that DRR and CCA must be interwoven, and the AMS should share their experiences of DRR and CCA to build institutions for the purpose of capacity building to technology transfers.

In their work plan for the ASEAN Strategic Plan on the Environment (ASPEN) 2016–2025 ASOEN, the climate change adaptation is not well articulated. ASPEN highlights some key strategies in various sub-sectors such as Nature Conservation and Biodiversity, and Climate Change. The activities/

programmes within the fundamental strategies are yet to identify the country/states to take the lead. For example, these three activities are yet to identify the host country to execute the plan, namely 1) exchange knowledge and share experiences, including best practices on adaptation and mitigation measures in coastal areas, 2) Promote awareness, education, and training on

climate change adaption and mitigation measures in coastal areas and 3) Conduct pilot projects on social and ecological resilience. It should be noted here that each sectoral body of AMS must propose activities in the ASPEN and invite other AMS to join the effort. Yet, it is still too early to see the concrete actions of the ASPEN in regard to joint efforts to address climate change.

Table 14: List of Ministries Invited for Target Interviews and Focus Group Discussion

No.	Sectoral Body (Abbreviation)	Government Agencies
1	ASEAN Committee on Disaster Management (ACDM)	National Committee for Disaster Management
2	ASEAN Committee on Women (ACW)	Ministry of Woman Affairs
3	ASEAN Commission on the Promotion and Protection of the Rights of Women and Children (ACWC)	Ministry of Social Affairs, Veterans and Youth Rehabilitation and Ministry of Women's Affairs
4	ASEAN Senior Officials on the Environment (ASOEN)	Ministry of Environment
5	Committee under the Conference of Parties to the ASEAN Agreement on Transboundary Haze Pollution (COM)	Ministry of Environment
6	Senior Labour Officials Meeting (SLOM)	Ministry of Labour and Vocational Training
7	ASEAN Cooperation on Civil Service Matters (ACCSM)	Ministry of Civil Service
8	Senior Official Meeting on Culture and Arts (SOMCA)	Ministry of Culture and Fine Art
9	Senior Official Meeting on Sports (SOMS)	Ministry of Education Youth and Sport
10	Senior Officials Meeting on Education (SOMED)	Ministry of Education Youth and Sport
11	Senior Officials Meeting on Health Development (SOMHD)	Ministry of Health
12	Senior Officials Meeting Responsible for Information (SOMRI)	Ministry of Information
13	Senior Officials Meeting on Rural Development and Poverty Eradication (SOMRDPE)	Ministry of Rural Development
14	Senior Officials Meeting on Social Welfare and Development (SOMSWD)	Ministry of Social Affairs, Veterans and Youth Rehabilitation
15	Senior Officials Meeting on Youth (SOMY)	Ministry of Education Youth and Sport

Source: Author

National Adaptation Plan of Action

The AMS have different documents detailing National Adaptation Plans and can be found in other National Development Plans. The review is just focused on what activities the AMS are pursuing to address each kind of climate-related hazard from the National Communication (NC) to the UNFCCC. It should be noted that some AMS submit their National Communication more than others, as shown in Table 14. Mexico is added into the table as the leading country that introduced most of its NCs to the UNFCCC.

Brunei Darussalam highlighted climate change adaptation (CCA) in its Initial Communication (NC1) to the UNFCCC. The primary climate change impacts to address are the threats to biodiversity and forestry sectors, including peatland. Its peatland provides flood protection, slope stability and a freshwater supply. The National Adaptation Framework (NAF) of Brunei Darussalam approaches CCA via its Strategic National Action Plan for Disaster Risk Reduction (SNAP), focusing on Governance, Risk assessment and early warning, Knowledge management, Vulnerability reduction, and Disaster

preparedness. The NAF of Brunei also covers four domains, including Coastal and Flood Protection, Safeguarding Forests and Biodiversity, Managing Food Security, and Strengthening Resilience in Public Health. The focus of this CCA remained the same in their Second Communication to the UNFCCC.

Cambodia, among the most vulnerable countries in the world, has integrated CCA into many different sectors under the framework of its Climate Change Adaptation Strategic Plan. For example, the Ministry of Agriculture, Forestry, and Fisheries (MAFF) have a Climate Change Adaptation Plan. The same applies to the Ministry of Water Resources and Meteorology (MoWRAM) and the National Committee for Disaster Management (NCDM). Each agency's Climate Change Adaptation Plan has a different role to ensure that vulnerability is reduced respectively in their sector, including forestry or hydro-meteorology. The case of the Ministry of Women's Affairs (MoWA) also has its uniqueness in regard to Gender and Climate Change, Green Growth, and Disaster Management, which seem to embrace resilience by emphasising the roles of the genders, mainly women.

Table 15: Climatic Hazards among AMS

No.	Country	NC1	NC2	NC3	NC4	NC5	NC6
1	Brunei Darussalam	2016	2017	-	-	-	-
2	Cambodia	2002	2016	-	-	-	-
3	Indonesia	1999	2011	2018	-	-	-
4	Lao PDR	2000	2013	-	-	-	-
5	Malaysia	2000	2011	2018	-	-	-
6	Myanmar	2012	-	-	-	-	-
7	Philippines	2000	2014	-	-	-	-
8	Singapore	2000	2010	2014	2018	-	-
9	Thailand	2000	2011	2018	-	-	-
10	Vietnam	2003	2010	2019	-	-	-
11	Mexico	1997	2001	2006	2010	2012	2018

Source: UNFCCC (n.d.)

NC1 and 2 of Cambodia highlighted increasing the water use efficiency and creating additional sources of income for farmers. Also, in the long run, there will be infrastructural interventions, expanding to other areas with lower risks, insurance, better varieties of crops, and long-term research. For the health sector, adaptation programmes aim to reduce: (i) the number of malaria cases and (ii) deaths caused by malaria. The NC of Cambodia (maybe other AMS) did not provide details of the activities to address each climate hazard in the country, for there are other primary sectoral documents that are dedicated to specific challenges such as Gender and Climate Change.

Indonesia's third National Communication to the UNFCCC contains very comprehensive details of the adaptation activities for different hazards. Their NC details CCA activities for Coastal (Marine and Fishery), Agriculture, Water Resources, Forestry, Special areas (Rural/Urban), and Health based on academic publications. It is interesting to see that Indonesia highlights Watershed, Vulnerable groups (Children), and Lake Ecosystem as sectors for their vulnerability assessment as cited in its NC3. These sectors are not common in other AMS. Here is an example of the adaptation of the urban industry: 1) Development of dikes equipped with polder systems to protect the area behind the dike, 2) Mangrove rehabilitation to increase soil surface and reduce wave energy destruction so that the rate of erosion can be reduced; and 3) Practising fish culture using sylvofishery. It should be noted that the sectors that are normally found in the National Adaptation of Action (NAPA) include Agriculture, Water, Forestry, Coastal Zones, and Health.

Lao PDR is very similar to Cambodia as an agrarian country. Its climate change adaptation activities focus on Agriculture, Forestry, Water, and Public Health. In its NC2, Lao PDR highlighted its commitment to the agricultural sector with the support from the United Nations Development Programme (UNDP). Facing floods and droughts, Lao PDR has embarked on activities related to effective governance for small-scale rural infrastructure and disaster preparedness in a changing climate.

Based on its NC2, Malaysia has more coverage of adaptation activities than Brunei, Cambodia, Indonesia, and Lao PDR. These activities include Water resources (including water supply: domestic commercial and irrigation use and Floods and Erosion), Agriculture (Palm oil, Rice, Rubber, Cocoa), Forestry & Biodiversity, Coastal and Marine (Sea level rise, increase in intensity: duration and frequency of storms, Sea Surface Temperature Increase), Energy and Transport (Oil and Gas, Electricity, Transport), Public Health (Malaria, Dengue, Food, and Water-borne Diarrhoeal diseases) and Cross-sector adaptation. In its NC3, Malaysia has modified some sectors (removed cross-sector) and introduced a new sector, namely Infrastructure & Housing. For this new sector (Infrastructure & Housing), the adaptation is associated with water harvesting, solid waste management, and land used for housing development.

So far, Myanmar has only submitted its first National Communication to the UNFCCC — in 2012. It managed to highlight some activities related to Agriculture, Biodiversity, Coastal Zones, Forestry, Public Health, and Water Resources. Myanmar's NC1 also listed the activities to be done within each sector. Given that Myanmar submitted only its NC1, the details of its NC are very comprehensive in regard to highlighting the activities to be done associated with their development priority. For example, in the agriculture and livestock sector, the NC1 of Myanmar elaborates that adaptation measures include adjusting cropping systems, improving farm management, including post-harvest technology; using stress-resistant plant varieties and ensuring climate-resilient agriculture; promoting water use conservation and efficiency; and expanding water impoundment systems through clusters of smaller dams and ponds. These are among other activities. In each sector, they are embedded with both mitigation and adaptation measures.

The Philippines' climate change adaptations focus on the sectors of Agriculture and Food, Watershed (forestry, biodiversity, and water resources), Coastal and Marine Resources, and Human Health. While the first three sectors are considered as separate adaptation options, Health is an integral

part of all sectors. The Philippines' NC2 has shown that adaptations are not only achieved by government initiatives but also by private sector actors. The activities that are led by the private sector include 1) Establishment of cooperatives to lower costs of production inputs and develop marketing strategies, 2) Empowerment of women in farm management, and 3) Diversification of livelihoods to augment the family income, among other initiatives.

Singapore is taking the lead in submitting National Communications to the UNFCCC. So far, it has submitted four NCs with comprehensive climate change adaptation activities. Different from other countries in ASEAN, Singapore's NC did not detail its adaptation activities based on sectors but based on hazards. For example, in terms of a flood, Singapore would require all new developments and re-developments of 0.2 hectares or more to implement measures to slow down surface runoff and reduce the peak flow of stormwater into the public drainage system by implementing on-site detention measures such as detention tanks or rain gardens and bio-retention swales (i.e. "Source" solution). It should be noted that with the size of the country and its unique economy, Singapore does not have as many adaptation activities as Vietnam, Thailand, or Cambodia.

The Second National Communication to the UNFCCC by Thailand points to five vulnerable sectors, including Agriculture, Water Resources, Health, Forest and wildlife, and Marine and coastal resources. Its NC2 contains limited discussion of adaptation activities but the document refers to many different projects (mainly funded by the government) related to climate change adaptation options.

The climate change adaptation included in the Second National Communication to the UNFCCC by Vietnam is a bit different from that of other AMS. It starts with the impacts of each sector (Water Resources, Coastal zones, Agriculture, Forestry, Aquaculture, and Human Health) followed by short- and long-term adaptation options. For example, whether Vietnam is going to experience the impacts of climate change on annual flows, flood flows and low flows in the future was assessed based on the rainfall-flow model and the above-mentioned

climate change scenarios. The government is reinforcing and upgrading the existing system of river and sea dykes and building a water pump and drainage system in low-lying areas and coastal flood-prone areas.

Concluding Remark

A review of the climate change adaptation among the ASEAN member states (AMS) reveals that some countries are far more advanced and focused on hazards such as heat controls (in their urban setting) while others are yet to define their activities to ensure that their main economic sectors are safe and resilient to climate change impacts. In the context of climate change adaptation, we can group AMS into three: agriculture-based economies, transition economies, and developed economies. The countries with dependence on the agricultural sector, mainly Cambodia, Lao PDR, Myanmar, and Vietnam (CLMV) are focusing more on the agriculture and water sectors. The adaptation for countries with transition economies such as Thailand and the Philippines, is more focused on their urban setting while managing water resources for their growing agro-industries. The climate change adaptation activities in smaller countries such as Singapore and Brunei Darussalam are mainly urban energy consumptions.

Data reciprocity such as rainfall and temperature among AMS would be good for the sake of understanding how much change is taking place in southeast ASEAN. A vulnerability assessment for climate adaptation should be done for AMS so that we can identify the common and unique adaptation options. So far, there is no comprehensive study at this regional scale but there are some studies at the sub-regional level such as Brunei Darussalam, Indonesia, Malaysia, and the Philippines (BIMP). Then, each AMS would be able to share knowledge and resources to promote and enhance the adaptation options.

Reports on climate change adaptations are not widely available at the regional level in both committees (ADMC and ASOEN) in the Socio-cultural community of ASEAN. Given that there are Work Plans for ADMC and ASOEN associated with climate change adaptation efforts, we can conclude that the joint efforts of the AMS are yet to materialise.

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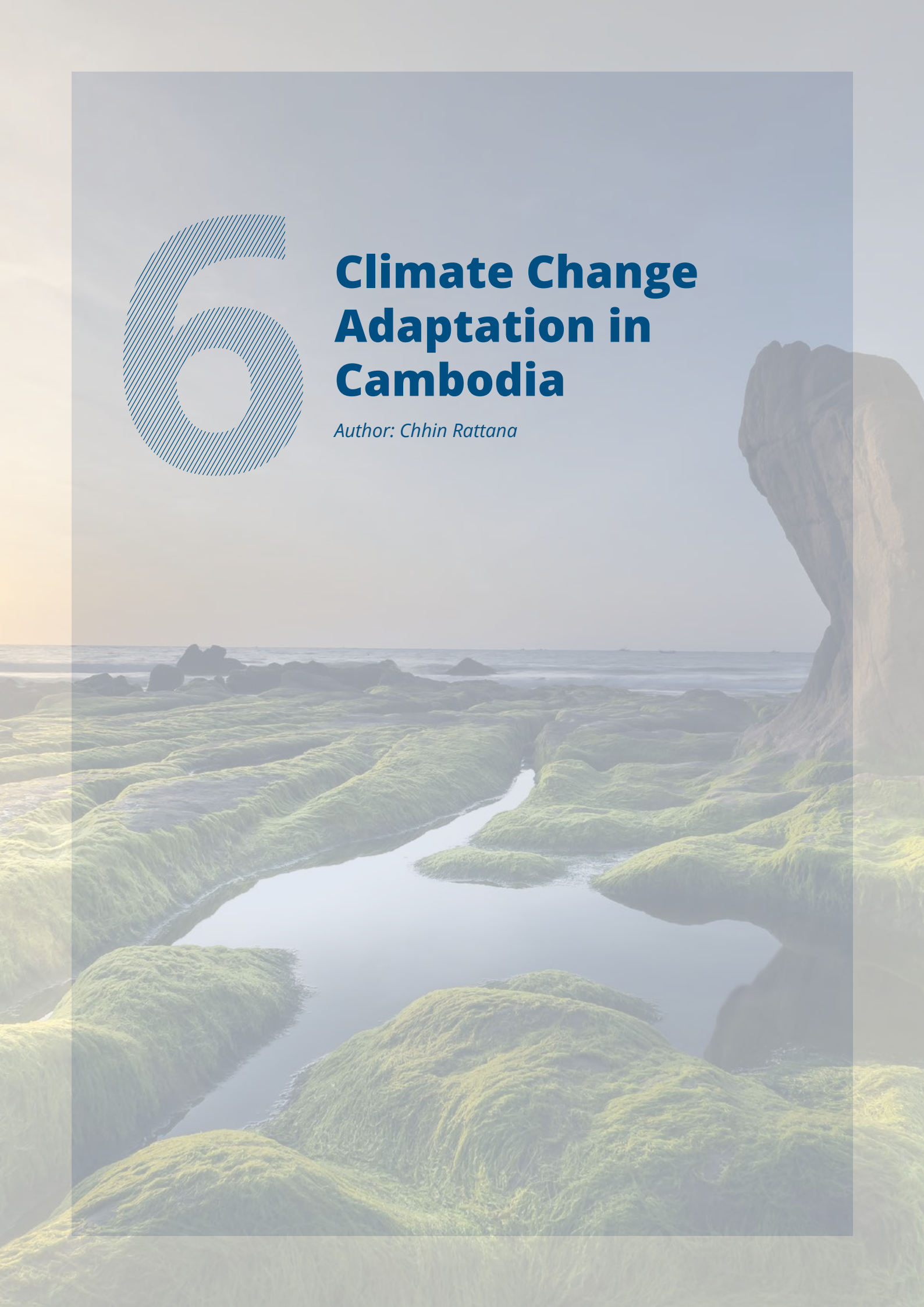
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Climate Change Adaptation in Cambodia

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Introduction

Climate change has become one of the greatest challenges the world is facing, which requires both global and national efforts to cope with. The impact of climate change is considered a major risk for socio-economic development and environmental sustainability as the Earth is being heated up by global warming resulting from human activity. Southeast Asia continues to face increasing threats from climate change, with increasing loss of human lives and significant damage to economic development and natural resources. The eye-witnessed impacts of climate change in the region we have all observed include the alarming trends of more frequent and intensified floods, droughts, saline intrusion, and extreme weather events, especially over the last decade.

Cambodia is ranked amongst the countries most vulnerable to climate change in Southeast Asia (Yusuf and Francisco 2009), and this is due to a combination of its relatively high reliance on subsistence agriculture, forestry and fisheries, and low adaptive capacity resulting from the shortage of technically skilled human resources, institutional capacities, and adaptation financing. Cambodia has also been affected by a history of civil war and poverty with a GDP of USD1,643 per person per annum in 2019 (World Bank 2021b). Climate hazards occurring in Cambodia include floods, droughts, heatwaves, and cyclones (WBG and ADB 2021). In coastal areas, underground water salinisation, and seawater intrusion are common problems. Sea level rise caused by melting ice sheets and thermal expansion of ocean water are also expected to be potential threats to the coastal area as the Earth's temperature rises. The occurrence of droughts and floods is widespread in Cambodia, and are recognised as the main contributors to poverty (NCDM 2013). Climate change has become a primary issue for the world as well as Cambodia, which needs to give urgent attention to designing appropriate and concrete climate change policies, strategies and actions in response at the global, regional, national, sub-national, local and individual levels.

Understanding the necessity for climate actions, Cambodia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1996

in order to participate with the international community in the effort to address climate-related issues. Cambodia has enjoyed a sustained robust and inclusive economic growth rate of around 7.7 per cent per annum over the last two decades (World Bank 2021a). The rapid growth has substantially contributed to the acceleration of living standards and the huge reduction of poverty from 53 per cent in 2004 to 13.5 per cent in 2014, and to around 10 per cent in 2018 (MEF and GSSD 2019). Under the impact of climate change, retaining this robust economic achievement will be a challenging task for the government for years or decades to come (MEF and GSSD 2019). Response efforts to address climate change cannot be separated from economic development and poverty alleviation, which are vital in the transition towards a green economy and low-carbon, climate-resilient development (NCCC 2013). Thus, the government has formulated a range of national and sectoral policies to address the climate change challenges, and at the same time can retain its good performance of economic growth.

The remaining sections of the chapter are as follows. Section II describes the Cambodian National Policy on Climate Change and Mechanism. Section III provides the information on the sectoral adaptation framework in Cambodia. The monitoring and evaluation framework of climate change response of the government of Cambodia is provided in Section IV. Finally, a summary and conclusion are given in Section V.

Cambodian National Policy and Mechanism on Climate Change

The complexity and many uncertainties of climate change risks and threats to Cambodia's economic growth, livelihoods, and ecosystem functions point to the need for integrated approaches to plan climate change policy interventions in harmony with a relevant sustainable economic policy agenda gearing towards poverty reduction and environmental sustainability. Recognising the importance of a clear national policy on climate change mitigation and response, the Royal Government of Cambodia (RGC) established the National Climate Change Committee (NCCC) in 2006 (RGC 2006). The mandate of the NCCC is to prepare, coordinate and monitor the implementation of

policies, strategies, legal instruments, plans and programmes of the Royal Government to address climate change issues within the country. The establishment of the NCCC aims to contribute to the protection of the environment and natural resources and foreseeing and preventing man-made changes to the climate that might have adverse impacts on the people's well-being. The work of the NCCC was endorsed by the National Strategic Development Plan (NSDP) 2009–2013. The NCCC is an inter-ministerial mechanism and is cross-sectoral and multi-disciplinary. The prime minister of the Kingdom of Cambodia is the honorary chair of the committee and the committee chairman is the Minister of Environment. Then, the Climate Change Technical Team (CCTT) was initiated under the NCCC. The CCTT is responsible for technical activities and the provision of advice related to climate change issues in Cambodia necessary for the NCCC to fulfil its tasks.

The National Adaptation Programme of Action (NAPA) of Cambodia to tackle climate change was endorsed by the RGC in 2006 (MOE 2006). The NAPA's main objectives are (1) to understand the main characteristics of climate hazards in Cambodia (flood, drought, windstorm, high tide, salt water intrusion and malaria); (2) to understand the coping mechanisms to tackle climate hazards and climate change at the grassroots level; (3) to understand existing programmes and institutional arrangements for addressing climate hazards and climate change; and (4) to identify and prioritise adaptation activities to tackle climate hazards and climate change. Cambodia's NAPA promotes priority projects to address the urgent and immediate needs and concerns of people at the grassroots level for adaptation to the adverse effects of climate change in key sectors such as agriculture, water resources, coastal zones and human health (MOE 2006).

The Cambodia Climate Change Alliance (CCCA) programme was launched in February 2010, and led by the Ministry of Environment with support from the European Union, Denmark, Sweden, and the United Nations Development Programme (UNDP) (Ferguson & Sovith, 2014). The CCCA aims at creating the enabling conditions for Cambodia's

response to climate change through capacity building and institutional strengthening targeting key national institutions, sub-national authorities, and civil society, and demonstrating pilot measures for adaptation to climate change. The CCCA includes a horizontal multi-donor Climate Change Trust Fund, administered by the UNDP, which provides resources for the programme and for mainstreaming initiatives and to create a harmonised engagement point for donors, thereby minimising the transaction costs for the government. The overall objective of the CCCA is to strengthen the capacity of the NCCC to fulfil its mandate to address climate change and to enable line ministries and NGOs to implement priority climate change actions. At the time of this report, the CCCA's phase III is being implemented under the coordination of the UNDP and Department of Climate Change (DCC), and the National Council for Sustainable Development (NCSDD) of the Ministry of Environment (MOE). The existence of these new phases of the CCCA is due to the achievements of the first phase (2010–2014).

The NCCC and the CCCA programme have been particularly engaged in producing the Cambodia Climate Change Strategic Plan 2014–2023 (CCCSP) and the related Sector Strategies and individual ministry Action Plans to implement the strategies (Ferguson and Sovith 2014). The CCCSP is well designed to fill the policy gap, complement ongoing efforts and meet the emerging challenges of development, environmental and climate change issues (NCCC 2013). This is the first-ever comprehensive national policy document responding to the climate change issues that Cambodia is facing. Integration of climate change into national and sub-national level planning and the development of climate change strategies, action plans and financing frameworks are among the priority actions undertaken as defined in the NSDP update 2009–2013. The development of the CCCSP is a significant step towards embedding climate change into the NSDP 2014–2018 and sector development plans of all relevant ministries. The CCCSP is an important policy instrument that guides national entities and assists non-governmental organisations and development partners to develop concrete and appropriate

measures and actions related to adaptation and greenhouse gas (GHG) mitigation, which are the supportive pillars for the achievement of the Rectangular Strategy of the RGC and Cambodia Millennium Development Goals (NCCC 2013). In 2018, the Rectangular Strategy Phase IV (2019–2023) of the RGC integrated climate change into its 4th pillar “Sustainable and Inclusive Development” (GSSD 2021a). This corresponds to the 4th angle “Ensuring Environmental Sustainability and Preemptive Response to Climate Change”, serving as a policy framework for mainstreaming climate change responses into the NSDP 2019–2023.

The multisectoral Climate Change Technical Working Group (CCTWG) was established in 2017 and is chaired by a Deputy Secretary-General of the NCS and its total membership is 25 members from 19 different ministries/agencies. The CCTWG provides technical and advisory support on climate change to the members of the NCS, with terms of reference covering legal policy and regulatory frameworks, knowledge management and quality assurance, monitoring and evaluation, reporting on the sectoral responses, reporting to the United Nations Framework Convention on Climate Change (UNFCCC), technical appraisal, resource mobilisation and partnership, capacity development, and awareness and communication on climate change.

Sectoral Adaptation Framework

1. Energy

The Ministry of Mines and Energy (MME) has been playing a very significant role in climate change adaptation in the energy sector by involving related government institutions such as Electricite Du Cambodge (EDC), and the Electricity Authority of Cambodia (EAC). To comply with CCCSP implementation, the sector climate change for manufacturing industry and the Energy Sector (SCCSP) was initiated and adopted in 2015 by the Ministry of Mines and Energy (MME 2015). However, the above-mentioned SCCSP was insufficient and incomplete for the current development of the energy sector in Cambodia (MME 2020). Therefore, the MME has prepared the Climate Change

Action Plan for the Energy Sector 2021–2023 with support from EDC and EAC, to be the vital guidance frameworks for ministries, agencies, development partners, the private sector, NGOs, and other related stakeholders in order to implement climate change responses in the energy sector (MME 2020). CCAP 2021–2023 is to lead to improvement of the energy sector with green development and climate change resilience for the purpose of ensuring that the energy sector can provide adequate, reliable, affordable, and sustainable energy for the economic and social energy needs in Cambodia.

In addition, CCAP 2021–2023 provides guidance on many issues that are critical to energy development such as Updating the Power Development Master Plan, National Energy Efficiency Policy, study on climate-proofing of existing and future energy infrastructure, reduction of GHG emissions, and human resource capacity building to meet the country’s commitment on sustainable energy for all (SE4All) (UN and World Bank 2021).

Moreover, the MME also released the Cambodia Basic Energy Plan that sets out targets and policy recommendations on oil and petroleum production and consumption, electricity demand, renewable energy, energy efficiency, energy security, and predicted future energy demand and supply (MME and ERIA 2019). In response to the designed policy, the RGC encourages and supports investments in clean and renewable energy and intends to create a favourable and enabling environment for investors in this sector (UNDP 2019). For instance, Cambodia had already piloted two large-scale solar farm projects in the country by 2019, namely the Bavet Solar Farm with 10 MW capacity, and Global Purify Power (GPP), a Phnom Penh-based developer backed by a group of Southeast Asian investors with the capacity of 15 MW. After that, a 100 MW national solar park programme by EDC, backed by the Asian Development Bank (ADB), is being developed, including a 30 MW facility planned to start operations in 2022.

Besides the renewable energy policy, the RGC also encourages the energy efficiency initiative. Cambodia launched the Construction Law in November 2019, which determines the guiding

principles for the regulatory framework of the construction sector (UNDP 2020a). The development of technical building regulations will follow in the coming years. The incorporation of minimum energy efficiency standards into the regulation is necessary to avoid “locking in” an inefficient built environment for years to come. Effective implementation of energy efficiency in buildings has the potential to save up to 25 per cent of the sector’s energy demand by 2035.

2. Agriculture and Water Resources

Climate change adaptation options in the agricultural sector can generally be divided into engineering options (e.g. changes in drainage, irrigation systems, rural roads, storage buildings), non-engineering options (e.g. changes in cropping patterns, soil, landscape, water), and biophysical options (e.g. development of new cultivars) (ADB 2013). Effective adaptation implementation should incorporate all the three options together so that the adjustment or change coming from each option can be synchronised together toward achieving a smart and optimum decision. The line ministries of the RGC that must be involved in the climate change response in the agricultural sector include the Ministry of Agriculture, Forestry and Fisheries (MAFF), Ministry of Water Resources and Meteorology (MOWRAM), Ministry of Rural Development (MRD), Ministry of Public Works and Transport (MPWT), and Ministry of Environment (MOE), among others in the NCCC. However, the main players for agricultural adaptation are still the MAFF and MOWRAM, and the remaining ministries and agencies are supportive institutions.

As part of the adaptation to climate change, the MAFF has developed several action plans, projects, and guidelines for the agricultural sector. The Strategic Plan for Agricultural Development 2019–2023 promotes the development of agricultural technology, smart agriculture, research and development, and operational techniques at all stages of the agricultural production chain to respond to the impact of climate change (MAFF 2019). In addition, the Strategic Plan for Agro-Industrial Development in Cambodia 2019–2030 was also developed a year later in order to push the agricultural production to the next level

and support long-term vision in the industrial development policy of the RGC (MAFF 2020). The Agriculture Services Programme for Innovation, Resilience, and Extension (ASPIRE) (MAFF and IFAD 2021) project implemented by the MAFF highlights the achievements in at least three components: (i) Capacity development for extension services; (ii) Improved extension services; and (iii) Infrastructure supporting climate-resilient agriculture. A guidebook on climate-resilient pomelo growing techniques was also produced as one of the outputs of that project. Moreover, lots of technical books related to climate-resilient agriculture have been produced and archived in the e-library (MAFF 2021) of the MAFF to support a range of agricultural practitioners. In addition, a series of capacity-building programmes have been provided to farmer communities by the MAFF and partner institutions for awareness raising and assisting them to prepare for climate change adaptation (e.g. Hok et al., 2015). Besides governmental agencies, non-governmental organisations (NGOs) which work in the agricultural sector also contribute greatly to building climate-resilient agriculture, namely the Center for Study and Development in Agriculture (CEDAC) (CEDAC 2021), the Cambodia-Australia Agricultural Value Chain Programme (CAVA) (CAVA 2021), and the Cambodia Partnership for Sustainable Agriculture (CPSA) (CPSA 2021).

Climate change adaptation in agriculture is very much related to the national water resource management policy. In Cambodia, the MAFF is responsible for water resources for on-farm irrigated agriculture and for catchment management programmes, and the MOWRAM is responsible for the rehabilitation and construction of irrigation and water resources infrastructure, and institutional issues related to the development and maintenance of irrigation infrastructure. In the area of climate change adaptation, the MOE is responsible for national policy development for the sector, coordination among these two ministries, and monitoring and evaluation of the implementation of their planned activities. The MAFF and MOWRAM are responsible for implementing the activities based on their sphere of responsibility as stated above.

The climate change strategic plan for the water resource sector was released in 2012 by the MOWRAM to guide the underlying departments and related institutions on water resource management and development toward achieving sustainability for combating climate change (MOWRAM 2012). In order to support the irrigation system design to adapt to climate change, the CCCA produced the Climate-Resilient Irrigation Guidance Paper which was prepared by the Coastal Adaptation and Resilience Planning (CARP) Component (CCCA 2014). It covers climate-related considerations of hydraulic feasibility, design, and operation, for example, providing training and design recommendations for regulators for control of drainage, flooding and saline intrusion. This guidance paper could guide the related institutions, namely the MAFF and MOWRAM, on climate-resilient irrigation system design and construction. Recently, the Asian Development Bank (ADB) released a technical book on Cambodia Agriculture, Natural Resources, and the Rural Development Sector Assessment, Strategy, and Road Map, which describes the performance and development constraints of Cambodia's agriculture, natural resources, and rural development (ANRRD) sector in light of the coronavirus (COVID-19) pandemic and the current strategic investment priorities of the RGC and the ADB (ADB 2021). This technical book provides a clear recommendation and roadmap for improving the agriculture, water resources, and rural development in Cambodia to address the climate change issues in the sectors.

3. Infrastructure and Transportation

Climate change adaptation in the infrastructure and transport sectors is mainly implemented by the Ministry of Public Works and Transport (MPWT) and the Ministry of Land Management, Urban Planning and Construction (MLMUPC) at the national level. In accordance with the CCCSP, both ministries developed the sectoral climate change action plan for guiding the underlying departments and relevant agencies to take action in response to climate change.

The MPWT released the Climate Change Action Plan for the Transport Sector in 2014 (MPWT 2014). The action plan provides the strategic

framework and strategic objectives for addressing both adaptation and mitigation aspects of the climate change response for the transport sector in Cambodia. The action plan also identifies the measures that will promote both the transport sector's development and effective climate change response and outlines the actions and activities to be implemented. In 2015, the MPWT joined the monitoring and evaluation using the national Monitoring and Evaluation (M&E) framework for climate change established by the CCCSP (Rai et al. 2015). Based on the M&E framework, the MPWT's institutional readiness score is 26.5 per cent. The scorecards show that coordination mechanisms for responding to climate change are stronger than the levels to which climate change is integrated within the sector's financing arrangements.

The Climate Change Action Plan of the MLMUPC was released in 2015 (MLMUPC 2015). The MLMUPC established the internal Climate Change Technical Team (CCTT) which consists of all key technical departments' representatives as well as the department of planning, finance, and administrative for the preparation of the action plan. The prioritised actions in response to climate change for the MLMUPC for the period 2015–2018 are to prepare spatial planning guidelines at all levels for climate change adaptation, to integrate climate change response measures into the communal land use planning, to conduct climate change vulnerability assessment for major urban areas and cities and develop climate safeguard principles, to promote the settlement development that adapts to natural disasters in urban and rural areas, to promote proper shelters for low-income households and vulnerable households, to formulate and develop green infrastructure and green building guidelines for existing and ongoing city master plans, to mainstream climate change for the development of a building code, and to enhance climate change vulnerability assessment and adaptation through regional and provincial spatial planning, master plans, and land use planning in coastal areas.

In order to underpin the designed action plan, the MLMUPC implemented the Project for the Support for Improving the Living Environment and Disaster Prevention Capacity in Cambodia with

support from the Japan International Cooperation Agency (JICA) and UN-Habitat (UN-Habitat 2020) to support recovery and strengthen the resilience of populations affected by floods. The project supported the reconstruction and rehabilitation of households vulnerable to floods, identified low-cost and sustainable materials for housing, and supported the design and construction of resilient and affordable houses using low-cost and local material, and capacity building of resilient housing design for vulnerable communities.

Recently, the Phnom Penh Sustainable City Plan (PPSP) was developed as a result of the collaboration between the Phnom Penh Capital Administration (PPCA), the Department of Green Economy of the National Council for Sustainable Development (NCSO), and the Global Green Growth Institute (GGGI) and its consultant team from the International Centre for Environmental Management (ICEM) (NCSO-MOE, PPCA, and GGGI 2018). The PPSP is designed to support the implementation of the Phnom Penh Master Plan for Land Use 2035, through the design of specific green growth actions related to the strategic priorities identified in the Master Plan. In addition, it will support the achievement of the strategic goals set within the Phnom Penh Urban Transport Masterplan and the Phnom Penh Masterplan for Drainage and Sewerage. The PPSP identifies eight priority sectors to be addressed to achieve sustainable development in Phnom Penh, namely urban planning, urban vulnerability, energy, transport, built environment, manufacturing, solid waste, and public space and cultural heritage.

4. Disaster Management

Climate change adaptation in the disaster management sector is very crucial to minimise the climate risk as the Earth system response to global warming is observed in the forms of abnormal weather-related natural disaster occurrences. The National Committee for Disaster Management (NCDM), which is honorarily chaired by the prime minister of the Kingdom of Cambodia, is responsible for disaster management in Cambodia. Through the efforts of the NCDM, Cambodia's Strategic National Action Plan for Disaster Risk Reduction (SNAP-DRR)

2008–2013 shifted the national paradigm from disaster response to disaster risk reduction (DRR). An institutional structure for DRR was created within Cambodia, with the National Committee for Disaster Management at the national level and similar structures at subnational levels. Building on the SNAP-DRR, the National Action Plan for Disaster Risk Reduction was developed for 2014–2018. In the same year, the Climate Change Strategic Plan for the Disaster Management Sector was released for the purpose of building resilience among communities to disasters caused by climatic hazards by launching common measures to mitigate risks and vulnerabilities (NCDM 2013).

The strategies to address climate change issues in the disaster management sector include the links between Climate Change Adaptation and Disaster Risk Reduction, promotion of the early warning system (EWS), building disaster resilience and Climate Change Adaptation capacity at all levels through education, and developing by paying more attention to risk. Moreover, the NCDM also defined clear disaster risk reduction activities in response to climate change in the strategic plan, such as the formulation of law and policy, strengthening an institution's capacity for disaster risk management contributing to climate change adaptation, building preparedness capacity in response to disasters, improving the EWS, strengthening community-based disaster risk reduction, building capacity for disaster management and climate change, promoting public awareness of disaster risk and climate change, applying scientific methods to manage disaster risk, strengthening the security for vulnerable communities and enhancing people's livelihoods.

Climate change adaptation requires an EWS and risk assessment, and the use of natural resources in a sustainable manner when implementing disaster risk reduction measures (NCDM 2013). In 2015, the project "Strengthening climate information and EWSs in Cambodia" was implemented by the MOWRAM, MAFF, and NCDM with the support from the UNDP's Least Developed Countries Fund (UNDP 2020b). The project supported the RGC to bridge the existing gaps in institutional capacity, inter-ministerial coordination, and infrastructure

through three complementary outcomes: strengthening the capability to assimilate climate, hydrological, and environmental information as well as weather forecasting; increasing the availability and utilisation of climate and weather information for national, sectoral and sub-national planning; and enhancing institutional capacity for maintaining and operating an EWS and climate infrastructure.

Under the project, the MOWRAM installed some automatic weather stations and automatic hydrological stations (MOWRAM and UNDP 2021) for the provision of on-time weather forecasting to the public. Moreover, meteorologists, hydrologists, and technicians of the ministry were trained in modelling and forecasting. At the same time, the NCDM also launched an EWS (NCDM and People in Need 2021). The system warns people in advance of natural hazards occurring in Cambodia. When an event such as flooding is detected or predicted, a voice recording is sent to the mobile phones of registered users in the areas at risk.

Monitoring and Evaluation Framework

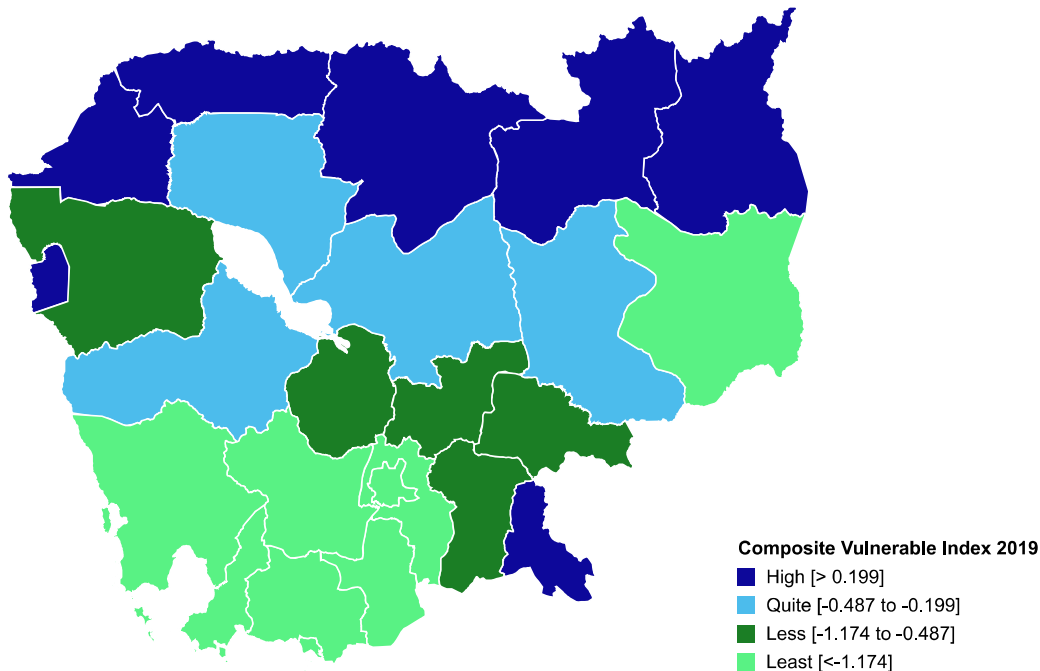
The CCCSP released in 2013 commits to developing a national Monitoring and Evaluation (M&E) framework for the response to climate change that can track multiple layers of information at national, subnational and sectoral scales (Rai et al. 2015). Cambodia already has a national M&E framework for assessing development interventions, which the government aims to integrate with the national M&E system for climate change responses. Doing so will assist in mainstreaming climate change adaptation and mitigation into national development priorities and targets as set out in the NSDP. The national M&E framework for climate change response, as outlined in the CCCSP aims to (1) keep track of the continuous development of adaptation efforts in a changing climate, (2) monitor policies on climate mitigation and low-carbon

development, (3) generate evidence and lessons to inform future policymaking, (4) facilitate the coherent integration of M&E of climate change into national development planning, and (5) provide the required information to fulfil Cambodia's reporting obligations to the UNFCCC and development partners.

Cambodia is implementing its national M&E framework to measure the performance of its national and sectoral responses to climate change, using the International Institute for Environment and Development (IIED)'s Tracking Adaptation and Measuring Development (TAMD) approach. The result of implementing a M&E framework based on the TAMD approach in 2015 shows that the total score of the national and sectoral institutional readiness baseline for the MPWT are 28.4 per cent and 26.5 per cent, respectively (Rai et al. 2015). Figure 10 illustrates the climate vulnerability index for all capital cities and provinces in Cambodia for 2019. Generally, the provinces located at the border are highly vulnerable to the impact of climate change, such as floods, droughts, and storms.

Cambodia submitted its Intended Nationally Determined Contribution (INDC) in 2015 and updated its NDC on 31 December, 2020. The adaptation features strongly in Cambodia's initial NDC and is equally important in the updated NDC due to the country's continued high vulnerability to climate change. Thus, the RGC launched the NDC tracking platform (GSSD 2021) under the NCSD of the MOE. Based on the platform, there were a total of 138 climate actions in line ministries and other governmental agencies in 2020 (Figure 11). Among these, 50 actions were related to mitigation, 58 actions were related to adaptation, and 30 actions were related to enabling. The list of projects and activities are also provided on the NDC tracking platform (GSSD 2021c).

Figure 10: Climate Vulnerability Index in Cambodia Based on TAMD Approach for 2019



Note: The index is composed of three types of climate-related hazards, namely floods, droughts, and storms.

Source: GSSD (2021b)

Figure 11: Climate Actions in Cambodia until 2021



Note: The actions were counted by projects and activities implemented in line ministries of the RGC.

Source: GSSD (2021c)

Summary and Conclusion

Cambodia is among the countries that are most vulnerable to climate change due to its relatively high reliance on subsistence agriculture and natural resources with low adaptive capacity. Thus, urgent attention from the RGC is required to design appropriate and concrete climate change policies, strategies, and actions in response at the national, sub-national, and local and individual levels. Cambodia has enjoyed economic growth of around 7.7 per cent annually for the last two decades. To retain this good achievement of economic growth under the climate change era is challenging. Thus, the government set a range of national and sectoral policies to address the climate change challenges, and at the same time retain its good performance in economic growth.

Cambodia created a national climate change policy intervention in harmony with a relevant sustainable economic policy agenda gearing towards poverty reduction and environmental sustainability. The establishment of the NCCC in 2006, which is an inter-ministerial mechanism and is cross-sectoral and multi-disciplinary, marks the starting point of the RGC's national-level intervention toward addressing climate change issues in Cambodia. With the support from the European Union, Denmark, Sweden, and UNDP, the CCCA programme was initiated to create the enabling conditions for Cambodia's response to climate change through capacity building and institutional strengthening for the adaptation measure. The NAPA and CCCA programmes can be considered as an external force triggering the climate actions in Cambodia to become more active and move to the next level. The development and release of the CCCSP by the NCCC and CCCA programme is another important benchmark of the national climate change policy in Cambodia. This is the first-ever comprehensive national policy document responding to the climate change issues that Cambodia is facing. In 2018, the Rectangular Strategy Phase IV (2019–2023) of the RGC integrated climate change into its 4th pillar of "Sustainable and Inclusive Development". This integration makes the CCCSP become a clear and

concrete policy instrument and roadmap to be implemented in all sectors at both national and sub-national levels efficiently.

After the release of the CCCSP, it has become mandatory for the relevant sectors which are vulnerable to climate change to develop their climate change action plans to comply with CCCSP implementation. The climate change action plan produced by each sector or ministry is a vital guidance framework for ministries, agencies, development partners, the private sector, NGOs, and other related stakeholders for implementing climate change responses in each sector. The sectors that play important roles in the climate change response and adaptation include energy, agriculture and water resources, infrastructure and transport, disaster management, and others. The vision, mission, purposes, necessary strategic activities, and plan were reported in the climate change action plan. Several projects have been implemented in the ministries of the relevant sectors for addressing climate change issues as stated in the action plan. Most of the implemented projects in the above-mentioned sectors were financially supported by the development partners of each line ministry. This indicates that climate financing in Cambodia relies heavily on external rather than internal sources. Thus, capacity building for climate financing practice based on internal sources is required so that the RGC can sustain the climate fund for the long-term future.

The CCCSP commits to developing a national Monitoring and Evaluation (M&E) framework for its response to climate change that can track multiple layers of information at national, subnational and sectoral scales. As a result, two M&E platforms were launched under the monitoring of the NCSD of the MOE. The first platform is the national M&E framework to measure the performance of its national and sectoral responses to climate change, using the International Institute for Environment and Development (IIED)'s Tracking Adaptation and Measuring Development (TAMD) approach. The second is the NDC tracking platform. These platforms are very important tools for monitoring,

evaluating, and tracking the performance of climate change response of the RGC and look for the opportunity to improve further. However, the sectoral M&E platform is still limited. This suggests that more efforts by the RGC are needed to build the capacity of M&E practice at sectoral level as well as sub-national level so that they can monitor, evaluate, and track their climate change response actions and report to the national level.

Climate change adaptation is one among the climate change response activities aimed to build a climate-resilient society. In this chapter, the Cambodian national policies and mechanism on climate change have been reported to serve as background knowledge followed by some examples of actions implemented in sectoral bodies of the RGC. The development of sectoral M&E platforms for climate actions in Cambodia is also considered an import step toward fully tracking the climate actions. However, the current platform was applied and tested in a few sectors only at the time of this report, which is not enough to see the overall performance of climate actions for the whole country and all sectors. Thus, expanding the platform to target all sectors and also go deeper into the sub-national level is very encouraging. Although a lot of activities on climate change adaptation in Cambodia have been reported, the positive impacts of such activities and their sustainability are not clearly reported. This requires further actions from the RGC and relevant bodies.

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Climate Change and Water Adaptation in Thailand

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The Situation of Climate Change and Water in Thailand

Based on the Intergovernmental Panel on Climate Change (IPCC) Reports, it is crystal clear that climate change is an existential threat to Thailand. Its impacts have already been felt across all economic and social sectors. It is worth noticing that the world's leading climate scientists have revealed that previous estimates have underestimated how rapidly we will feel the devastating consequences of a warming planet (IPCC 2021).

Across the world, countries are experiencing the need to protect their citizens in the face of water-related challenges caused by climate change. Thailand is no different. While Thais have been adapting to their natural environment for centuries, as evidenced in its architecture, diet, past city-planning, traditional farming techniques, and cultural practices, both internal and external pressures to modernise the country in line with Western ideology has caused the country to distance itself from its past water-based society (Phanthuwongpakdee 2016). Socially, most people no longer live in stilt houses, rely on floodwater for wet rice cultivation, or use boats as the primary means of transportation. Furthermore, in many parts of the country, rivers were dammed, reservoirs and irrigation canals were constructed, low-lying floodplains and forested areas were converted into farmland, housing areas or industrial estates, and a massive sum of money was spent on building various disaster-relief infrastructure (Phanthuwongpakdee 2016). Unfortunately, while modernisation has enabled Thailand to transform itself from an underdeveloped country to a newly industrialised nation, it created a false sense of security among the people, making them less resilient to their surroundings (Phanthuwongpakdee 2016).

Presently, as the population of Thailand is approaching 70 million (National Statistical Office 2020), it is important to note that a vast majority of the people are residing in low-lying areas along the rivers, in the country's 25 river basins, or close to its two coastlines (Department of Mineral Resources 2016; Friend et al. 2016, 16). Considering only the geographical characteristics

of where people live alone, it can be assumed that a vast number of Thai people are at risk of water-related disasters, including flash floods, severe droughts, and seawater encroachment (Phanthuwongpakdee 2016). The expansion of urban and industrial areas due to economic growth make more properties and people exposed to both flooding and drought events. Additionally, in recent decades, the government's attempts to promote investments in various industrial areas, including the massive Eastern Economic Corridor (EEC) in Chachoengsao, Chonburi, and Rayong Provinces, has caused water demand in the industrial sector to rise drastically. Water-related authorities have to divert water away from farmers and local people to satisfy these growing demands and sustain economic growth, often resulting in unfair allocations of water resources (Manorom 2020). Grievously, as climate change is being added into the equation, it can be reasoned that the damages to society, the economy, and the environment can be even more significant. Since climate change increases the frequency and intensity of extreme weather, water-related disasters will pose an ever-increasing threat to vulnerable communities and hinder sustainable development. Indeed, a few centimetres of sea level rise, a consequence of global warming, will cause havoc to Bangkok, the capital city, and devastate the country's coastal tourism. Likewise, since many people depend on agricultural activities, which are sensitive to changes in precipitation and temperature, a change in the weather pattern, impacting the vital water resource, can decrease yields (Horrie 2019), thus affecting the country's economy and food security.

While flooding and drought pose significant challenges to Thailand, flooding tends to dominate the mainstream conversations on climate-change-induced water-related disasters, particularly after the 2011 flooding event that affected over 13 million people and caused damage amounting to 1.425 trillion Thai Baht (about USD46 billion) (Phanthuwongpakdee 2016). While the 2011 flooding event was a big wake-up call for Thailand to address the issue of flood hazards, floods should not be the only water-related issue. The changing climate pattern in Thailand has also led to irregular rainfall and droughts. Droughts and associated

issues of water management are viewed as severe issues in academic circles. A preliminary study of the Centre of Sustainable Development Research and Support (SDG Move), Thammasat University, in collaboration with local researchers from various academic institutions, unveiled that water scarcity is among the most concerning environmental issues among many localities, especially in large urban areas, across the country (Bunnag 2021; SDG Move 2021). Experts fear that water scarcity will impact people's health, food security, domestic water supply and sanitation, energy, industry, and the functioning of ecosystems. Many Thai farmers have already experienced adverse effects from shifted seasons, abnormal precipitation patterns, and severe droughts influenced by El Niño, a climate pattern characterised by an unusual warming of surface waters in the eastern Pacific Ocean around the equator which affects the trade winds and atmosphere. In 2008, a severe drought affected over ten million people in the agricultural sector in 55 out of Thailand's 76 provinces (Kisner 2008). The country was affected by another severe drought in 2020 due to El Niño, which led to a drop in precipitation in 2019 (Sowcharoensuk 2020). The 2020 drought exacerbated Thailand's existing economic pressures by damaging the agricultural sector and cost up to 46 billion Thai Baht (USD1.5 billion).

As illustrated, social and economic sufferings due to water-related issues, including flooding and droughts, are inevitable, and they are projected to worsen with climate change. Fortunately, impacts can be lessened through the process of adaptation. While many definitions of adaptation can be found in the literature, most have comparable definitions epistemologically. For instance, Pielke (1998, 156) describes adaptations as the "adjustments in individuals' groups and institutional behaviour in order to reduce society's vulnerability", while Brooks (2003, 8) defines it as "adjustments in a system's behaviour and characteristic that enhance its ability to cope with external stress". While there are policies, at the national level, that aim at promoting resilient adaptation to climate change and sound management of water, obstacles from a silo mentality and the centralised nature of the government continue to problematise adaptation.

This chapter aims to illustrate that even with the existing problems and consequences of climate change, some agencies and people continue to seek pragmatic options to promote greater adaptability to water-related issues.

Areas of Knowledge that Have Influenced Adaptation Initiatives, Climate Change Policies and Activities to Manage Water-related Issues

Two areas of knowledge are highly influential in regard to Thailand's adaptation initiatives, climate change policies, and activities to manage water-related issues. The first area is the information on impacts, adaptation, and vulnerability presented in the United Nations (UN) Intergovernmental Panel on Climate Change (IPCC) Reports, particularly those from Working Group II, which focus on assessing the vulnerability of socio-economic and natural systems to climate change, the negative and positive consequences of climate change, and options for adapting to it. The second area of knowledge is the apprehension of integrated water resources management (IWRM) among experts, government officials, and residents. IWRM is widely advocated as the approach to achieve efficient water management and equitable allocation of water on a sustainable basis, under the increasing threat of climate change.

Knowledge from the Intergovernmental Panel on Climate Change (IPCC)

By analysing the IPCC's Assessment Reports from 1990 to 2014 (Table 16) and part of the Sixth Assessment Report (2021), it can be realised that there has been a gradual transition from focusing on reducing the impacts of climate change to adaptation and tackling vulnerability, defined as "the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change" (IPCC 2014). The first two Assessment Reports, in 1990 and 1995, addressed climate-induced impacts on water, especially flooding and droughts. Nonetheless, there was no direct mention of vulnerability in the first assessment report, and the second assessment report only highlighted vulnerability at the national

level (IPCC 1991 1995). Since the third Assessment Report in 2001, the IPCC has made significant progress to consider multiscale, long-term, and context-based planned adaptation to reduce vulnerability and promote a more sustainable society and ecosystems. Incorporating this knowledge in decision-making processes enhances the adaptation capabilities of the vulnerable population. Along with the vulnerable groups, such as those living in poverty, children, elderly, disabled individuals, homeless, and bedridden patients, the IPCC Reports also stress the importance of formulating a policy that addresses the susceptibility of individuals who are exposed to negative impacts from sea level rise, droughts, flooding, extreme temperature, extreme weather, and poor agricultural conditions (IPCC 2001, 2007, 2014).

After the release of the Fifth Assessment Report in 2014 (Table 16), which provides details of the vulnerability and exposure of human and natural systems to climate change, the Thai government's Office of Natural Resources and Environmental Policy and Planning (ONEP) formulated a Climate Change Master Plan (2015–2050) in 2015. Since then, adaptation has been mainstreamed, and earlier climate change impact and adaptation studies have been revised, publicised and disseminated. With more competency, the ONEP later formulated the National Adaptation Plan (NAP) in 2019 as a sector-based approach to the national adaptation framework in six sectors to mainstream climate change adaptation issues across government ministries and sub-national structures. Water management is listed as one of the six sectors in the NAP to drive integrated management with that of land and forest, besides promoting the capacity to manage climate-related risks which affect water resources. Regarding flood and drought relief, the NAP expects to invest in water infrastructure, early warning systems, risk surveillance networks, and compensation plans (ONEP 2018).

For the Sixth Report, with some parts released in 2021 and others in 2022, information on co-producing knowledge across food, energy, water, and health sectors has defined ways to achieve climate-resilient actions (IPCC 2017). While

academics in Thailand have already stressed the significance of resilient actions, incorporating this aspect into the recent IPCC Report(s) will influence policymakers to consider resilience more thoughtfully, in a similar manner to adaptation, and those who have to enforce climate-related policies to do so more seriously. As Thailand has become the non-Annex I country under the Kyoto Protocol since 1994, the environmental policymakers issued the Climate Change Master Plan of Thailand (2015–2050) to set a guideline of activities in the pre-2020 and post-2020 periods. For pre-2020 activities, the government launched the strategic plan of adaptation in the water sector with early warning system development, while key activities in the post-2050 period are related to efficient water use for agriculture, occupational training in disaster-prone areas, crop insurance for farmers against climate risks, and soil-water rehabilitation (ONEP 2015).

Integrated Water Resources Management (IWRM)

Another prominent factor that influences Thailand's adaptation initiatives, climate change policies and actions to deal with various water-related issues is Integrated Water Resources Management (IWRM). According to the Global Water Partnership, an international network created to foster an integrated approach to water resources management, IWRM is "a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (Global Water Partnership 2011, 1). IWRM was mentioned implicitly in the Fifth Assessment Report of the IPCC: "In Asia, adaptation is being facilitated in some areas through mainstreaming climate adaptation action into subnational development planning, early warning systems, integrated water resources management, agroforestry, and coastal reforestation of mangroves" (IPCC, 2014, 8). Indeed, it represents an iterative approach for the public, especially vulnerable people, to make informed decisions on climate change adaptation and development under ever-changing circumstances

(He 2013). However, IWRM can pose complexity in managing future climate and socio-economic uncertainties. To overcome this dichotomy, each society should problematise impacts and create suitable choices for adaptation at different scales based on their adaptive capacity (Flugel 2011; Giupponi and Gain 2017; Ludwig, van Slobbe, and Cofino 2014). Furthermore, IWRM promotes the shift from resistant approaches (engineering-based solutions) to more resilient practices (mixed strategies), which require the incorporation of societal concerns together with ecological aspects of water management. These mixed strategies include ecosystem restoration, capacity building, the adoption of new technology, the creation of risk mapping, the establishment of polycentric governance, civic engagement and public participation, and learning from other examples (Mao et al. 2017).

In Thailand, IWRM has been recognised as a vital approach towards achieving more effective management of water resources under the pressure of climate change. It is also an important approach that can help Thailand achieve the Sustainable Development Goals (SDGs). Subsequently, the Office of Natural Resources and Environmental Policy and Planning (ONEP) has adopted IWRM

as a strategy for sustainable water management through Thailand's National Adaptation Plan (NAP) in 2018 to reduce physical and social vulnerabilities (ONEP 2018). With the NAP, Thailand has established a managerial framework to integrate water planning across public agencies, enhance adaptive capacity, and raise public awareness of climate change and sustainable development. With the NAP, the ONEP hoped to increase the capacity of warning and adaptation to adjust to risks and lessen vulnerabilities. In 2020, the capacity building programme was implemented in the pilot communities and networks at the local level (ONEP 2020). Disappointingly, the target of decreasing total casualties from environmental disasters was unsuccessful because of the rising severity of droughts, flooding, forest fires, and smog aggravated by climate change. The government also lacked information on the progress of IWRM and the flood-drought prevention plan at the local level (ONEP 2020). Interestingly, this comprehensive adaptation policy was not successfully implemented because it encountered constraints due to various government organisations' practices. It is, therefore, worthwhile to comprehend the constraints from the administrative sector that have troubled successful adaptation to water-related issues exacerbated by climate change.

Table 16: Assessment Report on Impacts, Adaptation and Vulnerability (Working Group II) in Relation to the Water Sector

Report Dimensions	First (1990)	Second (1995)	Third (2001)	Fourth (2007)	Fifth (2014)
Impacts	Limited knowledge for each sector, region, and vulnerable groups to cope with changes in precipitation, water storage and scarcity, pollution, and extreme drought.	Increasing knowledge about climate impacts, while facing uncertain impacts of climate change in each region. The impacts were linked with land, other natural resources, population increase, economic growth, and other human-induced manipulation.	Experts began to comprehend various impacts from the increase in global temperature and the change in precipitation patterns in each region. More people are facing water stresses, flooding events, and droughts as consequences of population growth, unsustainable land use, economic development, and over-extraction of water resources.	Experts realised the impacts of climate change in each region, especially in developing areas. While many regions, like Southeast Asia, are experiencing increasing crop yields, they face problems associated with higher water stress. Over-extraction of water to produce cash crops and other usages decrease surface water supply and lower the quality and quantity of groundwater.	There is an increasing climate-related risk due to uneven development, unplanned land use, and increased emission of greenhouse gases. Climate change will lead to multiple adverse effects impacting the livelihoods of people and multiple ecosystems due to heat, water shortage, riverine and urban flooding, and drought.
Adaptation	The focus was on long-term mitigation using engineering measures with the construction of structures that can assist people to better cope with future impacts from climate change.	Technological-, institutional-, financial-, and information-based management are crucial for minimising impacts of climate change and promoting adaptation and conservation.	Multiscale, long-term, and context-based adaptation is necessary to avoid maladaptation among the people and promote sustainable development, especially in developing nations.	Mixed strategies under climate-development linkages are necessary. These strategies must incorporate the forecasting of future adaptation in each area and sector. Attention must be paid to monitor both short-term and long-term adaptation pathways.	The climate change rate should be delayed by adopting information-based and integrative measures, such as IWRM, empowering iterative learning and decision-making, besides mainstreaming climate change adaptation in development policies.
Vulnerability	N/A	Countries should pay attention to national-level vulnerability.	Countries should avoid damaging the natural systems and pay more attention to vulnerable groups, notably people living along the coasts, farmers, fishers, and people in ill health.	Attention must be paid to different elements that can contribute to more vulnerability to climate change. These elements include uneven development, poverty, food security, and limited access to resources and healthcare systems.	In addition to vulnerable groups, such as the elderly, young children, the disabled, and people living in poverty, concern should be had for vulnerable populations and biosystems, particularly those at risk of adverse impacts from sea level rise, droughts, flooding, extreme temperature, extreme weather, and poor agricultural conditions.

Note: Highlighted cells represent the main focus of each Assessment Report.

Source: Adapted from IPCC (1990, 1995, 2001, 2007, 2014)

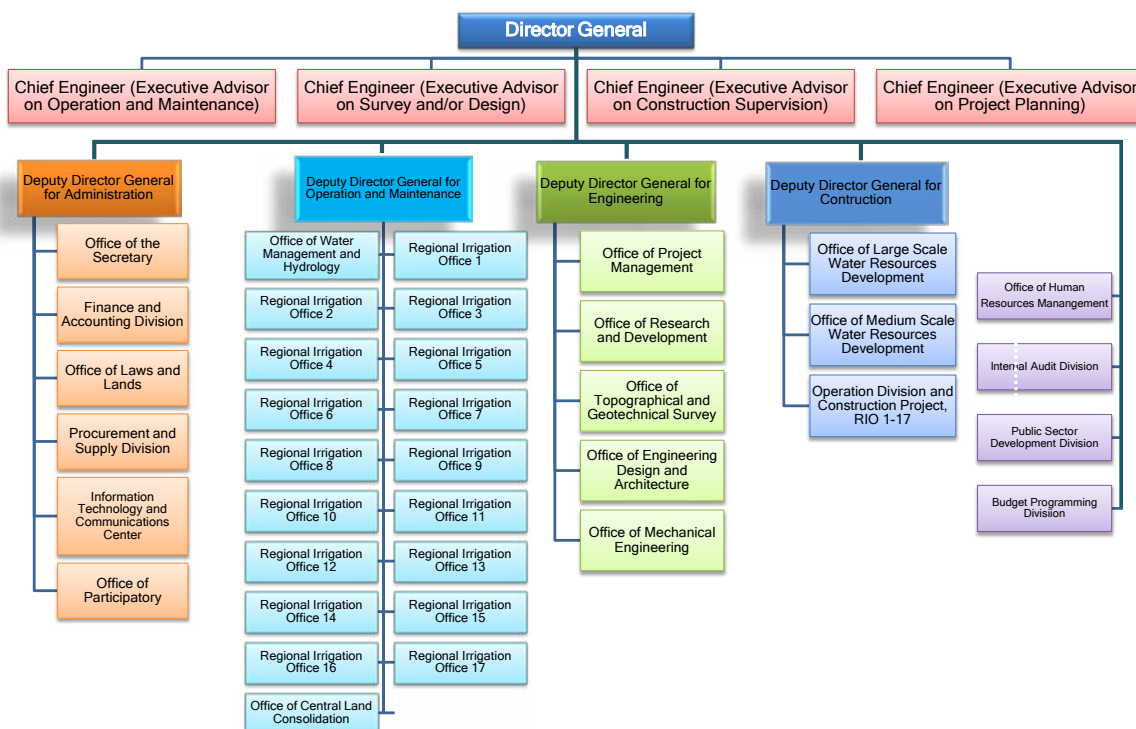
Constraints from Government Organisations

In Thailand, there are many water-related organisations and agencies, such as the Metropolitan Waterworks Authority, the Wastewater Management Authority, Department of Water Resources, Department of Groundwater Resources, Department of Disaster Prevention and Mitigation, Department of Royal Rainmaking and Agricultural Aviation, Department of Industrial Works, the Electricity Generating Authority of Thailand (EGAT), and the Royal Irrigation Department (RID). These different authorities oversee their narrow mandates, such as allocation of irrigated water (by the RID or the Department of Water Resources), dredging of canals (by the RID or different municipal authorities), regulation of land use (by various authorities depending on the ownership of the land), supervision of underground water (by the Department of Groundwater Resources), maintenance of water-transport infrastructure (by the Marine Department), operation of dams for electricity generation (EGAT), and mitigation of water-related

disasters (Department of Disaster Prevention and Mitigation). While many government agencies and their officials are working diligently within their lines of duty, there is no denying that the frequent absence of meaningful coordination among these authorities has made water management inefficient. Attempts have been made to unify the works of different departments, such as the establishment of the Ministry of Natural Resources and Environment (MoNRE) in 2002 to oversee water-related organisations and the Office of National Water Resources, a regulatory agency established within the Office of the Prime Minister, in 2017, to unify cross-sectional water policy. The efficiency of these organisations is debatable.

On top of the meagre intergovernmental collaboration, the centralised nature of the Thai government agencies and frequent limiting of the power of the local governments also create complications concerning localisation processes. The Thai government is still very top-down, and its policies often exclude the voices of the local actors. Localisation of resource management and

Figure 12: Organisational Structure of the Royal Irrigation Department (RID)



Source: Royal Irrigation Department (n.d.)

adaptation to climate change, on the other hand, is significant because the process pays attention to the voices of the local communities and aims to enable local or regional authorities to take control of their affairs and employ actions that best fit the contexts of their localities. Indeed, as Melis (2019) emphasised, localisation can be a complex process since it is also about resources and the power relations between different local actors at multiple levels of local governance. However, it is still essential to highlight the fact that the locals know about the situations within their areas, and with the support from the central government through a bottom-up approach, they are more likely to execute pragmatic strategies to reduce their vulnerability to climate change more competently.

In any case, localisation is not about encouraging every community to be entirely self-reliant. The central government continues to be vital in providing support in terms of funding and knowledge to the local administration, besides regulating and ensuring that local governments are working competently in their localities as agents of positive change. For instance, Phanthuwongpakdee (2016) highlighted that while the central government favoured the construction of flood protection structures along the water channels, many locals in Central Thailand outside the Bangkok Metropolitan Region disagreed with the choice of certain structures and the locations where they were built. On the one hand, people did not dismiss the importance of the central government-funded structural measures. On the other hand, many felt that their knowledge, opinions, and voices on the choice of adaptation measures should be included through public participation or civic engagement (Phanthuwongpakdee, 2016). Evidently, adaptation measures in relation to flooding were not just about building more dams or floodwalls. As part of future strategies to better handle water-related disasters, like flooding, locals prefer their local government to have more autonomy to operate the water gates in their localities and to be granted democratic rights to hold public negotiations regarding where the surplus water should be diverted, instead of merely waiting for the orders

from the capital (Phanthuwongpakdee 2016). With greater autonomy and power to act quickly, local authorities are more likely to address the local need to reduce vulnerability and support adaptability quickly and efficiently.

Regrettably, even with the Decentralisation Act BE¹ 2548 (CE 1999), which specifies that various organisations' power and authority must be devolved, the decentralisation process in Thailand is still limited. Only some functions, such as wastewater management and the ownership of small structures, including irrigation canals, aquifers, and embankments, have been truly localised. The devolution of powers often excludes the transfer of technical knowledge and experience (Nikomborirak 2016). Deunden Nikomborirak, a researcher from the Thailand Development Research Institute (TDRI), stated in her report that many authorities are unwilling to give up the more stable and prestigious occupation of being a civil servant to become an employee of a local administration (Nikomborirak 2016). Without experts with vital engineering knowledge and technical experience, the local administrations are unlikely to make decisions or execute plans to support the people to adapt more resiliently to climate change in a prompt manner. They will continue to rely on national-level authorities and may have to wait for a long time before support eventually arrives.

Another constraint concerns the fact that most local administrations are small. While this small size may be optimum for some services, such as waste collection and wastewater management, it is not practical for more complex issues, like water resources management and disaster management. Local authorities have little capacity to raise money on their own to manage resources efficiently. Instead, most of the funding comes from the central government, through the Department of Local Administration Promotion, and financial assistance from relevant organisations like the RID, which supervise various local administrations (see Figure 12). Such supervision means that the local administration can only exercise limited power

1 Buddhist Era

and may not be able to make and execute crucial decisions. According to Nikhomborirak (2016) and Phanthuwongpakdee (2016), local administrations continue to rely on decisions, emergency funds, and assistance from the central government when disasters strike.

Despite constraints from the government sector, many organisations and communities in Thailand realise that they cannot simply wait for the central government to act. Phanthuwongpakdee (2016) highlighted in his study that after the 2011 massive-scale flood that caused havoc to many parts of Thailand, many people were keen to adapt to achieve a less vulnerable future. People are aware that they too can play a crucial role in adapting to climate change and better managing the shared resource, that is, water. While more well-to-do people may initiate their own adaptation approaches, others might turn to their family members or relatives living elsewhere for help (Phanthuwongpakdee 2016). Many people also turn to their neighbours, communities, or local organisations for support. Interestingly, in Thailand, many local religious institutions, especially Buddhist temples, offer assistance to members of the communities after disasters (Phanthuwongpakdee, 2016). Many monks or other religious leaders can utilise their connections and, in some cases, influences to gain materials and financial support to help those in need.

Adaptation Cases

Even with the constraints and obstacles that may impede adaptation to future climate-related challenges, many individuals, and organisations at the local and national levels, and even international ones, are employing different approaches to promote climate change adaptation, particularly in the context of water resources.

Concrete Adaptation — Early Warning System and Water Storage Facilities

Several government organisations have tried to subdue existing problems that hinder water management and seek pragmatic methods to promote adaptation to future water-related issues that may arise due to climate change. For instance, in 2012, the Ministry of Agriculture and Cooperatives deployed the 2013–2016 Strategic Plan, which explicitly indicated the attempt to promote drought-resistant plants and low-water-consumption farming methods. Besides, relevant authorities also implemented a reliable and in-time drought early warning system in targeted areas. Unfortunately, the assessment of the Strategic Plan suggested that the alternative experimental plants were not market competitive, and the early warning system was inaccessible for many farmers, despite being installed successfully. To improve the situation and enhance future adaptation, the Ministry of Agriculture and Cooperatives updated the Strategic Plan and implemented a new one for 2017 to 2020. The 2017–2020 Strategic Plan aimed to improve the market competitiveness of recommended drought-resistant plants and implement farm-related risk management and crop insurance schemes,² to provide incentives for farmers to shift from conventional farming crops and methods to more adaptive ones. By following the Strategic Plan, cassava farmers in the North-eastern Region of Thailand have shifted the cultivating period, from only one in August to the division of about three times throughout the rainy season, between June and October (Ministry of Agriculture and Cooperative, 2016). To maximise water usage, farmers also employed the ploughing technique that reaches a deeper soil level, allowing water to seep further down. Many farmers also switched to cassava breeds that are tolerant of droughts and diseases (Ministry of Agriculture and Cooperative, 2016).

² The insurer will compensate the insured farmers if their crops are destroyed by extreme weather cases, such as droughts, floods, and typhoons. This scheme, in principle, helps mitigate climate change adverse impact for farmers for the time being while looking for an alternative farming method.

Furthermore, the Royal Irrigation Department (RID) has prioritised infrastructure projects to increase the adaptive capacity against severe droughts. The RID has been advocating for the construction of 421 water detention basins and other water storage facilities which vary in size across the country. These new facilities are expected to add approximately 28,300 hectares of irrigable land, with the capacity to contain about two million cubic metres of water (National News Bureau of Thailand, 2020). While the actions led by the RID seemed to promote adaptation to both flooding and droughts, it is unfortunate that the attempts are mainly top-down measures. Organisations, like the RID, should also consider complementary bottom-up approaches to highlight the reality of the locals and how they are experiencing impacts from climate change.

Hesitation to Cope Due to Unclear Urban Land Rights

In recent years, extreme weather conditions and rising sea levels due to climate change have worsened the flood condition and land subsidence in many parts of the Bangkok Metropolitan Region (BMR). While the sea level rise is arguably a subtle threat in a medium to a longer timeframe, minor to intermediate-scale flooding events have been common occurrences since the city is in the Chao Phraya Delta, a flood-prone area. With frequent flooding, it is known that people know how to live and cope with water through experience. Despite how modernisation and rapid development have distanced people and their livelihoods away from their flood-prone reality, many people continue to possess the knowledge to cope with floods at the emergency management stage (Archer et al. 2019). This scenario also applies to the informal settlements adjacent to the Chao Phraya River and some communities situated in the designated floodway areas of the city. Nevertheless, scholars, such as Chivakidakarn (2014) and Archer et al. (2019), found that the issue regarding urban land has appeared to be one of the barriers for households and communities to effectively cope with the run-off, albeit their actual human and social capital.

Thailand has undergone several reforms of land institutions and relationships. Remarkably the political regime changed from an absolute monarchy to constitutional monarchy in 1932. In Bangkok, former peasants' settlements lived on land belonging to a few landlords, primarily aristocrats or extended members of the royal family. Following the land reform in 1932, the only change was their relationship from feudalism-based "patron-client" to a more modern "lessor-tenant". Hence, it is observed that, at the present time, land rent contracts or tenures are rather collective. In other words, households in a particular community are likely to continue renting land from the same landlords within the same land tenure type.

Urban land tenure typology is associated with a level of tenure security. However, it might not always relate to perceived flood coping capacity and coping actions at the community level, as suggested by Chivakidakarn (2014) in the case of Bangkok. From the highest tenure security to the lowest, the typologies are:

1. Freehold — residents hold full land rights with formal deeds.
2. Formal rent — residents hold some land rights with formal contracts.
3. Informal rent — residents hold some land rights in without contracts.
4. Invaded — residents do not hold any land rights, such as informal settlements.

While it is a common belief that disaster coping capacity increases as land tenure becomes more secure, Chivakidakarn (2014) contradicts this perception. Chivakidakarn (2014) collected data on the perceived coping capacity to flooding from households in different communities representing each tenure type in Bangkok in 2012. Data were derived from three community workshops and over 200 questionnaires assessing the livelihood and level of perceived flood coping capacity of households from different land tenure types. The analysis illustrates that communities with lower land tenure security, "the invaded", yield the highest coping capacity and, interestingly, as high as the freehold type. In comparison, the most

vulnerable type of tenure is formal rental contracts. The type of landowner, such as governmental or private sector, also appears to determine the level of disaster coping capacity.

Many flood coping measures are executed on a community scale, such as the rescuing system, allocation of the community evacuation centre, aid and ration distribution, water pump installation, temporary flood walls/sandbags, and receiving compensation pay-outs. However, if never discussed between the lessors and their tenants, these measures are less likely to be implemented in regard to rented land. The trend is worse for formal rent tenure types. The more formal and strict the tenure is, the more likely it is for residents to avoid altering the property, leading to conflicts with their landlords (Chivakidakarn 2014). Therefore, in securing and increasing coping capacity, traditional cities with complicated intermediate land rights issues, especially concerning the relationships between landlord and tenant, must consider adaptive or coping rights allocation in cases of possible disasters, formally or informally.

Urban land rights in Bangkok represent an excellent example of the importance of understanding the contexts of people at the ground level. The national-level organisations dealing with water-and-climate-related management are encouraged to consider land rights as a factor that undermines people's capacity to cope with and adapt to impacts of climate change. Enabling the participation of vulnerable residents in decision-making on climate responses through public legal instruments that influence laws, such as land tenure, could be an effective adaptation strategy.

Child-Centred Approach to Adaptation

Leaving no one behind is the central, transformative promise of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs). For Thailand to be able to achieve its SDGs, it should consider the groups of population that are vulnerable, yet their actions are not being highlighted in the main discourse on climate change.

Climate change may be notably dangerous for children in developing countries. Hanna and Oliva (2016) found that children are more at risk of climate change than adults, mainly because they are weaker and less able to dissipate heat. Even though children are often defined as one of the most vulnerable social units, they can be the agent of change in climate adaptation (Sin-ampol 2017; Plan International 2018).

Researchers, such as Vaddhanaphuti et al. (2018), observe that children in many communities of Northern Thailand are taught to be observant of their environments. As they learn to understand the benefits of the ecosystem services in their areas, these children become concerned about the negative impacts of climate change on their environments. Girls and young women, in particular, are constantly worried that climate change, in combination with the effects from deforestation, expansion of commercial farmland, and growing demand for cash crops will negatively impact their water resources (Plan International 2018). Vaddhanaphuti et al. (2018) found in their study that lowland children of Northern Thailand are generally more concerned about flooding problems, while drought-related problems are the focus of highland children.

Teaching children in Northern Thailand to appreciate nature and worry about climate change and environmental degradation is an excellent start towards a sustainable future. The IPCC (2018) states that for the world to halt climate change, it is critical to raise feelings of personal responsibility to reduce climate change. Bouman et al. (2020) found in their study that being worried about climate change promotes support for climate policies, but it can also promote actions to mitigate climate change and adapt to it. In the case of Northern Thai children, they use the community-based traditions that they learn to deal with unexpected change. To manage water in the face of climate change, children apply strategies including river cleaning, building small dams and reservoirs for water storage, as well as afforestation (Vaddhanaphuti et al. 2018; Plan International 2018).

There is no denying that children's actions alone are not enough to increase the adaptability of communities. Nevertheless, by being active agents, children can advocate positive change. Their actions can potentially encourage more adults to engage in climate actions, promote sustainable development and encourage the preservation of local knowledge. The teaching of locally accumulated knowledge can serve as an additional source of resilience at the local level (Sin-ampol 2017). Traditional knowledge, or local wisdom, can represent a wealth of long-term memory of the socio-ecological adaptations to change (Vaddhanaphuti et al. 2018).

Typically, the government should be responsible for protecting the adaptive capacity of children (Plan International 2018). However, multi-level communication across public and non-public stakeholders could be a critical factor in reducing the gap between children and adults (Vaddhanaphuti et al. 2018). Multi-level communication can help children join in wider adaptation circles beyond their community and integrate formal knowledge from their school and local beliefs into more extensive actions (Sin-ampol 2017). Academics or the private sector could support children to learn with other youth groups in youth councils, youth networks, and excursion programmes (Vaddhanaphuti et al. 2018). For example, the young members of Northern Thailand's communities met flood-prone children's groups in the central region to exchange their knowledge about disaster risk reduction and climate change adaptation (Plan International 2013).

In short, a child-centred adaptation approach will be practical if the children and their communities are empowered by stakeholders, including government agencies, to exchange knowledge and practices. Not only is strengthening knowledge, information, and collaboration from the bottom needed, but transferring knowledge to action for adapting to climate is necessary. They can assume the roles of climate leaders as they are aware of the risks among household members, but their power should be enhanced equally and justly (Plan International 2018).

Ecosystem-Based Adaptation (EbA) in Water Resources Management

Along with the citizen-led adaptations, relevant authorities also employ a strategy within their power to manage issues of water availability in the face of climate change. Water availability is highly dependent upon healthy ecosystems and their provisioning services. As ecosystems and water resources in Thailand are highly degraded (ONEP 2018), more people are becoming more vulnerable to problems like water scarcity. In turn, the health of ecosystems themselves is further threatened by the impacts of climate change. Fortunately, degraded natural resources and ecosystems can be rehabilitated by implementing Nature-based Solutions (NbS). According to the European Environment Agency (2021), there are many policies and works worldwide that use nature as a fundamental tool to address socio-economic challenges. Although these approaches may go by many names, they can be classified as NbS (European Environment Agency 2021, 15–17). The German Corporation for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit: GIZ) stated that if NbS focus on adaptation and if they are implemented as an element of a climate adaptation strategy, they are termed "Ecosystem-based Adaptation" (EbA) approaches (Dörendahl and Dipankar 2021, 16–19). To help Thailand become more resilient and able to adapt to the impacts of climate change, the government has incorporated the ecosystem-based adaptation (EbA) approach into the national plans and policies, especially by including it in the National Adaptation Plan (NAP) (ONEP 2018). EbA in water planning highlights the maintenance of wetland ecology, river and canal flow, and other natural resources (ONWR 2018). The government has started collaborating with international and national river basin organisations to experiment with how EbA could be implemented in IWRM and promote adaptation to climate change. A good example is a collaboration between the Office of National Water Resources (ONWR) and GIZ.

The ONWR and GIZ have collaborated and piloted EbA in several river basins (ONWR 2019, p. 35), such as the Yom Basins in upper Central Thailand,

the Huai Sai Bat Basin in Northeast Thailand, and the Tha Di Basin in Southern Thailand. The ONWR and GIZ partnered with local universities to further develop, analyse, and monitor adaptation measures, considering existing water and climate policies to avoid any possible conflicts of interest that may arise. Local researchers explored the use of retention basins (Bang Rakam Model) and oxbow lakes in the Yom River Basin to relieve localised flooding and droughts (GIZ 2020a; GIZ 2020b). The research sponsored by GIZ (2020a; 2020b) also measured EbA employing living weirs and wetland development in floodplains and riparian zones of the Huai Sai Bat Basin of Northeast Thailand and the Tha Di Basin of Southern Thailand. These measures are found to be economically practical, widely accepted, and easily engaged by the local people (Meier et al. 2016). Implementing these EbA programmes in IWRM may help reduce physical and social vulnerability in the middle to long term (Lohr 2015).

In sum, EbA and IWRM are central to enhancing capacity for local people, youth representatives, and national and regional stakeholders (GIZ, 2021a; GIZ 2021b). EbA initiatives for climate-induced water management in Thailand have partly existed both at policy and practical levels. Results from the experimental stage are favourable. Further analysis of the side-effects and vulnerability to local society and ecosystems will enable the setting up of proper measures to assist residents' long-term adaptation.

Way Forward for Better Adaptation in the Future

Both flooding and droughts are the adverse effects of climate change anticipated by the experts and academia in Thailand. Several attempts in the forms of plans, policies, projects, and ad hoc adaptive actions from the national to household level are evident, as presented in this chapter. Both impacts are water-related; they involve vastly extended issues — human settlement and agriculture — yet the challenge for water management to be thoroughly applied is apparent in the case of Thailand. The adaptation strategies are diverse as well as stakeholders. There are vertical

collaborations on ecosystem-based adaptation transferred from the international development agency down to villagers on the ground. Long-established adaptive capacity derived from seasonal water-related events throughout history is also embedded within the people, including children. These strategies exist, but there is room for further integration with more recent adaptation methods. As presented in the chapter, there are still several barriers, and all indicate a common gap within the water management at all levels, that is, a coherent positioning or task allocation among actors under sturdy mid-term to long-term strategic plans.

Government agencies can act as leaders to create a more climate-resilient future while ensuring local empowerment and securing the existing adaptive capacity. The implementation of effective water management policies at various levels requires a multifaceted approach taking into consideration the interests of all affected people. These government agencies, however, must collaborate meaningfully with non-government sectors to facilitate the implementation of various policies and climate actions. More importantly, it must act as the facilitator who can deliver the voices of the locals to policymakers and assure that policies and actions cater to the diverse lives across the country without leaving anyone behind.

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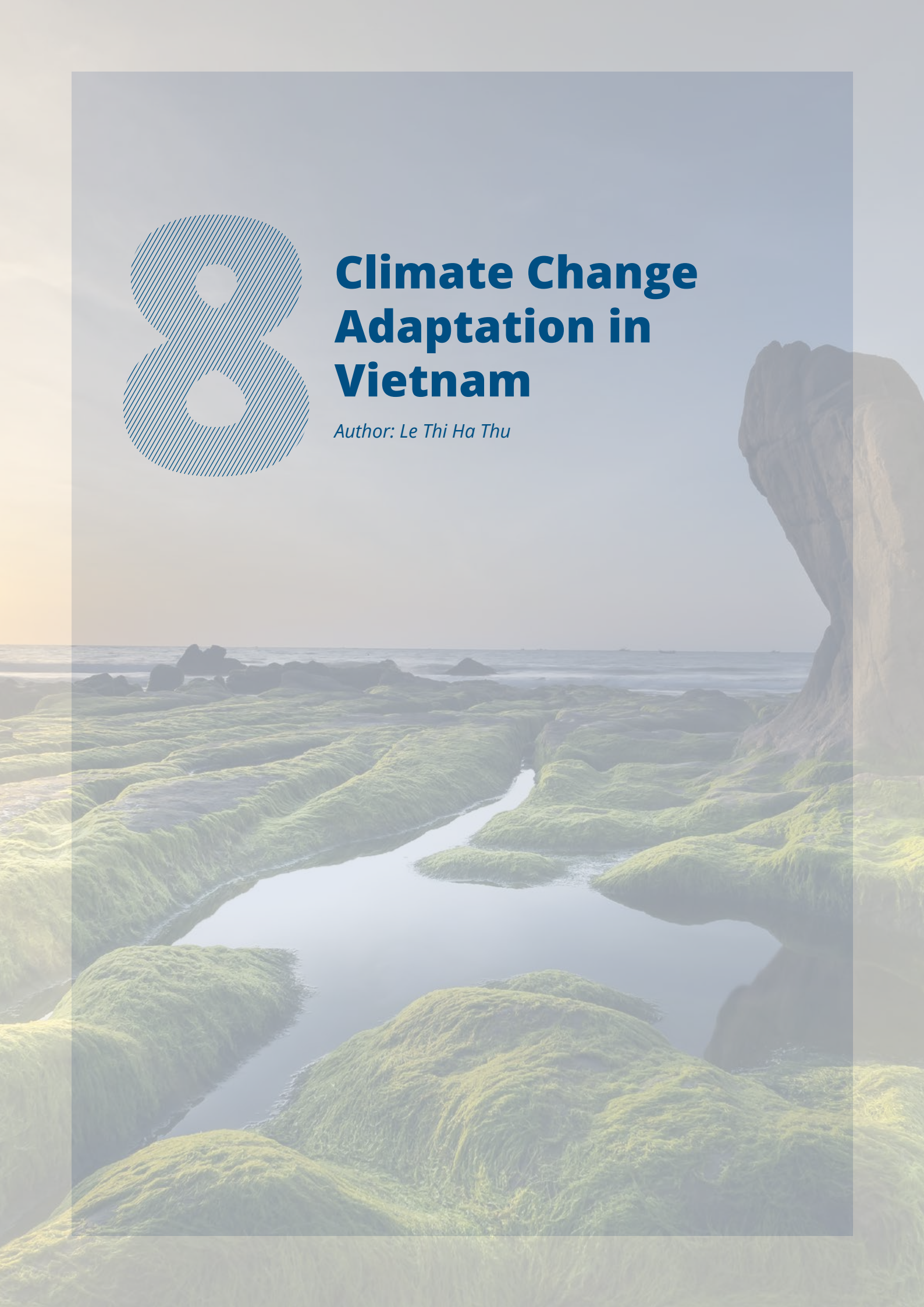
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Climate Change Adaptation in Vietnam

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Introduction

Vietnam has faced many challenges caused by climate change, with the increase of extreme phenomena. International studies and forecast models have shown that Vietnam is one of the 10 countries that are most negatively affected by climate change, which can wipe out economic gains as well as create barriers to the sustainable development of the nation in the future. As stated in Vietnam's updated Nationally Determined Contribution (NDC), monitoring data over the past 60 years (1958–2018) shows that the annual average temperature of the whole country rose by about 0.89 degree Celsius; rainfall decreased in the northern regions from 1 per cent to 7 per cent while increasing in the southern regions from 6 per cent to 21 per cent (The Socialist Republic of Vietnam 2020). Since Vietnam has a long coast, the country is hit by typhoons, and the number of strong typhoons is rising. Average sea levels at 12 coastal and island monitoring stations are also increasing by 2.74 mm/year, particularly 3.0 mm/year during 1993–2018, which caused salinisation in the Mekong Delta in the south (The Socialist Republic of Vietnam 2020).

According to the General Statistics Office of Vietnam, most recently in 2020, the flood in Central Vietnam from September to November caused 104 dead and missing persons, with 388 injured. It was confirmed that 2,100 houses collapsed and were swept away, 249,800 houses were damaged, 5,600 cattle and 1.5 million poultry died, and 66,700 hectares of rice and 35,400 hectares of crops were damaged. In November 2020 alone, the total value of property damage caused by natural disasters was 18,700 billion Vietnamese Dong. All year round, 372 people die or go missing, and the total value of property damage was estimated at VND38,400 billion (equivalent to USD1.69 billion) (Sài Gòn Giải Phóng Online 2020).

As calculated by the Ministry of Agriculture and Rural Development for five months in early 2020, damage due to droughts and saltwater intrusion was about VND3,310 billion (equivalent to USD145 million) and VND2,500 billion (approximately USD110 million), respectively. In the Mekong

Delta, the rainfall from August to September 2020 was 30–40 per cent lower than the average of the recent years (Báo Chính Phủ 2020). Vietnam's Central Steering Committee for Natural Disaster Prevention and Control stated that El Nino from 2014 to 2016 caused 24,000 hectares to stop production, and 31,000 households lacked water for domestic use in the South Central region (Central Steering Committee for Natural Disaster Prevention and Control 2016).

According to research by the Vietnam Chamber of Commerce and Industry, private enterprise is more sensitive to climate change in comparison with FDI enterprise, with a focus on sectors of agriculture, forestry, and fishery (Đậu Anh Tuấn et al. 2020). As stated in the research, climate change caused an annual loss of 7 working days and about USD1000 for each private enterprise (Đậu Anh Tuấn et al. 2020). Another study by Oxfam Vietnam shows that the poor and women, especially in the rural and coastal areas, are strongly impacted by climate change, and the government's effort to reduce poverty has seriously been threatened by extreme weather events in recent years (Oxfam 2008). Related studies also find that climate change has a substantial impact on the aforementioned sectors, whilst these sectors provide job opportunities for about 60 per cent of the population of the country (Tran 2011; Schmidt-Thome et al. 2014; Trinh 2017).

This chapter aims to show Vietnam's effort to adapt to climate change. The introduction part shows some negative impacts of climate change, then part two elaborates on some climate change adaptation policies at the national level, part three discusses the sectoral framework, and part four summarises the main points of the chapter.

National Policy

The Government of Vietnam is well aware of the growing challenges faced due to climate change and has responded aggressively through policies and institutional agendas to address vulnerability to climate change. In June 2013, the Party Central Committee passed Resolution No. 24/NQ-TW on Proactively Responding to Climate Change, Strengthening Natural Resource Management

and Environmental Protection. The resolution identifies the fight against climate change as “one of the most important tasks of the whole political system”. Previously, two strategies issued by the Government on Climate Change (2011) and Green Growth (2012), were the focus of Vietnam’s climate change response policy. The National Strategy on Climate Change focuses on building resilience to the impacts of climate change and some mitigation activities, while the National Green Growth Strategy focuses on less carbon emissions, green production, including technological innovation, conservation of natural capital assets and the promotion of green lifestyles. Both of these strategies have specific action plans with specialised programmes. Two other related strategies, the National Strategy on Disaster Prevention and Mitigation (2007), and the National Action Programme on REDD+ (2012), also play an important role in realising the noble goal of building a climate-resilient and low-carbon economy (Vietnam Ministry of Planning and Investment 2015).

At national level, in 2008, the state government established a national steering committee to respond to climate change. The Prime Minister is the chairman and the Minister of Natural Resources and Environment is the standing vice-chairman. The members of the committee include the Minister of Planning and Investment, Minister of Finance, Minister of Agriculture and Rural Development, and Minister of Foreign Affairs.

On 22 October 2018, the Communist Party of Vietnam passed a resolution on the strategy for the sustainable development of Vietnam’s marine economy by 2030, with a vision to 2045 (Resolution No. 36-NQ/TW). The resolution targets that by 2030, the area of marine and coastal conservation zones will increase to at least 6 per cent of the natural area of the country’s maritime zones, and the coastal mangrove forest area will be restored to at least equal to the area in 2000. Previously, in Resolution No. 76/NQ-CP dated 18 June 2018 of the government on natural disaster prevention and control, the government considers that natural disasters develop in a more and more complicated and unforeseeable manner, causing heavy losses to human life, property and infrastructure (with

an estimated annual loss of 1.0–1.5% GDP). Concurrently, the government sets objectives to provide safe residences for 100 per cent of households in densely populated areas frequently hit by natural disasters, reduce human loss by 30 per cent, and supply adequate information on natural disasters to 100 per cent of administrations at all levels, agencies, organisations and households nationwide.

Related to this, Decree 160/2018/ND-CP allowed the Prime Minister to establish the Central Steering Committee for Natural Disaster Prevention and Control. This committee is in charge of organising, directing, and operating disaster prevention, response, and recovery on a national scale. The chairman of the committee is the Deputy Prime Minister, members are representatives who are leaders of ministries, ministerial-level agencies, and government agencies, including the Ministry of Agriculture and Rural Development (MARD), the Ministry of Natural Resources and Environment (MONRE), the Ministry of Defence, Ministry of Public Security, Ministry of Information and Communication, Ministry of Industry and Trade, Ministry of Transport, Ministry of Construction, Ministry of Education and Training, Ministry of Health, Ministry of Culture, Sports and Tourism, Ministry of Foreign Affairs, Ministry of Labour, War Invalids and Social Affairs, Ministry of Planning and Investment, Ministry of Finance, Vietnam Television, and Voice of Vietnam; and representatives of some units of MARD, MONRE, the Ministry of Defence, National Committee for Search and Rescue, and the Vietnam Academy of Science and Technology.

In 2020, the National Assembly approved the amended Law on Natural Disaster Prevention and Control and the Law on Dikes. Accordingly, the revised Laws amend regulations to ensure that the requirements for natural disaster prevention and control are fulfilled when investing in the construction of a number of projects and works.

Recently, the Prime Minister issued a decree on a climate change adaptation national plan for 2021–2030 with a vision to 2050. In relation to this, MONRE is in charge of coordinating with the National Committee on Climate Change, relevant

ministries, and provincial people's committees to implement, monitor and evaluate the national plan on climate change adaptation.

In July 2020, Vietnam submitted the updated Nationally Determined Contribution. The updated version identifies strategic tasks for climate change adaptation in order to improve adaptive capacities, enhance resilience and reduce climate-related risks, contributing to the achievement of the country's sustainable development goals and thereby further contributing to GHG reduction. The strategic tasks for climate change adaptation identified in the updated NDC include (i) improving adaptation efficiency through strengthening state management and resources, and (ii) enhancing the resilience and adaptive capacity of communities, economic sectors, and ecosystems (The Socialist Republic of Vietnam 2020).

For the next ten years, Decision No. 1055/QĐ-TTg dated 20 July 2020 of the Prime Minister promulgating the National Climate Change Adaptation Plan for the 2021–2030 period, with a vision toward 2050 identifies three specific objectives including: (i) Improving climate change adaptation effectiveness through enhancing state management in relation to climate change;

(ii) Enhancing the resilience and improving the adaptive capacity of the community; (iii) Reducing natural disaster risks and damage, and being ready to respond to natural disasters and extreme weather events due to climate change. Of these, objective (ii) intends to achieve its goal based on the natural capacity of its biodiversity and forest system, especially as forest areas play a significant role in climate change mitigation.

Sectoral Adaptation Framework

Forestry Sector: Main Driver for Climate Change Mitigation

The forestry sector and authorities have issued and implemented several policies on both adaptation and mitigation (Table 17). Forests play a vital role in both climate change mitigation and adaptation; they can be carbon sinks to absorb carbon emissions but also can convey carbon accumulated inside their structure into the environment through reforestation. Therefore, mitigation projects like REDD+ (reducing emissions from deforestation and forest degradation) can help to increase carbon storage and avoid the risk of the harmful effects of climate change (Thuy et al. 2014).

Table 17: Key Mitigation and Adaptation Policies in Forestry Sector

	Policy
Adaptation	- Action plan for Adaptation to Climate Change in the Agriculture and Rural Development Sector for 2016–2020, with a vision to 2050
Mitigation	- National Payments for Forest Environmental Services: Decree 99, Decree 156; - National REDD+ Programme 2012 - National REDD+ Programme, conservation, increasing carbon sink capacity, and sustainable forest resource management until 2030.
Both adaptation and mitigation	- National Strategy for Environmental Protection until 2010 and vision toward 2020; - National Target Programme to Respond to Climate Change 2012 - National Climate Change Adaptation Plan for the 2021–2030 period, with a vision toward 2050

Source: Thuy et al. (2014)

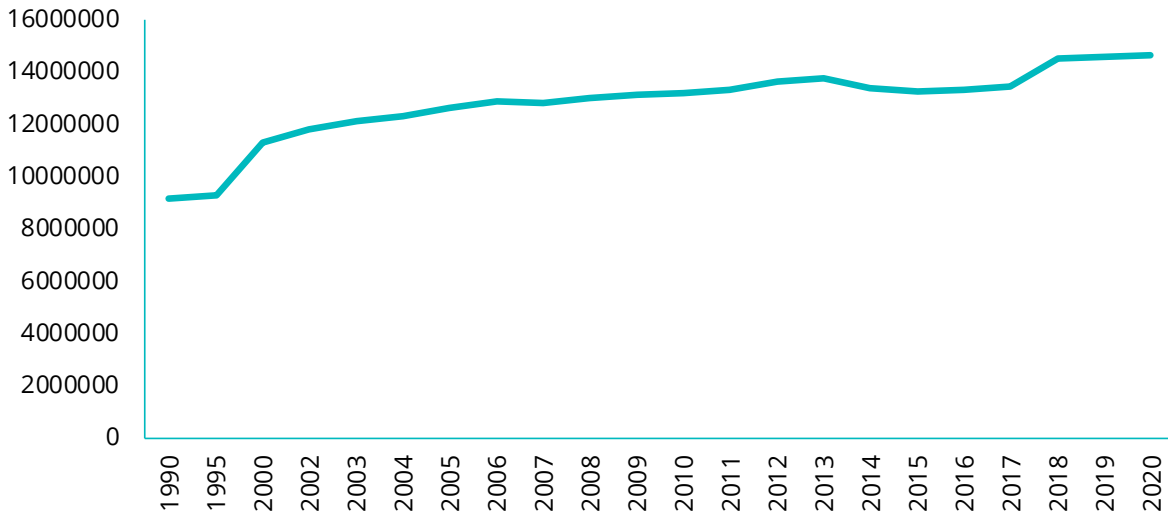
In Vietnam, since the 1990s, the government has promoted the reforestation process through many plantation programmes such as the five-million-hectare reforestation programme. Afforestation and natural forest regeneration have increased the total forest area of the country to about 14.6 million hectares by 2020, compared with 9.2 million hectares in 1992 (Figure 13). It is said that Vietnam's forest has nearly recovered to what it was in 1945, in terms of cover rate (Figure 14).

Since 2008, through the pilot implementation of the initiative to reduce greenhouse gas emissions from deforestation and forest degradation (REDD+) and payment for forest environmental services (PFES), Vietnam has integrated PFES into its national forestry plan to invest and attract new financial sources for forest protection and development. After 10 years of implementation, the revenue from PFES payments has reached more than VND5,700 billion or an average of VND2,280 billion/year, which is used to pay for the management and protection of over 6.8 million hectares of forest equivalent to 46 per cent of the country's forest area (Nguyễn Chiển Cường 2020). Similarly, it is estimated that Vietnam's REDD+ carbon revenue in the coming years can reach USD70–80 million/year (equivalent to about VND1,560–1,780 billion/year), which is expected to provide important financial support for forest protection and development. In 2020, the Carbon Fund of the Carbon Partnership Facility paid USD51.5 million through the World Bank for 10,300,000 certified emission reductions and can pay for up to 5,000,000 certified emission reductions (Carbon Fund of the Forest Carbon Partnership Facility 2020).

Agriculture Sector: Changing Practices

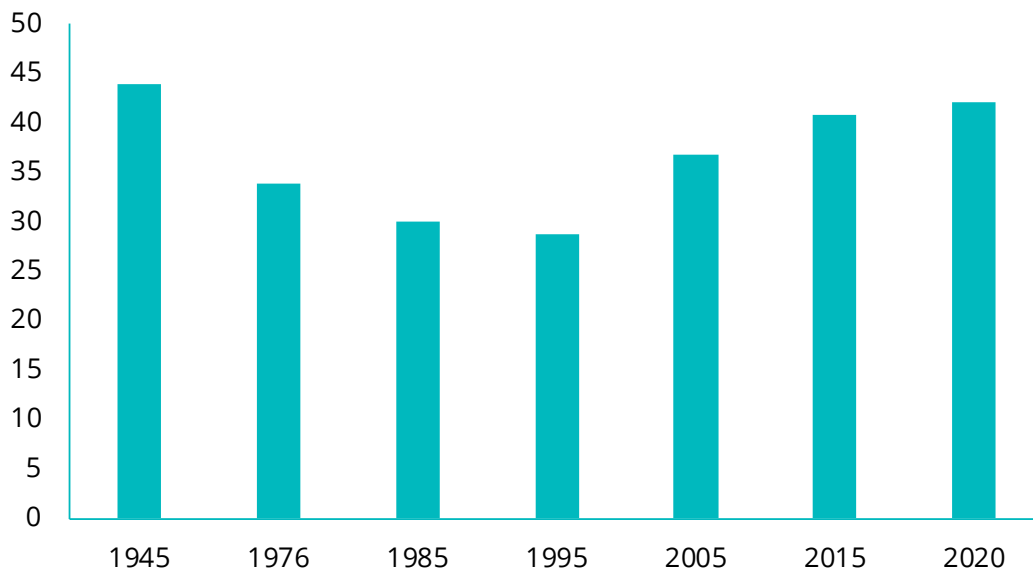
Although agriculture is the second-largest source of greenhouse gas emissions that contributes about 33 per cent of total GHG emissions in Vietnam (CIAT and World Bank 2017), agriculture is also most exposed to climatic change. The impacts vary across the different regions of the country. Previous research in the Mekong Delta (Vietnam) shows that people who perceive higher risks from climate change are likely to have adaptation intentions and more effective adaptive measures (Le et al. 2014). To alleviate the potential risks and maintain their yields, farmers have implemented various adaptation measures, including changing farming practices, changing crop varieties, adjusting the farming calendar, diversifying crops, diversifying livestock, improving irrigation, and intensifying soil quality (Vo, Mizunoya, and Nguyen 2021; Olafsrud 2020). In an area prone to saline intrusion like the Mekong Delta, besides dykes, farmers in the region tend to mix shrimp with rice instead of rice yields all year round. In addition, people also try to maximise yields through polyculture (ducks and catfish) or combined use of livestock and biogas. Farmers also take advantages of agricultural waste to cultivate mushrooms (Olafsrud 2020). As Vo, Mizunoya, and Nguyen (2021) discovered, farmers in the central coastal region tend to change the crop variety grown and adjust the farming calendar since these methods cost less and are simple to carry out. Diversifying crops and livestock are also among their choices to adapt to the changes.

Figure 13: Forest Area Changes in the Period of 1990–2020



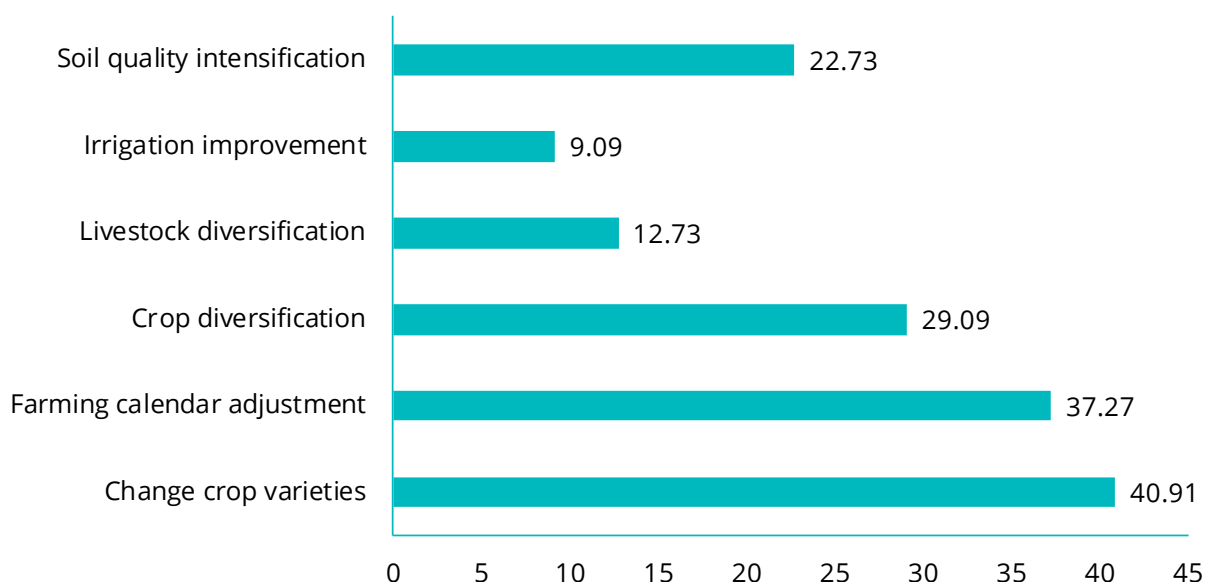
Source: Nguyễn Chiến Cường (2020)

Figure 14: Forest Cover Changes in the Period of 1945–2020



Source: Nguyễn Chiến Cường (2020)

Figure 15: Determinants of Farmers' Adaptation Decisions to Climate Change in the Central Coastal Region of Vietnam



Source: Vo, Mizunoya, and Nguyen (2021)

Transportation Sector

Currently, the transportation sector contributes about 10.8 per cent of total carbon emissions in Vietnam. Under the business-as-usual scenario, these emissions are projected to grow at an annual rate of 6–7 per cent, reaching nearly 70 million tonnes of carbon equivalent by 2030. The most cost-effective measures to increase the sector's resilience include converting traffic from road to inland and coastal waterways, adopting stricter fuel-efficiency standards for vehicles, and promoting electric vehicles' development (Oh, Cordeiro, et al. 2019). According to research by the World Bank and GIZ, taking climate change into account, 20 per cent of the transport network is vulnerable to future disaster risks. The research stated that road network failures can result in very high losses of up to USD1.9 million per day, and railway failures can result in losses of up to USD2.6 million per day (Oh, Alegre, et al. 2019).

Construction Sector

On 24 July 2020, the Ministry of Construction issued Decision 967/QD-BXD on promulgating the Action Plan of the Ministry of Construction to implement the Paris Agreement on climate change, period 2020–2030. The action plan is based on the goal of developing the construction industry's activities to reduce greenhouse gas emissions and adapt to climate change.

Specifically, the Ministry intends to reduce greenhouse gas emissions in building materials production, construction, urban development, and urban technical infrastructure in line with the commitment in its NDC. The Ministry has defined the main group tasks: GHG emission reduction tasks, adapting to climate change, preparing resources, and the mission of establishing an open and transparent system of measurement, reporting, and appraisal (MRV) (Vietnam Ministry of Construction 2020).

In order to achieve the aims of policies and prepare resources, the ministry requires the authorities to (Vietnam Ministry of Construction 2020):

- » Study and fulfil policies and institutions on mitigating GHG emissions in urban areas, production of building materials, management of solid waste, and green building development;
- » Research and develop policies and institutions to perform urban development planning, and develop technical infrastructure to adapt to climate change;
- » Develop training, teaching, promotional and awareness programmes on climate change to meet the needs of implementing the Paris Agreement;
- » Assess the technology needs to adapt to climate change and reduce greenhouse gas emissions for the construction sector, suited to Vietnam's conditions;
- » Carry out experimental application of a number of potential climate change response technologies suited to Vietnam's conditions.
- » Review and propose mechanisms and policies to encourage research and technology transfer on climate change, and strengthen international cooperation in research and technology exchange;
- » Develop a resource mobilisation framework for climate change and green growth;
- » Propose a list of projects for the Ministry of Construction to respond to climate change and green growth, giving priority to projects that implement the commitments of the NDC and are capable of mobilising the participation of other stakeholders, mobilising resources from the private sector, and providing international support.

In order to set up the MRV system, it is required to establish and develop the MRV system for sector-level GHG emission reduction activities in relation to construction works, production of building materials, solid waste, urban development; and periodically develop national adaptation notices for the construction sector, including progress achieved and adaptation targets in the NDC (Vietnam Ministry of Construction 2020). In addition, the ministry will build a technology transfer monitoring system and strengthen the construction industry's capacity, integrate climate change and green growth issues into the policies,

master plans and plans of the construction industry, strengthen coordination and resolve inter-regional and inter-sectoral issues in response to climate change, and identify inter-sectoral and inter-regional issues for coordination and implementation.

Industry and Energy Sector

Climate change has led to changes in rainfall and water flow. Changes in rainfall will affect hydrological cycles and river flows, leading to changes in the generation output of hydropower projects. Changes, due to the effects of climate change, in water consumption patterns and increased demand for water for other purposes, for example for irrigation, could reduce the amount of water supplied to hydroelectricity (ADB 2012). Facing a water shortage for power generation, the Vietnamese government has supported incentives to develop recycled energy such as wind and solar power. According to Decision 11/2017/QĐ-TTg on tax and land incentives for solar power development, solar power projects connected to the grid before 30 June, 2019 are committed to buying all electricity at 9.35 cents/KWh for 20 years, with the goal that by 2030, solar power will account for about 3.3 per cent of the total electricity generated in the country. With high incentives in terms of committed price, commitment time, tax and land, solar power has attracted a lot of domestic and foreign investors, mainly in the coastal areas and central highlands.

With the government's incentive mechanisms for renewable energy development, in the years 2018–2021, many wind and solar power projects have been integrated into the power grid. Up to now, the total capacity of operating solar power sources is over 17,000 MW and it is expected that by the end of 2021, the total capacity of solar power sources will be about 5,600–6,000 MW. According to the energy strategic orientation in Resolution 55 of the Politburo, issued in February 2020, the Basic Scenario of Power Master Plan VIII aims to increase the total capacity of renewable energy sources as a proportion of the total power capacity up to 53.9 per cent by 2025 and 47.8 per cent by 2030 (nangluongvietnam 2020). In the first 4 months of

2020, solar power generated 18,783 MW (9,583 MW of rooftop solar power and about 9,200 MW of farm solar power). Up to the end of 2021, there was about 4,000–5,000 MW of wind power put into operation according to the registered investor plan.

Disaster Risk Management

Vietnam has formed a Central Steering Committee for Flood and Storm Control (Figure 16). However, there is a lack of collaboration among each component of the committee (Nguyen, Ginige, and Greenwood 2018). The Ministry of Natural Resources and the Environment (MONRE) has the leading role in climate change coordination in Vietnam. In parallel, the Ministry of Agriculture and Rural Development (MARD) is responsible for mitigation of and response to natural disasters and extreme weather events. Each ministry has a sub Committee for Flood and Storm Control, and each province has a Steering Committee for Flood and Storm Control (Nguyen, Ginige, and Greenwood 2018). Vietnam has been recognized as one of the countries most vulnerable to the impact of climate change and its associated phenomena, including natural disasters and extreme weather events (NDEWEs).

Vietnam has been recognized as one of the countries most vulnerable to the impact of climate change and its associated phenomena, including natural disasters and extreme weather events (NDEWEs)

At the local level, facing increasingly severe and destructive natural disasters such as floods and droughts, the authorities in Vietnam have improved their resilience and become more adaptive to respond to the negative impacts. In Thua Thien Hue province, local authorities also invest in infrastructure such as river and sea dykes besides disaster preparedness efforts. In Quang Binh province, provincial and district Committees for Flood and Storm Control have involved the private sector in disaster response efforts. In addition, local authorities take advantage of media networks to disseminate early warning alerts widely. Recently, NGOs have provided training for promoting community awareness and capacity for the local

response, which enables the implementation of community-based disaster responses (Christoplos et al. 2017).

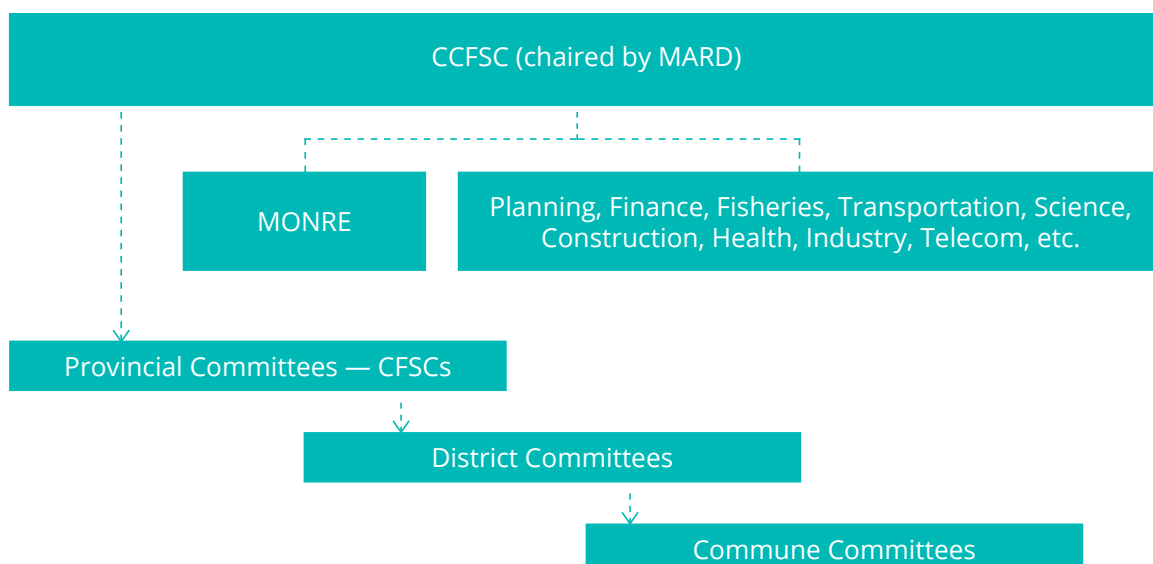
Summary

Since the World Summit Conference 1992, Vietnam has actively joined in combating climate change. The solutions for adaptation and mitigation have been discussed at both national and local level. At policy level, the government issued the Climate Change and Green Growth strategy, and related sectoral support policies such as the National Action Programme of REDD+, National Strategy on Disaster Prevention and Mitigation, Action plan for Adaptation to Climate Change in the Agriculture and Rural Development Sector, and Action Plan of the Ministry of Construction to implement the Paris Agreement on climate change. Those policies provide a legal framework for the sector to apply sustainable approaches in production to adapt to climate change.

In the field, local government and community also make proper responses to climate change impacts. Besides constructive solutions such as dykes, local authorities have strengthened their proactiveness and availability to tackle natural disasters such as floods. Local people in some regions have changes their harvest methods and season to cope with climatic change.

As one of the countries heavily affected by climate change, over time, the management of natural resources, environmental protection, and proactive response to climate change have been identified by the Government of Vietnam as issues of special importance, which have great influence and are decisive for sustainable development. Accordingly, Vietnam actively participates in the joint efforts to combat climate change of the international community to turn the “challenge” posed by climate change into an “opportunity” for sustainable development for all. Vietnam actively integrates climate change response content into official legal documents. This is one of the important bases and premises for making guidelines and policies for socio-economic development, thereby ensuring national defence, security and social security.

Figure 16: Institutional Arrangement for Disaster Management in Vietnam



Source: Nguyen, Ginige, and Greenwood (2018)

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Climate Change Adaptation in Vietnam

Authors: Try Thuon and Rath Sethik

**Review of the Available Climate Change Funding
Mechanism of ASEAN and the Role of Cambodia
Holding the Chairmanship in 2022**

Introduction

Climate funding mechanisms involve a complex process of converting nature into market values through the structural mechanism for calculating currency values of carbon stock and emissions based on expert knowledge, technology, and market price. Driven by the utopian ideal of “One vision, one identity, one community”, the Association of Southeast Asian Nations (ASEAN) has brought back former conflicting countries into the leagues to fix their fragmented interests, thereby addressing regional problems, not only trade and security but the emerging and ongoing transboundary climate change impacts. ASEAN is one of the regions with fast-growing dynamics in the world. Given its geography and long coastline, shared transboundary rivers, and the concentration of development in the coastal zones, a large population still depends on natural resources for their livelihoods; these are the key sectors and areas prone to climate change impact. Such impacts come from increased temperature, extreme events like cyclones and storms, floods, and droughts which are forecast to intensify (Zhuang, Suphachalasai and Neulle Samson 2013). This region is now home to 563 million inhabitants, with the population rising by 2 per cent annually compared with the global average of 1.4 per cent (ibid). The area has experienced rapid economic growth over the last few decades that has lifted millions of people out of extreme poverty, while the incidence of income and non-income poverty remain high in many countries, so achieving the Sustainable Development Goals (SDGs) by 2030 remains a daunting task (ibid). It represents the most significant challenge to the region’s sustainable development and poverty eradication efforts and human security. Addressing climate financing mechanisms is not only a single state effort but requires regional cooperation over existing regional mechanisms and those at the global scale.

It is argued that self-interested individual states have mixed attitudes towards cooperation unless material benefit is gained (Stern 2007). Collective actions by independent sovereign nations are challenging this. These international collective actions require countries which have advanced,

emerging industries and developing countries to commit to reducing GHG emissions. By 2010, the top ten countries have decided to reduce their emission source, which is the foundation for GDP growth energy sectors. For instance, Brazil plans to increase alternative energy to 10 per cent by 2050. China plans to have 10 per cent reduction of air pollution, and increase of 15 per cent from renewable energy by 2020. The USA aims to reduce GHG emissions to the 1990 level by 18 per cent of the 2002 level by 2012. California, the largest state, planned to reduce CO₂ emissions by 80 per cent of the 1990 level by 2050. States in the northeast and the West Coast have reduced their by 10 per cent between 2015 and 2018 (ibid). In ASEAN, countries like Indonesia, Malaysia and Singapore promised to reduce their emissions by up to 26 per cent, 40 per cent, and 16 per cent by 2020 (Caballero-Anthony 2013). Indonesia is the third highest emitter in the world behind China and the USA. The current COP 26 advocates all member countries of UNFCCC signatories to reduce their emissions. Cambodia is one of the countries to promise to facilitate emissions by not allowing to have any further coal power plants or hydropower construction on the Mekong mainstream. Many sectors like those from construction sector emerge as emission sources to be reduced within those emerging economies in Asia, which include Cambodia. There is no supranational authority to impose coercive sanctions, but rather the cooperating nations have to perceive sufficient benefits to make them willing to sign international treaties or other agreements that share a joint vision of responsible behaviour. ASEAN countries should recognise that without their meaningful involvement and collective actions to address climate financing, there will be no future for sustainable growth and shared common societal values in the region.

In this chapter, the authors uncover the hidden practice of funding mechanisms for climate change adaptation in ASEAN states with selected case studies from Cambodia. We draw experiences from the global and international normative framework down to the country level with Cambodia as the case study and then consider regional projects that are jointly implemented at the ASEAN level. We propose key actions and mechanisms to enable the adaptive funding mechanism of climate change

adaptation and mitigation. This chapter examines the nature of key drivers for climate change funding mechanisms at the international level, the policy narrative, and the development framework of climate change intervention within ASEAN. This includes the current long-term initiative of regional peatland forest management and transboundary haze management. The chapter also discusses the Cambodian context as an example of climate change intervention as the country has attracted multi-financing mechanism sources for its development trajectory.

The material used for this chapter is drawn from published articles on related topics plus case studies drawn from the author's previous working experience on climate change adaptation and mitigation in the least developed countries (LDCs) that Cambodia and Lao PDR used to be. The chapter draws normative frameworks from both the international and regional levels, which include those from the UNFCCC, the Kyoto protocols, and the regional context. Existing materials and the policy framework of the ASEAN climate change framework were also consulted and used as the critical point of discussion to present the cases, primarily key issues related to regional haze, which has been the result of the conversion of peatland into large commercial-scale farming. At the same time, the effects of smoke have extended across the borders of countries. The development of commercial farming through conversion of peatland has been strongly associated with transnational corporate companies, which required regional entities like ASEAN to get involved. The materials and case studies from various projects and funding mechanisms from the Cambodian context are also discussed to unfold the nature of the practices of respective countries in the region. The key discussion entails the hidden concept underlying the funding mechanism, the relationship of carbon credit purchasers, and the host country of carbon owners often associated with complex actors and institutional arrangements.

Key Drivers for International Climate Funding

International efforts to address climate change have proliferated in advocating the polluter pay principle (Zhuang, Suphachalasai and Neulle

Samson 2013). This involves the advanced and industrial countries which are the key CO₂ emission generators into the atmosphere (Bayon, Hawn and Hamilton 2009). The key debate is framed as threats which have later been treated as risks to be managed and overcome. Addressing climate impact needs to consider the economic cost and growth of the countries. Most emissions come from fossil fuels for energy production to enable the growth of nations. A popular figure generated by Newell and Patterson (2010) shows in the US that a reduction of CO₂ emissions by 20 per cent would cost the economy up to USD3.6 trillion. The figure was later estimated to range from USD8,000 billion to USD3.6 trillion (Newell and Paterson 2010).

Newell and Paterson (2010) show that the risks have become a central concept for international cooperation to avoid the bad reputation of not being responsible for the societal impact. These risks range from legal liabilities for any environmental damage and refusing to cap carbon emission, to risking the loss of market opportunities. As a result, most oil and gas international companies are systematically including risks in their programmes like the giants Shell and British Petroleum Company Limited (BP) (ibid).

The shift toward a low-carbon economy will create significant business opportunities. New markets for low-carbon technologies and products worth billions of dollars will be made if the world acts on the scale required. We believe that tackling climate change is a pro-growth strategy. Ignoring it will ultimately undermine economic growth (Newell and Paterson (2010). The ASEAN region is faced with the growing impact of climate change, in particular agriculture with 60 per cent of the population actively engaged. The region had contributed 66.4 per cent of the inland capture fishery and 88.8 per cent of aquaculture contribution to the global amount by 2008 (Caballero-Anthony 2013). These impacts encourage private corporations to formulate climate response strategies (CRS) to fund adaptation as part of their social responsibility strategies (SRS). By 2015, the invested budget in this sector was up to USD85 billion, mostly in labelling green business practices (Newell and Paterson 2010).

A Look At the Science

Before the industrial revolution of the 18th and 19th centuries, the atmospheric concentration of CO₂ was approximately 280 parts per million (ppm). Today, the atmospheric concentration of CO₂ has risen to 387 ppm, primarily because of anthropogenic emissions from the burning of fossil fuels utilised in transportation, agriculture, energy generation, and production of everyday materials. The loss of natural carbon sinks (places where carbon is pulled out of the atmosphere and trapped either in geological formations or biological organisms) — on land and in the ocean — is also contributing to increased levels of CO₂ in the atmosphere.

Sources: Adapted from Bayon, Hawn and Hamilton (2009)

The climate funding mechanism has also invoked new forms of global positions, in particular the relationship between the north and the south (Giddens, et al. 2018). The north refers to highly developed and advanced countries, while the south refers to those less developed, formerly colonial states. Different forms of global mechanisms are often created and imposed by those from the north, including the clean development mechanism (CDM) that leads to potential certified emission reductions (CERs) to facilitate sustainable benefit to the host countries (Käkönen et al. 2014). Project developers who are interested in pro-poor rural energy projects have often found that the high transaction costs and complex methodologies of CDM make it too difficult for these projects to be economically viable.

Climate financing requires cooperation and transparency to ensure equitable benefit distribution to the proposed beneficiaries within the host countries. Studies show that self-interested individual states have mixed attitudes to collaboration unless material benefit is gained (Stern 2007). Collective action by independent sovereign nations is one of the challenges. There is no supranational authority to impose coercive sanctions, except cooperation to secure sufficient benefits to be party members of treaties (ibid.).

The scientific proof from the box above shows that a rapid rise in the concentration of CO₂ in the atmosphere concerns scientists because CO₂ is a greenhouse gas. The study by Bayon, Hawn, and Mamilton (2009) shows that Greenhouse Gases (GHGs) allow sunlight to enter the atmosphere, but they keep the heat released from the Earth's surface

from getting back out. The carbon credit buyers are mostly private international corporations. But offsetting carbon emissions has become symbolic of business practices to attract more product consumers to be socially, environmentally, and economically responsible.

Achieving carbon neutrality cannot be achieved overnight but needs careful planning, execution, and negotiated and institutional capacity development in dealing with measuring, reduction, purchasing green production and offsetting practices. HSBC seeks to be carbon neutral for their operation in developing countries and least developed countries (LDCs). They are buying Verified Emission Reductions (VERs) which have been officially registered or verified by the Clean Development Mechanism (CDM) executive board. The purchasing can be done through key brokers who act as middlemen, which include project owners. In principle, HSBC seeks to buy VERs in voluntary market from less developed countries which retains their forests or through improved technology for energy reduction. The decision to finance projects includes (i) the viability of the project with absence of carbon financing, (ii) projects that continue to support low-carbon economic practices, and (iii) those projects that have long-term sustainable benefits. A series of offsetting projects include emission destruction, emission reduction, and emission sequestration. The first one includes methane (e.g. livestock methane and industrial (e.g. HFC23,SF2)), the second one includes renewable energy, energy efficiency, and others such as REDD+, and the third one includes land use agriculture and forestry.

Newell and Paterson (2010) show that key polluters, like international corporations from industrial countries, often restrict the carbon credit they purchased by ensuring that the profits must go to the poor of the host countries. The intention was later accused of being manipulated by the host country's politics; some even faced dilemmas of giving up the credit. As many countries have experienced colonialism, the emerging of new carbon credits has invoked this legacy sentiment, and most credit buyers are often accused of seeking control of the country's natural resources.

In contrast, the literature suggests that a lack of autonomous state institutions, trusted civil society, and meaningful engagement are key reasons for project failure. Scott argues that the state tends to simplify its administration under the influence of modernism, science and technology, and the imposing of authoritarian states while ignoring local knowledge and resource participation (Scott 1998). Ferguson rejects Scott's view and argues that state development project intervention is not purely aimed at improving poverty as they intended but concealed with power and service to gain over opposition parties which later legitimise their action rather than poverty reduction and social progress (Ferguson 1990). In practice, many adaptive projects often create more bureaucratic systems among ruling elites and rather than benefiting the poor.

International Normative Framework

While funding mechanisms have been discussed since the late 1990s, still, action pushes for a financial commitment from the international communities, primarily advanced countries and international corporations, starting with the COP 13 meeting in December 2013, known as The Bali Action Plan. The plan provided the foundation of negotiation to COP 15 with emerging 2 degrees Celsius target with key sectors to be mitigated including REDD+, adaptation, technology development, transfer, capacity building, and financing assistance. Through this mechanism, it was expected that at least USD30 billion was hoped to be added to the existing commitment from advanced countries in support of Least and

Developing Countries to stabilise their emissions while adopting low-carbon economy practices by 2010 and 2012. However, by 2010, the COP 16 in Mexico called for additional funding support of USD100 billion per year (Zhuang, Suphachalasai and Neulle Samson 2013).

The United Nations Framework Convention on Climate Change (UNFCCC) plays a key role in hosting COP meetings and establishes the principle of common but differentiated responsibilities and the principle of polluter pays. The interpretation of both have been under significant discussion, which includes the thinking of equitable distribution of emission reduction commitments but in the recent negotiation proposed addressing equity concern through the contribution of countries to fund climate-friendly technologies (Käkönen et al. 2014).

Käkönen, et al. (2014) state that the UNFCCC provides a platform for policy narratives produced by different development actors to emphasise the links between development, adaptation, and mitigation. This is due to the increased consensus that climate change will significantly affect and alter development processes. The mainstreaming of climate change into development processes and financing by donors is done, however, against the backdrop of decreasing Official Development Assistance (ODA) commitments by donors. Focusing on the synergies between adaptation, mitigation, and development may allow the meagre resources to go a long way if they can be claimed to address multiple goals simultaneously (ibid).

Recent reviews show different estimations for this ODA commitment. For instance by 2030, the UNFCCC estimated climate action to cost from USD49 to USD171 billion per year, while the World Bank projected it to range from USD75 by 2010 to USD100 billion per year by 2050. The cost of adaptation for East Asia and the Pacific will occupy 19.5 per cent to 28.7 per cent of it, given the temperature increase of up to 2 degrees Celsius (Kuntjoro 2013).

According to the UNFCCC, there are at least five primary funding sources available at the global scale. These include the Global Environmental

Facility (GEF) which plays the first three significant roles in managing funding mechanisms, which provide for, first, the GEF Trust Fund (GTF), second, the Least Developed Countries Fund (LDCF), and third, the Special Climate Change Fund (SCCF). The SCCF has been eligible for Cambodia and Lao PDR within ASEAN members. The fourth is known as the Kyoto Protocol and the Climate Green Fund (GCF) established in 2010 by Conference of the Parties (COP16) in Cancun. The funds generated from these mechanisms include 2 per cent taxes on Clean Development Mechanism (CDM) projects and all countries in Southeast Asia are eligible to access this source of funding. The final mechanism is done through multilateral, regional, and bilateral mechanisms. Some are being initiated through international cooperation between multi-development banks like the World Bank, Asian Development Bank, UN agencies, and other development partners. The Climate Investment Fund aims to assist developing countries to achieve low emissions, climate resilience, and offsetting projects. This can be found in the Strategic Programme for Climate Resilience (SPCR), Cambodia Climate Change Alliance (CCCA), and the joint credit mechanism on REDD+ projects being piloted by the government of Japan and Korea in Cambodia (Kuntjoro 2013).

The carbon offset programme under the UNFCCC is seen through the Clean Development Mechanism (CDM) and reducing emissions from deforestation and forest degradation (REDD+). CDM and Voluntary Emission Reduction (VER) schemes promote ways for industrialised countries to offset their carbon emissions through buying carbon credits. Similarly, REDD+ was established to create financial value for the carbon stored in forests by offering results-based payments for developing countries for their actions to reduce deforestation and forest degradation and enhance conservation and the sustainable management of forests. As well as market-based programmes, a green economy relies on various state initiatives, including environment-related infrastructure expansion (e.g. water, renewable energy, green transportation), “climate-smart” agriculture, micro-insurance, cash transfers, and community forestry expansion. Mechanisms such as the European Union’s Forest

Law Enforcement, Governance, and Trade (EU FLEGT) are aimed to improve the state regulatory capacity in specific sectors (Mahanta, Amanda, Milne 2015).

Globally, under the UNFCCC’s CDM for Kyoto protocol and EU Emission Trading Scheme, the voluntary market is small but still important among global budgets with a total of USD516 million, and forest carbon provides 32 per cent of the total scheme, competing with other sectors like renewable energy and efficient cooking stoves (ibid).

Experience from LDCs shows that climate change adaptation is often associated with a narrative discourse of inadequate infrastructure, information deficits, limited planning capacity, and insecure access. The conventional proposed intervention tends to avoid politics, but mainly is in favour of technology and expert knowledge, and as a result, this does not go beyond identifying poverty and lack of information or capacity as sources of vulnerability; they do not address the causal factors affecting the low power, assets, and level of social protection (Lebel, et al. 2018). Thus, reliance on external funding sources often creates a condition that influences project governance which often fails to address the local initiative adaptation strategies, initiated mainly by the local community. Finally, framing adaptation is usually influenced in favour of the dominant groups of society who tend to stabilise the development pattern and distribution process (ibid). Economically, Cambodia, which was one of the LDC countries, has recently graduated from the status and has enjoyed strong economic growth rates during the past decades. The country is now being upgraded as a low middle-income country.

ASEAN Perspectives on Climate Funding Mechanisms

Based on international agreement, each country in the region needs to establish a ministry’s agency that can serve as a focal point to deal with climate change and its impact and implement the programme for adaptation and mitigation. These include the transformation toward

climate resilience which includes building adaptive capacity, taking technical and non-technical adaptation measures in climate-sensitive sectors, mainstreaming climate change into development plans. Key sectors for this adaptation include water, agriculture, forestry, coastal and marine resources, and health (Zhuang, Suphachalasai and Neulle Samson 2013). Over the last decade, most adaptation funds go to development work related to livelihood restoration and coping with floods and droughts, while mitigation goes toward technical adoption in creating win-win strategies mostly linked to energy efficiency uses and emission reduction.

At the regional level, ASEAN has formulated the agreement on Transboundary Haze Pollution as one of the outstanding issues signed by the member state in 2014 (ASEAN Secretariat, ASEAN Agreement on Transboundary Haze Pollution 2016). The key source of the fund can be drawn from the member's condition and secured both technology and loans from outside. Peatland forests are found within unique ecosystems located in coastal and freshwater wetland areas across countries in Southeast Asia. In 2006, this peatland was estimated to account for around 25 million hectares, or 60 per cent of the world's tropical peatlands and around 6 per cent of the full extent of global peatland resources (ASEAN Secretariat, ASEAN Peatland Management Strategy 2006–2020 2013). Most of the peatlands of Southeast Asia are in Indonesia, which has over 70 per cent of the total peatland area in Southeast Asia. Other major peatland areas are found in some countries such as Malaysia, Brunei Darussalam as well as Thailand, and Vietnam, the Philippines, Lao PDR, Cambodia, Myanmar, and Singapore which have smaller areas of peatlands. The last decades of improved development, land conversion and degradation triggered by land and forest fires have significantly reduced peatland resources over the past few years. Peatlands are typically found in low-altitude, sub-coastal areas extending inland for distances of up to 300 km. The depth of peat varies from 0.5 m to more than 10 m. Grave concerns faced by these peatlands include the increased forest fires and creating transboundary haze pollution, the destruction of community livelihoods, overexploitation, losing

carbon sequestration, biodiversity, and increased floods that are commonly found in the recent studies (Global Environmental Center and ASEAN secretariat 2013). Inadequate knowledge of peatland management and restoration and lack of policies have pushed ASEAN member states to adopt the ASEAN Peatland Management Strategy 2006–2020 (APMS) and updated it in 2013 to provide guidance for collaborative action.

The programme aims to promote sustainable management of peatlands in the ASEAN region through collective actions and enhanced cooperation, support and sustain local livelihoods, reduce the risk of fire and associated haze, and contribute to global environmental management:

The ASEAN agreement on Transboundary Haze Pollution (AATHP) focused on six significant actions to be achieved by 2020. These include the inventory of Peatland of the region, the imposing of a zero-burning practice, the study of forest fire root cause and its counter-discourse, the imposing of sustainable management of the peatland, conserving, protecting, reducing emissions and generating biodiversity, and development of national action plans (ASEAN Secretaria and GEC 2013).

The ASEAN Peatland Forest Project (APFP) funded by the Global Environmental Facility (GEF) and International Financing Agricultural Development (IFAD) aims to demonstrate, implement, and scale up the sustainable management and rehabilitation of peatland forest in Southeast Asia. The two countries which are the biggest producers of transboundary haze include Indonesia and Malaysia. This project was co-managed by the two countries. The Philippines and Vietnam from 2010–2014 focused on three significant aspects of strengthening institutional capacity and regulation, and the framework for peatland degradation reduction, by piloting sites that involved both the private sector and local communities. From 2011–15, the EU was one of the vital funders through its ASEAN secretariat in the addressing of peatland forest degradation in eight countries except for Brunei and Singapore.

Peatland issues have been contentious with the recent outbreak of regional haze, in particular in Malaysia, Indonesia, Singapore, and Thailand. The impact of haze across the border has been significant and has become politicised with discourse against each other, and in particular, small farmers are often accused of being the forest destroyers and forest burners while in turn they accuse large-scale corporations of being the key architects of forest fires and polluting the air quality. The case is clearly articulated among the urban and rural communities in Chiang Mai, one of the cultural tourism attractions in the region.

The Peatland Forest Project (APFP) has been established since 2006. Up to 2020, this programme has been used to address and restore peatland forest in more sustainable manners through capacity development, formulation of the regional framework in coping with peatland conversion, and restoration against unsustainable commercial palm oil practices. Peatland conversion for commercial farms has been criticised for its solid emissions of PM.2.5 which have created intense political debates among regional states and those cities affected by the emerging hazard.

One of the outcomes of the Sustainable Management of Peatland Forest in Southeast Asia is its innovative funding mechanism (ASEAN

and Global Environmental Center 2016). The Projects assisted ASEAN Member States (AMS) in developing a combined portfolio of projects for the ASEAN Programme for Sustainable Management of Peatland Ecosystems 2014–2020 (APSMPE) worth approximately USD240 million. The governments of AMS indicated their commitment to support the APSMPE as well as commitments from the European Union, GIZ, and potential partners from the private sector. The APSMPE was endorsed by all Environment Ministers in September 2013.

A report to aid policymakers entitled “Development of Financing and Incentive Options for Sustainable Management of Peatland Forests in Southeast Asia” was produced in 2013 with inputs and comments from the AMS. There has been a significant increase in financing for peatland work from developed countries and involvement of the private sector in conserving peatlands in Southeast Asia. Financial support from developed countries (e.g. Norway, USA, Germany, Korea, and Australia) aimed to rehabilitate the degraded peatland areas as well as reduce further degradation and GHG emissions from the peatlands. An innovative financial mechanism has been developed by the private sector, such as plantation companies for local communities and lessons learned through peer learning programmes.

Table 18: SEA Peat Project Executive Agencies and Country Implementing Agencies

Project executive Agency: Global Environmental Centre	
Country components	Project associated
Cambodia	Department of wetland and coastal zones, Ministry of Environment
Indonesia	Mitra Insani Foundation
Lao PDR	Ministry of Natural Resources, Energy and Environment
Malaysia	Global Environmental Center
Myanmar	Ministry of Environmental Conservation and Forestry/Forest Resource Environment Development and Conservation Association (FREDA)
Philippines	Biodiversity Management Bureau-Department of Environment and Natural Resources (BMB-DENR)
Thailand	Department of National Parks, Wildlife and Plants Conservation, Ministry of Natural Resource and Environment
Vietnam	Center for Environment Sciences and Ecology (CESE).

Source: Adapted from ASEAN Peatland Forest Project (APFP) (2016) (2nd edition)

With Cambodia Holding the Chairmanship of ASEAN in 2022, What Is the Implication of the Climate Financing Mechanism?

As Cambodia is now taking the ASEAN chairmanship in 2022 through their 38th and 39th summits held from 26–28 October, 2021 in Hanoi, the Cambodian Prime Minister claimed to enhance the region's centrality, unity, and development. Various key emerging issues include the discussion of economic resilience, the pressure of geopolitical competition, transnational crime, territories, climate change, and infectious disease to ensure the way forward in peace, security, and prosperity. To cope with this, the prime minister vowed to ensure a dynamic trade hub and investment by enhancing both physical and digital connectivity, strengthening the capacity of small and medium enterprise (SME), and promoting entrepreneurship among women and youth as well as safeguarding the collective action against the COVID-19 pandemic and support more regional infrastructure development.

Cambodia has experienced having LDC status for over a decade, but with its excellent performance of economic growth, the country managed to elevate itself to the current status of low middle-income level and is aiming to become a middle-income country by 2030 and high income by 2050. The government has progressed well with its climate change adoption funding mechanism, capacity, policy formulation, and collaboration work with development partners. Being a LDC, the country obtained various support through National Adaptation Programmes of Action (NAPA), Piloting Program for Climate Resilience (PPCR) Support, and various Clean Development Mechanism (CDM) projects (Käkönen, et al. 2014). As a party member of the UN, the country has ratified many UN laws, regulations, treaties, and conventions. Since 2008, key actions and policies addressing climate change have gained more support through institutions and action plans. Most policies observing and anticipating climate change mention flooding, drought, a rise in sea levels, intense storms, and tropical diseases. Priority sectors for adaptation include forestry, water, infrastructure, coastal zones, human health, fisheries, and agriculture.

With the approval of the CCCSP, the sectoral climate change strategic plans were formulated by 15 government ministries, covering the environment, agriculture, water, land management and construction, mines and energy, industry, health, education, gender, disasters, public works and transport, and rural development. At the same time, intending to turn these strategic plans into actual actions on the ground, the abovementioned ministries created five-year Climate Change Action Plans (CCAPs), covering the key priority actions for both adaptation and mitigation measures, and defining the budget needed to implement the projects identified concerning the activities.

To support such efforts, the country has developed national programmes to back CCAP implementation with financial support (grants and loans) from development partners such as the Pilot Programme for Climate Resilience (PPCR) - Phase I, between 2011 and 2012, which was funded by the World Bank (WB) and Climate Investment Funds (CIF), PPCR - Phase II — Strategic Programme for Climate Resilience (SPCR), between 2013 and 2019, which was funded by the Asian Development Bank (ADB) and CIF, Bilateral donors, who have supported many other sectoral projects to implement the CCAPs and the great success story of Cambodia Climate Change Alliances (CCCA) since 2012 up to present.

The capacity of the government institutions both at the national and sub-national levels still needs to be improved. Last year, the National Council for Sustainable Development (NCS), with support from the Cambodia Climate Change Alliance (CCCA), compiled inputs from various ministries to develop Cambodia's updated Nationally Determined Contribution (NDC), which was submitted to the UNFCCC on 31 December, 2020 (RGC 2020). This updated NDC presents the country's commitments and needs for the next decade to realise its vision for a low carbon and resilient society. The updated NDC is much more detailed than the Intended Nationally Determined Contribution (INDC) and revises the BAU scenario as it expands sectoral coverage. Cambodia updated its GHG reduction target to 41.7 per cent by 2030, equivalent to 64.6 MtCO₂e (see table 19). This is a significant increase in ambition compared to the 27 per cent reduction target outlined in its INDC.

Table 19: National Adaptation Plan (NAP) Process and Milestones

2006	2013	2014	2016	2017
Cambodia's National Climate Change Committee	Cambodia Climate Change Strategic Plan 2014–2023	Cambodia's Climate Change Financing Framework (2014)	Cambodia Climate Change Action Plan	Cambodia's National Adaptation Plan Financing Framework and Implementation Plan (NAPFFIP)
Comprising ministries and government agencies, this was created to coordinate policies, strategies and programmes that address climate change.	It has created a national framework to respond to climate change, which was integrated into the National Strategic Development Plan, 2014-2018.	This promotes a shared approach to defining climate finance and assessing its current level and prospects for future financing.	Developed through 15 ministries to deliver CCCSP strategies and priorities, it has identified 171 actions (93% focused on adaptation) and financing gaps.	Its primary purpose is to bring the NAP process in Cambodia closer to implementation, with the specific aim of increasing the possibilities for Cambodia to access additional adaptation financing.

Source: Adapted from NAP Global Network (2017)

Table 20: Summary of BAU Emission and NDC Emission Reduction

Sector	BAU 2016 emissions (MtCO ₂ e)	BAU 2030 emissions (MtCO ₂ e)	NDC 2030 Scenario (MtCO ₂ e)	NDC 2030 reduction (MtCO ₂ e)	NDC 2030 emission reduction %
FOLU	76.3	76.3	38.2	- 38.1	- 50 %
Eergy	15.1	34.4	20.7	- 13.7	- 40 %
Agriculture	21.2	27.1	20.9	- 6.2	- 23 %
Industry (IPPU)	9.9	13.9	8.0	- 5.9	- 42 %
Waste	2.7	3.3	2.7	- 0.6	- 18 %
Total	125.2	155.0	90.5	- 64.5	- 42 %

Source: Adapted and modified from the Cambodia's updated Nationally Determined Contribution (NDC) (2020)

Climate financing through REDD+ has become both popular and a problem. It aims to conserve forest via selling ecosystem services, thereby maintaining carbon stocks while generating local livelihoods

(Mahanty, Bradley and Milne 2015). The proposed intervention has been problematic among different groups within the social system (Milne and Mahanty 2015). These groups include integrated conservation and development projects (ICDPs), community-based natural management (CBNRM), and market-based schemes, such as payment ecosystem services (PES) and carbon trade such as REDD+ schemes being introduced in the country. The funding model is performance-based payment to conserve the carbon stored in trees and forests, known as Reducing Emissions from Forest Deforestation and Forest Degradation (REDD) (Mahanty, Bradley and Milne 2015). This method is heavily driven by foreign international agencies and organisations. However, key challenges, which include actors' social relations among stakeholders and complex institutions, come into play.

In principle, the National REDD+ strategies 2016–2020 proposed four clusters which include the potential to solve the problem of forest losses, the potential to reduce carbon emissions and benefit the country, capacity building to achieve multiple benefits, which include the capacity to monitor and verify carbon stocks and the new form of livelihood strategies, and strategies to engage local participation which include indigenous peoples and women (RGC 2016). The recent evidence shows that local identity, culture, and knowledge of forest conservation are often ignored or paid less attention by both formal and informal institutions. Local knowledge through the Cambodia Prey Lang Community Network (CPCN) has been one of the unique groups defending and demanding land and natural resource conservation through the practice of a narrative and storytelling approach (Parnell 2015). Complex advocacy, networking, and the media alliance have become vital tools to spread information about the people, their identity, and local knowledge.

Activities funded under REDD+ projects include support for patrols and law enforcement, wildlife, forest, and law enforcement monitoring (including

the use of SMART). Nearly 50 per cent of the funds from carbon sales are used for community development and livelihood improvement activities in the 22 villages located within or on the edge of the protected areas.

A project known as Keo Seima Wildlife Sanctuary (KSWS) covers an area of 292,690 hectares in which REDD+ has started operation since 2010 in core areas of 167,000 hectares. The model of this operation is being carried out through landscape planning which includes improving governance, law enforcement, monitoring, and community development biodiversity conservation. Indigenous Communal Landtitling is one of the significant targeted outputs, where six out of 14 ITCs had been granted by October 2020. By 2019, the first 20 villages had received benefits shared in cash invested in local development with the total budget allocated of USD219,857.09. The ideal funded local developments include small-scale infrastructure, agriculture, and health development among ethnic communities. Completed emission gross sale is USD3,840,379 for five years, of which USD1,369,999 will be used for overall project operation while the rest is to be spent on REDD+ programmes at the local level.

The scheme has strongly adopted the voluntary carbon market representing the new waves of valuation of forest land to cope with the weak law enforcement, illegal logging, and rapid conversion of forest land for agriculture. Cambodia is an attractive country for REDD because of the potential for significant emissions to be avoided if forest loss is reduced. The RGC is the primary player in REDD, given the numerous laws and regulations that reinforce state ownership and control the country's natural forest.

Another form of the voluntary carbon market is being carried out through the Joint Credit Mechanism (JCM). This JCM is another popular approach to carbon financing being applied in the Prey Lang areas. The mechanism is being proposed by two countries, namely Japan and Korea. The basic concept of JCM is first to achieve both emission reduction targets and contribute to the ultimate objective of the UNFCCC by facilitating global action for GHG emission reductions or removals. The rate

of success for this model is government-centric rather than community-oriented. The Keo Seima benefit-sharing mechanism has been one of the replicated cases to be applied, but the nature of the issue embedded in the proposed site is not the same. The areas have been previously funded by the USAID but later cancelled as the project benefit was being accused of favouring the formation of elite bureaucratisation to increase the number of middle-class professionals who work for the projects, and local participation was not meaningful.

Conclusion

Cambodia, as the chairman of ASEAN 2022, can draw on the many lessons learned about the climate financing mechanisms that the country has developed and the transparency and accountability they have engaged in with civil society, local community, development partners, and private sectors of advanced countries. Trust and clarity, and responsibility to enhance collective action and being accountable for its own people's prosperity and inclusive economic growth for all remain key challenges ahead to overcome. Key pressure within the ASEAN context, behind geopolitical interests, include the outstanding climate change impact, the ongoing pandemic, and the emergence of water security in the region.

Experiences show that climate financing is both mandatory and voluntary in terms of commitment and market values. Its success rests on the political culture of the implementing countries, and the market structure. Most European credit buyers often shift toward energy efficiency to reduce emissions. The implementation cost with which developing countries are often faced is cost-sharing while obtaining funds for their project intervention. This mode of implementation is commonly found within the GEF programme which requires cost-sharing or co-financing to ensure project sustainability and commitment. Timing and delivery risks are often faced by the host countries with detailed scientific data required and the uncertain political context within the host countries.

Adopting a climate financing mechanism means addressing the development synergy between mitigation and adaptation. Safeguard development from climate change impacts and narratives on climate resilience development stress the importance of strengthening adaptive capacities, aiming for better accountability. Low-carbon development is also building synergy between mitigation and development, which is like CDM-related co-benefit narratives. This has been challenging for the less developed countries and communities that are lower CO₂ emitters. The third narrative is the triple win of climate compatible development where adaptation, mitigation, and development go alongside each other.

The review also shows that the climate financing among ASEAN states remains slow with only one programme being operated and implemented as the transboundary peatland haze pollution. The scheme has not addressed unequal country development and the polluter pay principle. Through this programme, most of the countries that are converting more peatlands include those from Malaysia and Indonesia while key investors come from Singapore. Peatland conversions are mostly found to be paving the way for agroforestry or large-scale palm oil production. The level of emissions from these peatlands is higher than in the normal forest. Burning peatland also strongly causes transboundary smoke which affects not only people's health through increased PM 2.5 but also tourism and other economic sectors.

The key enablers for climate financing include the political commitment of the host countries, building adaptive institutions and capacity for the project executive, and ensuring reliable access to finance, which require additional cost over the existing mechanism being implemented by the states. There is a need for interstate autonomous trusted civil society and the local engagement to generate meaning climate financing and distribution.

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10

Funding Mechanism in One of the ASEAN Nations : A Case Study in Cambodia

Authors: Sok Serey and Pheakdey Nguonphan

Background

The Intergovernmental Panel on Climate Change (IPCC) has confirmed that climate change already exists in the Association of Southeast Asian Nations or ASEAN region. This IPCC report also reveals a cumulative trend in mean surface air temperature in Southeast Asia, with a 0.1–0.3 degree Celsius upsurge per decade recorded between 1951 and 2000 (IPCC, 2007). Moreover, the recently published State of Southeast Asia 2020 survey listed climate change among the top three security challenges facing Southeast Asian nations (Seah et al. 2021). As a result, climate change is one of the most significant development challenges confronting Southeast Asia in the 21st century. Adaptation and mitigation are at the heart of the climate change response in ASEAN nations, and the region requires special attention to low-carbon growth to bring significant co-benefits, and the costs of inaction far outweigh the costs of the required actions (Weiss 2009).

Since the 2000s, ASEAN nations have put climate change on the regional development agenda. The current ASEAN institutional framework on the environment and climate change is implemented under the ASEAN Socio-Cultural Community (ASCC) pillar. Moreover, ASEAN nations have adopted a global role to fight regional climate change, and its commitment represents all the ten member nations in their international solving forums and with extra-regional actors (Nguitrugool and Rúland 2015). For example, ASEAN has closely worked to establish international arrangements in relation to global climate change ambitions at the United Nations Framework Convention on Climate Change (UNFCCC) (ASEAN, 2007). The ASEAN Secretariat has acted as a platform for adaptive capacities through (1) conducting collective research and knowledge sharing, (2) mobilising support for its regional and national initiatives, and (3) coordinating national efforts through the development of action plans (Caballero-Anthony, 2012). As one of seven technical working groups reporting to the ASEAN Senior Officials on Environment (ASOEN), the ASEAN Working Group on Climate Change (AWGCC) is

responsible for enhancing regional cooperation in regard to climate change, promoting collaboration between sectoral bodies, and articulating ASEAN's concerns and priorities at the international level (ISEAS-Yusof Ishak Institute, 2020).

In 2012, the 12th ASEAN Ministerial Meeting on the Environment and the 8th Meeting of the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution¹ released an ASEAN Action Plan on the Joint Response to Climate Change Finance and Investment. The action plan aims to promote (1) a common understanding of institutional arrangements for approaching multilateral funds (i.e. Green Climate Fund, Green Investment Fund, and Adaptation Fund), (2) sharing of information on enhancing private sector investment in low-carbon development, production, and technology; and (3) disseminating information on mobilising multilateral funds (ASEAN 2012). Beirne et al. (2021) proposed the establishment of regional and international disaster financing mechanisms and risk-pooling arrangements. In 2017, the Southeast Asia Disaster Risk Insurance Facility was founded as a regional catastrophe risk insurance pool for the Lao PDR and Myanmar with financial support from Japan, Singapore, and the World Bank. In addition, the ASEAN+3 grouping (including China, Japan, and Korea), developed an emergency financing facility and mission of the ASEAN+3 Macroeconomic Research Office to develop a surveillance mechanism for climate-related macrofinancial risk for the ten countries (Volz, 2020).

Therefore, investment funding and resource mobilisation coordination are two of the most important mechanisms for regional climate change response. Resource mobilisation and investment funds are financed through ASEAN nations, bilateral and multilateral agencies, and international donors (ADB, 2014). Some ASEAN nations such as Indonesia, the Philippines, Thailand, and Vietnam have mobilised climate investment funds to accomplish their missions; magnificently develop clean technology investment plans to mobilise more than USD10 billion to enhance energy

1 See details at https://asean.org/page/481/?static_post.

efficiency, renewable energy, and sustainable transport. While countries such as Indonesia and the Lao PDR are implementing forest investment programmes, Cambodia carried out a pilot programme for climate resilience (ADB, 2007).

The paper examines funding mechanisms in ASEAN nations with a focus on (1) financing global climate responses and intervention, (2) sources of climate funding support in Asia and South East Asia, (3) Funds and initiatives supporting Southeast Asia (2003–2020); and (4) Cambodia's Official Development Assistance (ODA) for climate change responses (2009 and 2021). The paper is primarily written based on secondary sources derived from national and international publishers; they include journals, books, and research reports. A desk review technique was also an essential part of the writing by collecting, organising, and synthesising available and relevant documents. Content analysis was used to quantify certain words, phrases, subjects, or concepts in a set of historical or contemporary texts. This analysis was also applied to determine certain words, themes, or concepts within some given qualitative data collected from secondary and primary data. Besides, the authors also used situation analysis, which aims to critically evaluate the situations and conditions of climate change funding which were gone through from one period to another. This analysis provides the knowledge to identify the opportunities and challenges of climate change response in ASEAN countries.

Financing Global Climate Responses and Intervention

A report on the Global Landscape of Climate Finance 2019 by the Climate Policy Initiative (CPI) revealed that the annual flow of global climate finance rose to USD579 billion from USD546 billion in 2018. The annual global climate finance trend increased from USD342 billion in 2013 to USD612 billion in 2017 because of the rapid rise in finance which happened across nearly all types of investors (Figure 17). Developed countries have committed, based on the Paris Agreement, to finance the climate change response to achieve requirement that the long-term goals are to be consistent with a low-emission and climate-resilient pathway (EU,

2021). In exchange, developing countries have been asked to decrease their greenhouse gas emissions.

In 2010, the Green Climate Fund (GCF) was initiated to provide financial support for reducing the green gas emissions and climate change adaptation in developing countries. The GCF has coordinated wider investments to effectively address the causes and consequences of climate change through promoting low-carbon and climate-resilient development in developing countries. The fund provides financing through grant components of investments, technical assistance (stand-alone and piggyback or linked to loans), and direct charging. It has three components: (1) adaptation, (2) clean energy development, and (3) reduced emissions from deforestation and forest degradation and improved land use management (REDD+) and land use (Nature, 2021).

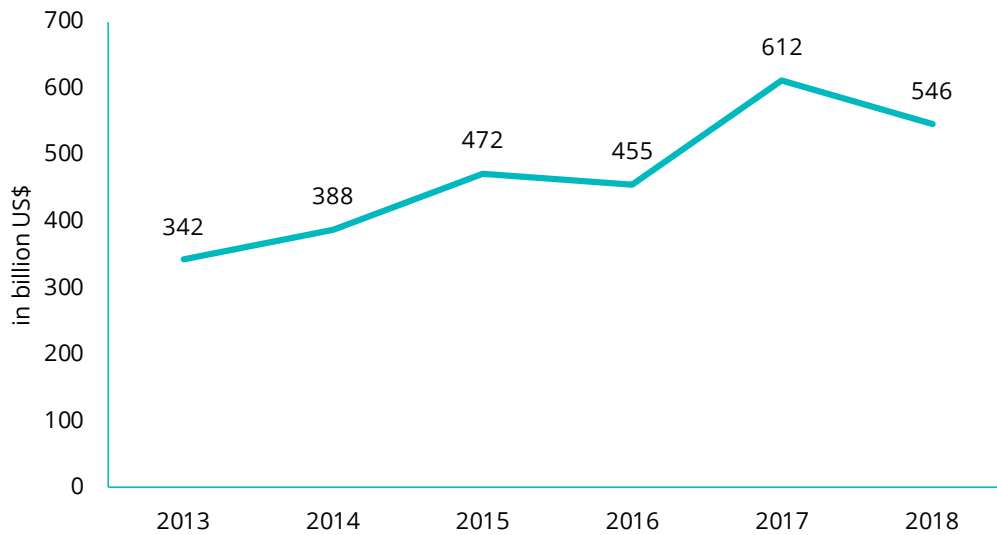
Domestic, bilateral, and multilateral development financial institutions have continued to fund the majority of public finance and increased their average commitments in 2017/2018, but economic developments in 2018 led some major players to reduce their investment (Climate Policy Initiative 2020). Regional economic growth has increased domestic funds from the national budget to advance infrastructure. In 2017/2018, the total global finance was USD579 billion, derived from private actors (USD326 billion) and public actors (USD253 billion). A slowdown in the world's economic growth and a change in national policies toward deleveraging and financial risk management, in particular in East Asia and the Pacific, was likely to impact national development financial institutions in 2018. Many bilateral and multilateral DFIs, individually and collectively, have recently made renewed commitments to significantly increase levels of financing in the short term and work toward making all development bank finance compatible with the climate and SDG goals in the longer term (Climate Policy Initiative 2020).

Multilateral climate funds play a substantial role in assisting nations to implement low-emission, climate-resilient development trajectories. Funds are being used for capacity building, research,

and technological advancement for reducing the barriers to other climate finance flows. The multilateral climate funds also have critical political implications, reflecting recognition by developed nations. The developed countries have a strong commitment to reducing historical greenhouse gas emissions in line with the UNFCCC to support developing countries to mitigate and adapt to climate change (Climate Funds Update 2021). Since 2014, it has met initial pledges worth USD10.3 billion. Of the total, the European Union (EU) has

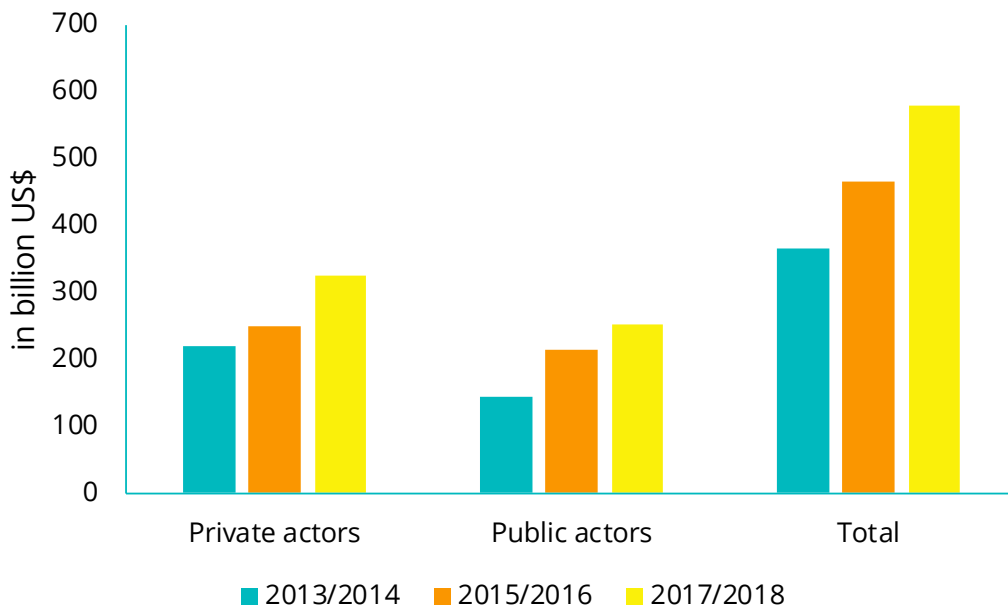
pledged approximately half, i.e. USD4.7 billion. In the first Green Climate Fund replenishment in October 2019, 27 countries promised to replenish the fund with an extra USD9.78 billion equivalent for the next four years. The vast majority of the Green Climate Fund replenishment is derived from the EU Member states. Some EU Member states and regions also contribute about 95 per cent of their annual voluntary pledges to guarantee the functioning of the Adaptation Fund (EU 2021).

Figure 17: Total Global Climate Flows 2013–2018



Source: Climate Policy Initiative (2020)

Figure 18: Global Climate Flows by Public and Private Actors



Source: Climate Policy Initiative (2020)

Sources of Climate Fund Support in Asia and South East Asia

Climate funds are very important for the response in Asia because the region is home to the largest poor populations in the world. Many countries, for example Cambodia, Lao PDR, Vietnam and the Philippines, do not have a sufficient budget for their climate response, and they are highly to be vulnerable to the impacts of climate change, including floods, droughts, glacier melts, and extreme weather events (Shepherd et al., 2013). According to the World Bank (2014), Asian countries require attention to be paid to climate mitigation and adaptation because they are important for economic growth and human development. The Climate Fund Update recorded USD5.7 billion or 530 projects funded between 2003 and 2020; all these funds were donated by 17 multilateral climate funds and initiatives. Most of the multilateral climate funds and initiatives tracked by the Climate Fund Update were primarily made available in Asia through occasional loans. Key sources were obtained from the governments of Germany, Australia, Norway, and the UK (Heinrich Böll Stiftung North America 2015). Overall, the Clean Technology Fund (CTF) was the largest contribution accounting for USD1.72 billion or 34 projects. The second-largest contribution was by the Green Climate Fund (GCF-IRM, GCF-1); these sources of funds have been active since 2015. By 2010, the Clean Technology Fund (CTF) had funded USD1.67 billion or 35 projects in Asia (Heinrich Böll Stiftung North America 2021).

In the low-income countries of Asia, most of the climate funds have mainly been invested in adaptation projects. Such funds were primarily delivered through the Pilot Programme for Climate Resilience (PPCR) and the Least Developed Countries Fund (LDCF). Moreover, a large portion of adaptation projects have been developed under a multi-sectoral approach to reducing resilience, disaster risk reduction, and agriculture (Heinrich Böll Stiftung North America 2015). The implementation of multi-sectoral approaches helps to establish collaboration between organisations in different areas of policy (health, social, environment) and different sectors (public, private, and communities).

In order to support the climate change response in developing countries, the Asian Development Bank (ADB) established a climate change fund in 2008 to effectively address the consequence and negative impacts of climate change, for example floods, droughts and windstorms. In Asia and the Pacific, the ADB has funded various sectors alongside its own priorities; the climate change fund has served as a key mechanism for projects. Key responses to climate change include mitigation, resilience building, reduced emissions from Reducing Emissions from Deforestation and forest Degradation (REDD+), climate proofing of development plans and investments, and climate finance readiness (ADB 2020).

Regional assistance has also been through Greater Mekong Subregion (GMS) Climate Change and Environmental Sustainability Programme; this initiative aims to improve climate resilience, green growth, and environmental quality. The technical assistance targets three outputs: climate and disaster resilience enhancement, and facilitation of low-carbon transitions; promotion of climate-smart landscapes and environmental quality enhancement, and green technologies and financing instruments. In 2019, the Climate Change Fund contributed funding of USD3.0 million divided between USD1.5 million on adaptation and USD1.5 million on Reduced Emissions from Deforestation and Degradation and Improved Land Use Management (ADB 2020). The financing responses to climate change are required to align with existing expenditure responsibilities. Moreover, the responsibilities of local governments are greater than their capacity to increase taxes, and as such, they will be dependent upon transfers from central or regional governments (intergovernmental transfers). Moreover, they might receive international public finance. This could be both from devoted climate finance funds, like the Climate Investment Funds, as well as development finance which has possible co-benefits from a climate change perspective (UNDP, UNCDF, and UNEP 2012).

Table 21: Climate Funds Supporting Asia 2003–2020

Attributes	Amount Approved (USD millions)	Projects approved
Clean Technology Fund (CTF)	1,722.9	34
Green Climate Fund (GCF-IRM, GCF-1)	1,671.9	35
Global Environment Facility (GEF-4, 5, 6, 7)	918.8	191
Pilot Programme for Climate Resilience (PPCR)	290.0	21
Least Developed Countries Fund (LDCF)	204.5	44
Global Climate Change Alliance (GCCA)	168.5	19
Scaling Up Renewable Energy Programme in Low-Income Countries (SREP)	164.2	15.0
Adaptation Fund (AF)	95.1	38.0
Forest Investment Programme (FIP)	93.4	7.0
Forest Carbon Partnership Facility (FCPF)	63.0	8.0
Adaptation for Smallholder Agriculture Programme (ASAP)	62.4	6.0
Global Energy Efficiency and Renewable Energy Fund (GEEREF)	60.3	7.0
Special Climate Change Fund (SCCF)	47.2	13.0
Partnership for Market Readiness (PMR)	32.3	13.0
UN-REDD Programme	29.4	8.0
Millennium Development Goals Achievement Fund (MDG-F)	25.0	3.0
BioCarbon Fund	19.0	1.0
Total	5,667.9	463

Source: Heinrich Böll Stiftung North America (2021)

Funds and Initiatives Supporting Southeast Asia (2003-2020)

Since the 2000s, strengthening ASEAN's Institutional Framework's climate change agenda has started to support a vision of ASEAN as one, and subsequently the formation of the three ASEAN community pillars. The current ASEAN institutional framework on the environment and climate change is established under the ASEAN Socio-Cultural Community (ASCC) pillar (ISEAS-Yusof Ishak Institute 2020). During the 11th ASEAN Ministers' Meeting on the Environment held in 2009, the Singapore Resolution on Environmental Sustainability and Climate Change was established, and the ASEAN Working Group on Climate Change (AWGCC) is responsible for administering the implementation of the relevant action plans in the ASEAN Socio-Cultural Community Blueprint 2025.² The 16th ASEAN Summit held on 9 April 2010 issued the ASEAN Leaders' Statement on the Joint Response to Climate Change to recognise the Southeast Asian region's vulnerability to climate change. The summit also discussed the development of an ASEAN Action Plan to carry out the ASEAN Leaders' Statement on the Joint Response to Climate Change (AAP-JRCC) developed by ASEAN Single Window (ASW). Moreover, ASEAN nations have promoted a common understanding of institutional arrangements for mobilising multilateral funds, for example, the Green Climate Fund, Green Investment Fund, and Adaptation Fund. ASEAN also shared information and experience on promoting the investment of the private sector in low-carbon development, production, technology advancement, and information sharing on accessing multilateral funds (ASEAN, 2012).

Regional trust and cooperation are the key policy implications among ASEAN nations to respond to climate change. The key responsibilities include promotion of renewable energy sources, for example, solar and wind power, engagement of multilateral organisations and private sector

stakeholders to intensify climate adaptation measures in agriculture and river management, and the creation of new financial incentives and market mechanisms to facilitate investments in renewable energy projects and infrastructure in cooperation with multilateral financial institutions (ISEAS-Yusof Ishak Institute 2020). In 2018, the ASEAN Smart Cities Network (ASCN) was established to influence this enriching local governance. This network is developed as a platform for cities across the region to work together, share knowledge, and build bankable projects to solve urban problems specific to each city's needs, potentials, and local contexts. ASEAN projects are operating through government-to-government channels, but the ASCN has adopted a different approach to shape partnership. This network covered 26 pilot cities,³ and their national representatives to the ASCN work together to summarise the scope of work and outcome of their smart city projects. The ASEAN Secretariat facilitates pairing up with solution partners or business entities for implementation. Up to date, it has effectively attracted regional and international solution partners from various countries such as the US, Japan, Australia, the Republic of Korea, and China. These countries provided support for infrastructure improvement, technology development, and capacity building under the ASCN. Most ASCN pilot cities developed proposals for infrastructure and public services improvement, but some of them also target climate change adaptation and environmental protection (ISEAS-Yusof Ishak Institute 2020).

ASEAN has an active leadership role in managing climate change in the global community. The stewardship is derived from the ASEAN heads of state and the government of each country. The ASEAN member countries at the regional level have issued various declarations and/or statements regarding climate change at their summits held in 2007, 2009, 2010, 2011, 2014, 2015, 2016, and

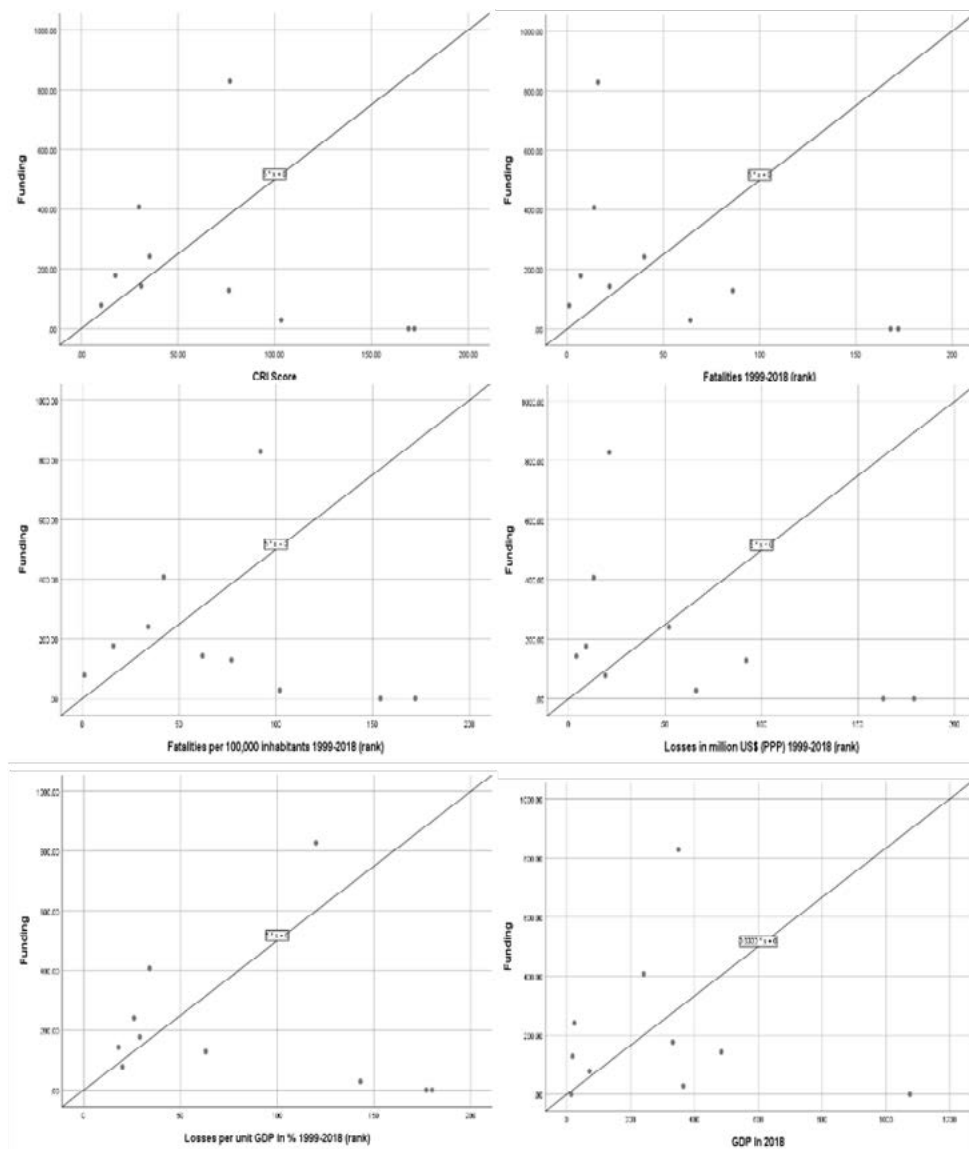
² See details at: <https://intl.dentr.gov.ph/asean-environmental-groups/asean-working-groups/article/2>.

³ The 26 ASCN Pilot Cities include Bandar Seri Begawan, Battambang, Phnom Penh, Siem Reap, Makassar, Banyuwangi, DKI Jakarta, Luang Prabang, Vientiane, Johor Bahru, Kuala Lumpur, Kota Kinabalu, Kuching, Nay Pyi Taw, Mandalay, Yangon, Cebu City, Davao City, Manila, Singapore, Bangkok, Chonburi, Phuket, Da Nang, Hanoi, and Ho Chi Minh City.

2017. Through the statements, ASEAN leaders have raised ASEAN's common concerns and ambitions regarding global resolution of the issues of climate change in order to develop an ASEAN community which is resilient to climate change through national and regional actions. Jointly, ASEAN nations have been working to reduce the negative impacts of climate change by concentrating on the implementation of actions in the ASEAN Socio-Cultural Community (ASCC) Blueprint 2025. In order to understand the pertinent strategic measures illustrated in the ASCC Blueprint 2025, the AWGCC is directed by the AWGCC Action Plan that comprises priority actions until 2025. This workplan

will further be incorporated into the ASEAN Post 2015 Strategic Plan on the Environment (ASPEN), which is currently being developed (ASEAN 2021). The latest data from the Climate Funds Update, as of March 2021, recorded funds and initiatives supporting ASEAN countries between 2003 and 2020 (Table 22). Between 2003 and 2020, USD2,034 million were provided to ASEAN countries except for Singapore and Brunei. Of the total, Indonesia received USD828.3 million which was the highest followed by Vietnam (407.7 million), Cambodia (241.3 million), and the Philippines (177.6 million).

Figure 19: Relationship among Funds, CRI score, Fatalities, and Losses



Source: Climate Funds Update (2021)

The Green Climate Fund shares similar characteristics of governance and operational structure (Sovacool et al. 2017). The climate change response is funded by both public and private financial institutions to address the scale of environmental challenges faced by people and the Earth (Global Impact Investing Network, 2021). Correlation analysis shows that there is no association between the amount of funding received by ASEAN nations and the Climate Risk Index (CRI) score (P-value=0.391), fatalities 1999–2018 (rank) (P-value=0.134), fatalities per 100,000 people 1999–2018 (P-value=0.562), losses in USD millions 1999–2018 (PPP) (P-value=0.139), and losses per unit GDP in per cent (P-value=0.66) and

GDP in 2018 (P-value=0.809) (Table 22). According to the Global Impact Investing Network, funding for climate change is directly granted to the most vulnerable and poorest nations. Many least developed countries are largely dependent on external sources, the private sector, and bilateral and multilateral development banks because they do not have a sufficient public budget (EU 2021). There are various institutions to finance the climate response under key frameworks and conventions; they include Sustainable Development Goals (SDGs), the Paris Agreement, Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC) (Global Impact Investing Network 2021).

Table 22: Funds and Initiatives Supporting ASEAN Countries (2003–2020)

Countries	Fund	CRI score	Fatalities 1999–2018 (rank)	Fatalities per 100,000 people 1999–2018	Losses in USD million 1999–2018 (PPP)	Losses per unit GDP in %	GDP in USD billion
Indonesia	828.3	76.83	16	92	21	120	350
Vietnam	407.7	29.83	14	42	13	34	241
Cambodia	241.3	35.33	40	34	52	26	24
Philippines	177.6	17.67	7	16	9	29	332
Thailand	143.2	31.00	22	62	4	18	484
Lao PDR	128.8	76.33	86	77	92	63	18
Myanmar	78.2	10.33	1	1	19	20	71
Malaysia	28.9	103.33	64	102	66	143	365
Brunei	0	169.17	168	154	179	180	14
Singapore	0	172.17	172	172	163	177	1075

Source: Beirne et al. (2021) and Heinrich Böll Stiftung North America (2021)

Cambodia's ODA for Climate Change Responses (2009 and 2021)

Cambodia has made a considerable commitment to respond to the negative impact of climate change and is aligned with the global efforts to combat climate change. Moreover, Cambodia has been one of the forerunner countries pursuing a low-carbon resilient development agenda officially to address development, adaptation, and mitigation together (Fisher 2013). In 1995, Cambodia ratified the United Nations Framework Convention on Climate Change (UNFCCC). As then categorised as a Least Developed Country (LDC), Cambodia developed one of the first LDC National Adaptation Programmes of Action in regard to climate change in 1996 (CCCN, 2014). As a result, Cambodia is considered as a success story in relation to mainstreaming climate change response into public policy and the start of a clean development mechanism (CDM). Cambodia's climate change response has been administered and governed through the National Climate Change Committee (NCCC). The NCCC was established in 2006 and chaired by the Ministry of Environment (MoE). The MoE established the Cambodia Climate Change Office (CCCO) in June 2003 as a climate change secretariat, and it was later promoted to the Climate Change Department (CCD) in October 2009. The CCD is responsible for all related activities regarding the climate change response in Cambodia. The department is an arm of the General Directorate of Administration for Nature Conservation and Protection (GDANCP). Its mission is to contribute to sustainable development under climate change conditions and follow the legal framework and policies of the Royal Government of Cambodia (RGoC) (MoE, 2022). In response to the current impact of climate change, the Cambodia Climate Change Strategic Plan (2014–2023) has been formulated to envision Cambodia as a 'greener, low-carbon, climate-resilient, equitable, sustainable and knowledge-based society', and was developed as part of a Cambodia Climate Change Alliance (CCCA)-funded project (RGC, 2013, p. xi).

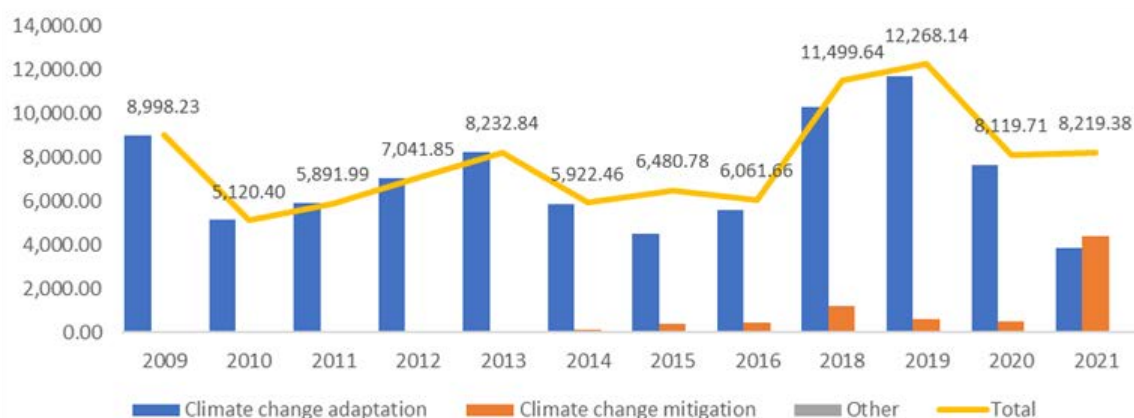
Ian Christoplos and Colleen McGinn (2016) agree that Cambodia's climate change policy is 'not principally grounded on country-level realities ...[but] internationally driven and dependent on the existing international incentives and structures

developed to support low-carbon development' (p. 369). There is no doubt that international fundings are very important for climate change programme interventions in Cambodia. The latest Official Development (ODA) hosted by the Council for the Development of Cambodia shows that Cambodia received between USD6 and 13 million per year from development partners, including bilateral agencies, multilateral agencies, and international donors (Figure 19). The highest proportion of funds was allocated to climate adaptation; only a tiny amount was used for mitigation. Key stakeholders for climate change programme interventions include government agencies from national to sub-national levels, non-governmental organisations (NGOs), communities, the private sector, and academia. At the national level, the Climate Change Department (CCD) has worked with development partners, NGOs, and international donors to get involved and take action on the ground such as the Strategic Programme for Climate Resilience (SPCR) with ADB, the Cambodia Climate Change Alliance (CCCA) (EU, Sida, UNDP) and Reducing the Strengthening Rural Livelihoods (SRL) with UNDP. Cambodia is preparing itself for a climate-resilient, sustainable future (MoE, 2022).

At the sub-national level, local government agencies are gradually applying commune vulnerability assessments to recognise climate adaptation measures that can increase a community's resilience to the negative impacts of climate change. These measures are funded through their Commune Investment Programmes (CIP). However, adaptation is the priority for Cambodia; mitigation is increasingly becoming a crucial portion of Cambodia's response to climate change. Growing evidence demonstrates that many mitigation investments can produce co-benefits in regard to climate change adaptation, development, employment, energy security, and public health. These co-benefits can contribute to achieving several Sustainable Development Goals (SDGs), in particular those related to affordable and clean energy (SDG 7), sustainable cities and communities (SDG 11), and responsible consumption and production (SDG 12) (MoE 2022).

Figure 20: Cambodia's ODA for Climate Change Responses (2009 and 2021)

Unit: in thousand of US dollars



Source: CDC (2022)

Concluding Remark

Based primarily upon our findings, but with some additional insights from impacts and responses to Climate Change in ASEAN nations, we conclude that: (1) global climate finance in 2019 was USD579 billion for long-term goals to work on a low-emission and climate-resilient pathway. While developed countries are committing to finance the climate change response, developing countries are expected to decrease their greenhouse gas emissions. (2) USD5.7 billion or 530 projects were funded in Asia between 2003 and 2020. Countries such as Germany, Australia, Norway, and the UK were the key funders. Climate adaptation is one of the main projects implemented in the least developed countries of Asia because it is very crucial for economic growth and human development. (3) USD2,034 million were recorded between 2003 and 2020 in ASEAN countries except for Singapore and Brunei. Indonesia was the biggest grantee receiving USD828.3 million, followed by Vietnam (407.7 million), Cambodia (241.3 million), and the Philippines (177.6 million). Correlation analysis shows that there is no relationship between the amount of funding received by ASEAN nations and the Climate Risk Index (CRI) score, fatalities 1999–2018 (rank), fatalities per 100,000 people 1999–2018, losses in USD million 1999–2018 (PPP), and losses per unit GDP in percentage and GDP in 2018.

Climate change funding mainly flows to the most vulnerable and low-income countries in the ASEAN region. In Cambodia, climate funds are very crucial for the national response; they are mainly derived from development partners, including bilateral agencies, multilateral agencies, and international donors. Between 2009 and 2021, the CDC's ODA database tracked between USD6 and 13 million per year from development partners to respond to climate change. As a result, climate change policy in Cambodia is more donor-driven and dependent on the existing international incentives and structures. Since the 2000s, ASEAN's climate change agenda has started to support a vision of an ASEAN Community, and subsequently the formation of the three ASEAN community pillars. The current ASEAN institutional framework on the environment and climate change is established under the coordination of the ASEAN Socio-Cultural Community (ASCC) pillar.

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11

Sustainable Finance and EU Taxonomy

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Introduction

Climate change and environmental issues have had many consequences around the globe and caused physical disruption to economic growth and the sustainable development of the world. In response to these impacts, countries around the world have developed tremendous and efficient models of technologies and measures, including mitigation and adaptation approaches to combat climate change as well as natural disasters. Key issues of implementing the approaches have been the need for an adequate livelihood framework such as physical, human, natural, and financial assets. But the financial resources have been on the forefront platform of discussion at international events such as the Conference of the Parties (COP) on how the financial resources can be sought and allocated to fulfil the climate change response approaches, and primarily support the developing countries and least developed countries where climate change has plagued their countries from economic growth and sustainable development. The COP 21 (in Paris 2015) formally called for member states of the UNFCCC (United Nations Framework Convention on Climate Change) to adopt the practical approach of sustainable finance for the climate change-related programmes and projects, which will be playing a crucial role in supporting long-term economic growth and sustainable development (UNFCCC, 2015).

Sustainable finance is known in several forms and used interchangeably: green finance, climate fund, and green investment fund (EC 2018a). The European Union (EU), in its Taxonomy Regulation, defines that Sustainable finance means the process of environmental, social, and governance (ESG) conservation when making investment decisions in the financial sector, leading to more long-term development projects encompassing sustainable economic activities. Through its taxonomy, the European Union (EU) has established its policy and regulation on financial support to ASEAN countries to combat climate change and disasters. In response to EU taxonomy, the ASEAN countries have also developed their own taxonomy (called ASEAN Taxonomy) to support sustainable financing and complement their respective

national sustainability initiatives, and serves as ASEAN's common language for sustainable finance for development projects/programmes (ASEAN Secretariat, 2021).

Sustainable finance also consists of transparency and accountability when the projects are implemented on the ground, and risks related to ESG factors are also taken into consideration in that they may have an impact on the financial system (EU, 2018). Additionally, sustainable finance plays a significant role in delivering the policy objectives and sustainable development goals (SDGs) in relation to fundamental practices (EC 2018b). For instance, the European green deal as well as the EU's international commitments on climate and sustainability objectives, Bonn Challenge aiming to bring 350 million hectares globally under restoration by 2030, and the United Nations Decade on Ecosystem Restoration has been launched and is redoubling efforts to mobilise resources for restoration (UNEP 2019). The sustainable finance frameworks in both EU and ASEAN Taxonomies have encouraged private investment funds to support the goals of becoming climate neutral, climate-resilient, and resource-efficient with a fair economy in addition to the public budget. Furthermore, sustainable finance will help the recovery of a resilient economy and impacts caused by the COVID-19 pandemic.

Overview of Sustainable Finance in Climate Change

History of Climate Finance and Its Progress

A group of visionary leaders at the Earth Summit held in Rio de Janeiro envisioned in 1992 that transforming private investment would be vital to accomplishing sustainable development. This helped to start the United Nations Environment Programme Finance Initiative (UNEP FI), which recruited its first members in May of the same year. After 29 years, the world of finance has dramatically changed. Moreover, the UNEP FI's members have been at the frontline of that change, taking steps together to shift financial institutions on the road to an economic system that enhances sustainable development. Through

the mechanism of the Kyoto Protocol 1997 and UNFCCC, many funding organisations like the EU, SIDA (Swedish International Development Agency), DANIDA (Danish International Development Agency), and USAID (United States of America) have been established in support of climate change relevant programmes/projects worldwide. As announced by the member countries of the UNFCCC in the COP21 in Paris in 2015, governments of developed countries, multilateral development banks, and multilateral climate funds declared their contribution to climate actions (Table 23). By adopting the climate finance declaration of the COP conference, member countries made funds available for recipient countries (developing and least developed), including ASEAN countries, to support their climate action programmes and projects. As the requirement of the UNFCCC, each member country has developed national policy and guidelines to mobilise the internal and external resources. Studies and reports conducted by the World Bank (WB) (2019) indicated that investment in climate change initiatives would have been sufficient to build a sustainable economy if no COVID-19 pandemic had troubled the world. Based on the October 2019 available data from the World Bank, the world will need to make essential investments in physical infrastructure over the next 15 years [around USD90 trillion by 2030] in the context of climate change, and these amounts can be realised through sustainable financing frameworks. Based on the UNFCCC mechanism, ASEAN nations have also developed their financial mechanisms by attracting funds from EU countries and mobilising their internal resources to support the climate change programmes/projects. However, the dimensions of the fund vary from one country to another due to their economy and the necessity to invest in climate change initiatives while considering other vital sectors of each nation.

Review of International Financial Mechanisms

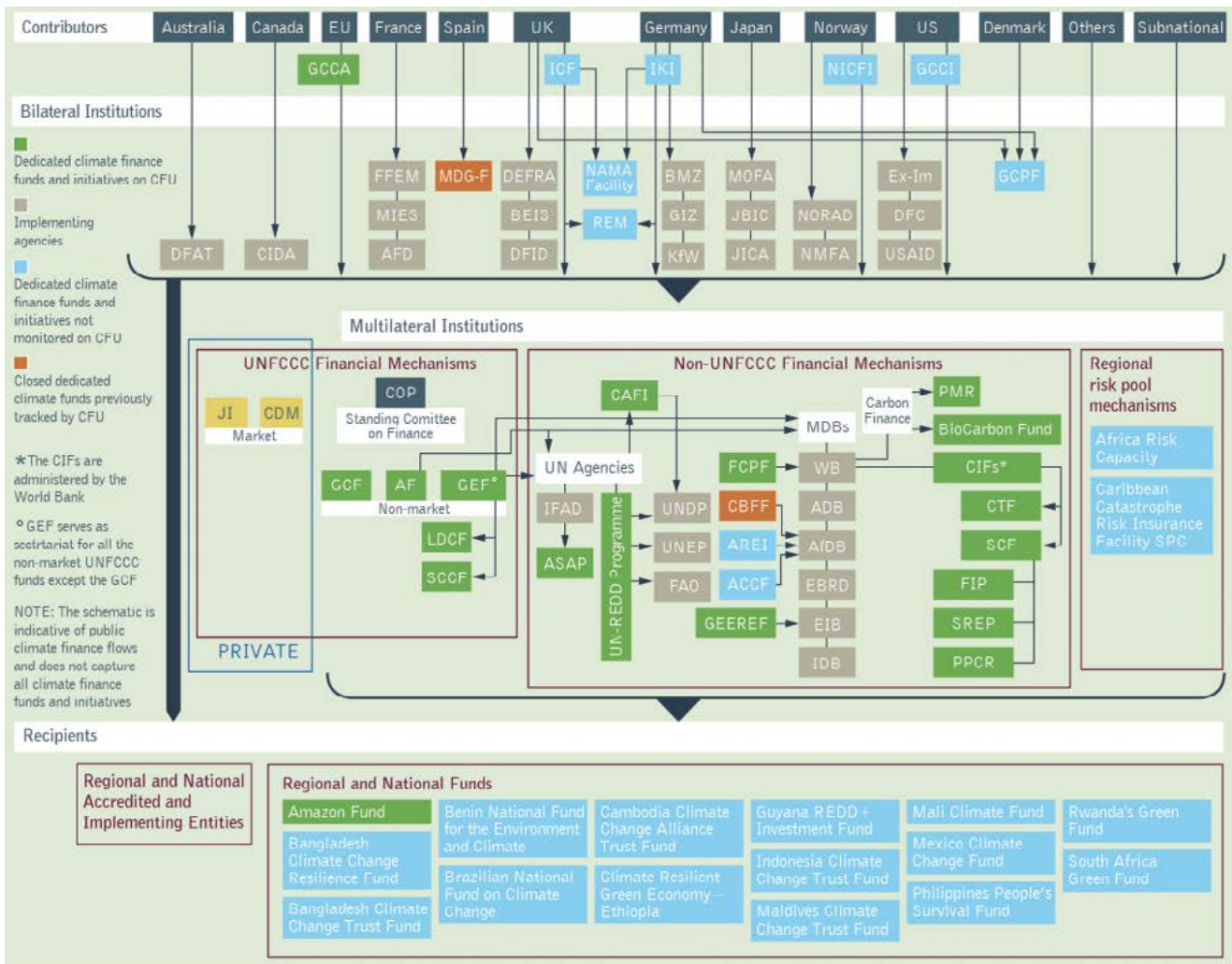
Through the financial mechanism of the UNFCCC, the member countries¹ agreed to contribute substantial funds to climate-related programmes and projects through various channels like international, multilateral, bilateral, and regional initiatives. This is called a “global climate finance architecture”, which is complex and constantly evolving (Figure 21) (CFU 2020). A growing number of recipient countries are also setting up national climate change funds that receive funding from multiple contributor countries to coordinate and align contributor interests with national priorities.

The kinds of climate finance available differ from one to another, like grants and loans, security guarantees and private equity. The architecture of climate finance comprises the different structures of governance, modalities, and objectives based on an agreed framework with loan recipient countries. The climate finance mechanisms also increase the challenges of coordinating and accessing finance, as well as its monitoring. While disclosing information of climate finance programmed through multilateral initiatives is growing, detailed information on bilateral initiatives, regional and national funds is rarely available and sometimes inaccessible. Since then, the ASEAN countries have not created their fund specifically for climate finance, and they are mostly recipient countries from developed countries and UN bodies. As of March 2021, the ASEAN nations called for the establishment of sustainable finance called “ASEAN Taxonomy” in connection to the EU framework.

Based on the UNFCCC policy and mechanism of climate finance, a number of financing bodies have been established, such as multilateral, bilateral, development bank loans, regional and national initiatives.

1 As of 2018, the UNFCCC has 197 parties including 196 United Nations member states, and one regional economic integration organisation. <https://unfccc.int/process-and-meetings/the-convention/status-of-ratification/status-of-ratification-of-the-convention>.

Figure 21: Global Climate Finance Architecture



Source: Climate Fund Update (2020)

Multilateral Funds

The multilateral climate finances have grown fast in the last decade and offer recipient countries a financing way that is less influenced by donor-led approaches and ways of working. Below are short reviews of multilateral finance bodies that can potentially mobilise the resources for Asian countries and Cambodia, particularly from EU to ASEAN countries (CFU, 2020).

1. The Global Environment Facility (GEF) was established in 1991 as an operating entity of the financial mechanism of the UNFCCC for environment-related sectors, administering funds for the Paris Agreement, Conventions of biodiversity and desertification, and several other Conventions primarily for developing and least developed countries. For the sixth replenishment of the GEF (GEF6, 2014–2018), USD4.43 billion for all focal areas was pledged by 30 donor countries, of which USD1.26 billion was allocated to the climate change focal area. For the seventh replenishment period (2019–2022), USD4.1 billion was pledged by around 30 countries to support all five focal areas. Funds for biodiversity and land degradation were increased, but funds for climate change were slightly decreased to USD700 million due to the growth of the GCF. As of December 2020, the GEF had endorsed more than 834 projects in the targeted area of climate change accounting for USD4.1 billion through its fourth, fifth, sixth, and seventh Trust Fund.
2. The Adaptation Fund (AF) was launched in 2009 under the UNFCCC with a total budget of USD1,039 million, and USD454 million has already been disbursed to projects. The AF channelled direct climate finance for developing countries via the accredited National Implementing Entities that consider the environmental, social, and gender standards with technical support of UN agencies or multilateral development banks (MDBs).
3. The Green Climate Fund (GCF) was created at the Durban COP and approved its first projects at the end of 2015. Like the GEF, it assists as an operating entity of the financial mechanism of both the Paris Agreement and the UNFCCC. The fund supports the projects addressing the paradigm shift towards climate resilience and low-carbon development in developing countries with a country-driven mechanism and a commitment to a 50:50 balanced allocation of finance to adaptation and mitigation. The first mobilisation process raised USD10.3 billion. By November 2020, the GCF's fund had resulted in pledges from 31 contributors of funds amounting to USD9.9 billion.
4. The Climate Investment Funds (CIFs) were established in 2008 and are administered by the World Bank in partnership with regional development banks like the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), the African Development Bank (AfDB), and the Inter-American Development Bank (IDB). The CIFs focus on geographical areas in selected developing countries, with the objective of sustainable development through climate-resilience activities. The total funds of USD8 billion are pledged for CIFs. The CIFs have financed various programmes like Clean Technology Fund (CTF), Strategic Climate Fund (SCF), the Pilot Programme for Climate Resilience (PPCR), and the Scaling Up Renewable Energy Programme in Low-Income Countries (SREP), and the Forest Investment Programme (FIP).
5. Multilateral Development Banks (MDB) have the key role of delivering multilateral climate finance to developing and least developed countries like in ASEAN, with climate finance commitments of USD61.6 billion made in 2019 alone (EBRD et al., 2020). The MDBs mainly include the WB, AfDB, ADB, EBRD, and IDB, which have incorporated climate change considerations into their core lending and operations. There are various funding packages beneficial for the ASEAN region as well and being managed by the MDBs, including the Forest Carbon Partnership Facility (FCPF) for REDD+, Partnership for Market Readiness

(PMR) BioCarbon Fund by the WB; the EU's Global Energy Efficiency and Renewable Energy Fund (GEEREF) by the European Investment Bank.

6. Other initiatives led by UN Agencies include UN agencies like the UNDP, UNEP, and FAO which perform the roles of implementing entities for the GEF, SCCF, LDCF, AF, and the GCF. The UN-REDD Programme, run in 2008, brought together the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP),

and the Food and Agriculture Organization of the United Nations (FAO) to improve REDD+ activities in developing and least developed countries. Similarly, the International Fund for Agriculture and Development (IFAD) executes the Adaptation for Smallholder Agriculture Programme (ASAP), which assists smallholder farmers in scaling up climate change adaptation in rural development programmes.

Table 23 below presents the committed funds to combat the climate change impacts.

Table 23: Funding Agencies Supporting the Climate Change and Natural Resource Management Projects/Programmes (COP 21 in 2015 in Paris), Especially EU to ASEAN Countries

No.	Funding Sources	Amounts (mil)	Periods	Targeted Actions	Remarks
A Governments of Developed Country Parties					
1	Belgium	EUR 61	until 2020	Mitigation and adaptation	Additional EUR 51.6 mil. to support GCF
2	The Czech Republic	USD 7.3	2015–2020	Mitigation and adaptation	USD 5.3 mil. for GCF, USD 2 mil. for climate finance readiness activities.
3	Denmark	USD 38	2016–2020	Mitigation and adaptation	Of which USD 22 mil. was allocated to the Least Developed Countries Fund
4	Estonia	EUR 6	2015–2020	Mitigation and adaptation	USD 1 mil. to GCF
5	European Commission	EUR 10,000	2016–2020	Mitigation and adaptation	About EUR 2 bil. per year
6	Finland	EUR 500	2016–2020	Mitigation and adaptation	New investment funding for developing countries
7	France	EUR 25,000	2016–2020	Mitigation and adaptation	The annual increase of adaptation finance to EUR 1 bil. by 2020
8	Germany	-	2016–2020	-	It is expected to double its international climate finance by 2020 compared to 2014
9	Hungary	USD 3.5	2016–2020	Mitigation and adaptation	Additional USD 3.5 mil. to GCF
10	Iceland	USD 50	2016–2020	Adaptation	Focus on geothermal development, sustainable land and ocean management, and gender equality in climate action.
11	Ireland	EUR 175	2016–2020	Adaptation	Contribution to the Least Developed Countries Fund
12	Italy	USD 4,000	2015–2020	Mitigation and adaptation	Support for international climate finance
13	Lithuania	-	2015–2020	Adaptation	EUR 0.1 mil. for GCF in 2015

14	Luxembourg	EUR 365	2014–2020	Mitigation and adaptation	EUR 245 mil. of climate-related ODA and an additional EUR 120 mil. for international climate finance
15	Netherlands	EUR 550	2015–2020	Mitigation and adaptation	EUR 440 mil. in 2015 and in 2016 increased to EUR550 mil
16	Norway	USD 2,000	2016–2020	Mitigation	Focus on REDD+
17	Poland	USD 8	2016–2020	Mitigation and adaptation	Support for Green Climate Fund
18	Slovenia	-	2016–2020	Mitigation and adaptation	Increased climate finance support by 50% from 2016 to 2020
19	Spain	EUR 900	2016–2020	Mitigation and adaptation	
20	Sweden	-	2016–2020	Mitigation and adaptation	Double multilateral climate support in 2016 compared to 2015.
No.	Funding Sources	Amounts (mil)	Periods	Targeted Actions	Remarks
B Multilateral Development Banks					
21	Asian Development Bank	USD 6,000	2016–2020	Mitigation and adaptation	USD4 bil. for mitigation, USD2 bil. for adaptation
22	European Bank for Reconstruction and Development	USD 20,000	2016–2020	Mitigation and adaptation	
23	European Investment Bank	USD 100,000	2016–2020	Mitigation and adaptation	Support development through grants and loans with 35% of total lending by 2020.
24	World Bank Group	USD 145,000	2016–2020	Mitigation and adaptation	Upsurge in climate financing, from 21% to 28% of annual commitments by 2020
C Multilateral Climate Funds					
25	Green Climate Fund (GCF)	USD 10,100	2016–2020	Mitigation and adaptation	Support from the developed countries
26	Least Developed Countries Fund (LDCF)	USD 248	2016–2020	Mitigation and adaptation	Hosted by the Global Environment Facility, a fund contributed to by 11 countries
27	Adaptation Fund (AF)	USD 75	2016–2020	Adaptation	Contribution from Germany, Sweden, Italy, and the Walloon Region of Belgium

Source: UNFCCC (2015)

The climate funds mostly came from the developed countries in Europe, North America, Australia, and Japan. The fund pledged by the member countries of the UNFCCC during the COP 21 accounts for about USD355 billion from 2015 to 2020. Other superpower countries like China and Russia did not pledge any funding in support of international climate change actions during the conference. Still, they might internally arrange a budget for climate change activities within their country. Many countries in Asia and Africa are considered as fund recipient nations as they are still in the categories of developing and least developed countries. The funds are primarily channelled in loans to the public sector of UN member countries, for which a large portion of the loans is for mitigation followed by adaptation measures. The funded loans usually have an attached grant as technical assistance to support the execution of loans from the donor countries and banks. Multilateral climate funds like the GCF, LDCF, and AF provide concessional loan terms (low-interest rates) and grants to climate-proofing programmes in developing countries.

Bilateral Funds

In addition to the multilateral finance mechanism, the Bilateral Finance Mechanism of EU nations is also in place to support developing and least developed countries in ASEAN based on bilateral agreements between donors and recipient countries through the existing development agencies (like the EU, DFID-Department for International Development, Sida, Danida, AFD-French Development Agency, GIZ-German Corporation for International Cooperation, NORAD-Norwegian Agency for Development Cooperation, etc.) and these may not be under the mechanism of the UNFCCC. Special terms and conditions are mentioned in the agreement, but it may be not easy to access them. The Bilateral Funds have limited transparency and consistency in the reporting of finance disbursed for climate change programmes. However, some countries with self-classifying and self-reporting climate-relevant financial flows have not had independent verification or a standard reporting format. The 2018 Biennial Assessment reported that USD31.7 billion from 2015–2016 was financed annually by

developed to developing countries bilaterally, in addition to that spent through climate funds and development finance institutions (UNFCCC, 2018). In addition, an annual average of USD30.3 billion in climate-related official development assistance (ODA) was reported to the Organization for Economic Cooperation and Development's Development Assistance Committee (OECD DAC) in the same year. Germany's International Climate Initiative (IKI), the UK's International Climate Fund (ICF), and the EU's Global Climate Change Alliance (GCCA) have been the most relevant climate-specific bilateral funds in recent years. Other bilateral donors (including Sweden and the US) are currently providing climate-related development assistance to developing and least developed countries around the world, including ASEAN countries like Cambodia. They could remain relevant for the financing of the country's National Adaptation Plan (NCS 2017). Below are prominent bilateral funding organisations that provide funds in support of developing and least-developed countries' climate change relevant activities (CFU 2021) with particular reference to the EU to ASEAN nations:

- » **GCPF** — Global Climate Partnership Fund (Germany, UK, and Denmark): managed by the German ministry (Federal Ministry for Environment, Nature Conservation, and Nuclear Safety), and German Development Bank (KfW) that finances projects/programmes specifically on renewable energy and energy efficiency through public-private partnership.
- » **ICF** — International Climate Fund (UK): pledged GBP5.8 billion from 2016 to 2021. In 2019, the ICF increased the fund to GBP11.6 billion to assist developing nations to cope with the impacts of climate change from 2021–2026. The UK ICF channels a substantial share through dedicated multilateral funds, including the CIFs and the GCF.
- » **IKI** — International Climate Initiative (Internationale Klimaschutzinitiative, Germany): has committed over USD4 billion for more than 730 projects on mitigation, adaptation, and REDD+ since its establishment in 2008. The initiative was funded initially partly through the sale of national tradable emission certificates, providing finance that is mostly extra to existing development finance commitments.

- » **MDG-F** — MDG Achievement Fund (implemented by the UNDP). The overall funding was nearly USD900 million disbursed for 130 programmes in 50 countries across eight thematic areas from 2007 to 2010. The Environment and Climate Change Window had a total funded amount of USD89.5 million, and Spain was the only contributing country.
- » **NAMA facility** — Nationally Appropriate Mitigation Action facility (UK, Germany, Denmark, and the EC); the fund supports the NAMA Facility that supports nationally appropriate mitigation actions (NAMAs) in developing countries.
- » **NICFI** — Norway's International Climate Forest Initiative: The Norway government has committed USD350 million each year since its operation in 2008 through bilateral partnerships, multilateral channels, and civil society. The pledged funds have been made for REDD+ activities in Brazil, Indonesia, Tanzania, and Guyana since then, but the timeframe to end the support has not been indicated.
- » **REM (REDD+ Early Movers by Germany and UK)** — A substantial amount of funds was committed by these European countries, but the exact amount of budget was not disclosed internationally.

Regional and National Funds

Developed countries have also established their own programmes and projects. Still, most of them have provided funds through grants as well as loans to support the developing and least developed countries for sustainable development and climate change-related projects/programs. However, as member countries of the UNFCCC, a growing number of developing countries have established the regional and national channels and funds with various types of forms and functions, channeled through the international finance and domestic budget allocations, and the domestic private sector (CFU, 2020). For ASEAN countries, there are: Indonesian Climate Change Trust Fund, Cambodia Climate Change Trust Fund managed by the National Council Council for Sustainable Development (NCS), and the Philippines People's Survival Fund. Currently, many national climate change funds are being formulated in Bangladesh, Benin, Ethiopia, Guyana, the Maldives, Mali, Mexico,

Rwanda, and South Africa. The funds are financed mainly by donor communities and multilateral development banks, and UN agencies.

Sustainable Finances for ASEAN Countries

As mentioned early, many countries in Asia are grouped into Developing and Least Developed Countries. They are in the stage of badly needing financial resources to develop their economies and support the livelihoods of their hungry people. The infrastructure and agricultural sectors are the backbone of Southeast Asia's economic growth, but the region faces a considerable investment shortfall of more than USD100 billion a year (ADB 2017). To bridge this gap, private capital investment has a much, more significant role in financing infrastructure projects. To gather available financial resources from EU nations, ASEAN also announced in March 2021 the establishment of the ASEAN Taxonomy on Sustainable Finance. Each country in ASEAN has developed sustainable financial mechanisms in various ways, and they have adopted the UNFCCC mechanisms and the Taxonomy will lay out the expected standard and framework for each ASEAN country to adopt. These have been institutionalised into the national budget mechanism and the central banks. For instance, Cambodia has set up the financial mechanism for climate change programmes and projects throughout the country in relation to which the Ministry of Environment (MOE) and Ministry of Economy and Finance (MEF) have administered the mechanism through multi and bilateral cooperation with international and regional donors, private companies (in the form of Public Private Partnership), and the national budget.

Many countries in Asia are categorised as being highly vulnerable to climate risk. Myanmar, the Philippines, Cambodia, Bangladesh, Vietnam, and Thailand have been among the nations worldwide that have been most vulnerable to climate change over the last two decades (Kreft et al. 2016). According to the Global Adaption Index (2017) by the University of Notre Dame, various nations of Southeast Asia are extremely at risk to climate change while economic, social, and governance

readiness to enhance resilience has been limited. Due to their climate change vulnerability and the need to reduce carbon emissions, capital investments in green and climate-resilient infrastructure are immediately required across the region (Volz 2018). The physical infrastructure gap in developing Asia has been assessed by the ADB, costing USD1.7 trillion annually or up to USD26.2 trillion between 2016 and 2030 (ADB 2017). Of the USD26.2 trillion with expected investment by the ADB's 45 developing member countries (DMC), USD3.6 trillion is required explicitly for climate change mitigation and adaptation expenses. Of the investment, 56 per cent is required for power, 32 per cent for transportation, 9 per cent for telecommunications, and 3 per cent for water and sanitation. For Southeast Asia countries, the ASEAN Investment Report 2015 estimates that USD110 billion annually would be needed for physical infrastructure investment in power, transport, information and communication technology, and water and sanitation in ASEAN through 2025 (ASEAN Secretariat and UNCTAD, 2015).

Few countries in ASEAN have introduced sustainable finance guidelines and regulations, like the Monetary Authority of Singapore and the People's Bank of China that formed the Central Banks and Supervisors Network for Greening the Financial System, which was launched at the One Planet Summit in Paris in December 2017. The low level of involvement of Asian financial institutions in international sustainability initiatives is reflected in the low level of green lending and investment. According to the 2016 Global Sustainable Investment Review, the total amount of sustainable investment assets under management in Asia (excluding Japan) reached USD52 billion in 2016 (GSIA 2017).

In support of ASEAN countries, the ADB recently created Green Finance that identified all financing instruments, investments and mechanisms necessarily contributing to a "climate plus" approach, which will impact both climate and environmental sustainability goals (ADB 2020). Green Finance promotes the reduction of greenhouse gases and improved climate resilience, air and water quality, ecosystems, biodiversity, and use of resources. The

Green Finance solutions will also support the green recovery of post-COVID-19 economic growth in the ASEAN region. Green recovery aims to support environmentally sustainable, socially inclusive, and climate-resilient initiatives.

Sustainable Finance Mechanism for EU Countries

The European Union established its Sustainable Finance Framework in March 2018, supported by a comprehensive package of new and enhanced regulations. These consist of a new Sustainable Finance Disclosure Regulation, aiming to better categorise the sustainability authorisations of investment funds, and a new EU Taxonomy, aiming to define what economic activities are 'green' and 'grey'. This financial mechanism can be followed and implemented by the EU member countries and recipient countries just like ASEAN countries under bilateral agreements with the EU. To implement the Sustainable Finance Framework, the Sustainable Finance Action Plan (SFAP) was formulated as a primary policy objective by the European Union that aims to promote sustainable investment across the 27 nations. Some portions of the Framework have become effective from March 2021 while waiting for formal adoption of the new laws.

Moreover, the sustainable finance framework was created in response to the Paris Agreement signed in December 2015, and to the United Nations 2030 Agenda for Sustainable Development Goals (SDGs) made earlier in 2015, which established the SDGs. The framework is also aligned with the goals of the European Green Deal, which aims to see the EU carbon neutral by 2050.

The EU has contributed a considerable amount of funds for climate change-related initiatives and institutions like banks, UN agencies, and trust funds if compared with other developed nations. These include the Green Climate Fund, Adaptation Fund, Global Environment Facility, and Climate Investment Funds, which are multilateral budgets for climate change adaptation and mitigation programmes, funded by contributions from individual countries, and these funds have been made available to ASEAN countries like Cambodia

for implementing the SPCR projects from 2014–2021 with total funds (grants and loans) of about USD600 million (ICEM 2019).

EU Taxonomy of Finance on Climate Change Initiatives

The EU countries have considered the direct investments for sustainable projects and activities for achieving the Climate and Energy Targets for 2030 and achieving its objective of the European Green Deal. The COVID-19 pandemic has redirected the funds towards sustainable projects so that its economies, businesses, and societies — above all health systems — are more resilient to climate and environmental hazards and shocks. In this regard, sustainable financing is needed to achieve the common goal of sustainable economic growth. Thus, the EU countries have called for establishing a framework for sustainable funding for sustainable economic activities or an “EU taxonomy” as a standard classification system.

The EBA (European Banking Authority, 2019) defines sustainable finance as “funds allocated to optimize the economic growth while exacerbating the pressures on the environment and natural resource and considering the social and corporate governance aspects”. Sustainable finance also considers human rights, social inequality, management structures, and executive remuneration in its operation (Tang 2021). Popular examples of sustainable finance programmes include climate change response mechanisms (mitigation and adaptation), ecosystem restoration and management, and biodiversity management and conservation. Climate finance is a part of sustainable finance that aims to assist mitigation and adaptation actions. The fund can come from various sources like internal, external, and the private sector that invest in multiple sectors such as renewable energy, transportation, and infrastructure.

The European Union, as one of the main international bodies, strongly supports the initiatives of transition into a more resource-efficient, low-carbon, and sustainable economy and has been at the frontline to create sustainable financial systems to back sustainable growth and development. In 2015, the EU the forerunner in adopting the UN 2030 agenda, sustainable development goals, and the Paris climate agreement. The Paris climate agreement mainly includes the commitment to align financial flows with a pathway towards low-carbon and climate-resilient development.

As part of the European green deal strategy, it aims to make EU countries part of a climate-neutral continent by 2050 by investing in and mobilising more than €1 trillion of sustainable investments in the next decade (EU 2018). This will establish the right environment — or ‘enabling framework’ — to coordinate and rouse the public and private investments desired for the change to a climate-neutral, green, competitive, and inclusive economy for which the EU taxonomy needs to be formulated in order to implement the EU green deal. The EU taxonomy will guide companies, investors, and policymakers to consider environmental sustainability in their activities. In addition, the taxonomy will create guaranteed security for investors, safeguard private investors from greenwashing, assist private companies to become more climate-friendly, mitigate market fragmentation and help shift investments to where they are most needed.

On 12 July 2020, the EU taxonomy entered into force following its official release on 22 June 2020. It sets out four overarching environmental objectives² to make sure that any economic activity needs to be qualified as environmentally sustainable (EU 2021). To implement the Taxonomy Regulation, the EU also established the IT tool called “EU Taxonomy Compass” that guides investors, developers, and private sector-related bodies to check the eligibility of technical screening criteria for additional

2 Environmental objectives: 1) sustainable use and protection of water and marine resources, 2) transition to a circular economy, 3) pollution prevention control, and 4) protection and restoration of biodiversity and ecosystems.

economic activities substantially contributing to the climate objectives and the other environmental objectives of the Taxonomy Regulation. The key aim of the EU Taxonomy Compass is to make it easier to integrate the criteria into business databases and other IT systems for comprehensive analysis of business and investment opportunities that do not harm the environment and are climate-friendly. The key and its sub-sectors on which the EU Taxonomy Compass focuses include forestry; environmental protection and restoration activities; manufacturing; energy; water supply, sewerage, waste management, and remediation; transport; construction and real estate activities; information and communication; professional, scientific and technical activities; financial and insurance actions; education; human health, and social work activities; and arts, entertainment and recreation. The analysis of the eligibility of these sectors must be in relation to the six environmental objectives established under the Taxonomy Regulation such as a) climate change mitigation, b) climate change adaptation, c) the sustainable utility and protection of water and marine resources, d) the transition to a circular economy, e) pollution prevention and control, and f) the protection and restoration of biodiversity and ecosystems.

Given the Taxonomy taking effect, the EU Commission presented its 2030 climate target plan in late September 2020, with the aim to increase the emissions reduction target of 55 per cent by 2030 as compared to 1990. By doing so, the EU needs to invest some €350 billion every year from 2021-2030, which doubles the figure of the previous decade. The EU has already provided the impetus to help attract the required investments with the European Fund for Strategic Investments and other initiatives. The financial sector will be the key player in reaching the target, and this can be accomplished by:

- » re-orienting the investments towards more sustainable technologies and businesses
- » financing the growth in a sustainable manner over the long term
- » contributing to a low-carbon, climate-resilient, and circular economy

To make this happen, the EU Commission has since 2018 been developing a comprehensive policy agenda on sustainable finance, comprising the plan of action on financing sustainable growth and the development of a renewed sustainable finance strategy in the framework of the European green deal, and the new strategy for financing the change to a sustainable economy that will also benefit the ASEAN countries in terms of trade, investment and joint actions to make the world free of climate change impacts.

Conclusion

Financial capital has played a significant role in shaping the world order and the world's sustainable development and human wellbeing. Due to severe climate change impacts and unwise actions by humanity, the world has seen tragedy resulting in disasters, deforestation and degradation, and pollution. There is a dire need for substantial financial resources to restore and rehabilitate this ugly tragedy through various strategic financial mechanisms like sustainable financing frameworks, UNFCCC climate change funding, the EU green deal, and ASEAN Taxonomy, etc.

Sustainable finance and the EU Taxonomy Regulation have been established by the European Commission for the primary purpose of mobilising financial resources from both public as well as private sectors to support the sustainable development and climate-proofing projects/programmes which inflict no harm to the environment as well as accelerate non-climate change impacts. The finance has not only been made available for EU member countries, but also developing and least developed countries in Asia, Africa, Latin America, and Oceania through a variety of channels like multilateral, bilateral, and development bank agreements in terms of loans, concessional loans, and grants in support to climate change and sustainable development initiatives. Different ASEAN countries may have varied capacities and opportunities to absorb the EU funds for their projects due to social, economic, environmental and governance aspects. The EU finance is often conditional on social equality, human rights, ecological sustainability, and good

governance; and many countries in Southeast Asia find it challenging to meet the EU optimum standards as set forth in the EU Taxonomy. This has pushed each ASEAN country to gravitate towards different poles of the world such as democratic and communist nations.

EU Taxonomy regulation has set up a comprehensive IT Tool containing specific criteria and aligning with the environmental objectives indicated in the EU green deal and requires all investors and the private sector to check if their future investment projects take the environment and climate change aspects into serious consideration in the portfolio of EU Taxonomy. The mechanisms have been considered exceptionally candid assets and models so that other countries around the world, including ASEAN countries, can learn and establish their models based on political, social, economic, and environmental aspects. However, the implementation of an ASEAN taxonomy will essentially vary from one ASEAN country to another due to the individual political, economic, environmental, and governance spheres that each country has thus far developed and enhanced.

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12

Conclusion

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ASEAN, a region with a large population relying on natural resources for their livelihoods and subsistence, is threatened by the increased temperature, sea level rise, and extreme climate events, namely storms, floods, and droughts. Its vulnerability is largely defined by its low-adaptive capability, high exposure to tropical cyclones, sea level rise, high dependence on agriculture and natural resources, and other conditions. As a result, increasing catastrophic natural events have been observed and wreaked havoc on the economy, environment and social structures. Loss and damage worth hundreds of millions of US dollars to the regional economies and people have been reported annually, while the environmental impacts have also been detrimental.

The ASEAN Members States (AMS) have adopted numerous policies and strategies for adaptation and mitigation in response to climate threats. The action plans have been mainstreamed and integrated into sectoral development plans at national and sub-national levels, and public investment and awareness-raising have been conducted. Such policies and strategies include Climate Change Strategy and Strategic Plans, National Adaptation Plan, Climate Change and Green Growth Strategy, National Action Programme on REDD+, National Strategy on Disaster Prevention and Mitigation, and Public Climate Expenditure Institutional Review. In addition, all countries have submitted their Nationally Determined Contributions (NDCs), and the majority have submitted their long-term national strategy for carbon neutrality by mid-century.

Cambodia, Lao PDR, Myanmar, and Vietnam have been ranked as the most affected nations due to their heavy dependence on agriculture and natural resources and low adaptive capacity. Indonesia, Thailand, and the Philippines have also faced similar natural calamities of droughts, floods, and cyclones; however, their adaptive capacities are stronger. On the other hand, the main economic sectors, largely shared by services and industries, of three countries, namely Brunei Darussalam, Malaysia, and Singapore, are not very sensitive to climate change impacts. Therefore, sustainable water management, climate-resilient

infrastructure, climate-resistant crop research and development, ecosystem-based adaptation, multi-level collaborative adaptation, technology development and transfer, livelihood diversification, and financial support for loss and damages remain key areas for strengthening adaptive capacity for AMS to respond to climate change.

There have been notable advances in climate science and technology, particularly in such critical areas as water resources and agriculture. However, there remain gaps for improvement. For example, data reciprocity such as rainfall and temperature should be developed to understand changes at the regional level. As evidenced, some AMS have advanced climate change forecasting, downscaling, and risk and vulnerability assessments. Sharing climate change risk and vulnerability assessments, adaptation plans, and data would be beneficial for policymakers in the region to identify the most frequent and distinctive climate adaptation solutions. Moreover, the report on climate change adaptations is not widely available at the regional level in both committees (ADMC and ASOEN) in the ASEAN Socio-Cultural Community. Given that there are Work Plans for ADCM and ASOEN associated with climate change adaptation, the joint efforts of the AMS are yet to materialise.

In addition to adaptation, as of 2014, according to the most recent available data, AMS generated 3,774 megatonnes of CO₂. Of these total emissions, land-use change and forestry accounted for 43 per cent, energy generation 37 per cent, and agriculture 12 per cent. This illustrates the important role that the forest sector plays in climate change mitigation. Land-use change and forestry emissions have been relatively static over the past 20 years. However, emissions from other sources have been steadily rising. The AMS were responsible for 7.7 per cent of all global emissions in 2014, with 52 per cent of the emissions being from land use and forestry. The main drivers of deforestation and degradation in many AMS are land clearance for agricultural expansion, population growth, and timber trade.

Being the victim of climate change impacts, AMS have made commitments to mitigate their greenhouse gases emissions, even though it is

voluntary, as highlighted in the NDC. To meet their committed nationally determined contributions, AMS have implemented proactive actions in the areas of GHG inventory, GHG inventory monitoring, reporting and verification (MRV), and sector policy planning. A core issue is how to raise the ambitious level of the NDCs and the related long-term national objectives and policies. Most Member States have implemented the Reducing Emissions from Deforestation and Forest Degradation (REDD+) Programme/Strategy and reforms in the forestry sector to ensure sustainable forest management and address the core causes of deforestation while providing co-benefits for climate change adaptation, biodiversity conservation, environmental protection, and poverty alleviation. Seven of ASEAN's ten member countries are involved in at least one of the three major global REDD programmes, including the World Bank Forest Carbon Partnership Facility, the World Bank Forest Investment Programme, and UN-REDD, in addition to voluntary carbon markets. The potential emissions reduction from REDD+ varies from country to country. It largely depends on the area of forest owned and the historical deforestation that has occurred. For example, there were between 44 and 77 REDD+ projects and provincial REDD+ pilots identified in Indonesia. The REDD+ policy could decrease deforestation in Indonesia by 0.66 million hectares (17.45%) under five years of the study period (2005–2010) and reduce emissions by 1.09 million tCO₂-eq/5 years or a 24.75 per cent change of emissions.

Besides, it is also possible to increase investment in the region's traditional forms of cropping systems and forest co-management, known as "social forestry". There is a wide range of environmental and social benefits from social forestry, including carbon storage and water control and a safety net for rural communities. In ASEAN nations, including Cambodia, Indonesia and the Philippines, Thailand and Vietnam manage forest through various kinds of social forestry.

In addition, reforestation and/or afforestation should be encouraged through innovative schemes, such as Payment Ecosystem Services (PES), which encourages private and community participation

in reforestation initiatives. In addition, policies promoting reforestation must be coordinated with those governing land use and commerce. It is also critical to encourage commercial models of reforestation, afforestation, forest restoration, conservation, and community participation.

In addition to forestry and land-use, energy, agriculture, and waste and industrial processes are key for AMS to reduce GHGs. The AMS need to consider more ambitious emission reduction measures while keeping costs down by sharing best practices and new mechanisms like efficient carbon pricing and renewable energy trading through the ASEAN regional power grid, low-carbon agricultural practices, carbon capture and storage, gradual decarbonisation of the power and transport sectors, higher energy efficiency, low-carbon industrial processes, and waste management.

In this regard, the role of ASEAN in regional environmental governance should be maximised by focusing on ASEAN's capabilities and prioritising paths that significantly contribute to decreasing emissions and carbon sequestration. There are, however, challenges for the implementation of regional environmental governance, including (1) proliferation of Multilateral Environmental Agreements (MEAs) and fragmentation of GEG, (2) lack of cooperation and coordination among regional organisations, (3) lack of implementation, compliance, enforcement and effectiveness, (4) inefficient use of resources, (5) GEG outside the environmental arena, and (6) non-state actors in a state-centric system.

In order to achieve the efforts for climate change adaptation and mitigation, the funding mechanism plays a central role. The key enabler for climate financing includes the political commitment of the host countries, building adaptive institutions and capacity for project execution, and ensuring reliable access to finance, which requires additional cost over the existing mechanism implemented by the states. Therefore, there is a need for inter-state autonomous trusted civil society and local engagement to generate meaningful climate financing and distribution.

Mechanisms for financing climate change entail a multi-step process including expert knowledge, technology, and market prices to convert nature's intrinsic worth into a marketable commodity. Addressing the issue of finance mechanisms necessitates regional collaboration over existing regional mechanisms and global commitments at the national and global levels. There are a handful of financial instruments and mechanisms, including traditional loans, debt swaps, national climate funds, and carbon markets for climate mitigation and adaptation. Numerous financial agencies, including multilateral, bilateral, development banks, and regional and national initiatives have been established for resource mobilisation for Asian Countries. Moreover, the Member States have advocated a shared understanding of institutional structures for mobilising multilateral funds, such as the Green Climate Fund, Green Investment Fund, and Adaptation Fund. The members have also exchanged knowledge and experiences on encouraging private sector investment in low-carbon development, production, technological improvement, and information sharing on obtaining international financing.

The sustainable finance and EU Taxonomy Regulation has been established by the European Commission for the primary purpose of mobilising the financial resources from both public as well as private sectors to support the sustainable development and climate-proofing projects/programmes which provide no harm to the environment as well as accelerate non-climate change impacts. The finance has not only been made available for EU member countries, but also developing and least developed countries in Asia, Africa, Latin America, and Oceania through a variety of channels like multilateral, bilateral, and development bank agreements in terms of loans, concessional loans, and grants in support of climate change and sustainable development initiatives. Different ASEAN countries may have varied capacities and opportunities to absorb the EU funding for their projects due to social, economic, environmental and governance aspects. The EU Taxonomy regulation has set up a comprehensive list of tools containing specific criteria and aligning

with the environmental objectives indicated in the EU green deal and requires all investors and the private sector to check if their future investment projects take the environment and climate change aspects into serious consideration in relation to the portfolio of the EU Taxonomy. The mechanisms have been considered exceptionally candid assets and models that other countries around the world, including ASEAN countries, can learn from to establish their models based on political, social, economic, and environmental aspects.

However, EU finance is so often made conditional on social equality, human rights, ecological sustainability, and good governance, and numerous countries in Southeast Asia have challenges to meet the EU optimum standards as set forth in the EU Taxonomy. Therefore, the implementation of an ASEAN taxonomy will essentially vary from one ASEAN country to another due to the individual political, economic, environmental, and governance spheres that each country has thus far progressed and enhanced.

Ways Forward

Since the early 1990s, AMS have adopted and prioritised climate change as the top of the development agenda. As evidenced, climate change is mainstreamed into national development policies, strategies and sectoral action plans, and public budgeting along with the implementation of actual projects for GHG reductions, for example, clean development mechanism and REDD+, and public awareness-raising programmes. Recently, most ASEAN Member States have pledged to transition towards carbon neutrality by mid-century.

Safeguarding development from climate change impact and building climate resilience stress the importance of strengthening adaptive capacities. Low-carbon development is also built on a synergy between mitigation and development. This has been challenging for the developing countries and communities that are low CO₂ emitters. In addition, the triple win of climate compatible development is where adaptation, mitigation, and development are going alongside each other.

There are a number of key areas to be addressed in the ASEAN climate change response. First, significant financial resources are urgently needed for loss and damage caused by severe climate change disasters, in addition to the existing Green Climate Fund, EU Green Agreement, and ASEAN taxonomy. However, due to differences in social, economic, environmental, and governance aspects, introducing mechanisms such as the EU taxonomy to ASEAN nations may absorb funds for their projects in different capacities in regard to project formulation and implementation. Different cultural and political values may also create friction between the developed countries, mainly the EU members and the Southeast Asian States. Second, capacity building in climate change practice is needed for the AMS that rely significantly on external sources of climate finance rather than domestic ones to ensure that the climate fund is sustainable over the long term for the host country. Third, technology transfer is also an essential component. It is important to strengthen local experts and community capacity, research, information and management, technology transfer and acquisition, through education and training. In addition, the forest governance monitoring system, a crucial instrument for the ASEAN region to enhance regional legitimacy in global entities, and initiatives that support informed decision-making in the region also need to be improved. A capacity development programme for non-state actors to ensure that they are more able to support the diverse forest governance initiatives is key. Next, with abundant financial and human resources in the private sector, public-private should be promoted for technology transfer within the region and beyond.

Moreover, the potential pathway is expanding investment in social forestry as a typical cropping system model and co-management of forests in the region. This is because social forestry delivers a wider range of benefits in securing environmental services such as carbon storage, water regulation and biodiversity conservation, and is a safety net for rural livelihoods. There are almost 14 million hectares of forest managed under the various forms

of social forestry practised in ASEAN countries, especially Cambodia, Indonesia, Myanmar, the Philippines, Thailand and Vietnam.

Finally, climate change is cross-sectoral and inter-disciplinary. It requires multi-stakeholder engagement at all levels, including national and sub-national government agencies, institutions, international and local NGOs, regional policymakers, and investment agencies. Government agencies can act as leaders to create a more climate-resilient future while ensuring local empowerment and securing the existing adaptive capacity. Implementing effective climate change policies at various levels requires a multifaceted approach taking into consideration the interests of all affected people. These government agencies need to collaborate meaningfully with non-government sectors to facilitate the implementation of various policies and climate actions. More importantly, the governments must act as the facilitators who can deliver the voices of the locals to policymakers and assure that policies and actions cater for the diverse lives across the country without leaving anyone behind. Additionally, more assistance is needed from developed countries through multilateral and bilateral mechanisms of financial and technical support and technology transfer to implement REDD+, access the European carbon and other markets, and provide effective interventions and assistance for climate change adaptation and mitigation.

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Appears on p.158 of this study.

Imprint

Date of Publication: June 2022

Cover Illustration: © Pixabay/Quangpraha
Other sources indicated accordingly.

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Design Guidelines

The designated contributions do not necessarily reflect the opinions of Regional Project Energy Security and Climate Change Asia-Pacific (RECAP) of the Konrad-Adenauer-Stiftung e.V. and Asian Vision Institute (AVI).

This publication of the Konrad-Adenauer-Stiftung e. V. is solely intended for information purposes. It may not be used for the purpose of election advertising. This applies to federal, state, and local elections as well as elections to the European Parliament.

The publication was funded by the Federal Ministry of Economic Cooperation of the Federal Republic of Germany (BMZ).

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