



E-Paper

A 2030 Roadmap for Climate Adaptation in the Coffee Bean Belt of Southeast Asia

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 **HEINRICH BÖLL STIFTUNG**
SOUTHEAST ASIA

Abstract: Coffee is a cornerstone of Southeast Asia's economy, but it is facing brewing turmoil due to climate change. The warming temperatures and shifting weather patterns threaten coffee crops, putting the entire industry at stake. The ripple effect of this situation is undeniable, affecting small-scale cultivators to bustling coffeeshops. The need to mitigate these impacts has created varied responses across the region. While some nations have brewed up comprehensive policies, Myanmar's lack of action stands as a cautionary tale.

It is a pivotal moment requiring collective action, and national endeavors must evolve into regional and even global cooperation. Collaboration offers more than just a united front; it holds the promise of innovation exchange and shared wisdom. This paper sets the stage for Southeast Asian coffee stakeholders, advocating a shared roadmap for 2030. With climate challenges served on every cup, this roadmap could be the blend that safeguards economies, cultivators, and the future of the coffee industry.

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Introduction: Southeast Asia where the Coffee Bean Belt meets vulnerability to climate change

The Working Group 1 of the Sixth Assessment Report confirms that human-induced climate change is already affecting many weather and climate extremes in every region across the globe (IPCC, 2021)¹. Those extreme incidents are evident to everyone from the most developed to the least developed countries, usually in tropical cyclones, storms, floodings, droughts, heatwaves, and heavy precipitation. Such incidents, if they exceed the capacity of adaptation, will cause loss and damage to lives, and economic and non-economic aspects of our society. However, the impacts of changing climate occur at the very least noticeable than most could comprehend, such as in every cup of coffee we drink every morning!

Climate change severely impacts the coffee industry throughout its supply chain, particularly jeopardizing the coffee plantation and livelihood of millions of coffee farmers. The recent study by Richardson et al. (2023) confirms many previous studies that coffee plantations have been severely affected by climate impacts, including increasing average temperature, disrupted rainfall patterns, flooding, storms, drought, and heatwaves. Furthermore, the land suitable for coffee cultivation globally will decrease by 50% by 2050 (Slezak, 2016²; Wiener-Bronner, 2022)³. Arabica species (*Coffea arabica*), which is considered specialty coffee and has a high market value, thrives in optimal temperature range of 18-21°C. With the warming climate, the coffee cherry ripens too fast and is badly damaged if the temperature rises above 30 °C (SEI, 2021). Robusta Coffee (*Coffea canephora* var. *Robusta*), a less valuable market price commonly drank in developing countries, prefers warmer climates at 22-28 °C but is sensitive to cold. However, both coffee varieties are expected to experience ongoing systematic shocks in production due to the projected rise in global temperature (Richardson et al., 2023)⁴.

The impacts of climate change on the coffee industry have manifested in lower coffee yields and spiking prices in recent years. Since 2021, coffee prices in the global market have continued to increase, with the average price of Arabica increasing by 42.3%, and the average price of Robusta by 27.3% (Econ Digest, 2022)⁵. This has resulted from climate impacts that have affected Brazil, the world's largest Arabica supplier, and Vietnam, the

¹ <https://www.ipcc.ch/report/ar6/wg1/>

² <https://www.theguardian.com/environment/2016/aug/29/climate-change-predicted-to-halve-coffee-growing-area-that-supports-120m-people>

³ <https://edition.cnn.com/2022/01/26/business/coffee-climate-change/index.html>

⁴ Richardson, D., Kath, J., Byrareddy, V. M., Monselesan, D. P., Risbey, J. S., Squire, D. T., & Tozer, C. R. (2023). Synchronous climate hazards pose an increasing challenge to global coffee production. *PLOS Climate*, 2(3), e0000134.

⁵ <https://www.kasikornresearch.com/en/analysis/k-social-media/Pages/Coffe-FB-23-11-2022.aspx>

world's largest Robusta supplier. Brazil's droughts have caused the global coffee stocks of Arabica to decrease by around 11% in 2023, the lowest amount in 23 years. At the same time, severe flooding in Vietnam has caused the Robusta coffee supply to drop by more than half (Econ Digest, 2022).

Perfect coffee growing regions known as "the Bean Belt" (Photo 1) are geographical locations of world coffee plantations spanning between the Tropics of Cancer and Capricorn or 23 degrees north and 30 degrees south of the equator⁶. The belt passes over 70 countries from five continents: South America, North America, Africa, Asia, and Oceania. Almost all Southeast Asian countries, Vietnam, Indonesia, Thailand, Myanmar, Laos, Philippines, Malaysia, Cambodia, and *Timor-Leste*, are in the Bean Belt and have coffee plantations where most growers are smallholders⁷.

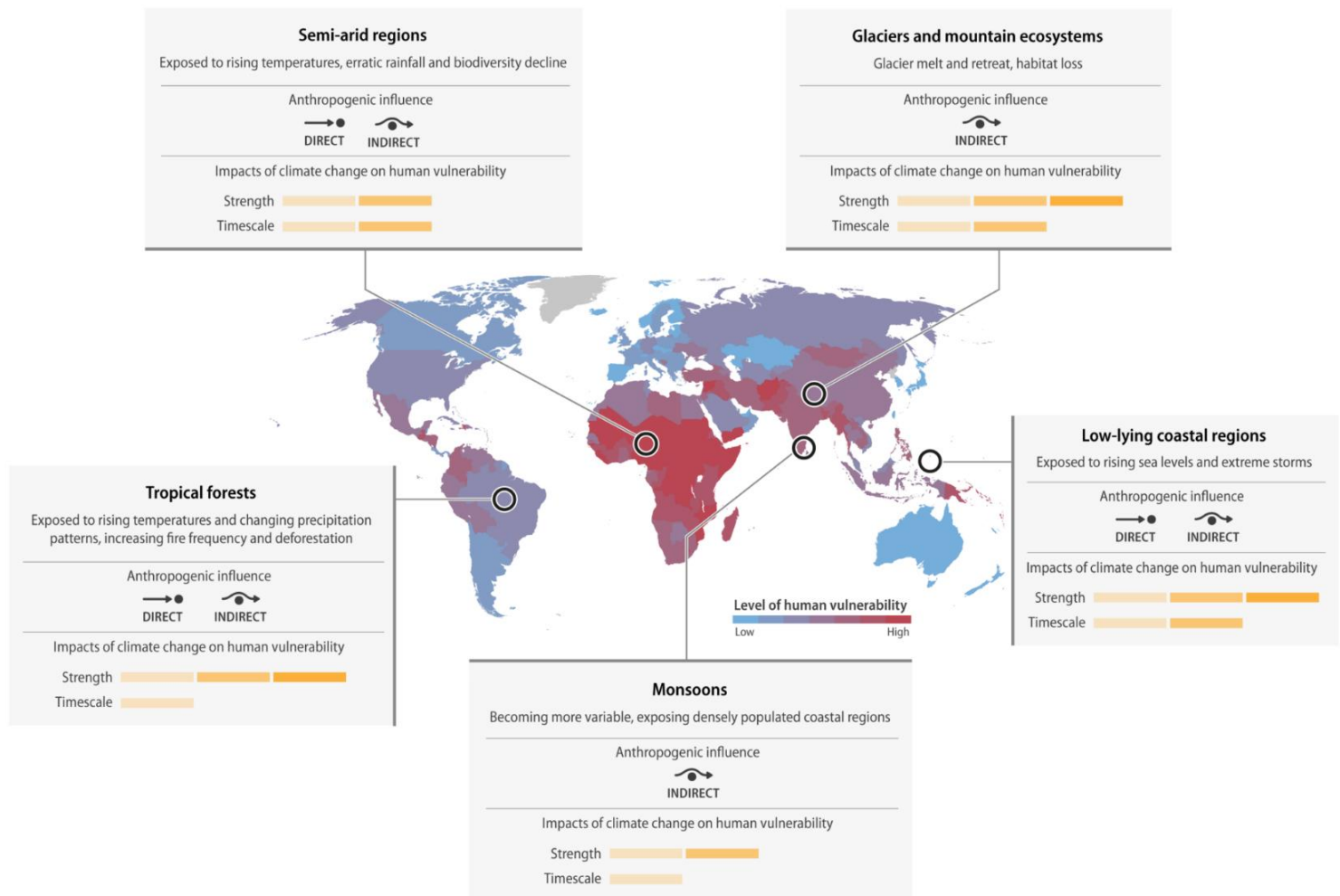


Graphic 1: The Bean Belt, source: Ryan Richardson, *The Ohio State University*⁸

⁶ <https://sprudge.com/what-is-the-coffee-belt-179028.html>

⁷ <https://fulcrum.sg/cafe-culture-and-sustainable-development-in-southeast-asia/>

⁸ <https://u.osu.edu/ryanrichardscoffeecommoditychain/sample-page/>



Graphic 2: Regions at risk of being affected by climate-driven hazards,
source: 10 Insights in Climate Science⁹

However, when looking at the global vulnerability assessment, those regions at risk of being affected by climate-driven hazards are the same as the Bean Belt regions. Based on the map (see Photo 2), vulnerable communities at risk from climate-induced extreme weather are parts of Central America, Asia, the Middle East, and several regions of Africa, i.e., the Sahel, Central and East Africa. Southeast Asia, South Asia, Africa, and South America are particularly warned of insufficient water resource availability due to climate change, affecting large populations' food security and health¹⁰. In a report by WWF Germany in 2021, it was estimated that 100 million smallholder farmers were producing primary commodities, like rice, corn, palm oil, cocoa, and coffee in Southeast Asia¹¹. A report by the UN Conference on Trade and Development (UNCTAD) in 2020 mentioned more than 20,000 small coffee farming families in Laos, with over 300,000 people working in the country's coffee industry¹².

Considering the high number of coffee smallholders in Southeast Asia whose livelihood is prone to climate-induced hazards, it is therefore imperative that the region have a coping

⁹ <https://10insightsclimate.science/year-2022/vulnerability-hotspots-cluster-in-regions-at-risk/>

¹⁰ <https://10insightsclimate.science/year-2022/vulnerability-hotspots-cluster-in-regions-at-risk/>

¹¹ <https://climatefocus.com/wp-content/uploads/2022/06/WWF-2021-Unlocking-Smallholder-Finance-for-Sustainable-Agriculture.pdf>

¹² https://unctad.org/system/files/official-document/ditctabinf2020d2_en.pdf

strategy to address existing climate impacts. The region must have prevention plans and policies to prepare itself and its vulnerable populations like those coffee smallholders for future climate risks. Do Southeast Asian countries have those plans and policies?

The need for climate adaptation for agriculture and coffee industry

Paris Agreement states the importance of both mitigation and adaptation actions by: “*increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production*” (Article 2, Paragraph (b)). However, mitigation action has been prioritized more than adaptation efforts. The NDC synthesis report reviewing NDCs¹³ from 193 Parties submitted to the UNFCCC as of 23 September 2022 found that almost all Parties (97 %) presented their domestic mitigation targets and measures, while around 80% stated their adaptation efforts and measures. Those who communicated their adaptation component in their NDCs usually referred to “the adaptation-related research; vulnerabilities; adaptation measures, in particular NAPs¹⁴ and sectoral actions; contingency measures; synergies with mitigation and other global frameworks; and monitoring and evaluation of adaptation”¹⁵.

Adaptation efforts are less prioritized, raising a critical concern in climate action. Although ambitious mitigation will be implemented, climate change’s impacts will continue and disproportionately affect populations. Therefore, adaptation strategies and actions are essential. Climate change poses severe risks to agriculture and food security, jeopardizing human security (Anderson et al., 2020)¹⁶.

Agriculture is considered the most climate-sensitive sector of the economy because it relies on land, water, and natural resources which climate affects (Ortiz-Bobea, 2021¹⁷; EPA, 2022¹⁸)¹⁹. Several climate adaptations for the agricultural sector are proposed and widely studied. They are, for example, land use and land management, crop and livestock management, water supplies improvement, water management, soil nutrient management, intercropping management, pest management, adapted crop varieties, technology research and development (Xui, 2020; ²⁰Smithers and Blay-Palmer, 2001)²¹. Farmers can make some adaptations with the help of civil society, international development organizations, researchers, or even private companies. However, many require the states' involvement and apparatus to drive and implement changes.

Scholars have suggested that the transformational climate adaptation in the agricultural sector demands the state and its formal institutions to play a role in facilitating, linking,

¹³ Nationally Determined Communications

¹⁴ National Adaptation Plans

¹⁵ <https://unfccc.int/ndc-synthesis-report-2022#Mitigation-including-co-benefits>

¹⁶ <https://www.sciencedirect.com/science/article/pii/S1369526619301219>

¹⁷ Ortiz-Bobea, A. (2021). The empirical analysis of climate change impacts and adaptation in agriculture. In *Handbook of agricultural economics* (Vol. 5, pp. 3981-4073). Elsevier.

¹⁸ <https://www.epa.gov/climateimpacts/climate-change-impacts-agriculture-and-food-supply>

²⁰ Cui, X. (2020). Climate change and adaptation in agriculture: Evidence from US cropping patterns. *Journal of Environmental Economics and Management*, 101, 102306.

²¹ <https://www.sciencedirect.com/science/article/abs/pii/S0143622801000042>

Smithers, J., & Blay-Palmer, A. (2001). Technology innovation as a strategy for climate adaptation in agriculture. *Applied Geography*, 21(2), 175-197.

and coordinating with and among other informal and non-state actors (Rickards & Howden, 2012; Islam & Nursey-Bray, 2017)²².

The need for climate adaptation strategies and policies for the coffee industry has never been more apparent. Bianco (2020) investigated five global coffee companies' climate adaptation strategies as part of their corporate social responsibility (CSR) and disappointedly found that the companies did not take the adaptation seriously, nor did they attempt to address environmental and livelihood challenges faced by smallholder coffee farmers. However, some initiatives have been taken to address these challenges. In 2018, GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) partnered with Nestle to conduct the "Improving coffee smallholder coffee farming systems in Southeast Asia or Coffee+" project to enhance livelihood and build financial and farming management capabilities for coffee farmers in Thailand, Indonesia, and the Philippines²³. The project Coffee+ created a positive outcome.

In 2022, GIZ and Nestle have decided to continue the next phase under the project "Transforming livelihoods and climate resilience of smallholder coffee producers through adopting regenerative agriculture production systems (Coffee++)". The new project Coffee++ has the same objectives of enhancing the livelihood of smallholder coffee farmers but with a new focus on addressing climate impacts in the three previous countries plus Côte d'Ivoire. Coffee++ deployed many tools and approaches, such as "coffee agroforestry and agricultural farm and landscape restoration, as well as proven approaches such as GIZ's Farmer Business School (FBS), diversifying farm income through intercropping, enhancing the capacity of farmer groups and institutionalizing project intervention through strategic partnerships to sustain project measures, resources, and approaches²⁴.

The efforts by international agencies and coffee companies are admirable. However, these may be insufficient if the governments are not involved. This section discusses the role of national governments by attempting to answer questions about their role in addressing climate impacts on the coffee industry and enhancing coffee farmers' livelihood. Do they formulate and implement policies for climate adaptation in the agricultural sector, specifically for coffee? If yes, what is the content of their national adaptation plan for addressing climate impacts on the coffee industry?

A policy review on Southeast Asian countries' agricultural and coffee industry adaptation plans

In this section, the paper reviewed the policy documents of 11 Southeast Asian countries at the international and national levels. Firstly, it reviewed Nationally Determined

²² Rickards, L., & Howden, S. M. (2012). Transformational adaptation: agriculture and climate change. *Crop and Pasture Science*, 63(3), 240-250.

Islam, M. T., & Nursey-Bray, M. (2017). Adaptation to climate change in agriculture in Bangladesh: The role of formal institutions. *Journal of environmental management*, 200, 347-358.

²³ https://www.thai-german-cooperation.info/en_US/the-coffee-project-in-thailand-has-been-launched-to-help-coffee-farmers-cope-with-climate-change/

²⁴ https://www.thai-german-cooperation.info/en_US/the-coffee-project-in-thailand-has-been-launched-to-help-coffee-farmers-cope-with-climate-change/

Contributions (NDCs) submitted to the UNFCCC (United Nations Framework Convention on Climate Change). Article 4, paragraph 2 of the Paris Agreement states, “Each Party shall prepare, communicate, and maintain successive nationally determined contributions that it intends to achieve”²⁵. The Nationally Determined Contributions (NDCs) are the efforts of each country to mitigate greenhouse gas emissions and adapt to climate change’s impacts. Parties to the UNFCCC were required to submit their NDCs for the first time in 2020, and then submit them again every five years thereafter. NDC is, therefore, an official pledge which countries give to the UNFCCC and the international community regarding their climate actions. The paper analyzed whether the countries include climate adaptation plans in their NDCs and whether they focus on the agriculture sector in general and specifically the coffee industry.

Secondly, the paper reviewed the National Adaptation Plan (NAP) (if there are any) to see if there are any points related to adaptation for agriculture, and thirdly, it reviewed the specific adaptation plan and policy for the coffee industry (if there are any).

Table 1: Eleven Southeast countries’ NDCs, NAP, and specific national adaptation policies for the coffee industry.

Country	NDC ²⁵	NAP	Adaptation plan for the coffee industry
Brunei Darussalam	<ul style="list-style-type: none"> • Brunei is committed to reducing greenhouse gas (GHG) emissions by 20% relative to Business-As-Usual levels by 2030. • Adaptation was first embedded in Brunei’s Initial National Communication submitted to UNFCCC in 2016. 	<ul style="list-style-type: none"> • Implemented Brunei Darussalam National Climate Change Policy (BNCC) for Climate Mitigation and Climate Adaptation and Resilience Efforts • NAP is under development. 	<ul style="list-style-type: none"> • No coffee policy
Cambodia	<ul style="list-style-type: none"> • Set an ambitious reduction target of 64.6 million tCO₂e (41.7% reduction compared with BAU) • Adaptation was embedded since the initial NDC (2015) and NDC (2020), containing mitigation targets and 	<ul style="list-style-type: none"> • Initiated National Adaptation Plan Process (NAP) since 2014 • National Adaptation Plan Process implemented in 2017 • NA Communication Strategy implemented in 2018 	<ul style="list-style-type: none"> • No coffee policy

²⁵ <https://unfccc.int/NDCREG>

	adaptation actions until 2030		
Indonesia	<ul style="list-style-type: none"> Indonesia has set an unconditional reduction target of 29% and a conditional reduction target of up to 41% of the BAU scenario by 2030²⁶. Indonesia formulated the NDC Adaptation Road Map and put it in Annex 2 in the revised NDC. The adaptation plan aims to build climate resilience in economic, social, livelihood, and ecosystem and landscape. 	<ul style="list-style-type: none"> Indonesia's national action plan on climate change adaptation is called Rencana Aksi Nasional–Perubahan Iklim (RAN-API).²⁷ Adaptation action for agriculture and food security is a primary sector affected by sea-level rise and changes in weather, climate and rainfall. 	<ul style="list-style-type: none"> Indonesia's central government put coffee as one of the seven strategic commodities (coffee, cocoa, coconut, cashew, pepper, nutmeg, and vanilla) to achieve a three-fold export target for 2020-2024; therefore, many policies and incentives are implemented (Andoko et al., 2020).²⁸
Laos	<ul style="list-style-type: none"> Laos set a national level 2030 unconditional target of 60% GHG emission reductions compared to the baseline scenario, or around 62,000 ktCO₂e in absolute terms 	Besides the National Adaptation Plan (2021), climate change adaptation has been mainstreamed in many national policies.	Lao Coffee Sector Development Strategy by 2025 was implemented in 2014.
Malaysia	<ul style="list-style-type: none"> It aims to reduce its economy-wide carbon intensity by 45% in 2030 compared to 2005. Malaysia explained its adaptation strategy in Annex 1 in their NDC. 	<ul style="list-style-type: none"> The NAP is not yet available. 	<ul style="list-style-type: none"> The Third National Policy (1998-2010) claimed that coffee was one of the critical commodities to be developed.
Myanmar	<ul style="list-style-type: none"> Unconditional reduction target is 244.52 million tCO₂e and 414.75 million tCO₂e if international finance and technical support are received by 2030. 	<ul style="list-style-type: none"> With support from the Green Climate Fund, Myanmar is developing its NAP. 	<ul style="list-style-type: none"> No coffee policy

²⁶ <https://unfccc.int/sites/default/files/NDC/2022-09/ENDC%20Indonesia.pdf>

²⁷ <https://www.climateactioncard.org/2018/08/indonesias-national-action-plan-on-climate-change-adaptation/>

²⁸ Andoko, E., Zmudczynska, E., & Liu, W. Y. (2020). A strategy review of the coffee policies and development by the Indonesian government. *FFTC Agric. PolicyPlatform*, 6(03), 1-12.

	<ul style="list-style-type: none"> • Myanmar prioritizes climate adaptation in its NDC due to vulnerability 		
Philippines	<ul style="list-style-type: none"> • Set an unconditional reduction target of 2.71% and a conditional target of 72.29% of the total projected business-as-usual cumulative economy-wide emission 	<ul style="list-style-type: none"> • Philippines implemented National Climate Change Action Plan (NCCAP) as its NAP. 	<ul style="list-style-type: none"> • The Philippine Coffee Industry Roadmap, first version 2017-2022, an updated version 2021-2025
Singapore	<ul style="list-style-type: none"> • Singapore aims to reduce emissions to around 60 million tons of carbon dioxide equivalent (MtCO₂e) in 2030 • Adaptation action is written in Chapter 4 on "Vulnerability and Adaptation Measures of the 5th National Communication. 	<ul style="list-style-type: none"> • Singapore established in 2010 the Resilience Working Group (RWG) to assess physical vulnerability. 	<ul style="list-style-type: none"> • Singapore Coffee Association plays an active role in building coffee industry.
Thailand	<ul style="list-style-type: none"> • Thailand pledges to reduce GHG emissions by 30 percent from the projected business-as-usual (BAU) level by 2030, and by 40% with international support. Also, it set the goals to be carbon neutrality by 2050 and net zero emissions by 2065 	<ul style="list-style-type: none"> • NAP was implemented in 2017 with 6 targeted sectors, including Agriculture and food security. 	<ul style="list-style-type: none"> • Thailand implemented National Coffee Strategy, the first version started in 2009. The recent one is from 2017-2021
Timor-Leste	<ul style="list-style-type: none"> • Refrain to set a reduction target. 	<ul style="list-style-type: none"> • The NAP was implemented in 2021 with a vision to build a climate-resilient development trajectory for the country and its people. 	<ul style="list-style-type: none"> • National Coffee Sector Development Plan Timor Leste (2019-2030) was implemented by the Ministry of Agriculture and Fisheries with the support of the ADB.
Vietnam	<ul style="list-style-type: none"> • Unconditional contribution increased from 9% to 15.8%, and conditional contribution 	<ul style="list-style-type: none"> • The NAP was implemented in 2018 with the scope from 2020-2030. 	<ul style="list-style-type: none"> • Comprehensive government policies and measures to

	increased from 27% to 43.5%.		enhance the coffee industry
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Policy review by country

1. Brunei

The NDC of Brunei submitted to the UNFCCC in December 2020 mentions the mitigation target of reducing GHG emissions by 20% relative to Business-As-Usual levels by 2030. The country has implemented the Brunei Darussalam National Climate Change Policy (BNCCP) for Climate Mitigation, Adaptation, and Resilience Efforts. Brunei is considered vulnerable to climate impacts. The country experiences higher temperatures during the dry season and higher rainfall during the wet season. The rise in sea level ~~rise~~ is a concerning issue because most of its population lives within 5 to 10 kilometers of the coastline. Furthermore, the hydrocarbon resources (oil and gas) that contribute to Brunei's social-economic activities are concentrated along the coastal areas. Brunei is developing research and long-term assessments on climate impacts such as increased temperature, sea level rise, and changes in precipitation. Nature-based solutions are prioritized as a sustainable solution to enhance climate resilience²⁹.

Brunei Climate Change Secretariat (BCCS) was established in 2018. It is mandated to develop, implement, monitor, and evaluate the country's climate change policies, strategies, and actions. The BCCS has implemented 10 strategies which are part of the BNCCP to shape the country toward low-carbon and climate resilience by 2030. Strategy No.8 states that Brunei would become climate resilient and adapt to climate risks such as flooding, forest fires, strong wind, and landslides. Securing local food production and stocks is one of the critical objectives of the adaptation strategy. However, the government prioritized rice production and implemented many measures to increase local rice production, such as opening more rice production areas and using modern high-yield varieties such as Laila and Titih (Brunei Darussalam's Initial National Communication, 2016)³⁰. There is no government policy on coffee in Brunei.

2. Cambodia

The country submitted its first NDC to the UNFCCC in December 2020. Cambodia forecasted that in 2030, overall GHG emissions of the country with FoLU (forestry and other land use) will be 154.9 MtCO₂e. Therefore, Cambodia set an ambitious reduction target in the NDC 2020 to reduce 64.6 MtCO₂e, which equals a 41.7 % reduction compared with the BAU case. Of this 64.6 MtCO₂e, the FoLU will take a significant cut for 38.1 MtCO₂e (NDC Cambodia, 2020). Because of the country's vulnerability to climate impacts, climate adaptation is prioritized in Cambodia's Initial NDC submitted in 2015, and the updated NDC 2020. Cambodia initiated the National Adaptation Plan (NAP) process in 2014, and in June 2018, the country launched its first NAP Communication Strategy to promote critical adaptation efforts in Cambodia (National Council for Sustainable Development, 2018)³¹. Cambodia experiences frequent flooding, irregular precipitation,

²⁹ <https://climatechange.gov.bn/SitePages/Pages/bnccp-goals.aspx?strategy=8#>

³⁰ <https://unfccc.int/sites/default/files/resource/brnnc1.pdf>

³¹ https://www4.unfccc.int/sites/NAPC/Documents/Parties/Cambodia_NAP_Communications.pdf

droughts, sea storms, and seawater intrusion. Furthermore, the country's economic activity is based on agriculture, which has limited human and financial resources, and little access to technology and infrastructure. According to NAP Communication Strategy (2018), it is estimated that around 80% of the Cambodian population relies on agriculture. Changes in water level in the Tonle Sap Great Lake and Mekong River, therefore, cause a negative impact on agricultural production.

The country's socioeconomic context exacerbated climate change as people do not have sufficient capacity and resources to cope with those impacts. Agriculture and water resources, forestry, coastal zones, and human health are assessed as the most vulnerable sectors. Funding required for adaptation action has been calculated as over US\$ 2 billion. Agriculture requires the highest funding, for US\$ 306,268,600 (NDC Cambodia, 2020, p.52). The government set 58 prioritized adaptation actions in these six vulnerable sectors. The agriculture sector will implement 17 actions on the issues, including agribusiness, animal health and production, agriculture and energy, and agriculture and gender (NDC Cambodia, 2020, p.4). The National Adaptation Plan Process stated that rice production is affected and significantly correlated with climate variability, droughts, and floods (National Council for Sustainable Development, 2017). However, no policy documents at the national level mentioned coffee production. Presently, there is no coffee policy in Cambodia.



Photo 1: Bunong farmers from other communities come to practice intercropping farm (Coffee mix with other crops) in Bousra Credit: Neth Prak



Photo 2: Community prepares seedlings which support by BIPA (Bunon Indigenous People Association) Credit: Neth Prak



Photo 3: Bunong farmers take coffee seedlings from BIPA's seedling place Credit: Neth Prak

3. Indonesia

Indonesia submitted its enhanced NDC in September 2022 with a more ambitious reduction target to align with increased GHG emissions. In 2019, the country recorded total GHG emissions as 1.845 GtCO₂-eq. The primary emitting sectors have been the same since the Second National Communication submitted to the UNFCCC in 2010. Land Use Change and Forest (LUCF) accounted for the most GHG emissions, followed by the energy sector (fossil fuel combustion). In its enhanced NDC (2022), the country set an unconditional reduction target of 29% and a conditional reduction target of up to 41% of the BAU scenario by 2030. As the largest archipelago country with the 3rd longest coastline in the world, Indonesia is vulnerable to climate change, particularly exposure to sea level rise. The country implemented the National Action Plan for Climate Change Adaptation (Rencana Aksi Nasional Adaptasi Perubahan Iklim: RAN-API) 2014. RAN-API aims to be a national action plan to adapt to climate impacts, integrating multi-stakeholder input and collaboration. It focuses on building resilience in three pillars: economic, social and physical, and ecosystem.

According to RAN-API, climate change affects agriculture and food security in many ways, for example, “the decline in agricultural production due to changes in precipitation and decreased water availability due to precipitation deficit, sea level rise causes inundation of sea water in coastal areas, shoreline retreat, seawater intrusion via groundwater and river, landslide, flooding, changes in the pattern of population growth and migration of pests and plant disease” (BAPPENA, 2014)³². The RAN-API reported a study from the Indonesia Climate Change Sectoral Roadmap (ICCSR) 2010 showed decreased rice production due to drought, particularly in Java Island. The policy recommends finding an alternative variety of food crops that are more resilient to climatic stress, and more land and water resources efficient than rice, like corn, green beans, sago, and canna (local plants).

Regarding coffee, Indonesia is in the Bean Belt. With its total area of coffee plantations of approximately 1.24 million hectares (933 hectares of Robusta plantations, and 307 hectares of arabica plantations) (Consulate General of The Republic Of Indonesia In Chicago, The United States Of America, 2018)³³, Indonesia is the fourth largest world coffee producer after Brazil, Vietnam and Columbia (ICO, 2021)³⁴. Therefore, the government considers coffee as one of the seven strategic commodities along with cocoa, coconut, cashew, pepper, nutmeg, and vanilla) and aims to increase threefold export value during 2020-2024 (Andoko et al., 2020).³⁵

Through the Ministries of Agriculture, Trade, and Industry, the central government oversees enhancing the coffee industry to increase the quality and quantity of coffee exports. The key challenges causing fluctuating coffee yields include climate change, farmers’ lack of knowledge and skills, limited access to credit and financial support, poor facilities and infrastructure, use of low-quality seedlings and weak pest management system, low-quality coffee beans due to minimal post-harvest handling, weak farmer institutions, limited partnerships between farmers and industry and government, limited access to technology and information, and poor trade management (Andoko et al., 2020; USAID(a), 2022)³⁶

³² https://www.accrrn.net/sites/default/files/publication/attach/ran-api_english_translation.pdf

³³ <https://kemlu.go.id/chicago/en/read/indonesian-coffee/4484/etc-menu>

³⁴ <https://www.ico.org/prices/po-production.pdf>

³⁵ Andoko, E., Zmudczynska, E., & Liu, W. Y. (2020). A strategy review of the coffee policies and development by the Indonesian government. *FFTC Agric. PolicyPlatform*, 6(03), 1-12.

³⁶ <https://www.usaid.gov/indonesia/fact-sheets/resilient-coffee-climate-action-and-access-finance-coffee-enterprises>

The central government implemented a wide range of policies and instruments to increase the value and production of Indonesian coffee along the value chain. To name a few, the Ministry of Agriculture implemented programs and incentives such as training on Good Agricultural Practices (GAP), quality seeds provision, adequate fertilizers and pesticides, and rejuvenation of coffee plantations, the Environmental Bureau launched a community-based coffee agroforestry system, the Deputy of Marketing for the Creative Economy Agency promotes Indonesian coffee products to foreign countries by adding brand values, and etc.

Apart from government policy and incentives, international actors assist in the livelihood and income development and sustainable plantation of coffee farmers in Indonesia. USAID partnered with “Root Capital,” an NGO working on agriculture from the US, and Keurig Dr Pepper, an extensive beverage company from North America, in running the program called the Indonesia Coffee Enterprise Resilience Initiative (Resilient Coffee) to assist smallholding farmers in access to finance and business education (USAID(b), 2022)³⁷.



Photo 4: Coffee farmer in Bantaeng and Gowa, South Sulawesi, Indonesia. Credit: World Agroforestry Centre/Yusuf Ahmad.

4. Laos

In May 2021, Laos submitted its NDC which set the unconditional GHG reduction target to be 60% compared to baseline scenario, or around 62,000 ktCO₂e in absolute terms. The unconditional target can be increased with support from developed countries³⁸. Lao PDR

³⁷ <https://www.usaid.gov/indonesia/press-releases/dec-19-2022-united-states-launches-resilient-coffee-support-indonesian-coffee-farmers>

³⁸ <https://unfccc.int/sites/default/files/NDC/2022-06/NDC%202020%20of%20Lao%20PDR%20%28English%29%2C%2009%20April%202021%20%281%29.pdf>

has economy is very much based on natural resources and agriculture. Over 70% of its population's livelihood was estimated to rely on agriculture (UNDP, 2018)³⁹. Besides, the country has limited capacity to cope with climate impacts due to its status as a Least Developed Country (LDC). Widespread flooding in 2018 and 2018 due to climate change had caused loss and damage to lives, livelihood, and economics across the country. On the other hand, droughts severely affect agricultural production, food security, hydroelectric power generation, and human health.

Lao PDR claimed to have started drafting the National Adaptation Plan (NAP) in 2021. The country also mainstreamed the adaptation into many national plans and policies, including the 8th National Socio-Economic Development Plan (2016 – 2020), the National Green Growth Strategy to 2030, the Ten-Year Natural Resources and Environment Strategy 2016 – 2025, a draft Urban Development Strategy to 2030, Agriculture Development Strategy to 2025 and Vision to 2030, and Strategy on Climate Change and Health Adaptation 2018 – 2025 and action plan 2018 – 2020.

Lao PDR's adaptation actions are to build resilience in the most vulnerable sectors: agriculture, forestry and land use, water resources, transport and urban development, public health, and energy. The Ministry of Agriculture and Forestry put effort into building and enhancing the resilience of agricultural activities. Because floods and droughts are the main climate impacts, crop varieties (rice and vegetables) resistant to water are introduced to farmers. In addition, climate-smart agriculture technology is applied to increase the productivity of cash crops.

Coffee is a national agricultural cash crop, thanks to the conclusion of the general government meeting held in April 2013 (Lao PDR, June 2014⁴⁰). In 2014, the Lao Coffee Sector Development Strategy (LCDS) by 2025 was approved by the Prime Minister and cabinet members of the Government of Laos. The LCDS aims to promote coffee to become a key source of national revenue and international reputation for coffee quality. It has the vision to create by 2025 "an expanding coffee sector, oriented toward quality and respect for the environment, providing sustainable and decent incomes for smallholder producers, as well as viable business conditions for private sector partners" (Lao PDR, June 2014).

Climate change and other natural disasters are posing a threat to Lao coffee. Farmers need to be educated to be aware and capable of reducing the consequences of climate impacts. The LCDS, therefore, stated the importance of strengthening the Research Centers' technical and operational capacity to provide a climate adaptation approach to coffee farming. R&D on climate-resilient coffee varieties and seedlings is also another essential adaptation solution.

5. Malaysia

Malaysia submitted its updated NDC to the UNFCCC in July 2021. This latest submission has seen a more ambitious GHG emissions reduction target, namely the pledge to reduce unconditionally economic-wide carbon intensity in 2030 by 45% compared with the 2005 level⁴¹. The country's adaptation strategy was mentioned in Annex 1 in their updated NDC, focusing on water resource management, coastal resources, agriculture and food supply,

³⁹ <https://www.adaptation-undp.org/lao-pdr-and-un-environment-launch-development-gef-project-proposal-advance-nap-process>

⁴⁰ <https://usercontent.one/wp/www.laocoffeeboard.org/wp-content/uploads/2021/10/CNCL-Strategy-LCSD-2014.pdf?media=1687232463>

⁴¹ <https://unfccc.int/sites/default/files/NDC/2022-06/Malaysia%20NDC%20Updated%20Submission%20to%20UNFCCC%20July%202021%20final.pdf>

urban and infrastructure resilience, public health, forestry and biodiversity, and cross-sectoral adaptation issues. Government support for climate adaptation manifested in the national development plans - the Eleventh Malaysia Plan (2016-2020) and the Twelfth Malaysia Plan (2021-2025).

The country has tried to develop the National Adaptation Plan (NAP), particularly after severe floodings in December 2021, which damaged 11 States and caused losses and damages of as much as RM6.2 billion (United Nations, n.d.).⁴² Prime Minister Datuk Seri Ismail Sabri Yaakob announced plans to create a Malaysian National Adaptation Plan to address the growing impacts of climate change (ICE, July 2022).⁴³ Meenakshi Raman, the president of Sahabat Alam Malaysia (SAM), an environmental NGO established in 1977, expressed concerns about the slow progress in making the National Adaptation Plan (NAP) a reality in Malaysia. She highlighted that the current planning and development approaches not only fail to integrate climate concerns but also undermine resilience to climate change (Dermawan, 2023)⁴⁴.

Climate change poses risks to agriculture and food security in Malaysia. Climate change patterns like temperature, precipitation, and humidity, will reduce crop yield. The study has raised concern that cultivating crops such as rubber, oil palm, and cocoa will not be possible due to droughts in many country areas. This is quite concerning because an estimated one-third of the Malaysian population depends on agriculture and 16% of total land use was farming or plantations for economic crops such as oil palm, rubber, cocoa, and coconut (Salmah et al., 2007; Alam et al., 2012)^{45,46}.

Oil palm is a prominent Malaysian plantation crop. However, there is an increasing awareness that coffee plantation is potentially serving as an alternative cash crop to the oil palm industry, whose prices are falling. The coffee industry in Malaysia is booming, and its consumption has been increasing over the years. Young, educated generations are major coffee regular consumers, enjoying the mushroom of international coffee chains and local coffee cafés (Ramanathan, & Ali, 2021)⁴⁷. Despite the potential contribution of coffee as an economic crop, the Malaysian government has not yet implemented a clear and robust coffee development strategy.

In the Third National Policy (1998-2010), coffee was regarded as one of the crucial commodities to be developed. The plan mentioned the government's goal of increasing the productivity and competitiveness of coffee farming (Ramanathan, & Ali, 2021, p.9-7). It is a private coffee company rather than the government that takes action to build the coffee industry in Malaysia. Nestlé in 2019 conducted a program called "Nescafe Grown Respectfully" to improve the livelihood of local coffee farmers in Kedah and revive the local coffee industry (Ramanathan, & Ali, 2021, p. 9-7).

⁴² <https://sdgs.un.org/partnerships/flood-management-and-climate-change-adaptation-malaysia>

⁴³ <https://www.ice.org.uk/news-insight/news-and-blogs/ice-blogs/the-infrastructure-blog/ipw-malaysia-proposes-climate-adaptation-plan-and-global-sdg-progress-stalls>

⁴⁴ <https://www.nst.com.my/news/nation/2023/04/902672/state-govts-not-sync-climate-crisis>

⁴⁵ SALMAH, Z., AHMAD JAMALLUDDIN, S., & CHAN, Y. M. (2007). National Policy Responses To Climate Change: Malaysian Experience. *National Hydraulic Research Institute of Malaysia (NAHRIM), Malaysia*.

⁴⁶ Alam, M. M., Siwar, C., Talib, B., Mokhtar, M., & Toriman, M. (2012). Climate change adaptation policy in Malaysia: Issues for agricultural sector. *African Journal of Agricultural Research*, 7(9), 1368-1373.

⁴⁷ Ramanathan, R., & Ali, N. (2021). Coffee Consumption and the Sustainability of the Coffee Industry in Malaysia. *Trends in Undergraduate Research*, 4(2), 91-100.

Another example of the private actor is that Sabarica, a producer of Sabah's Arabica coffee species, has been promoting awareness among the local roasters about the availability of Arabica coffee beans in Sabah. Their effort led to the growing number of local farmers of Arabica coffee plants.

6. Myanmar

Myanmar submitted an updated NDC to the UNFCCC in August 2021. Myanmar has released very small GHG emissions, around 0.61 tons of CO₂e/person (2018 data). However, it sets quite an ambitious reduction target of 244.52 million tCO₂e unconditionally, and 414.75 million tCO₂e with a condition of receiving international support by 2030. Myanmar is vulnerable to climate-induced extreme weather and more frequent and intense disasters like cyclones, floods, heatwaves, landslides, and coastal winds. Therefore, the country needs to prioritize climate adaptation and Disaster Risk Reduction (DRR). Both Myanmar's Intended Nationally Determined Contribution (INDC) and updated NDC firmly stated the government's goal in coping with adaptation and DRR and the need to receive international assistance and support on these programs. Agriculture, livestock, and fisheries are affected by coastal floods, winds, as well as riverine floods. As a result, they are the prioritized sectors for climate adaptation actions.

Regarding the agriculture sector, Myanmar formulated and implemented national plans which are related to this sector, namely the Myanmar Climate Change Policy (MCCP) (2015-2018) and Myanmar Climate Change Strategy and Master Plan (MCCSMP) (2018-2030), Agriculture Development Strategy (ADS), and Technical, Needs Assessment (TNA) for Adaptation. The country also developed a National Adaptation Plan (NAP) with the Green Climate Fund (GCF) support.

Climate Smart Agriculture Strategy implemented in 2015 set the goal for Myanmar to become a climate-resilient, with food, water, and nutrition security by 2030. Rice is the main crop in Myanmar, and Climate Smart Agriculture has mainly focused on a rice-based farming system. However, many studies have shown that Myanmar, especially the Northern regions, has the perfect environment for growing high-quality Arabica coffee (Basu et al., 2019)⁴⁸. Currently, Shan state is the major coffee producer in Myanmar, with 27,000 acres of plantation area, followed by Kayin state (10,029 acres) and Mandalay (over 5,000 acres) (ASH, 2023)⁴⁹. Despite this significant potential of coffee production and exports, there are no concrete government plans and policies to enhance and support the coffee industry in Myanmar.

As a result, many challenges in Myanmar's coffee cultivation are well recognized, but still unresolved i.e., limited production technologies and knowledge, poor infrastructure, unavailability of credit or loans, weak land law and regulation, small-scale agricultural production, poor network between growers and consumers; poor competition among farmers; and plantation are in conflicts and disputed zones (Basu et al., 2019, p.7).

⁴⁸ <https://www.theigc.org/sites/default/files/2019/09/Basu-et-al-2019-policy-brief.pdf>

⁴⁹ <https://www.gnlm.com.mm/promising-future-ahead-for-myanmars-coffee-industry/>



Photo 5: Picking Coffee by Danu Ethnic Farmers from Southern Shan State, Ywar Ngan Township, Credit: Genius Shan Highlands Coffee



Photo 6: Picking Coffee by Danu Ethnic Farmers from Southern Shan State, Ywar Ngan Township, Credit: Genius Shan Highlands Coffee



Photo 7: Coffee Drying in the Managed Drying House, Credit: Genius Shan Highlands Coffee

7. The Philippines

The Philippines submitted its NDC in April 2021 to the UNFCCC. By the year 2030, the country aims to achieve an unconditional reduction target of 2.71% and a conditional target of 72.29% of the total projected business-as-usual cumulative economy-wide emission (3,340.3 MtCO₂e). The country is in the Tropical Cyclone belt and the Pacific Ring of Fire, therefore being highly vulnerable to climate-induced hazards. It requires more than adaptation action but measures to cope with and compensation for loss and damages. It was estimated that the economic dimension from loss and damage from climate hazards in the Philippines is increasing dramatically. Super Typhoon Haiyan in 2013 caused loss and damage worth 4% of GDP, and the typhoons in 2020 ruined the agriculture sector and infrastructure, causing damage valued at approximately USD 852 million.

The Philippines has implemented a series of policies related to climate change issues, to name a few; the Climate Change Act 2009, the National Framework Strategy on Climate Change 2010-2022, and the National Climate Change Action Plan (NCCAP) 2011-2028, the National Climate Risk Management Framework of 2019 and the Sustainable Finance Policy Framework of 2020. The NAP of the Philippines is embedded in NCCAP, which set four thematic priority areas for adaptation action, including food security, water sufficiency, ecosystem and environmental stability, and human security (NICCDIES, n.d.)⁵⁰. In 2016, the country implemented the NAP-Ag Program to integrate climate change adaptation and disaster risk reduction into the agriculture sector (FAO, 2023)⁵¹.

Coffee is regarded as an agricultural commodity that has been planted and produced in the country for four centuries. However, the coffee yield dropped from 72,342 MT DC (36,171 MT GCB) in 2015 to 60,640.95 MT DC (30,320.47 MT GCB) in 2020, and the country has imported over 81% of coffee for domestic consumption (Department of Agriculture, 2022)⁵². To increase coffee production and farmers' income in the Philippines, the Department of Agriculture, the Department of Science and Technology (DOST), and the Department of Trade and Industry have collaborated in drafting and implementing the Philippine Coffee Industry Roadmap. The first version is from 2017-2022, and the updated version is from 2021-2025. The two roadmaps resulted from consultation with various stakeholders in the coffee industry, be they farmers, processors, manufacturers, related associations, and scholars (Department of Agriculture, 2022)⁵³. The SWOT analysis conducted in the current roadmap for 2021-2025 viewed climate change as threatening the coffee industry. The roadmap provides program actions to cope with climate change, such as regional and provincial climate risk and vulnerability assessment, timely and aggressive early warning systems regarding typhoons and other natural disasters, and disaster risk management activities, R&D for coffee varieties which are climate resilience i.e. drought-tolerant varieties, and R&D for coffee varieties that are tolerant for other abiotic stresses i.e. ash fall from a volcanic eruption, flash flooding (Department of Agriculture, 2022).

⁵⁰ <https://niccdies.climate.gov.ph/climate-reports/national-adaptation-plan>

⁵¹ <https://www.fao.org/in-action/naps/partner-countries/philippines/en/>

⁵² <https://www.pcaf.da.gov.ph/wp-content/uploads/2022/06/Philippine-Coffee-Industry-Roadmap-2021-2025.pdf>

⁵³ <https://www.pcaf.da.gov.ph/wp-content/uploads/2022/06/Philippine-Coffee-Industry-Roadmap-2021-2025.pdf>



Photo 8: Researcher mark coffee stem borer Credit: FUERZAS Ivey



Photo 9: Farm tour together with the Women in Coffee enablers in Sagada, Mountain Province in Luzon, Philippines Credit: Philippine Coffee Board Inc.



Photo 30: One of the coffee meetings of our NGO with the local government unit of Basilan Province in Mindanao, Philippines Credit: Philippine Coffee Board Inc.

8. Singapore

Singapore actively communicated its NDC. The country submitted a second updated NDC to the UNFCCC in November 2022, with a new reduction target of around 60 million tons of carbon dioxide equivalent (MtCO₂e) in 2030⁵⁴. Adaptation actions are referred to in Chapter 4 on Vulnerability and Adaptation Measures, of the 5th National Communication (National Environment Agency, 2022)⁵⁵. Singapore is naturally vulnerable to climate change due to its geography as a low-lying and densely populated island state. In 2010 the Resilience Working Group (RWG) was established to assess the vulnerability of Singapore under the leadership of the Ministry of Sustainability and the Environment (MSE) and the Ministry of National Development (MND). Six key physical risk areas are identified and need adaptation actions. They include sea-level rise and flood resilience, water sustainability, biodiversity and greenery, public health and food security, safe buildings and infrastructure, and the urban heat island effect (National Environment Agency, 2022)⁵⁶.

Food security is vital to Singapore as it imports 90% of its food supply. The government attempts to diversify food sources to reduce risks from food supply disruption while at the same time supporting the development of local agrifood companies to produce food in local areas. At least 30% of national nutritional needs should be produced locally by 2030. Coffee consumption in Singapore is rising, especially during and after the COVID-19 pandemic. In fact, the country started coffee plantations during British Colonial rule. The ethnic migrants in Singapore brought their indigenous coffee cultures and set up coffee houses called Kopitiams, which has built the unique coffee culture of the country (FoodTechBizDesk, 2023)⁵⁷. Although Singapore does not have a coffee plantation, it has established itself as a regional hub for coffee trading. The Singapore Coffee Association recently *set a plan for Singapore to become a regional specialty coffee trading hub*.

According to Victor Mah, SCA President and the president of the Association of Southeast Asian Nations Coffee Federation (AFC), Singapore's location is at the center of one of the world's most critical coffee-producing regions and busiest shipping lanes. With its track record of ease of business and free trade agreements with 26 countries and blocs, it is an ideal link between major coffee-producing and consuming markets in Asia and beyond. It is a vast transshipment coffee center for the whole Asia-Pacific region, with excellent port and air cargo facilities, banking and insurance facilities, and the presence of international coffee traders (Economic Review, 2021)⁵⁸.

⁵⁴ <https://unfccc.int/sites/default/files/NDC/2022-11/Singapore%20Second%20Update%20of%20First%20NDC.pdf>

⁵⁵ <https://unfccc.int/sites/default/files/resource/Singapore%20-%20NC5BUR5.pdf>

⁵⁶ <https://unfccc.int/sites/default/files/resource/Singapore%20-%20NC5BUR5.pdf>

⁵⁷ <https://www.foodtechbiz.com/business-updates/singapores-unique-coffee-culture-attracting-producers-and-caf-operators-worldwide-says-globaldata>

⁵⁸ <https://sbr.com.sg/economy/news/singapore-eyes-becoming-key-trading-hub-specialty-coffee>

9. Thailand

The country submitted its second updated NDC in November 2022. Thailand pledged to reduce GHG emissions by 30% from its BAU level by 2030 and will increase up to 40% with international support⁵⁹. Besides, Thailand is committed to reaching carbon neutrality by 2050 and net-zero emissions by 2065. According to the Long-Term Climate Risk Index (CRI): World Map of the Global Climate Risk Index from 1997 – 2016, Thailand was ranked No.9 for being a country at risk of climate impacts in the form of extreme weather. The country, therefore, gives adaptation action equally important to mitigation.

Thailand's NAP was implemented in 2018 by the Office of Natural Resource and Environmental Policy and Planning (ONEP), Ministry of Natural Resources and Environment. The NAP assessed vulnerability and proposed general adaptation plans for six sectors: water management, Agriculture and food security, tourism, public health, natural resource management, human settlement, and security⁶⁰. The NAP was integrated into other national frameworks to drive adaptation actions such as the draft Action Plan for Climate Change in Agriculture (2023 – 2027), the Climate Change Adaptation Plan on Public Health (2018 – 2030), the 20-year Water Resource Management Master Plan, and the Spatial Plans.⁶¹

Coffee is an essential economic crop in Thailand, apart from rice, sugar cane, and corn. The Ministry of Agriculture and Cooperatives implemented the first National Coffee Strategy in 2009. However, the plan was unsuccessful due to financial constraints and incomprehensive planning. The present version was from 2017-2021, aiming to enhance the coffee industry throughout its value chain and focus on Thai coffee's potential and unique identity⁶². However, the coffee industry is facing critical challenges. Since joining the AFTA (ASEAN Free Trade Area) on 1 January 2010, it resulted in reduced import tax of coffee beans and instant coffee from 5% to 0%. This affected Thailand's competitiveness with Vietnam, Laos, and Indonesia, which have higher yields and lower production costs.

Thai coffee plantation is mostly agroforestry or mixed garden; therefore, it cannot provide high yield like the monoculture plantation. National Coffee Strategy (2017-2021) set a vision for Thailand to become a coffee production and trading leader in Southeast Asia and promote Thailand's unique coffee identity in the global market.

The Thai coffee industry has a distinguished development strategy for each type of coffee due to having different challenges: Most Arabica plantations are located on land without private ownership, which means farmers do not have the right to receive support from the government. Climate change affected Arabica plantations in various ways, such as severe spreading of rust disease and insects such as Coffee Berry Borer (*Hypothenemus hampei ferrari*); coffee processing not meeting the standard; lack of labor to harvest coffee cherry; incorrect storing methods; and illegal import of Arabica coffee beans from another country.

⁵⁹ <https://unfccc.int/sites/default/files/NDC/2022-11/Thailand%202nd%20Updated%20NDC.pdf>

⁶⁰ <https://climate.onep.go.th/wp-content/uploads/2019/07/NAP.pdf>

⁶¹ <https://unfccc.int/sites/default/files/NDC/2022-11/Thailand%202nd%20Updated%20NDC.pdf>

⁶² <https://www.doa.go.th/hort/wp-content/uploads/2019/11/%E0%B8%A2%E0%B8%B8%E0%B8%97%E0%B8%98%E0%B8%A8%E0%B8%B2%E0%B8%AA%E0%B8%95%E0%B8%A3%E0%B9%8C%E0%B8%81%E0%B8%B2%E0%B9%81%E0%B8%9F-%E0%B8%9B%E0%B8%B5-2560-2564.pdf>

As per the Robusta variety, farmers did not select and modify the seedlings causing inconsistent yield in each harvest. The area of plantations decreased and are in lands without private ownership or land title deeds. The area of plantations decreased and are in lands without private ownership or land title deeds. Coffee trees are aged over 25 years, resulting in lower yields. Moreover, climate change causes the Robusta coffee cherry to ripen many times, making it difficult to find labor to harvest coffee cherries and process coffee. Farmers also lack new agricultural knowledge and technology, making the production cost high.



Photo 41: Anthracnose. Credit: Mae Fah Luang Foundation under Royal Patronage



Photo 52: Black Rots. Credit: Mae Fah Luang Foundation under Royal Patronage



Photo 63: Doi Tung Coffee Farming. Credit: Mae Fah Luang Foundation under Royal Patronage



Photo 74: Coffee leaf Rust. Credit: Mae Fah Luang Foundation under Royal Patronage



Photo 85: Drying process Credit: Mae Fah Luang Foundation under Royal Patronage

10. Timor Leste

Timor Leste submitted its updated NDC in November 2022 to the UNFCCC. The available GHG emission inventory data of Timor Leste was from 2010 data which was calculated as 1483 GgCO₂ and excludes emissions from oil and gas production. In the updated NDC, Timor Leste claimed the right to be the Least Developed Country and refrain from setting reduction targets until the new emission inventory is clarified and validated. In terms of adaptation, Timor Leste stated its priorities since its first NDC. According to the climate model, the country will face severe temperature increases, climate variability, frequent ENSO (El Niño Southern Oscillation) events, and changes in precipitation. Such impacts will cause disruptions to agricultural productivity and food supply, food security of the country. Timor Leste implemented the NAP in 2021⁶³ providing results of sectoral baselines and current and future vulnerabilities. The targeted sector under the NAP includes Disaster Risk Management, agriculture and food security, water and sanitation, health, coastal systems and marine resources, infrastructure, and transboundary climate change issue.

Coffee is considered the most valuable cash crop in the country (p.28)⁶³. Climate impacts on coffee are known due to its sensitivity to changes in rainfall patterns and temperatures. In addition, the coffee plantation employs women labor in the washing and drying of coffee beans, while men work on preparing and planting seeds, doing pest control, and grinding. The climate impacts on the coffee industry will cause differential vulnerabilities between men and women.

Ministry of Agriculture and Fisheries, with a technical assistance grant from the Asian Development Bank, has implemented the National Coffee Sector Development Plan of Timor Leste (2019-2030). The plan collected data and input from various stakeholders, including the Timor Coffee Association, which led the pilot quality gap assessment. The National Coffee Sector Development Plan mentioned clearly that climate change affects the coffee industry during its plantation period, “Unpredictable weather patterns make it more difficult to harvest and dry coffee, as rain during the harvest can inhibit these efforts. Increases in temperatures also increase the risk of pests and diseases such as coffee leaf rust” (p.21)⁶⁴.

To tackle problems facing the coffee industry, the National Coffee Sector Development Plan proposes six systematic actions which are:

1. Research and Development,
2. Production and Productivity,
3. Quality and Value Addition,
4. Market Access and Promotion,
5. Domestic Consumption and Coffee Tourism, and
6. Coffee Sector Management and Coordination.

⁶³ <https://www4.unfccc.int/sites/NAPC/Documents/Parties/Timor%20Leste%20NAP.pdf> p.28

⁶⁴ <https://www.adb.org/sites/default/files/linked-documents/51396-001-sd-02.pdf>



Photo 16: Coffee Processing Centre, Drying Coffee process Credit: Kafe Organiku Atsabe



Photo 17: Coffee Processing Centre, Drying Coffee process Credit: Kafe Organiku Atsabe



Photo 98: Coffee ready to deliver to suppliers Credit: Nuno Ridenio

11. Vietnam

Vietnam submitted its updated NDC to the UNFCCC in November 2022, with a more ambitious reduction target than in the previous NDC 2020. The unconditional target is 15.8% compared to BAU by 2030 and can increase to 43.5% with international support⁶⁵. As a developing country, Vietnam has been industrializing actively in the past few decades. However, it has also faced severe impacts from climate change with constraints in resources and capacity. From 1958 to 2018, a vast number of adverse climate impacts were recorded; namely, the country's annual average temperature increased by about 0.89 Celsius degrees, annual average precipitation increased by 2.1%, the number of heavy typhoons increased, the number of hot days, nights and droughts increased, extreme rainfall increased, and average sea level increased by 2.74 mm/year and 3.0 mm/year during 1993-2018. Vietnam's long coastal lowlands and delta areas are prone to climate impacts, i.e. storms, floods, sea level rise, salinity intrusion, and land submergence. This endangers the agriculture and food security of the country, given the fact that 18% of Vietnam's GDP comes from agriculture, and nearly 50% of employment is in this sector⁶⁶. Mekong Delta, an important agricultural area of Vietnam, is projected to be affected by sea level rise and saltwater intrusion, making the production of specific crops unfeasible.

In 2011, Vietnam implemented the National Climate Change Strategy (2011-2020), and in 2018, the NAP (2020-2030) was released. Both national plans give high importance to responses to the climate impacts, particularly the agricultural sector and food security. Coffee is the second most exported commodity after rice. It exports over 1.5 million metric tons of coffee annually, making it the second world's largest coffee producer after Brazil, but is the world's largest producer of Robusta coffee beans⁶⁷. Despite such success, the Vietnam coffee industry has many challenges i.e., lack of labor, dependence on small-scale farmers, aged plantation areas, increased production costs from high labor costs, etc. With this importance, the Vietnamese government has issued a wide range of policies and measures to enhance the coffee industry comprehensively. To name a few, Vietnam coffee sustainable development strategy, Coffee rejuvenation strategy, Coffee production planning i.e. Plan for developing Vietnam's coffee sector till 2020 and vision to 2030, plan for increasing added value, credit lending policy for coffee rejuvenation, technical Training and education for farmers, a decree to exempt irrigation charge for households that land/water surface for agricultural product, a decree to reduce Value Added Tax down to 5% for critical inputs i.e. fertilizer, pesticide, livestock and fishery feed, a decree on exemption and reduction of agriculture land tax by 50% of land tax for agriculture enterprises, a decree to attract foreign investments in agriculture, government support to reduce post-harvest loss, promotion of high tech-tech application in agriculture, Support to apply UTZ, 4C and GAP production standard (Good Agricultural Practices) and last but not least, support to build cooperation among stakeholders via farmer association, cooperative and production groups.⁶⁸

⁶⁵ https://unfccc.int/sites/default/files/NDC/2022-11/Viet%20Nam_NDC_2022_Eng.pdf?download

⁶⁶ <https://www.fao.org/3/c0200e/c0200e.pdf>

⁶⁷ <https://www.nescafe.com/gb/understanding-coffee/coffee-producing-countries/>

⁶⁸ <https://ap.fftcc.org.tw/article/1086>



Photo 10: Farmers in the North West of Vietnam are participating in a field training on best practices on Arabica coffee production Credit: Trung Pham Quang



Photo 110: Local extensionist visited a farm and provided hands-on technical support to farmers Credit: Trung Pham Quang



Photo 121: A farmer in the Central Highlands of Vietnam selling dried coffee bean. Credit: Trung Pham Quang



Photo 22: Farmers in the Central Highlands of Vietnam harvesting fresh cherry Credit: Trung Pham Quang

Ways forward: Building a Regional Roadmap 2030

Coffee is an essential economic crop in all Southeast Asian countries. The plant is sensitive to the impacts of climate change, which disrupts value chains and has adverse effects on stakeholders ranging from small-scale farmers to roasters, trading companies, coffee café, and end-consumers. Therefore, climate change affecting the coffee industry is a regional or global challenge.

This paper has revealed that some countries in Southeast Asia have implemented national coffee development policies and strategies to boost their coffee industry, which already faces preexisting problems that are severely exacerbated by climate change. However, other countries with strong potential in the coffee plantation, like Myanmar, have not yet issued a policy response to address the increasing impacts of climate change in their coffee industry. This policy gap needs to be addressed soon so that the country can be well-prepared and prevent the impacts of the changing climate.

National efforts need to be elevated to regional cooperation, recognizing the global scope of climate impacts. By fostering shared information and collaboration among countries, the groundwork for more effective solutions can be established, further facilitating the exchange of knowledge, wisdom, and innovative ideas.

This paper advocates for regional collaboration among coffee stakeholders in Southeast Asia. The aim is to formulate a comprehensive roadmap for 2030, which will serve as both a guiding framework and a shared objective for ASEAN countries. This collaborative approach seeks to collectively address the climate impacts in the coffee industry, promoting the well-being of farmers, facilitating sustainable agricultural practices, and advancing the coffee business across the entire value chain.

Chiang Mai University School of Public Policy, the Samdhana Institute, the Embassy of Ireland in Bangkok, and the Heinrich Böll Foundation Southeast Asia Regional Office are collaborating to organize a regional workshop on **“Policy responses to climate change impacts on agriculture, indigenous livelihood, and food security with a focus on the coffee industry.”** (see Photo 23). The workshop will be held on 17-19 September 2023 at the Raintree Chiang Mai Hotel, Chiang Mai.

We invite more than 40 stakeholders working along the supply chain of coffee in Southeast Asian countries, be they coffee growers, roasters, trading companies, government officials, and civil society. It aims to raise public awareness of climate impacts in the agricultural sector, establish a network among coffee industry stakeholders concerned about climate impacts in Southeast Asia, and formulate public policy to collectively prepare and cope with the coffee industry's existing and future climate impacts.



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Photo 23: Regional workshop on climate impacts on coffee industry

Author's Profile



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Her primary research areas are on energy and climate change. On energy, her work includes involvement in projects such as a consultation project for the Ministry of Energy, aimed at drafting regional energy policies for Thailand, research on policy instruments to stimulate blue hydrogen demand and supply in Thailand, and an examination of energy dependence between Thailand and Myanmar, among others.

On climate change, she has organized a Southeast Asian workshop on loss and damage, facilitated a regional workshop on climate impacts within the coffee industry. She takes on the development of a new Master's degree program in Climate Policy and Governance at Chiang Mai University. This new MA degree program is expected to accept applications for the Academic Year 2024. | Contact: warathida.c@cmu.ac.th