National Youth Statement 2024

Solidarity in Green Transition For Sustainable Malaysia

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Preface

The views and opinions expressed in this report are attributed to the authors of the Malaysian National Youth Statement as well as participants of the Youth Climate Change Survey launched on 31st July 2024, and may not necessarily reflect the official views of MYD. Any and all written errors are the authors' own.

This report represents **the Malaysian National Youth Statement** which will be further consulted and completed upon COP29 (hence they do not reflect the final outcomes of COP29). The final report will include analysis of the survey and consultations as well as authors' perspectives and references. The opinions, findings, interpretations, and conclusions expressed in this report are those of the authors' and are also based on the survey and do not necessarily reflect the views or official policies from the Malaysian government, industry or institutions. All the gaps identified and recommendations are subject to change upon the final submission of this statement. Recommendations provided may be in progress or are already implemented.

Authorship and editorial of the Malaysian National Youth Statement is credited as follows:

This report was developed collaboratively, led by Yashirdisai Sampasivam with input from contributors specializing in key areas. Yashirdisai Sampasivam and Wong Yun Qiu contributed to the Climate Finance and Accountability section and edited the entire report while integrating recommendations from the youth consultation.

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The report was also informed by the MYLCOY2024 project, managed by Yashirdisai Sampasivam and Hanis Alwani, and the Youth Climate Change Survey, conducted by Yashirdisai Sampasivam, Hanis Alwani, and Khalisah Khairina Razman.

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We welcome any and all feedback on this report. Kindly reach out to us at mylcoy@mydclimate.org and focalpoint@mydclimate.org.

Glossary

12MP	Twelfth Malaysia Plan
ACE	Action for Climate Empowerment
ACSR	Advisory Committee on Sustainability Reporting
AI	Artificial intelligence
BCX	Bursa Carbon Exchange
BNM	Bank Negara Malaysia
BUR	Biennial Update Report
BMP	Best Management Practices
BTR	Biennial Transparency Report
CBD	Convention on Biological Diversity
CBIT	capacity building Initiative for Transparency
CCPT	Climate Change and Principle-based Taxonomy
CCS	Carbon capture and storage
CCUS	Carbon Capture, Utilisation and Storage
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO_2	Carbon dioxide
CSA	Climate-Smart Agriculture
CSRD	Corporate Sustainability Reporting Directive
EE	Energy Efficiency
EFT	Ecological Fiscal Transfers
EIA	Environmental Impact Assessment
ESC	Education for Sustainable Consumption
ESD	Education for Sustainable Development

ETF	Enhanced Transparency Framework
FiT	Feed-in Tariff
FPIC	Free, Prior and Informed Consent
GBF	Global Biodiversity Framework
GEF	Global Environment Facility
GTFS	Green Technology Financing Scheme
IFRS	International Financial Reporting Standards
IoT	Internet of Things
IPPU	Industrial Processes and Product Use
JC3	Joint Committee on Climate Change
L&D	Loss and Damage
LULUCF	Land Use, Land Use Change and Forestry
MCCG	Malaysian Code on Corporate Governance
MGTC	Malaysia Green Technology and Climate Change Corporation
MKN	Majlis Keselamatan Negara (National Security Council)
MOSTI	Ministry of Science, Technology and Innovation
MSCF	Malaysia Smart City Framework
MyBIS	Malaysia Biodiversity Information System
MYD	Malaysian Youth Delegation
MYLCOY2024	Malaysian Local Conference of Youth 2024
MyNAP	Malaysian National Adaptation Plan
NADMA	National Disaster Management Agency
NAP	National Adaptation Plan
NCQG	New Collective Quantified Goal on Climate Finance
NDC	Nationally Determined Contribution

NEM	Net Energy Metering
NETR	National Energy Transition Roadmap
NGO	Non-Governmental Organisation
NPBD	The National Policy on Biological Diversity
NRES	Ministry of Natural Resources and Environmental Sustainability
NSRF	National Sustainability Reporting Framework
PPP	Public-Private Partnership
PV	Photovoltaic
RE	Renewable Energy
R&D	Research and Development
UNFCCC	United Nations Framework Convention on Climate Change
SC	Securities Commission Malaysia
SDGs	Sustainable Development Goals
SEDA	Sustainable Energy Development Authority
SRI	Sustainable and Responsible Investment
STEM	Science, Technology, Engineering, and Mathematics
TCFD	Task Force on Climate-related Financial Disclosures
TVET	Technical and Vocational Education and Training
VBI	Value-based Intermediation
VCM	Voluntary Carbon Market
WtE	Waste-to-energy

Contents

1.0 Introduction

Established in 2015, the **Malaysian Youth Delegation (MYD)** has served as a pivotal platform for young Malaysians aged 18-35 to actively engage in climate policy-making and advocacy spaces at both local and international levels. As a youth-led organisation in Malaysia with a specific focus on climate change policy and negotiations, MYD offers a unique space for youth to explore the country's role in navigating and implementing international climate agreements.

This year, MYD continues its mission by organising the Malaysian Local Conference of Youth 2024 **(MYLCOY2024)** with the theme **"Solidarity in Green Transition For Sustainable Malaysia"**. LCOY, also known as the Local Conference of Youth, is an event under the umbrella of YOUNGO, the official youth constituency of the United Nations Framework Convention on Climate Change (UNFCCC). The MYLCOY2024 theme underscores the urgency of an inclusive transition towards a greener Malaysia, underpinned by adequate financial resources, technological tools, and partnerships. It primarily aligns with key Sustainable Development Goals (SDGs) such as SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals).

The MYLCOY2024 theme is also aligned with COP29 (themed "In Solidarity for a Green World"), among which aims to enhance countries' ambitions in their Nationally Determined Contributions (NDCs) due in 2025, to realign with the pathway towards achieving the Paris Agreement goals. The last decade was the hottest recorded, with 2023 reporting an average near-surface temperature increase of up to 1.45°C, approaching the 1.5°C threshold set by the Paris Agreement (WMO, 2024). This rise in temperature poses significant obstacles to achieving the SDGs, with severe impacts on food security, displacement, and migration due to extreme weather events. Additionally, COP29 also aims to increase transparency in reporting actions via the Enhanced Transparency Framework (ETF), along with submission of mandatory information and data by parties in the agreed formats via their Biennial Transparency Reports (BTRs), allowing comprehensive analysis, review, comparison, and assessment of progress.

The Asia Pacific region, including Malaysia and other Southeast Asian countries, are mostly developing countries which are disproportionately vulnerable to climate change impacts. There is an urgent need for financial assistance to transition to a low carbon economy and enhance resilience. Concurrently, younger generations are facing a higher frequency of climate-related events compared to previous generations. Data from the Stockholm Environment Institute indicate that a child born in 2020 is twice as likely to experience wildfires, 2.6 times more susceptible to droughts, 2.8 times more exposed to river floods, and 6.8 times more prone to experience heat waves than someone born in 1960 (Aggarwal et al., 2022). In response to these challenges, integrating youth voices into environmental decision-making and supporting initiatives is critical and necessary to fostering a sustainable, resilient, and inclusive future.

Therefore, MYLCOY is crucial with its additional role as a preparatory process for MYD as one of their main climate advocacy channels. This **Malaysian National Youth Statement** ("Statement") is a part of MYLCOY2024's key component based on a comprehensive survey conducted prior to MYLCOY2024. This Statement reflects the voice of Malaysian youths on the

critical issues of climate change and sustainable development aligned with the MYCLOY2024 theme. However, the Statement has certain limitations due to the small number of respondents and the brief study period which does not necessarily reflect the collective voice of Malaysian youths and therefore the full diversity of their experiences in climate change. Hence, during MYLCOY2024, the draft of the Statement was further consulted and discussed as part of the agenda, ensuring it resonates with the insights and aspirations of participating youths.

As MYD brought together Malaysian youths at MYLCOY2024, the focus was on fostering dialogue and action around the topics of sustainable finance, adaptive capacity, and science-based decision-making. This initiative resonates with the broader objectives of the UNFCCC COP29, which emphasises the need for increased ambition in NDCs and the acceleration of financial flows for mitigation, adaptation, and loss and damage. By empowering youths through education, capacity building and advocacy, MYD aims to cultivate a generation of climate-conscious leaders ready to spearhead the transition towards a sustainable future.

2.0 Research Design and Identified Areas

The Malaysian National Youth Statement is informed by a comprehensive survey designed to capture the perspectives of Malaysian youths on key climate issues. The survey was structured around specific thematic tracks aligned with the MYLCOY2024 agenda, which are **Climate Finance, Adaptation, Technology and Innovation, Mitigation, and Climate Education and Action as a part of the Action for Climate Empowerment (ACE) agenda.** The survey featured a combination of multiple-choice and open-ended questions for both quantitative and qualitative insights which was made available in two languages; English and Bahasa Malaysia.

During the first phase, the survey targeted participants with expertise in relevant areas, while also included inputs from the broader Malaysian youth population. There were inputs from 36 participants from the first phase. The participants were encouraged to engage with at least one section of interest or contribute across multiple sections based on their expertise or interest. The data collected was subsequently analysed by MYD's working group members, who are experienced in these respective areas. This analysis involved performing a gap assessment to identify key issues and formulating recommendations based on the survey responses. The insights and recommendations derived from this process serve as the foundation for the **first draft of the National Youth Statement.** Following this exercise, the first draft was **further refined** through **consultations and discussions during MYLCOY2024 in September,** where participants' inputs were also incorporated within the Statement**.**

2.1 Climate Finance and Accountability

2.1.1 Introduction

Malaysia is classified as an upper-middle-income country by the World Bank and ranked 79th out of 166 countries on the SDG Index with a score of 69.32 (Sachs et al., 2024). Progressing towards sustainable development, Malaysia is on track to achieve 40.3% of its SDG goals while facing limited progress in 33.8% areas of the SDG goals (Sustainable Development Report 2024) underscoring the need for systemic change and a shift toward a more sustainable economic model.

Malaysia only accounts for 0.77% of global GHG emissions (UNDP, 2023). The energy sector has been the largest contributor to greenhouse gas emissions, accounting for 78.5% of the total in 2019 while also contributing to Malaysia's development (NRES, 2022). Currently, according to the Malaysian Investment Development Authority (MIDA), around 20% of the nation's GDP comes from the oil and gas sector with more than 3,500 businesses in this sector. To fulfil Malaysia's pledge in reducing carbon intensity by 45% from the 2005 level, one of the main strategies is utilising the National Energy Transition Roadmap (NETR) to gradually increase renewable energy installed capacity share, targeting 31% by 2025, 40% by 2035, and 70% by 2050. However, finance is both the main enabler and the main challenge in the implementation of renewables. According to the NETR, Malaysia will need up to RM1.3 trillion by 2050 to support the nation's energy transition initiatives in which 18% of funding is required primarily in investments for renewables power generation and green mobility.

On the other hand, Malaysia faces a plethora of adaptation challenges with natural hazards leading to not only increased floods and heatwaves but also losses in biodiversity, natural resources and infrastructure damages. According to the INFORM 2025 Risk Index, Malaysia scored 6.8, 6.4 and 3.1 for river flood, coastal flood and drought risk respectively. Currently, Malaysia is developing its National Adaptation Plan to include potential vulnerability in all sectors including agriculture, energy and health which is estimated to require US$85 billion for adaptation, not accounting for potential losses and damages. The Department of Statistics Malaysia (DOSM) reported in 2023 that about 96.9% of all businesses in Malaysia are small-medium enterprises (SMEs) which comprises manufacturers, service providers, smallholders and farmers, indigenous peoples and local communities. They require adequate financing and data availability to be able to adapt to the impacts of increasing climate events and prepare for recovery from the associated losses and damages.

Therefore, climate finance investments and partnership is crucial for developing countries like Malaysia and other Asia Pacific countries in balancing priorities between a sustainable and low-carbon development, and their economy. In the realm of climate finance, the New Collective Quantified Goal on Climate Finance (NCQG) represents a critical step forward, building on the unmet commitment of developed countries to mobilise USD 100 billion annually by 2020. The NCQG, aiming to incorporate a needs-based and more ambitious design, seeks to address the

financial needs for adaptation, mitigation, and loss and damage in developing countries including Malaysia.

However, achieving this goal requires robust accountability measures. The Enhanced Transparency Framework (ETF), a key focus at COP29, is essential for tracking the progress of each country's Nationally Determined Contribution (NDC) and the required financial support. Developing countries, including Malaysia, are expected to submit the Biennial Transparency Report (BTR) due in December 2024 and report their greenhouse gas inventories and NDC progress due February 2025. This survey track explores the critical intersection of climate finance, sustainability, and accountability. There is an urgent need to identify financial strategies needed to drive sustainable and low-carbon development, and climate resilience, in alignment with the NCQG and broader goals of the Paris Agreement.

2.1.2 Gap Analysis: Existing Policy and Its Implementation

A. Finance

Malaysia has increased its public funding for climate change, where the government allocated RM7.1 billion to the Ministry of Natural Resources and Environmental Sustainability (NRES) in its Budget 2024, which increased investments in environmental initiatives ranging from energy, biodiversity, flood mitigation and disaster risk management, and eco-tourism (Soon, 2024). In 2025, the Budget 2025 saw an increase in funds provided under the National Energy Transition Facilitation (NETF) Fund, setting aside over RM300 million to increase access to renewable energy, improve energy efficiency, support emerging technologies such as carbon capture, utilisation and storage (CCUS) and EVs, as well as circular economy (Ministry of Finance Malaysia, 2024).

One of Malaysia's key investment strategies in climate finance is through the Green Technology Financing Scheme (GTFS) 4.0, which aims to accelerate green investments by providing easier access to funding. NRES and the Malaysian Green Technology and Climate Change Corporation (MGTC), GTFS 4.0 allocates up to RM1 billion to support various categories, including producers and users of green technology, Energy Services Companies (ESCOs), housing developers, and low carbon mobility infrastructure (Ministry of Finance Malaysia, 2024). This scheme offers a government guarantee of up to 60-80% on green costs depending on the sector, and a 1.5% rebate per annum on interest or profit rates for up to seven years (MGTC, 2023). The scheme is set to run until December 31, 2025, or until the allocation is fully utilised, and is designed to foster green technology adoption, enhance energy efficiency, and support Malaysia's broader climate goals. However, this financial investment should be well monitored, measured, reported and verified to ensure that the investments are achieving the stipulated objectives.

Apart from that, Malaysia is increasingly shifting from conventional finance to sustainable finance, which aims to reflect a broader commitment to integrate environmental, social, and governance (ESG) principles into its financial practices. The growth of sustainable finance is evident particularly through green bonds, climate bonds, and Sukuks. Sukuks are a form of

Islamic financial certificate similar to bonds, but structured to comply with Shariah law, and are a significant aspect of this transition. Since the launch of the Sustainable Responsible Investment (SRI) Sukuk framework in 2014, Malaysia has introduced a variety of financial instruments that align with the SDGs, including its first green Sukuk in 2017. The country's financial regulators, such as Bank Negara Malaysia (BNM) and the Securities Commission Malaysia (SC), have been instrumental in promoting sustainable finance. Initiatives include the establishment of the Joint Committee on Climate Change (JC3), and the Sustainable and Responsible Investment Roadmap for the Malaysian Capital Market (SRI Roadmap) which outlines strategies to bolster Malaysia's sustainable finance ecosystem. This shift is further supported by incentives like tax exemptions for SRI funds, as well as the implementation of Value-based Intermediation (VBI) in Islamic banking, which emphasises positive social and environmental impacts. Through these measures, Malaysia is positioning itself as a leader in sustainable finance, fostering a financial landscape that prioritises long-term economic returns alongside ESG benefits.

Subsequently, BNM and SC are intensifying efforts to transition from sustainable finance to focused climate finance through JC3. Key initiatives include providing guidance for financial institutions to adopt the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and launching a Climate Data Catalogue to enhance climate data access. JC3 is spearheading pilot projects on adaptation, sustainable cities, and transition finance while developing sectoral guides for high-impact industries, while working closely with the Value-Based Intermediation Community of Practitioners (VBI CoP) to finalise sectoral guides for industries such as oil and gas, manufacturing, and construction, complementing earlier guides on palm oil, renewable energy, and energy efficiency.

In addition to all these policies and regulations that are encouraged by global market trends, Malaysia has launched its voluntary carbon market platform, the Bursa Carbon Exchange (BCX) to allow removal and reduction projects to be registered and traded, as it aims to utilise Article 6 of the Paris Agreement to achieve its NDCs. During the preparation of the BCX Voluntary Carbon Market (VCM) Handbook, there were already several Nature-based Solutions (NbS) projects registered with Verra and the Clean Development Mechanism (CDM). Apart from that, Malaysia is developing various policy instruments in accordance with the Paris Agreement as well as studying the feasibility of developing a carbon pricing mechanism in the country (NRES, 2024). Banks in Malaysia have also set targets to reduce investments in fossil fuels projects and phase out coal investments while channelling funds to more sustainable projects. All these efforts align the financial sector with national climate priorities while also increasing accountability of emitters.

Nevertheless, the survey results show a slightly different perspective where responses highlighted that there are gaps in Malaysia's current climate finance framework, emphasising the disconnect between existing policies and their practical implementation. Despite having policies, technology, and research in place, the lack of adequate funding from private sectors and partners remains a critical barrier to progress. Respondents consistently pointed out that while climate strategies are well-articulated on paper, their execution is hampered by insufficient financial resources and efficient development and progress. This issue is pervasive, affecting

organisations at all levels from grassroots initiatives to nationally recognised entities. When asked on what they think should be Malaysia's top priorities under the NCQG, respondents highlighted renewable energy projects, sustainable infrastructure development, and technology related to CCUS as critical areas. These selections reflect a strategic focus on reducing emissions through technological innovation and sustainable practices. Notably, the emphasis on renewable energy projects aligns with Malaysia's broader goals of reducing its carbon footprint and transitioning to a more sustainable energy mix. Additionally, the importance placed on sustainable infrastructure and capacity building underscores the need to create resilient systems that can withstand the impacts of climate change while fostering economic growth.

Interestingly, the call for investments in low-carbon technologies and climate adaptation measures also points to a recognition that mitigation alone is not sufficient. With climate impacts already being felt, there is an urgent need to develop and implement adaptation strategies, including early warning systems and support for communities affected by loss and damage. This aligns with global trends in climate finance, where adaptation and resilience are increasingly recognised as critical components of a comprehensive climate strategy. On the other hand, finance should be accompanied with not only motivation but also proper monitoring, reporting and verification (MRV) to ensure the success of a “climate fund”.

B. Accountability

The survey respondents emphasised that the climate finance architecture needs significant reform, particularly in terms of transparency and accountability. Several respondents stressed that without rigorous enforcement of laws and regulations, climate commitments may continue to be seen as mere lip service. At the national level, the reform of corporate reporting systems under the Malaysian Code on Corporate Governance (MCCG) is an example of an area needing improvement to ensure that financial flows are aligned with climate goals.

As such, the recent launch of the National Sustainability Reporting Framework (NSRF) under the Advisory Committee on Sustainability Reporting (ACSR) which is chaired by the Securities Commission Malaysia (SC) marked a huge step in the right direction. The adoption of the IFRS’ Sustainability Standards by the ACSR required both listed entities and huge non-listed entities to report their climate-related risks and opportunities, preventing certain big emitters from escaping via loopholes in the reporting systems. This complements earlier efforts such as the launch of the Climate Change and Principle-based Taxonomy (CCPT) by Bank Negara Malaysia (BNM) in 2021, which encourages financial institutions to incorporate climate considerations in their financing and investment decisions. The synergy between the two frameworks can be achieved via consistent and common criteria, similar to how the EU’s Corporate Sustainability Reporting Directive (CSRD) mandates companies to disclose their sustainability impacts by referring to the definitions prescribed in the EU Taxonomy.

At the international level, the Enhanced Transparency Framework (ETF) under the Paris Agreement is designed to track progress on NDCs and the necessary financial support. However, respondents pointed out that the current mechanisms for reporting financial provisions and needs, especially in the Biennial Update Report (BUR) and Biennial Transparency Report

(BTR), are insufficient. Developing countries like Malaysia face challenges in assessing and consolidating the necessary information, leading to gaps in holding contributors accountable and ensuring that funds are effectively utilised. Malaysia has recently submitted its Fourth National Communication Report (NC4) and has identified the need for external financial, technical, and capacity building support in key areas such as GHG inventories, mitigation, and adaptation. These needs were identified by proponent agencies, validated through workshops, and endorsed by the National Steering Committee on Climate Change. The BUR4 report details out that approximately USD 2.25 million in international funding is needed to improve GHG inventories. Additionally, the NC4 also included information on the iron and steel industry that requires over USD 46 million for mitigation actions, while adaptation initiatives across the country will need an estimated USD 63.6 million to enhance resilience measures.

2.1.3 Recommendations

A. Finance

1. **Scaling Up Green Financial Instruments with Increased Public Interest to Attract Global Investors**: Malaysia should build on its existing green financial infrastructure by scaling up innovative green products, such as green and social securitisation, blended financial instruments for biodiversity and conservation, and green loans for SMEs targeting both mitigation and adaptation. For instance, government-linked investment companies like PNB which have committed RM10 billion to green and transition assets, can collaborate with international investors and development financial institutions to expand financing for sustainable projects while leveraging Malaysia's leadership in green finance to attract more global capital. This will directly promote public and private investments, and enable technology transfer and capacity building across different sectors**.**
2. **Establishing a Malaysian Adaptation and Loss & Damage Trust Fund:** Establishment of this trust fund can be used to fund vulnerable communities and sectors, climate-resilient infrastructure, disaster preparedness and recovery, and capacity building initiatives. It should be fueled by a mix of public, private, and international contributions, with transparent governance and monitoring systems to ensure that resources are effectively used to mitigate the effects of climate change and build long-term resilience.
3. **Expanding Green Financing via Loans, Mortgages & Credit-Facilities:** Malaysia should expand green mortgages, loans, and sustainability-linked credit facilities to drive investment in energy-efficient homes, climate-aligned sectors and SMEs. These financial instruments should include favourable terms and strict MRV systems to ensure compliance and prevent misuse. capacity building initiatives should support businesses in not only developing but also measuring and reporting their sustainable projects to improvise their sustainability scoring to potentially attract more investors. These efforts should be aligned with national policies.
4. **Exploring Market-Based Emission Reduction Mechanisms:** Malaysia should evaluate the potential of emissions trading systems (ETS) and carbon taxes tailored to its economic landscape. For example, a carbon tax regime can be implemented on

major CO_2 emitters in a phased approach, with lower tax rates on essential goods and services to prevent lower-income households from being disproportionately affected. Besides, strengthening carbon markets through principle-based high integrity carbon credits and allowances is vital. The Bursa Carbon Exchange (BCX) should also expand its project eligibility criteria to allow for more innovative projects, such as a plastic credit mechanism to address plastic waste. Proceeds from traded credits could support BCX's administrative costs, with an allocated portion for a public budget for adaptation (similar to the Share of Proceeds mechanism under Article 6.4 of the Paris Agreement). The voluntary carbon market will be effective only if projects demonstrably reduce emissions, finance low-carbon supply chains or technologies, or achieve measurable and verifiable emission removals over the long-term implementation of the projects.

5. **Reallocating Funds & Recycling Revenues:** Malaysia could redirect subsidies from fossil-based products, particularly from groups that can afford them, to expand public budgets for renewable energy projects, sustainable infrastructure, and low-carbon technologies. It could also introduce focused carbon taxes on high emitters and reinvest the revenue into adaptation measures, loss and damage support, and resilience-building efforts. A recent report from the Basic Income Earth Network estimates and suggests that by removing petrol subsidies and imposing a carbon tax regime, each Malaysian can receive more than RM150/month in the form of a universal basic income (Williams et al., 2024).

B. Accountability

1. **Increasing Capacity Building of National Reporting Systems**: Leverage existing alliances and collaborative platforms such as the Joint Committee on Climate Change (JC3), Climate Governance Malaysia and CEO Action Network to increase capacity building on national reporting systems and share best practices, especially for SMEs. The MCCG has set a precedent for best practices in board governance and oversight, coupled with the rollout of the National Sustainability Reporting Framework (NSRF) which also implicates large non-listed entities, it is inevitable that SMEs will need to start accounting for their climate risks and opportunities as part of larger value chains. It is crucial that both financial and sustainability impacts are incorporated into corporate reporting systems, to allow for transparent reporting of financial flows aligned with national and global climate goals. Assurance requirements and systems should also be in place and aligned with financial reporting cycles, with the end goal of elevating transparency from a bottom-up approach, ultimately contributing to a seamless reporting process flow towards national climate disclosures such as the Biennial Transparency Report.
2. **Enhancing International Transparency Mechanisms**: Enforce the operationalisation of the ETF from a top-down approach to ensure accurate tracking and reporting of financial and resources required in each country's BTR. The Standing Committee on Finance (SCF) should provide additional resources to developing countries for better consolidation and assessment of climate finance information, especially in aligning their NDCs with the ETF. These resources should expand beyond existing institutional

arrangements based on the Global Environmental Facility (GEF) which could pose accessibility issues, and expand the capacity building Initiative for Transparency (CBIT) programme. Most importantly, the SCF should prioritise strengthening national institutions for transparency-related activities to ensure long-term sustainability of transparency mechanisms.

3. **Empowering Youths in Accountability Efforts**: Establish a **national-level youth stocktake** to involve young people in monitoring and reporting on climate finance, integrating their perspectives into Malaysia's climate finance strategies. This could be championed through a youth National Action for Climate Empowerment (ACE) Focal Point appointee, and supported by the Youth Cluster, a subcomponent under the Climate Change Consultation Panel established by NRES. This report - the Malaysian National Youth Statement - could also potentially serve as an accountability mechanism by integrating it as a formal input process for the Malaysian delegation that heads to the Conference of Parties on an annual basis.

2.2 Adaptation

The challenges posed by climate change are multifaceted, requiring not just reactive measures but proactive strategies to enhance resilience and adaptive capacity across communities, ecosystems, and food systems. Malaysia, in alignment with SDG Target 13.1, is committed to strengthening resilience and adaptive capacity to climate-related hazards and natural disasters. The increasing frequency and severity of floods, such as the devastating 2021 floods that claimed 54 lives across 8 states, underscore the urgent need for comprehensive adaptation strategies. The Twelfth Malaysia Plan (12MP) reflects this urgency, with significant budget allocations for flood mitigation and coastal protection.

A key component of climate resilience is safeguarding food systems, which are particularly vulnerable to the impacts of climate change. As Malaysia continues to face challenges like unpredictable weather patterns and extreme weather events, ensuring food security becomes increasingly critical. The sustainability of Malaysia's agricultural sector, including paddy, cocoa and local fruits farming, hinges on the integration of climate-smart agricultural practices, innovative farming techniques, and policies that support resilience. With consideration towards the above, the Youth Climate Change Survey has outlined two subsections under Adaptation:

- **Climate Resilience and Loss and Damage (L&D)**
- **Food and Agriculture**

2.2.1 Climate Resilience and Loss and Damage

2.2.1.1 Introduction

The National Adaptation Plan (NAP) is a primary instrument in building and implementing strategies to build climate resilience, and necessitates a whole-of-society approach. Malaysia's NAP (MyNAP) is currently under development, presenting a prime opportunity for incorporation of youth perspectives in the development phase.

One crucial area related to adaptation which needs to be addressed is Loss and Damage (L&D), which encompasses the economic and non-economic consequences of climate impacts beyond the ability to address through mitigation and adaptation measures. This report will spotlight the areas most vulnerable to L&D and urgently in need of climate resilience measures, including public health, agriculture and food security, biodiversity and forestry, as well as urban areas and infrastructure systems.

2.2.1.2 Gap Analysis: Existing Policy and Its Implementation

Each of the areas mentioned prior (public health, agriculture and food security, biodiversity and forestry, as well as urban areas and infrastructure systems) are governed by different policies

and frameworks, some of which are still in the planning stage, while others have already been implemented. Notably, there is a growing recognition of environmental factors and climate resilience in these governance systems. For example, the recently adopted Health White Paper acknowledges the impacts of climate change on physical health through waterborne and vector-borne diseases, as well as increased mental health issues stemming from climate anxiety (MOH, 2023). Additionally, the National Agrofood Policy 2021-2030 aims to tackle food security and enhance food availability alongside economic growth. The policy emphasises environmental sustainability and also considers the impact of the COVID-19 pandemic on food security. Another example is the Malaysia Smart City Framework, which is a national framework guiding multiple stakeholders in responding to urban challenges for improved wellbeing and quality of life. Similarly, the Low Carbon Cities Framework has been implemented and aims to reduce carbon emissions in specific areas of Malaysia.

However, despite the establishment of multiple policies and frameworks, there is still a lack of progress in implementation, and reporting and evaluation mechanisms. Additionally, certain initiatives such as the Low Carbon Cities Framework risk being too focused on technological considerations, and are not inclusive in its consideration of local communities. Finally, harmonisation is needed between these different policies and frameworks so that climate resilience is streamlined across sectors, which can contribute to more comprehensive climate resilience planning and implementation in the MyNAP.

The survey results indicated that areas of high priority for Malaysia to focus on in responding to L&D include “Public Health” and “Water Resources and Security”. Following which, “Agriculture and Food Security” was ranked the third most important sector among two-thirds of the respondents. “Biodiversity and Forestry” and “Cities and Infrastructure” were also highlighted as important areas to address in the MyNAP but are not as urgent as the first three areas noted above. This may be due to the nature of these areas experiencing slow-onset climate events, resulting in the perception of being lower priorities in comparison to other areas that present more urgent needs in the near future. However, biodiversity of terrestrial and marine ecosystems are declining rapidly and they require equal urgent attention.The recent adoption of the Kunming-Montreal Global Biodiversity Framework (GBF) at COP15 to the United Nations Convention on Biological Diversity (CBD) requires countries to include conservation of biodiversity in their national targets, and integration of impacts on biodiversity in their disclosures (Convention on Biological Diversity, 2022). In this report, agriculture and food security discussion areas that include biodiversity are further discussed in other sections.

2.2.1.3 Recommendations

1. **Defining and Monitoring Policy Implementation:** Establishing clear targets, robust data collection mechanisms, and well-defined evaluation procedures are essential steps for a robust policy implementation cycle. Strong monitoring frameworks ensure that strategies are evidence-based and outcomes are measurable. Notable examples of such specificity include the National Policy on Biological Diversity (NPBD) 2022-2030 and the National Agrofood Policy 2021-2030, which outline clear goals, strategies, and the

relevant bodies responsible for their execution. Additionally, here are some criterias to enhance climate resilience in these areas:

- **Cities:** Enhance participation and utilisation of the Green Building Index by incentivising developers and building owners through financial incentives and regulatory support. Emphasise resilience measures such as flood mitigation buffer zones, water security, and climate adaptation strategies. Developers must also disclose potential risks and integrate resilience planning into their projects to foster sustainable urban development.

- **Public Health:** Educate youth and children about low-carbon diets and promote healthy lifestyles as part of public health initiatives. This can include awareness campaigns on plant-based eating, reducing carbon footprints, and fostering sustainable habits to contribute to overall well-being and environmental sustainability. For example, the government can subsidise healthy eating in schools by mandating nutritious meals in canteens, and supporting canteen operators with capacity building and food nutrition labelling. Extend these efforts to urban populations by encouraging balanced diets and sustainable eating habits.

2. **Developing a shared framework as part of the MyNAPdevelopment to promote cross-sectoral coordination**. This can help streamline climate resilience in different sectors, increase potential for collaboration and harmonise their efforts better for a transformational adaptation.
3. **Working with indigenous peoples and local communities, which was a widely cited recommendation to support those affected by L&D.** Doing so can ensure that climate resilience is community-focused, especially in areas related to disaster management, public health, food security, water management, biodiversity and urban planning.
4. **Integrating Disaster Preparedness and Management Strategy:** Integrate existing disaster management plans developed by the National Disaster Management Agency (NADMA) in collaboration with other organisations, into MyNAP and other state-level policies. This approach should prioritise collaboration with the relevant stakeholders and ensure adequate public budgeting to increase public awareness campaigns and preparedness measures for climate-induced disasters such as floods and heat waves. Under the implementation of such an integrated policy, a crucial role for NADMA should be to identify effective data collection methods pre-, during and post-events, and ensure efficient utilisation and analysis of data collected to better prepare for future events, while working together with other governmental agencies like the National Security Council (MKN).
5. **Accelerating the Development of the National Planetary Health Action Plan (NPHAP)**: Mainstreaming and integrating the concept of planetary health in national policies is crucial, and needs to be done in a way which permeates through the public and drives systemic efforts. The Ministry of Science, Technology and Innovation (MOSTI) should leverage existing efforts that are already underway in Planetary Health,

including the recently published Planetary Health Roadmap and Action Plan (PHAM). The PHAM builds on a global network of research entities and non-governmental organisations via the Planetary Health Alliance, and has provided three big change areas involving governance institutions, the education sector and the businesses (Planetary Health Alliance, 2024).

2.2.2 Food Systems & Agriculture

2.2.2.1 Introduction

Malaysia's agricultural focus dates back to the 1960s, when the government adopted an interventionist approach to economic development, placing a significant emphasis on agriculture. The country is one of the world's top producers of palm oil while also cultivating other common cash crops including cocoa, pepper, coffee, tea, various fruits, and coconuts. The agricultural sector contributed to 7.2% of the nation’s GDP in the second quarter of 2024, and plays a critical role in national food security (DOSM, 2024). However, the impact of climate change, particularly the increasing frequency of droughts and floods, poses a serious threat to the sustainability of the Malaysian agricultural sector.

Located in the tropical climate zone of Southeast Asia, Malaysia's agricultural crops are highly susceptible to the impacts of climate change. Rising temperatures and unpredictable precipitation patterns could severely constrain the quality and yield of these crops (Dewi, 2009). Apart from oil palm and rubber, rice is the third most cultivated crop in Malaysia (DOSM, 2023). Paddy crops in particular require strong attention as it is a staple of every Malaysian household, and also one of the most water-intensive crops, consuming up to 30% of global freshwater consumption (Bouman et al., 2007). In low-altitude regions, rain-fed rice crops are at significant risk due to the variability in precipitation volume and distribution (Zhang et al., 2023). As such, it is important to start implementing sustainable agricultural practices and identify sector-specific adaptation strategies due to its high vulnerability to the impacts of climate change.

2.2.2.2 Gap Analysis: Existing Policy and Its Implementation

Malaysia's primary agricultural policy framework, the National Agrofood Policy 2.0 2021-2030 recognises the threat of climate change but lacks information on vulnerabilities of specific crops like paddy to floods and droughts (MAFI, 2021). In the National Policy on Climate Change 2.0, there is an emphasis on the agricultural sector under the Strategic Thrust 3 which focuses on adaptation, citing the need for comprehensive climate risks and vulnerability assessments, and climate-resilient infrastructure (NRES, 2024). Nevertheless, the specificities are yet to be detailed, and will likely only be covered in the upcoming MyNAP.

Although there have been efforts to introduce climate-resilient crop varieties and improve irrigation infrastructure, these initiatives have not been sufficiently scaled up. A Khazanah Research Institute (KRI) (2024) study on smallholders in Malaysia show that the country falls behind its regional peers when it comes to R&D for climate-resilient varieties, whereby in the five decades up till 2014 Malaysia had generated only 35 new paddy varieties, in contrast to neighbouring Indonesia which had generated 183. The lack of coordination between federal and state-level agencies leads to inconsistent policy execution, and the limited financial and technical resources available to farmers hinder their ability to adopt new practices and technologies. The same KRI study (2024) pointed out that there is no nationwide study on climate risks of smallholders in Malaysia, who are most vulnerable to climate change impacts and require targeted adaptation strategies. This is not a trivial matter, considering 40% of Malaysia's palm oil production comes from smallholders (Rahman, 2020).

Furthermore, national policies and guidelines focus on shaping good agricultural practices and/or sustainable processes, with less emphasis on the adaptive capacity of the agricultural sector. These include the Malaysia Good Agriculture Practices (MyGAP), Malaysia Organic Certification Scheme (myOrganic), a 'green recognition scheme' MyHIJAU Mark, Malaysian Sustainable Palm Oil (MSPO) and the Malaysia National Green Technology Policy (NGTP) (MGTC, 2022). Notably, creation of specific adaptation strategies at a nationwide level is difficult given the dynamic and localised nature of climate risk events. Hence, it is generally recommended for policies to focus on 'developing the capacity of a system to adapt' (OECD, 2023). One of the integrated approaches developed by the Department of Statistics Malaysia (DOSM) is the "Census of Agriculture 2024", which collects, processes and disseminates data from different ministries and sectors which includes agriculture, livestock, capture fisheries, aquaculture, forestry and logging sectors. This initiatives also harmonises the existing policies like the 12th Malaysia Plan, National Agrofood Policy 2.0, National Agri Commodity Policy 2021-2030, National Forestry Policy, Sabah Forest Rules, Sarawak Forest Policy, Dasar Kebun Komuniti Bandar and National Food Security Policy Action Plan. The challenge implementing this initiative would be collection of climate related data and risks in various sectors and scales.

Meanwhile, from the survey, the respondents pointed out significant gaps in Malaysia's farming practices concerning climate resilience strategies to address extreme weather events and other climate-induced challenges. They emphasised that current agricultural techniques lack necessary adaptation measures, leaving farmers vulnerable to the adverse effects of climate change like drought and flood. Additionally, there is a considerable knowledge gap among farmers especially the smallholders regarding the impacts of climate change and the adaptation strategies available to them. This is compounded by the lack of localised climate data to support accurate predictions and timely responses. These challenges underscore an urgent need for more comprehensive studies to project the long-term impacts of climate change on agricultural crops and food systems in Malaysia, ensuring sustainable and resilient practices for the future.

2.2.2.3 Recommendations

1. **Utilising Existing Information on Localise Climate Data and Upgrading Early Warning Systems**: Leveraging existing initiatives and tools like the Census of Agriculture 2024 and Malaysian Agriculture Information Portal within federal and state government to allow the localised climate data accessible to relevant stakeholders while upgrading early warning systems like the Flood Early Warning System (FEWS) to enable farmers to make informed decisions during natural disasters like floods, droughts or cyclones.
2. **Enhancing Capacity Building**: Equip farmers with sustainable management practices depending on the perceptions on climate change, knowledge, locations, availability of resources, cropping patterns, nature and degree of vulnerability and other factors to allow more effective adaptation approaches which should strategies that can incentivize their adaptation approaches like regenerative agriculture initiatives or vertical farming techniques.
3. **Mainstreaming Climate-Smart Agriculture (CSA):** Integrate Climate-Smart Agriculture practices into national farming strategies to enhance resilience and sustainability. This includes developing resilient crop varieties, efficient water management systems, and sustainable land use practices. Leverage Internet of Things (IoT) technologies and smart agriculture solutions, building on initiatives like Digital AgTech by the Malaysia Digital Economy Corporation (MDEC) and programmes by the Ministry of Agriculture and Food Security. Additionally, capitalise on investments facilitated by the Malaysian Investment Development Authority (MIDA) to scale up these innovations and promote sustainable agricultural development**.**
4. **Promoting Regenerative Agriculture:** Encourage regenerative agriculture practices that enhance soil health, increase biodiversity, and improve soil water retention including in paddy fields. These practices not only help in mitigating the impacts of climate change but also contribute to long-term sustainability by restoring the natural ecosystem functions of the land.
5. **Incentivising Utilisation of Technology and R&D:** Advancing sustainable agriculture requires stricter regulations on pesticide and fertiliser usage, coupled with upskilling for both large plantations and smallholders. For instance, the government can incentivise usage of natural fertilisers. Additionally, promoting vertical farming offers a solution for urban areas and flood-prone regions by providing controlled environments that optimise water use, reduce crop losses, and enable year-round production. Together, these are examples of initiatives that can enhance food security and encourage the adoption of innovative agricultural practices
6. **Improving Coordination, Accessibility & Funding:** Improve coordination among governmental bodies and enhance transparency and accessibility of capacity building resources and funding platforms, such as MyHIJAU, particularly for smallholders and underserved stakeholders. Develop an accessible and user-friendly platform to consolidate information related to sustainable agriculture like funding opportunities, permits & seed applications, quality assessment guidelines and access to sustainable agriculture certifications from government agencies and international bodies. This will

enhance accessibility, reduce barriers to entry, and support urban residents and small-scale farmers in adopting vertical farming and sustainable practices.

2.3 Nature & Biodiversity

2.3.1 Introduction

Nature and Biodiversity are crucial environmental agendas for Malaysia. For starters, Malaysia has a very rich biodiversity – as one of the world's 17 megadiverse countries, containing tropical rainforests, peat swamps, mangroves, seagrass beds and coral reefs, with 4,800km of coastline and constitutes part of the coral triangle which holds the highest biodiversity of marine life in the world (NRECC, 2023). Within the lens of climate, nature and biodiversity benefit our country as a carbon sink – bearing in mind that Malaysia was a net carbon sink up till 2004 (NRES, 2024), needless to say that the sequestration function of our nature and biodiversity is a crucial component of Malaysia's path to net-zero by 2050.

Zooming out of the climate lens, our biodiversity provides a number of ecosystem services which, per the National Policy on Biological Diversity (NPBD) 2022-2030 (2023), include but are not limited to the protection of water quality, soil generation, provision of building materials, flood mitigation and more. It is also increasingly acknowledged as a component of our planetary health, crucial towards balancing the state of our environment. However, Malaysia's biodiversity faces numerous threats in the wake of climate change. There is an urgent need for biodiversity conservation efforts since there is a 73% decline in average wildlife populations reported by the The 2024 Living Planet Index (Ritchie et.al, 2024). It was also estimated that Malaysia could potentially lose 6% of its gross domestic product (GDP) annually by 2030 due to the worst case scenario of a partial ecosystem collapse (Johnson et al., 2021).

Participants of the Youth Climate Change Survey acknowledged habitat loss and fragmentation as the largest contributor to the detriment of nature and biodiversity. This is largely driven by human activity through the overexploitation of natural resources, including the conversion of land for agricultural and urban development, ultimately disrupting ecosystem balance by depleting natural resources and reducing habitat space for wildlife. Following habitat loss and fragmentation, participants ranked the threats to nature and biodiversity as follows: ocean acidification (a decrease in the ocean's pH levels due to an overabundance of CO_2), loss of keynote species (animals which would significantly disrupt their respective ecosystem if they were to go extinct), extreme weather events (such as heatwaves) and invasive species (non-native alien organisms which may cause environmental harm).

Beyond these threats perceived by participants in the Youth Climate Change Survey, there remain other threats to nature and biodiversity and conservation outside of the Youth Climate Change Survey include but are not limited to the following:

- **Deforestation and forest fires:** This is driven by both natural and human activities. Unsustainable logging practices are a risk given the rapid development rate of the country. Meanwhile forest fires, which primarily take place in peatlands, are at bigger risk of occurrence due to increased incidences of extreme heat (Nelson et al., 2024).
- **Coral bleaching:** caused by prolonged heat stress within the ocean, the phenomenon causes coral species to expel algae (zooxanthellae) living in their tissues, causing them to turn completely white (National Ocean Service, 2024). While a bleached coral can

recover from its condition given the removal of stress conditions, long-term and repeated incidences of widespread bleaching poses a high danger of coral mortality, ultimately disrupting the balance of the ocean and also harm those whose livelihoods depend on the ecosystem services they provide. The world is currently undergoing its fourth global coral bleaching event (Mihaly, 2024), highlighting the urgent need for climate action and resilience management practices to protect ocean biodiversity.

- **Human-wildlife conflict:** this describes encounters between humans and animals which lead to negative outcomes, including but not limited to property damage and loss of life. In Malaysia, the main drivers of human-wildlife conflict are primarily habitat loss and fragmentation, urbanisation, as well as illegal poaching (Sabaan, 2017).

2.3.2 Gap Analysis: Existing Policy and Its Implementation

As a developing nation and an emerging high-income economy, Malaysia's decarbonisation efforts are driven by the need to balance economic advancement and sustainable development.

Malaysia's existing policies pertaining to nature and biodiversity are as follows:

- **National Policy on Biological Diversity 2022-2030:** a policy which sets out to ensure conservation efforts, sustainable usage of ecosystem services and the challenges and solutions to implementation of conservation efforts in Malaysia are aligned to the Kunming-Montreal Global Biodiversity Framework (GBF).
- **National Action Plan on Invasive Species 2021 – 2025:** raises awareness on invasive alien species, ensures safe introduction of exotic species, as well as strengthens regulation and enforcement of illegal poaching activities.
- **National Physical Plans** and **National Coastal Zone Physical Plans:** these are high-level national strategic plans to determine sustainable spatial planning policies. The most up-to-date versions of these policies are the 4th National Physical Plan (National Physical Plans are reviewed every five years in tandem with five-year plans, the latest being the 12MP) and the 2nd National Coastal Zone Physical Plan, both published in 2021.

At a global level, Malaysia aims to implement the conservation targets as determined by the Kunming-Montreal Global Biodiversity Framework under the UN Convention on Biological Diversity, the Aichi Biodiversity Targets, The Cartagena Protocol on Biosafety to the Convention on Biological Diversity and other biodiversity-related frameworks. The implementation of these policies poses some challenges mainly in increasing awareness and mobilising more funds for nature and biodiversity. In Malaysia, the financing capacity for these areas is quite diversified, with the establishment of various trust funds like the National Conservation Trust Fund and Marine Parks Trust Fund. Most biodiversity-related expenditure comes from the public sector, followed by NGOs and the private sector. Malaysia also received some international funds from multilateral bodies like United Nations Development Programme (UNDP) and bilateral agencies like Danish International Development Agency (DANIDA) (NRES, 2023). There are also other international mechanisms which support conservation enhancement and biodiversity-related

projects such as the “Reducing Emissions from Deforestation and Forest Degradation (REDD+)” which provide results-based payment for developing countries to support forest conservation and preserve forest carbon stocks.

Apart from REDD+, carbon markets have been linked to nature and biodiversity conservation efforts especially in nature-based projects including forestry. Carbon markets have become an increasingly prominent component in conservation and restoration efforts, particularly for developed nations that lack carbon sinks to support their decarbonisation efforts. Findings from the Environmental Defense Fund found that Article 6 of the Paris Agreement could both save costs of emissions reductions, while promoting conservation, sustainable forest management, and forest carbon stocks enhancement in developing countries (Edmonds et. al, 2019). In Malaysia, efforts in establishing carbon markets are largely driven by the Bursa Carbon Exchange (BCX), which facilitates the trading of carbon credits and renewable energy certificates (RECs) via standardised contracts.

However, carbon markets remain a contentious mechanism due to questions over their efficacy, as well as controversies pertaining to subprime carbon and “phantom credits”. The awareness on the function and operationalisation of carbon markets at the community level remains low; participants of the Youth Climate Change Survey largely reflected a lack of knowledge towards this area. However, several participants agreed that carbon markets played a crucial role in involving industry players (particularly those involved in hard-to-abate sectors) in decarbonisation efforts, and agreed that high-integrity credits and standards were necessary for the effective implementation of carbon credits, focusing on sustainable development and safeguarding indigenous peoples and local communities.

2.3.3 Recommendations

1. **Increasing the Volume of Protected Areas and Enforcing Laws**: Malaysia has committed to maintaining at least 50% of its land mass under forest and tree cover at the 1992 Rio Earth Summit, an effort which has been sustained until today. This can be enhanced by avoiding further degazettement of protected areas for development purposes. For example, the Malaysian government can increase the allocation of **ecological fiscal transfers (EFT)** to incentivise states to increase conservation efforts within their respective jurisdictions with proper monitoring, reporting and verification. Meanwhile, wildlife protection laws must be strictly enforced to combat poaching, overfishing, illegal trade, and habitat destruction, while also regulating tourism in environmentally sensitive areas. Finally, enhanced coordination between government agencies and stakeholders is essential to ensure successful implementation of cohesive and effective biodiversity conservation strategies.
2. **Encouraging Community-Based Conservation Efforts and Benefits-Sharing**: Decentralising conservation efforts encourages collaborations at all levels. In this context, partnerships with grassroots organisations are vital to the success of these efforts. Furthermore, the government should legally acknowledge the rights of

indigenous communities as landowners and protectors of nature, ensuring they are properly consulted through Free, Prior, and Informed Consent (FPIC) before any development occurs. Fair benefit-sharing for both Indigenous communities and local communities is essential to prevent exploitation while ensuring gain from the development revenues.

3. **Enhancing Data Accessibility and Promoting Native Species Conservation**: More comprehensive data collection on the distribution of native species and commercially valuable species should be prioritised, with publicly accessible data to reduce entry barriers for stakeholders through platforms like the Malaysia Biodiversity Information System (MyBIS) database. These datasets should inform stakeholders, allowing targeted conservation efforts for native species. For instance, agroforestry practices can incorporate native species to balance economic and ecological benefits.
4. **Increasing Restoration of both Marine and Terrestrial Ecosystems**: Restoring degraded ecosystems should include reforestation, preservation of endangered species, and efforts to restore ecological functions, ensuring the long-term sustainability of our natural environments. More emphasis should be placed on ocean conservation, focusing on sustainable fishing practices, protection of marine ecosystems, and the restoration of coral reefs. Attention should also be given to lesser-known wildlife species and the impacts of climate change on biodiversity. It is crucial to link climate change mitigation and adaptation with biodiversity conservation for a holistic approach to ecosystem protection.
5. **Mainstreaming Nature Financial Disclosure & Reporting:** Strengthen biodiversity-related financial disclosures, ensuring transparency and adherence to international treaties such as the Convention on Biological Diversity (CBD) and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This aligns with the principles of peace with nature, encouraging responsible investments in biodiversity conservation.
6. **Increasing Connectivity of Urban Green Spaces:** Develop and expand green corridors to enhance connectivity between urban green spaces, supporting both biodiversity and human well-being. This will promote peaceful coexistence between urban species and people, fostering a more sustainable urban environment.
7. **Educating Public to Coexist in Peace with Nature**: Public education is vital to promote sustainable behaviours such as reduced meat consumption, support for ethical products, and donations to conservation efforts.
8. **Enhancing Environmental Impact Assessments for Inclusive and Sustainable Development**: Strategic, transparent and robust environmental impact assessments (EIA) are crucial for identifying potential environmental harms and providing a transparent platform for the public, especially indigenous peoples and local communities, to voice their concerns and contribute to development projects.

2.4 Science, Technology & Innovation

2.4.1 Introduction

ASEAN countries, including Malaysia, are particularly vulnerable to climate change despite their relatively low historical contribution to emissions. Developed nations have largely driven global CO_2 emissions through industrial advancements, leaving developing nations to grapple with the consequences of climate change. Climate change is not just about weather patterns but affects all facets of life, including culture, science, and economic development.

Despite emitting less emissions, Malaysia has experienced significant climate changes over the past decades, with surface temperatures rising by 0.14°C–0.25°C per decade since 1970. Projections suggest that under high emissions scenarios, temperatures could increase by as much as 3.11°C by the 2090s, bringing with it more frequent and intense heat waves, increased rainfall, and a heightened risk of flooding, particularly in Sabah and Sarawak (World Bank Group and Asian Development Bank, 2021). These changes pose serious threats to Malaysia's agriculture, coastal regions, and vulnerable populations, potentially exacerbating poverty and inequality.

In response to these challenges, the role of science and technology in driving adaptation and mitigation efforts is crucial. For example, advancements in climate modelling allow for better prediction and management of flood risks, while innovations in agricultural technology can help protect crop yields from extreme weather. A key area where Malaysia has leveraged science and technology is in the development of biofuels and sustainable aviation fuels (SAF). By harnessing the potential of palm oil and other biomass as feedstocks, Malaysia can increase its production and exports of biofuels, reducing carbon emissions and contributing to a circular economy (Nash, 2024). Other examples include the integration of digital agriculture technologies involving artificial intelligence (AI) and the Internet of Things (IoT), which enhance resource efficiency and productivity in farming. This is currently spearheaded locally by innovators like TM One, HEXA IoT Sdn Bhd., REDtone IOT and many more (Mohd Farhan, 2024). Malaysia also aims to lead the Asian hub for carbon capture and storage (CCS) technologies given its geological capacity to store carbon, with the aim to reduce industrial emissions (Xu, 2023). These efforts not only support global climate goals but also help build national resilience to the impacts of climate change, demonstrating the critical importance of science and technology in securing a sustainable future.

Therefore, leveraging scientific research and technological innovation is vital for addressing these challenges and promoting sustainability. Malaysia, as a developing nation, should focus on enhancing climate change research, fostering technological advancement across various sectors, and encouraging the development of green technologies.

2.4.2 Gap Analysis: Existing Policy and Its Implementation

The National Science, Technology, and Innovation Policy 2021-2030 highlights the importance of science, technology, and cross-sectoral collaboration in addressing climate changes while including health, environmental pollution, climate change and food security as national challenges. In this policy, one of the action plans was to identify the national challenges and high impact initiatives. In regards to this, the survey respondents choose agriculture, waste management, and the fossil fuels phase down/out as critical areas for targeted science and technology innovation to address Malaysia's climate change challenges. These sectors were recognised as interconnected, with agriculture reliant on transportation and energy for their whole supply chain. Since most of Malaysia's emissions are generated from the energy and transport sector, it is vital for science and technological development to support Malaysia's low-carbon development plans within these areas. Respondents emphasised the foundational nature of these sectors, arguing that addressing food security and waste management is paramount for long-term sustainability. A shift towards renewable energy sources and the development of carbon capture technologies were viewed as essential complements to these primary focus areas. While recognising the importance of other sectors such as land use and forestry, participants underscored the urgent need for immediate and substantial progress in agriculture, waste management, and the energy transition.

For instance, the Ministry of Economy in Malaysia has established the National Energy Transition Roadmap (NETR) which aims to steer Malaysia from traditional fossil fuels-based economy to high-value green economy while Carbon Capture, Utilisation and Storage (CCUS) is one of the proposed solutions to accelerate the energy transition in Malaysia. To ensure the effectiveness of CCUS projects in Malaysia, the ministry is developing CCUS-specific policies and regulatory frameworks, namely a CCUS bill, that should define the roles of ministries and agencies and the amendment of existing legislation to incorporate key enablers for CCUS development (Nathan, 2024). Despite the existence of climate policies, the full implementation of science-based recommendations remains a challenge. An example is the efficacy of CCUS technologies which requires rigorous evaluation, including the potential environmental and societal impacts.

Furthermore, the integration of scientific evidence into policy-making is often impacted by non-scientific considerations, such as ethical, cultural, and religious perspectives which can be equally vital and should be given equal consideration. However, this should not hinder the research and development progress on the respective science or technology. Alternatively, science and technology should be utilised to help to identify the "low-hanging fruits" for the best climate technologies and initiatives. A diverse range of technological solutions should be explored to address the complexities of climate change, without being limited to CCUS which has proven higher risks.

2.4.3 Recommendations

1. **Increasing public funding or grants to support local green innovations:** This will propel existing efforts of SMEs and green entrepreneurs, ensuring that their efforts are aligned with existing policies and initiatives. To increase the funding pool, strong partnerships need to be forged within government sectors, industries and universities to enable the development of new intellectual properties in green technology. These funds should also be accessible to a broad spectrum of innovators, and not solely confined to academic institutions or universities.
2. **Addressing Risks in Climate Technologies:** Conduct comprehensive assessments of carbon removal and reduction technologies, expand CCUS research on addressing potential risk and failures, develop value-added applications like CO2-based leak detection systems to mitigate risks and enhance public awareness on risky technologies prior to development.
3. **Advancing Research and Technology for Adaptation and Biodiversity:** Promote agricultural innovations to enable sustainable downstream processes and expand research into applied solutions for adaptation and biodiversity.
4. **Promoting Inclusive and Technology-Driven Solutions:** Ensure climate policies and projects benefit vulnerable communities and indigenous people by providing the necessary resources while also sharing the benefits and profits obtained from their traditional knowledge in development of the innovation.
5. **Harnessing AI for Climate Solutions:** Leverage AI's capabilities in data analysis, prediction, and optimisation to set accurate baselines, identify vulnerabilities, allocate resources effectively, and develop innovative technologies. A centralised data system can be developed to increase accessibility to data, enhancing collaboration and informed decision-making by interested parties.

2.5 Mitigation

2.5.1 Introduction

Malaysia, like any other nation, is experiencing the adverse effects of climate change which prompts robust mitigation strategies to safeguard its economy, environment, and society. In 2023, Malaysia revised its Nationally Determined Contribution (NDC) to 'reduce its economy-wide carbon intensity (against GDP) of 45% in 2030 compared to 2005 level'. This was a 10% increase compared to the previous submission, which stated the last 10% of the target as conditional upon additional resources. Per the Fourth National Communication Report (NC4), Malaysia embeds mitigation actions with co-benefits for the country's economic development in national and sectoral policies, with a strong emphasis on the balance between mitigation and adaptation. According to the NC4 projections, the energy sector will dominate more than 70% of the country's emissions in all three scenarios by 2030 - Without Measures (WOM), With Existing Measures (WEM), and With Additional Measures (WAM). Consequently, mitigation strategies are focused on the energy sector, taking into account the projected energy demand growth to cater for the growing population and GDP.

When looking at the overall framework on climate mitigation efforts in Malaysia, the Twelfth Malaysia Plan (12MP) provides an overall direction, goals, and strategies for our national development in a five-year timeframe (2021-2025), while the NDC highlights our commitment to the international community in a longer timeframe, by 2030. Malaysia's national mitigation strategies address various sectors, including Energy, Transportation, Oil and Gas, Agriculture, Industrial Processes and Product Use (IPPU), Land Use, Land Use Change and Forestry (LULUCF), Waste, as well as CCUS (NRES, 2024). The survey respondents specifically identified the energy and waste sectors as critical national priorities for mitigation efforts. These sectors are seen as important areas where concentrated investments, technology transfer, and capacity building can significantly accelerate the country's transition to a low-carbon economy.

2.5.2 Gap Analysis: Existing Policy and Its Implementation

Overall, respondents highlighted the importance of climate mitigation as one of the key measures in the nation's efforts to combat climate change. Respondents within the field of mitigation underscored the significance of renewable energy and green technology as essential tools for decarbonisation, and to address the root causes of the climate crisis. Through mitigation efforts, it could help reduce the negative impacts of climate change, especially in protecting human health, and conserving biodiversity and the environment, whilst preventing the further escalation of extreme weather events.

A. Energy Sector

There is almost unanimous support by the respondents for energy efficiency measures, which are often considered as a "low-hanging fruit", followed closely by a strong backing for renewable

energy, bioenergy, and green mobility. Support for hydrogen is more moderate, reflecting an average level of interest while opinions on CCUS are polarised, with strong perspectives on opposing ends given its nature as a nascent technology. Key policies in the energy sector include the (1) National Energy Policy 2022-2040 (NEP), which outlines Malaysia's energy direction in aiming for enhanced macroeconomic resilience, energy security, social equitability, affordability, and environmental sustainability, by setting out targets for renewable energy integration and energy efficiency. There is also the (2) Malaysia Renewable Energy Roadmap (MyRER), a national roadmap that focuses specifically on the electricity sector, aiming to achieve a target of 31% renewable energyshare in the nation's installed capacity mix by 2025. It provides strategies for decarbonisation and maintaining system stability.

Additionally, the most notable and central policy in this sector is the National Energy Transition Roadmap (NETR), setting out the steps to achieve the net-zero emissions target by 2050. It includes strategies for increasing renewable energy capacity to 70% by 2050, phasing out coal power, and promoting hydrogen and green mobility among its six energy transition levers. Malaysia's renewable energy landscape is driven by various initiatives administered and managed by the Sustainable Energy Development Authority (SEDA). The (4) Feed-in Tariff (FiT) scheme, a policy mechanism proven effective in countries like Germany, the United States, and the United Kingdom, aims to expand renewable energy by offering a fixed, above-market payment per kilowatt-hour (kWh) for an agreed timeline, typically 15–25 years. This approach ensures price certainty and long-term financial security for renewable energy investors. Additionally, the FiT scheme enables partnerships with underutilized asset owners, such as rooftop spaces, by providing lease payments based on agreed terms (SEDA, n.d.). In Malaysia, all renewable energy resources can apply for Feed-in Approval (FiA) with a maximum installed capacity of 30MW unless special approval is granted by the Minister. The scheme is funded through the Renewable Energy Fund (Dana Kumpulan Wang Tenaga Boleh Baharu or KWTBB) (TNB, n.d.).

Conversely, the (5) Net Energy Metering (NEM) program allows households, businesses, and industrial users to generate power for self-consumption, with excess energy offsetting electricity bills, taking into account historical power usage (Sarif, 2018). Another initiative, the self-consumption (SELCO) policy, encourages generating electricity solely for personal use, driven by rising electricity costs and market based approaches like renewable energy certificates (RECs). These programs are complemented by efforts from Tenaga Nasional Berhad (TNB), Malaysia's largest electricity provider, which oversees initiatives such as the Supply Agreement for Renewable Energy (SARE), Malaysia Renewable Energy Certificate (mREC), and Green Electricity Tariff (GET).

At the ASEAN level, Malaysia participates in cross-border energy trade initiatives, including the Laos-Thailand-Malaysia-Singapore (LTMS) Power Integration Project and the Brunei-Indonesia-Malaysia-Philippines (BIMP) Power Integration Project (Huda, 2024). Malaysian companies are actively contributing to renewable energy development across the region, such as Solarvest Holdings Bhd's solar power project in Vietnam (Gim, 2024). These initiatives align with the ASEAN Power Grid (APG), which aims to create a fully integrated power

grid system across Southeast Asia, promoting regional collaboration and renewable energy development.

Whilst all of these policies form a framework for Malaysia's energy sector, they differ in their focus, scope, and target, with some being comprehensive while others are more specific. However, challenges arise in grid integration and scaling up other renewable sources. While energy efficiency initiatives are in place, their impact remains limited. Furthermore, building energy codes and appliance labelling standards require stricter enforcement. The NETR is a recent development, and its full impact is yet to be seen. Effective implementation requires significant investments, policy alignment, and public engagement. Overall, progress has been made but challenges related to policy enforcement, infrastructure development, public awareness, and financial constraints still hinder the full potential of these policies.

B. Waste Sector

In the waste sector, there are several key policies in the waste sector such as the (1) National Solid Waste Management Policy. It is an overarching policy that provides a framework for integrated solid waste management, emphasising reduction, reuse, recycling, and recovery (JPSPN, 2016). There is also the (2) Malaysia's Roadmap Towards Zero Single-Use Plastics 2018-2030 that sets out an action plan and policy direction in addressing single-use plastics, along with its low rate of recycling and presence of suitable alternatives (MESTECC, 2018). These policies combined with other supporting regulations and initiatives, form the foundation of Malaysia's efforts to improve waste management and reduce environmental impact. Improvements in waste collection and disposal have occurred, but challenges persist in waste segregation and recycling rates. There is an emphasis on waste-to-energy (WtE) technologies being part of the solution in this sector. While some WtE projects in Malaysia are still in the early stages, they face various challenges including technology selection, public acceptance, and regulatory frameworks.

2.5.3 Recommendations

The recommendations cut across the sectors previously mentioned with three notable overarching themes in enhancing mitigation efforts; financial support, capacity building, and technological transfer.

1. **Financial support**
    - Increase more funding, incentives, and subsidies in encouraging sustainable practices, capacity building programs, and on the development of green technology infrastructure.
    - Encourage targeted domestic investment in national mitigation actions, leveraging Malaysia's role as an Islamic finance hub to integrate ethical principles like transparency into green finance through collaboration with regional and international bodies such as the OIC.

- Promote international investment in national mitigation actions by prioritising environmental safeguards and protocols in policy development, ensuring protection for vulnerable groups and adherence to ecological standards for multinational investments.
- Public-Private Partnership (PPP) to cushion and reduce the risk when financing sustainable projects.
- Financial incentives and subsidies to encourage adoption of sustainable practices and enforcement of emission reduction.
- To increase avenues in providing tax breaks as incentives to the private sector in switching or investing in green technologies and green efforts.
- To enhance existing policy and regulatory tools to focus more on the implementation of energy efficiency standards and certificates aligned to the Energy Efficiency and Conservation Act (EECA) and the National Energy Efficiency Action Plan and other innovative solutions to expand renewables like tax breaks, and FiT.

2. Capacity building

- To amplify existing efforts in building capacity and awareness through implementation of formalised education such as the Education for Sustainable Development (ESD) nation-wide and collaborating with local educational institutions.
- To facilitate upskilling of local workers and building expertise in the green sector through training programs and reducing barriers to education, while ensuring clear communication of relevant policies across all levels.
- To expand opportunities and resource accessibility equitably to everyone including those in rural areas and the whole-of-Malaysia including East Malaysia.
- To empower locals to participate in reliable data collection and performance assessment for evaluating the effectiveness of mitigation efforts.
- To expand and enhance climate education initiatives with a particular focus on reaching individuals in rural communities and those involved in land stewardship.
- To further optimise the nation’s existing FiT scheme administered by the Sustainable Energy Development Authority (SEDA), by enhancing the accessibility and clarity of the approval process and information available on the official website.

3. Technology transfer

- Encourage localised technology transfer tailored to Malaysia's strengths, while fostering international collaboration with developed nations to share best practices and bridge gaps in knowledge and capacity.
- To encourage research and development (R&D) in innovating climate solutions.
- Technological support that is accessible to all especially those in rural areas such as the “smart recycling bin”.
- To further enhance international collaboration for capacity building, technological transfer, feasibility study and pilot projects to bridge the gap in mitigation efforts.

Prioritising equity, just transition, and skills development is crucial, especially in rural areas and East Malaysia, where additional resources are needed. By focusing on these areas, Malaysia can ensure that the benefits of mitigation efforts are distributed fairly, promoting a just transition across all regions of the country. There are several tools that can efficiently enhance mitigation efforts at the national level.

2.6 Climate Education and Youth Role in Climate Action

2.6.1 Introduction

The escalating climate crisis demands innovative and inclusive approaches. Youths, as the future stewards of the planet, possess a unique understanding of the challenges and opportunities presented by climate change. Climate education is essential as it equips individuals with the knowledge and skills needed to understand, mitigate, and adapt to the impacts of climate change. In Malaysia, it has gained increasing importance as the country addresses environmental challenges and works towards sustainable development. The approach to climate education in Malaysia is multifaceted, involving integration into the national education system, community engagement, and partnerships with various organisations.

2.6.2 Gap Analysis: Existing Policy and Its Implementation

Demographics of respondents are heavily centred in urban areas, indicating a lack of participation from rural areas. Inaccessibility of climate education is also influenced by the availability of resources in local languages. Complicated terms and jargons might hinder and affect the public's understanding of climate change. According to the survey, aspects that could have the highest influence on the youth to be more climate friendly is family and community. Climate education ranked second highest, followed by engagement activism, media and climate celebrity and lastly, climate policy.

The respondents strongly emphasised the critical role of youth in addressing climate change and the consequent need for comprehensive climate education. The young generation perceives themselves as the primary stakeholders who will inherit the consequences of climate change. They believe that equipping them with climate knowledge is essential for them to become effective leaders in mitigating and adapting to the crisis.

Young people possess a more open mindset compared to older generations, making them more receptive to new ideas and innovative solutions to climate challenges. Respondents highlighted the connection between climate awareness and action. They believe that a well-informed youth population is more likely to engage in climate-positive behaviours and advocate for sustainable policies. There is a consensus among respondents that addressing climate change requires a comprehensive understanding of the issue. Climate education is seen as a fundamental step towards developing informed decision-making abilities.

Respondents also emphasised the necessity of comprehensive climate education to equip the younger generation with the knowledge and skills to address climate change. Integrating youth perspectives into decision-making processes is crucial for developing effective and sustainable climate action strategies. The recommendations below align with the growing recognition of the importance of climate education and youth empowerment in addressing global warming. By providing a platform for young climate leaders, we can foster a culture of innovation and resilience, essential for navigating the complexities of climate change.

Following Malaysia's commitment to SDG 4, which seeks to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, the Malaysia Education Blueprint 2013-2023 formulated highly emphasised a holistic development for all children. In accordance with SDG 4, Education for Sustainable Consumption (ESC) and Education for Sustainable Development (ESD) have been integrated across subjects, commonly Science, Geography and Moral Education. However, challenges present among the educators which found the topic as insignificant, a burden to teach and had poor knowledge on the topic.

2.6.3 Recommendations

1. Strengthening Climate and STEM Education

- **Integrating Climate Education into Curriculum**: Incorporate climate topics and STEM-related activities across all education levels, mandating sustainability coursework in universities and embedding content on the Sustainable Development Goals (SDG) in school curriculums.
- **Building Educator Capacity**: Train educators to effectively teach climate-related topics through updated curriculums, interactive learning methods, and collaboration with training providers.
- **Experiential Learning**: Encourage hands-on activities such as field trips, community projects, and environmental clubs to foster practical understanding of climate issues.
- **Inclusive Access to Education**: Expand climate education to rural areas and indigenous communities, integrate indigenous knowledge systems by providing them resources and wages, and launch ambassador programs targeting underrepresented communities.
- **Parental and Community Engagement**: Partner with NGOs and local organisations to involve parents and community groups in climate education initiatives.

2. Promoting Green Skills and Career Readiness

- **Green Job Pathways**: Integrate training for emerging green careers, such as renewable energy and sustainability roles, through TVET and partnerships with industry leaders.
- **Industry Collaboration**: Work with companies to provide skill development for marginalised groups, including indigenous peoples.
- **Scholarships and Incentives**: Offer scholarships for climate-related studies with incentive-based mechanisms to retain talent in sustainability fields.

3. Enhancing Climate Communication and Leveraging Technology

- **Accessible Climate Information**: Ensure inclusivity through translation, outreach, and capacity building for non-technical audiences.
- **Media Engagement**: Use media platforms to mainstream climate awareness and promote lifelong learning across generations.

- **Data Accessibility and AI Integration**: Improve access to climate data, particularly in rural areas, and leverage AI to analyze trends and optimize resource allocation.

4. Strengthening Youth and Legislative Engagement

- **Youth in Policy Leadership**: Establish structured mechanisms for youth participation in climate decision-making and ensure youth representation in national policy-making, providing them with the education and skills they need to be leaders in the transition to a sustainable future.
- **Environmental Rights Advocacy**: Amend the federal constitution to include environmental rights (per the United Nations General Assembly's recognition of the right to a clean, healthy and sustainable environment, passed in July 2022) and promote an ASEAN environmental rights framework during Malaysia's ASEAN chairmanship.

3.0 Conclusion

In conclusion, Malaysia has made substantial strides in addressing climate change through policy development and strategic initiatives, particularly in the energy sector. However, to effectively achieve its carbon reduction targets and adaptation plans, Malaysia has to better align its efforts with the global climate agenda with several key areas that require attention.

- Strengthening financial frameworks, enhancing accountability, and aligning with global climate goals are essential for ensuring the efficacy and transparency of Malaysia's climate actions.
- Adaptation must also be prioritised alongside mitigation efforts to safeguard vulnerable communities and ecosystems from the adverse impacts of climate change. This includes enhancing climate-resilient infrastructure, improving water and food security, and fostering community-based adaptation initiatives to build resilience at the grassroots level.
- Protecting and restoring biodiversity is also vital for maintaining ecosystem services that support both mitigation and adaptation, ensuring a balanced and resilient environment.
- Leveraging science and technology through robust STEM education, innovation promotion, and rigorous evaluation of nascent technologies is crucial for developing sustainable solutions.
- Transitioning to a low-carbon economy by prioritising energy efficiency, renewable energy sources, and cleaner technologies is imperative for meeting Malaysia's climate commitments.
- Collaboration with other nations particularly within the ASEAN framework presents significant opportunities for sharing knowledge, resources, and best practices to address regional climate challenges effectively.

By addressing these areas, filling gaps in finance and accountability, and capitalising on opportunities, Malaysia can strengthen its climate policies implementation to foster a sustainable future, create economic growth, and contribute meaningfully to global climate mitigation and adaptation efforts.

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