

Chapter 4

Malaysia

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Chapter 4

Malaysia

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1. Climate-Change Policy Landscape

Across the world, concern is growing over the ability of countries to cope with the various impacts that climate change will have on economies and societies. Increased average surface temperatures are projected to trigger various climate-linked consequences that will, in turn, cause significant economic damage, including in Malaysia. These involve sea-level rise; extreme weather events (e.g. droughts, floods, and storms); as well as adverse consequences on health and mortality, ecosystems and biodiversity, and agricultural yields. In response, governments around the world have taken steps towards reducing greenhouse gas emissions, which are the primary cause of climate change, as well as towards improving their resilience to its effects.

In Malaysia, many of the climate-change adaptation efforts made to date relate to flood-mitigation and -prevention measures. The biggest threats that climate change poses to the country are extreme rainfall, in terms of both its frequency and severity, and sea-level rise. Yet, Malaysia's current approach to climate-change adaptation – let alone to the financing of these efforts – is scattered, under the purview of various ministries, government agencies, and departments. Indeed, one of the greatest impediments to building Malaysia's resilience to climate change is the lack of a comprehensive and coordinated national adaptation action plan.

This chapter begins by reviewing all major planned and existing climate-change mitigation and adaptation policies in place in Malaysia. While intended mitigation actions are clearly defined in various guiding policy documents and include initiatives across a variety of sectors under the purview of several ministries, the same cannot be said for adaptation actions. This means that policy implementation for climate-change adaptation will continue to be fragmented across ministries and to comprise ad-hoc efforts.

The main policy guiding government agencies, industry, communities, and other stakeholders in addressing the challenges of climate change in Malaysia is the *National Policy on Climate Change*, which was approved by the Cabinet in 2009 (MNRE, 2009). This document recognises the need for both mitigation and adaptation activities and is based on five principles: sustainable development, conservation, coordinated implementation (i.e. climate-change considerations incorporated into all development programmes), effective participation, and the notion of common but differentiated responsibilities and respective capabilities in the context of Malaysia's involvement in international climate agreements.

Since the formulation of this policy, Malaysia’s climate-change commitments and targets have been driven by its international commitments. Malaysia submitted its first nationally determined contribution (NDC) in 2015 and updated it in 2021. The first NDC submitted to the United Nations Framework Convention on Climate Change (UNFCCC) included a pledge to reduce by 35% – relative to 2005 – the emissions intensity of gross domestic product (GDP) in Malaysia by 2030. Another NDC, of a 45% reduction in the emissions intensity of GDP, is conditional on the provision of international climate funding and technology transfer. This was subsequently updated and enhanced to achieve 45% carbon-intensity reduction unconditionally in 2021. Malaysia provided information on adaptation strategies in an annex, including focussing on seven sectors – water, coasts, agriculture, infrastructure and cities, public health, forestry and biodiversity, and disaster management (Government of Malaysia, 2021).

Malaysia plans are important policy plans, mobilising resources for 5-year periods. The current plan, the *Twelfth Malaysia Plan*, strengthens adaptation by defining more dimensions and various strategies, such as taking evidence-based and risk-informed actions, incorporating the whole cycle of the Sendai Framework, and adopting a nature-based approach to flood management (EPU, 2021). The plan also continues the agenda of developing the national climate-change adaptation plan from the previous plan.

Table 4.1. Targets Related to Climate Action and Disaster Risk Reduction

Eleventh Malaysia Plan (2020 targets)	Twelfth Malaysia Plan (2025 targets)
At least 10% of coastal and marine areas and 17% of terrestrial and inland water areas gazetted as protected areas	At least 10% of coastal and marine areas and 20% of terrestrial and inland water areas gazetted as protected areas and through other effective area-based conservation measures
40% reduction in greenhouse gas emissions to GDP by 2030 relative to the level in 2005	45% reduction in greenhouse gas emissions to GDP by 2030 relative to the level in 2005
2,080 megawatts of renewable energy installed	10 integrated river basin management plans implemented
22% recycling rate of household waste	25% government green procurement
Establishment of national crisis and disaster management centre	40% recycling rate of household waste
2 million people protected by flood-mitigation projects	67% reduction in hydrochlorofluorocarbon consumption
	Disaster risk management policy launched
	31% renewable energy share of total installed electricity generation capacity
	Net-zero emissions by 2050

GDP = gross domestic product.

Sources: EPU (2015, 2021).

Malaysia has enacted numerous policies across industries and sectors that assist in both climate-change mitigation and adaptation. In the energy sector, policies are guided by the *National Renewable Energy Policy and Action Plan*, which was passed in 2009, along with the creation of the Sustainable Energy Development Authority (SEDA) (Ministry of Environment and Water, 2018). This plan sets the framework for key renewable energy policies that Malaysia has since enacted, including feed-in tariffs, net energy metering, and large-scale solar, all of which are under the purview of SEDA. Additionally, energy-efficiency improvements are emphasised through the *National Energy Efficiency Action Plan*, which aims to promote 5-star-rated appliances, set minimum energy performance standards, require energy audits and energy management in buildings and industries, and promote cogeneration and energy-efficient building design (Ministry of Energy, Green Technology and Water, 2015).

In the transport sector, several policies have the potential to have positive climate impacts. The *National Land Transport Master Plan*, as well as the *Greater Kuala Lumpur/Klang Valley Public Land Transport Master Plan*, emphasise the importance of public transport, in terms of infrastructure development and usage as well as reduced use of private vehicles. The *National Biofuel Policy* calls for higher biodiesel blends to reduce Malaysia's reliance on fossil fuels as a transport fuel, while national automotive policies of recent years have promoted energy-efficient and electric vehicles. Within the waste sector, two policies have the potential to reduce Malaysia's climate footprint – the *National Solid Waste Management Plan* and the Entry Point Project on developing biogas facilities at palm-oil mills. These strive to reduce the quantity of solid waste sent to landfills as well as to promote circularity by using by-products of the palm-oil industry to generate renewable energy (Ministry of Environment and Water, 2018).

Finally, Malaysia has enacted several policies within the land-use sector that have implications for climate-change mitigation and adaptation. The *National Forestry Policy* – as well as state-level forest policies – provide guidelines for the management, conservation, utilisation, development, and protection of Malaysia's rainforests. The National Forestry Council ensures the sustainable harvesting of timber products. At the same time, the *Eleventh Malaysia Plan* called for efforts to improve degraded forests, and the *National Policy on Biological Diversity, 2016–2025* aims to ensure that 50% of Malaysia's land mass remains forested (MNRE, 2020).

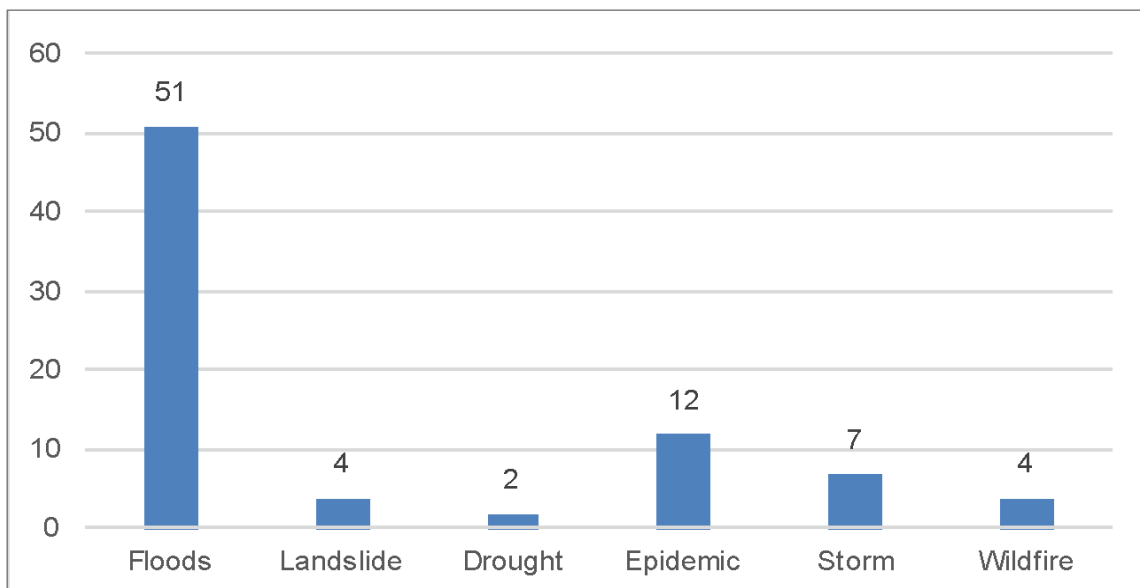
A review of climate change-related policies demonstrates that no clear action plan for climate-change adaptation is in place, however. Policy implementation for climate-change adaptation is fragmented across sectoral policies and enshrined in the budgets of multiple ministries. The next section reviews the scenario and policies related to adaptation.

2. Climate-Change Adaptation Challenges and Actions

Data indicate that 80 natural disasters – consisting of biological, climatological, hydrological, and meteorological disasters – have occurred in Malaysia since 1975, with the majority of these having occurred in the 21st century.¹ In total, 51 have been floods, including 42 that occurred from 2000 onwards – a figure (and share) that is projected to increase as the impacts of climate change are increasingly felt. Since 1975, flooding has affected almost 3.3 million residents in Malaysia and caused at least \$1.79 billion in economic damages.

Of all climate change-driven natural disasters, flooding is the most significant threat to Malaysia. **Error! Reference source not found.** shows how much more frequent floods are in the country relative to other natural disasters. The increasing frequency of these disasters is also apparent and highlighted in Figure 4.2, which exposes the sharply rising trend in the number of natural disasters since 1975.

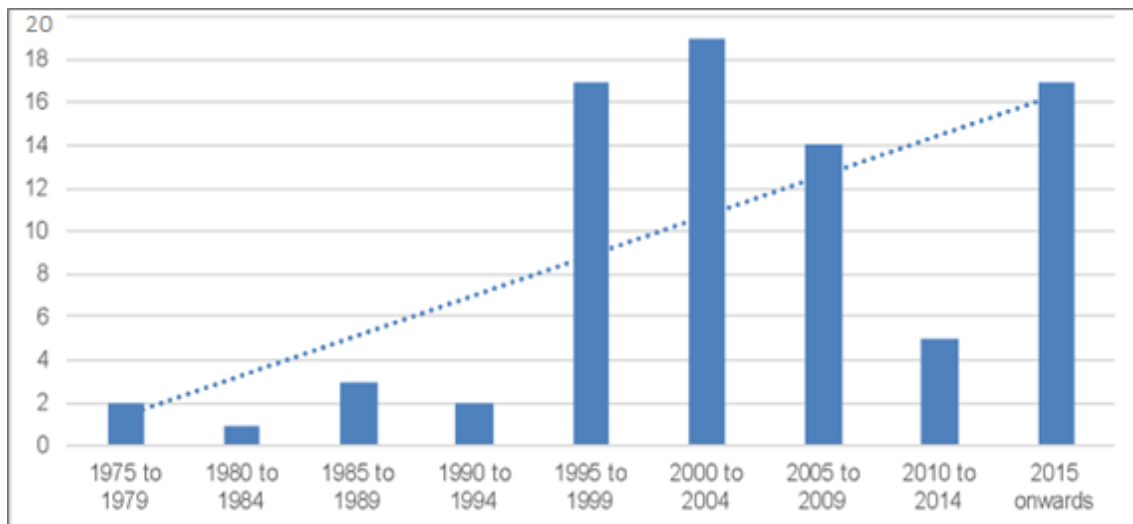
Figure 4.1. Types of Natural Disasters in Malaysia



Source: CRED, EM-DAT: The International Disaster Database, Brussels, <http://emdat.be> (accessed 20 December 2022).

¹ CRED, EM-DAT: The International Disaster Database, Brussels, <http://emdat.be> (accessed 20 December 2022).

Figure 4.2. Number of Natural Disasters in Malaysia since 1975



Source: CRED, EM-DAT: The International Disaster Database, Brussels, <http://emdat.be> (accessed 20 December 2022).

The damages that have accumulated to date, however, are dwarfed by projections of future damages that Malaysia will accrue as temperatures continue to rise. Rasiah et al. (2016) estimated that without improvements to existing mitigation efforts, annual climate change-related damages in Malaysia will rise from RM11.9 billion in 2020 to RM456.3 billion in 2050. By 2110, cumulative damages will reach RM40.0 trillion. In contrast, strong mitigation actions – such as Malaysia meeting its emissions reduction pledge to the UNFCCC – would truncate total damages by 87.5% to a total of RM5.3 trillion by 2110 (Rasiah et al., 2016).

However, further research is required on the localised effects of rising temperatures on different components of the economy over time, and these localised effects must then be translated into measurements of economic damage. Further research is also needed on the relationship between climate change and economic damages because of changing weather patterns and extreme weather events on a host of variables, including crop yields and agricultural production, mortality and health outcomes, economic productivity, sea-level rise in coastal areas, flooding and saltwater intrusion, and vector-borne diseases. Such a detailed, bottom-up approach to establishing future climate change-driven damages would put policymakers in a strong position to enact pre-emptive measures. This approach also lowers the cost of expensive adaptation infrastructure projects, especially when compared against the magnitude of the future climate damages.

While the process of putting monetary values on future costs will take time, there is already a preliminary understanding of some climate-change impacts on Malaysia. These physical impacts and vulnerabilities are reviewed as follows.

2.1. Water and Coastal Resources

Climate change is projected to cause increases in the frequency and severity of rainfall in Malaysia along with sea-level rise. As a result, concern is growing over flood vulnerability, saltwater intrusion, droughts, and coastal erosion, all of which will have negative effects on the security of Malaysia's water and coastal resources. Furthermore, the excess water has also impacted water security and infrastructure. This includes more frequent occurrences of excess water release in dams, which in turn increases the risks of flooding (Ministry of Environment and Water, 2018).

Numerous adaptation measures have been implemented to cope with these impacts. Most prominently, the *National Water Resources Policy* is a key policy that addresses water resources security, water supply, and water-related disasters with an aim to ensure that 'the security and sustainability of water resources [is] made a national priority to ensure adequate and safe water for all, through sustainable use, conservation and effective management of water resources enabled by a mechanism of shared partnership involving all stakeholders' (MNRE, 2012:20). The approach of integrated water resources management, supported by integrated river basin management and integrated flood management, is central to improving watershed planning due to 'consideration of their unique application ranging from facilitating allocation to addressing hazards' (MNRE, 2012:17).

There are other policy instruments, mainly informational, that can strengthen climate-change adaptation in the water sector. In 2018, the Department of Irrigation and Drainage prepared an integrated river basin management master plan for 25 river basins, but it is unclear if climate change is considered in the plans (Ministry of Environment and Water, 2018). It also developed *Malaysia Dam Safety Management Guidelines*, which include measures to ensure the safety of dams during construction and operation due to natural hazards such as floods (Jabatan Pengairan dan Saliran Malaysia, 2017). However, the guidelines do not account for climate change, explaining that understanding the effects of climate trends on Malaysia floods is still in its infancy. Lastly, the National Water Research Institute of Malaysia prepared the *Climate Change Adaptation Framework for Water Sectors* to strengthen adaptation in managing water resources, water utilities, and water-related disasters (NAHRIM, 2021).

Moving forward, the water sector will likely remain focussed on climate-change adaptation and on hard infrastructure in terms of mitigation and information for adaptation. Little evidence of nature-based or holistic solutions, such as sponge cities, has been introduced.

2.2. Food Security

Due to changes in the frequency and severity of rainfall, solar irradiation, and the rise in average temperatures – along with associated flood concerns – Malaysia is projected to suffer from significant reductions in average rice yields. Droughts are also projected to play a role in these decreasing yields, while saltwater intrusion into rice paddies remains a concern, particularly during the Southwest Monsoon. Flooding is also a threat to certain palm-oil cultivation areas (Ministry of Environment and Water, 2018).

The latest *National Agrofood Policy, 2021–2030* clearly acknowledges climate-change adaptation. Indeed, it aims for a paradigm shift towards a sustainable food system and adapting to climate change. Nonetheless, concrete actions are unclear, as there is no action plan towards meeting these policy statements (MNRE, 2012).

Adaptation in food security is also enshrined in the *National Policy on Biological Diversity, 2016–2025*, which seeks to improve the climate–biodiversity link (MNRE, 2016). It aims to develop and to implement appropriate agriculture landscape planning to ensure that agricultural activities are aligned with long-term biodiversity targets and minimise human–wildlife conflicts by providing extension services and technical support to smallholder farmers to improve productivity while conserving biodiversity.

Key agricultural policy instruments that may be linked to climate-change adaptation are incentive structures, such as subsidies for smallholders, tax mechanisms, guaranteed minimum prices, research, and budget for drainage and irrigation and other agricultural facilities and services. In 2020, the Ministry of Finance funded urban farming of various scales to improve community resilience during the COVID-19 pandemic and future shocks. However, these are not directly related to adaptation.

2.3. Forestry and Biodiversity

The health of Malaysia’s forests is projected to be adversely impacted by droughts and temperature increases, with expectations of decreases in biomass growth and increases in mortality rates. Drained peat swamps are expected to be particularly susceptible to forest fires, while mangrove forests are prone to sea-level rise and saltwater intrusion; another significant concern is habitat loss (Ministry of Environment and Water, 2018).

The main policy to address biodiversity and natural resources is the *National Policy on Biological Diversity, 2016–2025*, which identifies climate change as an emerging threat to biodiversity, noting that it ‘is well-established although its actual impacts on biodiversity are not easily predicted’ (MNRE, 2016:30). The policy aims to close this knowledge gap by expanding the evidence base of climate-change effects on biodiversity and assessing vulnerabilities of species and habitats to adaptation efforts (MNRE, 2016:90).

Similarly, the recently revised *Malaysian Forest Policy* identifies forest resources as integral in addressing mitigation and adaptation. Climate-related action plans in this policy are heavily skewed towards mitigation due to forests’ carbon sequestration potential, more so in Sabah through REDD+ (MNRE, 2021:45,86). However, adaptation receives little attention. The closest strategy with adaptation benefits is ‘enhancing effectiveness of water catchment management’ under Strategy 1 (MNRE, 2016:44), which primarily addresses water resources conservation.

2.4. Infrastructure

Again, the primary climate vulnerability of infrastructure in Malaysia is flooding. This impacts buildings, roads, drainage, transport infrastructure, sewerage facilities, and solid waste disposal facilities or sites. Haze is another concern, particularly to airports and seaports across the country (Ministry of Environment and Water, 2018).

There is no overarching policy that guides infrastructure planning in a holistic manner in Malaysia. Instead, it relies on sectoral strategies, such as that described under the water sector. Most environmental impacts and disaster risks are addressed at the project level –during feasibility study stages and environmental impact assessments as required by regulations such as the Environmental Quality Act 1974.

Seasonal storms and flooding are expected to continue to cause damages to energy sector infrastructure. In 2014, 2,788 of the 66,321 substations in Peninsular Malaysia were affected by flooding, and this figure is projected to rise over time. Transmission towers are also expected to be at risk of flooding. Sea-level rise, meanwhile, will affect energy sector infrastructure in low-lying coastal areas, while droughts will adversely affect hydropower plants due to limitations of water resources (Ministry of Environment and Water, 2018). The actions to address these are the responsibility of the electricity company, Tenaga Nasional Berhad.

2.5. Public Health

Flooding also concerns public health infrastructure, with events in 2014 causing damages to 168 public health care facilities. Such instances of flooding are expected to continue, especially in flood-prone areas, as extreme rainfall becomes more common. Sea-level rise is also expected to be a cause of damages, particularly in coastal areas. To address these issues, health care facilities frequently affected by flooding have been allocated funding for upgrades, relocation, and redesign, as per the 5-year plans (EPU, 2015, 2021). The closest policy that may strengthen adaptation in the public health sector is the *National Disaster Risk Reduction Policy* that is currently being drafted by the National Disaster Management Agency.

3. Future Infrastructure Adaptation Requirements

Studies have indicated that Malaysia must continue to enhance the climate-change resilience of many industries and sectors. Further steps were identified in EPU (2021) and Government of Malaysia (2018):

- (i) **Water and coastal resources.** Climate change must be considered in the design and construction of infrastructure such as dams, irrigation systems, and flood-mitigation structures.
- (ii) **Fisheries and aquaculture.** The resilience of critical marine habitats, such as mangroves, seagrasses, and coral reefs, must be improved through prevention of habitat loss, habitat rehabilitation, biodiversity restoration, enforcement of regulations, and establishment of additional marine protected areas.
- (iii) **Forestry and biodiversity.** Forest network areas should be extended, and management and rehabilitation of vulnerable ecosystems should be improved.
- (iv) **Buildings and flood relief centres.** Design standards and guidelines for buildings should be revised periodically. For developments in coastal areas, these standards and guidelines must be stricter to account for sea-level rise.

- (v) **Roads and drainage.** More technically advanced designs must be developed to enhance the durability and safety of roads, drainage, and bridges, particularly those in flood-prone or coastal areas.
- (vi) **Transport.** The design of hill slopes and track embankments must consider threats from climate change, particularly flooding and extreme weather events.
- (vii) **Water supply facilities.** The number of integrated multipurpose dams should be increased to reduce flood risks. Existing water catchment areas must be protected, and others identified and gazetted. Lastly, a water demand management master plan must be designed.
- (viii) **Other adaptation measures.** The Malaysian Meteorological Department should enhance its short- and medium-range weather- and flood-forecasting systems. The Department of Irrigation and Drainage should enhance its capacity in flood and drought forecasting. Training courses covering climate-change adaptation should be conducted by the Ministry of Agriculture and Agro-Based Industry. The Department of Veterinary Services should develop action plans to protect the livestock industry from extreme weather events.

4. Financing Infrastructure for Climate Change Adaptation

To review the implementation of infrastructure financing for climate-change adaptation in Malaysia, four areas were assessed across the policy cycle – budget, mainstreaming, regulations, and reporting. Opportunities and challenges are identified towards implementing infrastructure financing for climate-change adaptation.

4.1. Budgeting

Given the absence of a national climate-change adaptation action plan, as well as the lack of a single domestic authority on climate-change adaptation, Malaysia's budgetary allocations to relevant ministries for this purpose are based on specific policies on threats that climate change poses. As highlighted in the previous section, much of the adaptation action pertains to flood-mitigation efforts. Therefore, most resources and finance are channelled to address these. Under the Malaysia plans, allocations for flood-mitigation projects have substantially increased over the years. Indeed, under the *Twelfth Malaysia Plan*, RM16 billion is allocated for flood-mitigation projects, similar to the RM17 billion allocated in total from the *Ninth Malaysia Plan* to *Eleventh Malaysia Plan* (EPU, 2015, 2021; Ministry of Economic Affairs, 2018).

A more detailed analysis is challenging, as Malaysia does not practice climate budget tagging. Nonetheless, reviews of past annual budgets revealed that almost RM2.5 billion has been allocated since 2018 towards budgetary line items that seem to relate to the adaptation policies described in the previous section (Table 4.2).

The amount of annual budget allocations for climate-adaptation programmes steadily increased from RM282 billion in 2018 to RM308 billion in 2021. The increase is also reflected in the share of adaptation-related activities to the overall budget, which increased from 0.24% to 0.44% in the same period. This demonstrated that the expenditure and – arguably – commitment to adaptation has increased in recent times, not only in absolute terms but also in relative terms.

Secondly, the largest allocation is for flood mitigation plans and urban drainage. The second largest is for modernising paddy irrigation, which is only about one-fifth of the cost allocated to flood mitigation. Furthermore, the budget allocated to flood mitigation continued to increase from RM388 million 2018 to RM569 million in 2021. This is largely because the focus on flood mitigation is often through large infrastructure and engineering solutions, which require high investments.

Thirdly, however, without the use of a comprehensive system of climate budget tagging in Malaysia's annual budgets, it is impossible to deduce whether each of these line items are devoted entirely to climate-change adaptation activities. For example, Malaysia's adaptation policies include the training of agricultural sector workers to be conducted by the Ministry of Agriculture and Agro-Based Industry; while such an item can be found in the budgets, it does not necessarily mean that the entire allocation for this budgetary line item is towards the training of workers on the topic of climate-change adaptation. The same can be said of other budgetary line items, including programmes on sustainable forest management and green technology projects.

An additional consideration not captured in the analysis is the fact that Malaysia, as a federation, has different budget allocations at both the federal and state level and in the Constitution.

Table 4.2. Annual Budget Allocations for Climate-Change Adaptation Programmes, 2018–2021

Ministry	Programme	Budgetary Allocation (RM)			
		2018	2019	2020	2021
Agriculture and Agro-Based Industry	Modernisation of Paddy Irrigation Systems	72,593,708	152,111,846	131,455,400	115,217,000
	Agriculture Drainage System Development Plan	4,855,255	12,500,000	16,700,000	10,540,000
	Agriculture Zone Flood Control Programme	520,335	7,200,000	16,000,000	6,800,000
	National Agricultural Training	9,201,185	13,050,014	15,514,100	7,082,000
Natural Resources, Environment and Climate Change	Sustainable Forest Management	22,857,958	36,782,922	45,290,000	80,620,000
	Coastal Planting of Mangroves and Others	1,989,856	2,000,000	2,000,000	10,000,000
	Heart of Borneo Project	5,720,979	5,230,500	5,700,000	6,000,000
	Sustainable Forest Resource Development Programme	3,303,481	4,600,000	8,666,100	
	Dam Restoration	9,295,736	24,252,990	37,500,000	30,400,000
	Flood Hazard Alert and Control Plan	18,384,466	15,649,000	30,000,000	32,300,000
	Upgrade of Urban Infrastructure and Drainage, Flood Mitigation	12,886,575	32,000,000	22,000,000	51,000,000
	Coastal Erosion Prevention	28,935,524	31,670,000	35,500,000	57,275,000
	Flood Mitigation Plans and Urban Drainage	387,623,209	445,339,010	443,923,400	569,320,200
	Sustainable Drainage Management Plan	36,513,060	69,900,000	175,126,500	83,257,000
Environment and Water (formerly Natural Resources and Environment)	Green Technology Projects			1,000,000	4,200,000
	Department of Environment	42,503,270	71,228,000	67,595,000	83,250,000
	Environmental Conservation Division		360,860	3,400,000	4,180,000
	Energy Efficiency and Renewable Energy Programs	5,078,206	26,000,000	26,000,000	7,000,000
	Malaysia Green Technology Corporation	4,500,000	4,500,000	3,800,000	3,250,000

Ministry	Programme	Budgetary Allocation (RM)			
		2018	2019	2020	2021
	Environmental Management and Climate Change		118,715,000	120,968,300	195,491,600
Total		666,762,803	1,073,090,142	1,208,138,800	1,357,182,800
Total Annual Budget		282,250,000,000	316,550,000,000	299,020,000,000	307,540,000,000
Share of Total Budget Accruing to Environmental Operations and Programmes		0.24%	0.34%	0.40%	0.44%

Source: Authors.

Malaysia has also received external funding for six adaptation projects (Ministry of Environment and Water, 2020). This includes funding from the United States Agency for International Development (USAID) to support the Coral Triangle Initiative; from the Asia-Pacific Network for Global Change Research for strengthening the capacity for policy research on mainstreaming adaptation to climate change in agriculture and water sectors; from Sida to establish a mechanism to integrate climate-change adaptation into national and regional planning; from the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) to build capacity for adaptation in the agriculture and natural resources sector; from the Asian Development Bank (ADB) for sustainable management of the Coral Triangle; and from Conservation International as part of the Asia Pacific Climate Change Adaptation Project Preparation Facility (ADAPT) to increase access to financial resources for climate-change adaptation investment projects. Note that these are largely capacity-building projects rather than those that specifically enhance Malaysia’s resilience to the effects of climate change. Sources indicated that Malaysia also requested \$3 million from the Green Climate Fund amid the deadly floods that occurred in late 2021 to early 2022 to develop a national climate-change adaptation plan. However, the status of these funds is unclear.

Table 1.3. International Assistance for Climate-Change Adaptation, 2014–2019

Source	Project Description	Implementing Agencies	Approved Amount
GEF/UNDP	Third National Communication to the UNFCCC and Biennial Update Reporting for Malaysia	MNRE	\$852,000
GEF/UNDP	Second Biennial Update Report on Climate Change	MNRE	\$352,000
GEF/UNDP	Green Technology Application for the Development of Low Carbon Cities	Ministry of Energy, Green Technology, and Water	\$4,354,790
GEF/UNIDO	Greenhouse Gas Emissions Reductions in Targeted Industrial Sub-Sectors through Energy-Efficiency and Application of Solar Thermal Systems	Ministry of Energy, Green Technology, and Water	\$4,000,000
GEF/UNIDO	Energy-Efficient Low Carbon Transport	Malaysia Green Technology and Climate Change Corporation; Ministry of Energy, Green Technology, and Water	\$2,000,000
UNDP	Preliminary Study on Demand-Side Management	Economic Planning Unit	\$480,000
UNEP	MyCarbon Web Portal Planning, Design, and Pilot	MNRE	\$25,000

Source	Project Description	Implementing Agencies	Approved Amount
UNEP	National Climate Change Web Portal Content Development	MNRE	\$25,000
UNEP	Vulnerability Assessment and Adaptation Study of Climate Change Impacts on Floods in Sarawak River Basin	National Water Research Institute of Malaysia	\$48,000
United Kingdom	Green Growth Strategy Paper for the Preparation of Malaysia's National Sustainable Development Blueprint, 2015–2030	UNDP, Economic Planning Unit	£40,000
United Kingdom	Low-Carbon Cities Malaysia – Accelerating Local Government Leadership on Carbon Reduction in Petaling Jaya City Council	Carbon Trust, Petaling Jaya City Council	£99,000
United Kingdom	Accelerating the Rate of Deployment of Cost-Effective, Energy-Efficiency Solutions in LED Lighting Solutions	Carbon Trust, Malaysian Green Technology and Climate Change Corporation, SME Corporation Malaysia	£78,650
United Kingdom	Development of a Roadmap for the Effective Implementation of Malaysia's Intended Nationally Determined Contributions	UNDP, MNRE	£73,686
European Union	Tackling Climate Change through Sustainable Forest Management and Community Development	Sabah parks, Sabah Forestry Department	€3,250,000

GEF = Global Environment Facility, MNRE = Ministry of Natural Resources and Environment, UNIDO = United Nations Industrial Development Organization, UNDP = United Nations Development Programme, UNEP = United Nations Environment Programme.

Source: Government of Malaysia (2018).

External funding has demonstrated that the focus of financing is still mostly on mitigation, while adaptation funding is focussed on information and policy or flood-mitigation infrastructure.

4.2. Mainstreaming Climate-Change Adaptation Finance

From a policy perspective, the *National Climate Change Policy* balances adaptation and mitigation measures. However, it does not contain any specific actions for adaptation nor, as previously discussed, an action plan. It identifies 12 sectors related to climate-change adaptation, however – agriculture and food security; natural resources and environment (i.e. water, biodiversity, forestry, minerals, soil, coasts and sea, and air); energy security; industries;

public health; tourism; transport; infrastructure; land use and land-use change (including land reclamation); human settlements and livelihoods; waste management; and disaster risk reduction.

After the Paris Agreement in 2015, Malaysia's NDC² is guiding actions, includes both mitigation and adaptation, and highlights public expenditure to enhance resilience against climate change. It also states that a national adaptation plan would be developed for future coordination. Five objectives are included as the primary focus for adaptation: assessing flood risks, ensuring water security, ensuring food security, protecting coastlines, and preventing vector-borne diseases.

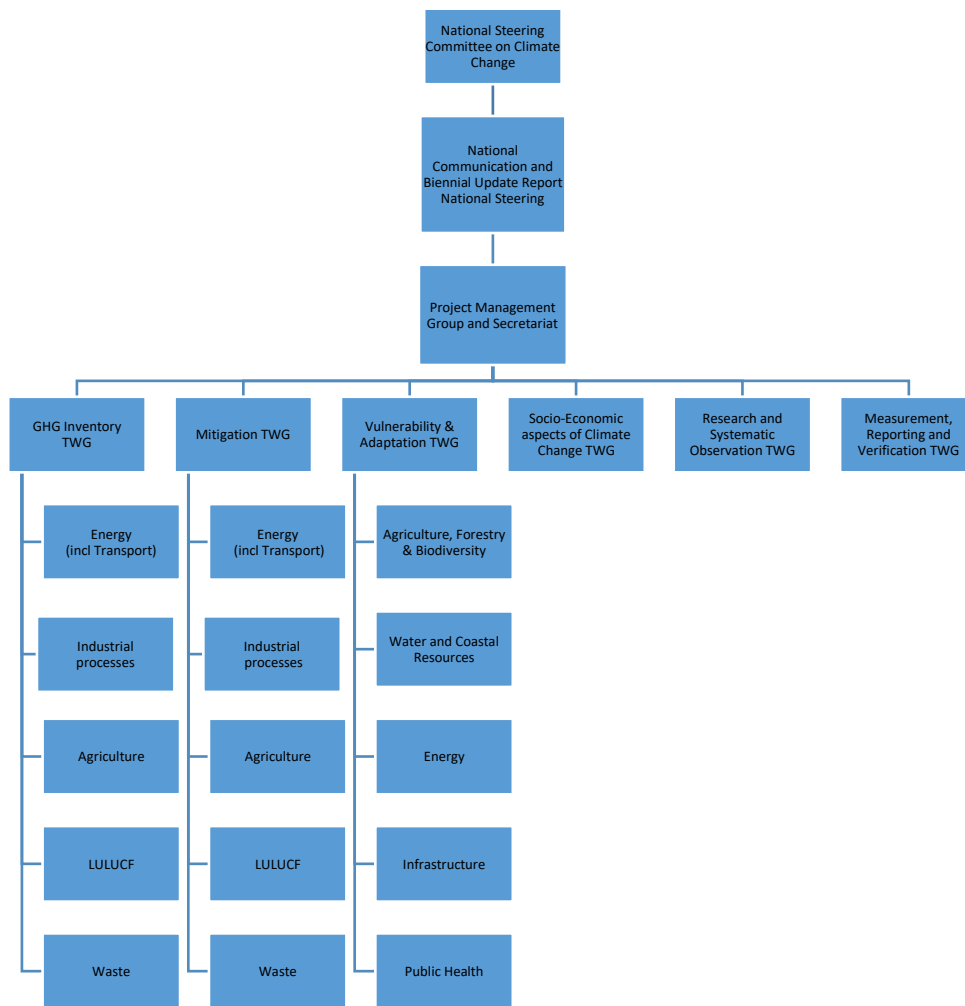
As the key guiding document for resource mobilisation and allocation, the Malaysia plans set the agenda for policymaking in Malaysia as well as for public financing. In this sense, they are the key documents for mainstreaming climate-change adaptation infrastructure funding, as they mobilise resources across all line ministries. Under the *Tenth Malaysia Plan (2011–2015)*, the government provided RM5 billion for flood-mitigation programmes. In the *Eleventh Malaysia Plan (2016–2020)*, a focus area on resilience against climate change and natural disasters was included as well as explicit strategies on improving flood-mitigation efforts and enhancing climate-change adaptation.

In terms of policy instruments to facilitate financing, the government has included various fiscal instruments and sources of funding for green initiatives, such as a green investment tax allowance, green income tax exemption, Green SRI Sukuk Grant Scheme and further green sukuk issuances, Green Technology Financing Scheme, and budgetary allocations to ministries. However, the focus is mainly on climate-change mitigation, especially large-scale renewable energy projects.

A comprehensive institutional structure also exists to mainstream climate change. The National Steering Committee is chaired by the secretary-general of the Ministry of Natural Resources and Environment (now Ministry of Environment and Water) with multistakeholder members including ministries, agencies, the private sector, and civil society organisations. Technical working groups were established to communicate with the UNFCCC, including one on vulnerability and adaptation as well as a sub-group that focusses on infrastructure. However, the groups were established mainly for international reporting rather than for the implementation or mainstreaming of climate action. Indeed, institutional arrangements are ad hoc, where meetings are only undertaken to coincide with national communication updates. Nonetheless, a degree of mainstreaming has been established through the structure of the international reporting process.

² Interviews with government officials indicated that the government is updating the NDC after the 2021 Climate Change Conference.

Figure 4.3. Institutional Arrangements under the National Steering Committee



LULUCF = land use, land-use change, and forestry; TWG = thematic working group
 Source: Ministry of Environment and Water (2020).

Generally, private finance has been growing in Malaysia in relation to projects aligned with the Sustainable Development Goals as well as value-based intermediation; socially responsible investing; and environmental, social, and governance practices in investment. This includes Bursa Malaysia supporting climate-related financial disclosures for its mandatory sustainability reporting for all listed companies. The challenge, however, is that there is a lack of capacity and guidelines on climate change. Bank Negara produced a discussion paper on developing a taxonomy and included climate-change adaptation as Guiding Principle 2 (Bank Negara Malaysia, 2021):

The objective of climate change adaptation is to increase resilience in order to withstand the negative physical effects of current and future climate change. An economic activity can be considered to meet climate change adaptation through ... measures to increase own resilience; ... other economic activities to adapt to climate change; ... measures to increase own resilience (e.g. implement early warning system to reduce risk of flooding); or contribute to the adaptation of other economic activities to mitigate physical effects of climate change (e.g. develop flood sensor technology).

As with public finance, due to the lack of a clear taxonomy and the inherent complexity of climate-change adaptation that cuts across multiple sectors at various levels, finance related to climate change from the private sector has focussed on mitigation through large-scale renewable energy projects. Efforts are ongoing to develop clear taxonomies on climate change generally and on adaptation more specifically. In principle, climate-change adaptation is already incorporated in existing guidelines towards principle-based and climate-related investments.

4.3. Regulations

There are no clear regulations on financing for climate change. The government is preparing a green procurement plan, but it is unclear whether adaptation will be included. Currently, there are no detailed criteria for climate-change adaptation.

In terms of regulations, there are various efforts to review building codes as well as infrastructure related to climate change. However, it is difficult to assess whether this review will be directly related to adaptation. For example, the building-code review is to, in part, increase energy efficiency of buildings (i.e. mitigation).

4.4. Reporting

Two means of reporting are assessed: domestic and international. As indicated in previously, the main reporting mechanism for climate-change adaptation is internationally through the national communication to the UNFCCC. The report includes an in-depth assessment on adaptation in Malaysia as well as adaptation needs. The main gap highlighted is the need for a national adaptation plan. This requires resources. The lack of a national adaptation plan is a major obstacle for reporting on financing specifically for infrastructure financing for climate-change adaptation.

Domestically, while the Malaysia plans monitor allocations through outcome-based budgeting, it is challenging to distinguish which budgets are allocated for climate-change adaptation as there is no climate budget tagging. Consequently, Malaysia should begin to employ a comprehensive set of indicators that highlight budgetary line items that address climate-change mitigation and/or adaptation and the extent to which they do so. Such climate budget tagging would allow key stakeholders to assess the state of financing for both mitigation and adaptation actions and allow policymakers to design the appropriate policy mechanisms, if necessary, to further Malaysia's efforts to mitigate climate change and adapt to its consequences.

5. Synthesising Malaysia's Adaptation Planning, Financing, and Institutional Environment

This section synthesises the assessment and challenges in the context of Malaysia's infrastructure financing for climate-change adaptation ecosystem. This is produced by undertaking a SWOT analysis on internal strengths and weaknesses (i.e. challenges) and external opportunities and threats.

The section is split into three parts. The first of these focusses on climate-change adaptation planning in the context of the Malaysia plans, the twelfth of which applies from 2021 to 2025, as well as the development of any specific national adaptation plans. The second focus is on financing for climate-change adaptation, emphasising its expansion of sources. The final part synthesises the institutional environment surrounding climate-change adaptation in Malaysia.

5.1. Planning Analysis

Strengths. The strength in terms of planning in Malaysia is in having a systematic development planning system. This consists of a 5-year plan at the federal level that coordinated by a central body, the Economic Planning Unit (EPU). The unit is also responsible for infrastructure planning. With a twin focus on infrastructure for attracting investment and for domestic socio-economic development, this centralised planning has been largely effective.

In terms of infrastructure quality, according to the World Economic Forum's Global Competitiveness Index, Malaysia performs relatively well, ranking 35th globally in overall infrastructure quality (Schwab, 2019). This demonstrates the strength in terms of availability and capacity in planning and coordination for infrastructure.

Weaknesses. Despite the impressive trajectory of infrastructure development planning, addressing more complex challenges that require long-term planning – such as for climate-change adaptation – is more challenging. As infrastructure planning is driven by EPU, addressing the long-term benefits of infrastructure relies on its coordination with and input from line ministries. In this sense, challenges arise from long-term planning for climate-change adaptation, as there is no reference point such as a national adaptation plan. Similarly, the lack of sectoral or downscaled risk assessments and information on the vulnerability levels of different contexts means that planning for specific infrastructure for adaptation measures is a challenge.

Opportunities. The Ministry of Environment and Water is developing a national adaptation action plan that will provide a reference point for infrastructure financing for climate-change adaptation. A large-scale and long-term study, *Water Services Transformation 2040*, which includes climate change as a focus area, provides a model for future planning that is based on evidence.³ Moving forward, the availability and quality of information and evidence for infrastructure financing for climate-change adaptation must be improved.

Threats. The first threat is in terms of capacity. While Malaysia has relatively high research capacity on climate-change adaptation, linking adaptation, infrastructure, and finance is still a

³ Water Services Transformation 2040, <https://wst2040.my/>

major challenge. Secondly, in terms of long-term planning, recent years have seen political instability whereby changes in government have also brought about changes in policy agendas, and therefore, planning. To mitigate this, there is a need to institutionalise the capacities and policies on long-term climate action, specifically on infrastructure development.

5.2. Financial Analysis

Strengths. Infrastructure financing for climate-change adaptation is still largely from public expenditure. The centralised coordination and resource mobilisation by EPU is again a strength in terms of the ability of mainstreaming such funding across multiple sectors. This ability for mainstreaming is demonstrated in recent budgets, including for 2021 that has allocations related to flood alerts, control, and mitigation programmes conducted by the Department of Irrigation and Drainage and forestry programmes under the Department of Forestry.

Secondly, Malaysia's financial system is highly reputable with a high level of capacity. This is evidenced by the World Economic Forum Global Competitiveness Index ranking Malaysia 15th in the world in terms of its financial system (Schwab, 2019) as well as consistently ranking it 1st in terms of Islamic finance in the world (Refinitiv, 2022).

Weaknesses. In terms of public expenditure, despite the ability to mainstream across various sectors, a few weaknesses remain. Firstly, it is difficult to ascertain the exact amount of expenditure on climate-change adaptation financing due to the lack of climate budget tagging. Secondly, resources are mainly focussed on the water sector, in particular for flood mitigation, rather than on other sectors of climate-change adaptation. Thirdly, a review of public expenditure shows that the allocation for environmental sustainability overall is still relatively low, with a total allocation of 0.66% of the overall budget for 2021.

In terms of private sector financing, despite the capability of the private sector and the industry's recent efforts towards climate finance, there is little evidence of such financing for climate-change adaptation infrastructure. The focus has been largely on large-scale mitigation projects.

Opportunities. The 2021 budget highlights its ambition to leverage Malaysia's capability in the financial industry to make Malaysia a sustainable finance hub. This includes issuing the first sovereign sustainability bond in Malaysia. Combined with the leadership of key institutions such as the Ministry of Finance, Bank Negara, and Securities Commission Malaysia as well as key private financial institutions, leveraging private finance is crucial. Institutionally, this includes the establishment of the Joint Committee on Climate Change, which aims to pursue collaborative actions for building climate resilience within the Malaysia financial sector, co-chaired by Bank Negara and Securities Commission Malaysia. To ensure its feasibility and sustainability, the budget and issuance of sovereign sustainability bonds pave the way for blended finance mechanisms across private and public resources.

Threats. Despite positioning Malaysia as a sustainable financial hub, the capacity within the industry is lacking, in particular, on assessing the risks associated with climate-change adaptation in financing infrastructure projects. Moving forward, there is a need for intensive capacity building to both realise this agenda as well as including climate-change adaptation as a priority in financing options.

5.3. Policy and Institutional Environment Analysis

Strengths. EPU has the mandate and capacity to mainstream planning across all lines and implementing agencies at the federal level. Specifically, for infrastructure financing for climate-change adaptation, the EPU structure consists of cross-sectoral sections, the Division on Economy of Environment and Natural Resources, Infrastructure Division, and Development Budget Division. This structure allows for the mainstreaming of such funding in terms of planning and resource mobilisation. Beyond EPU, planning of physical infrastructure is also undertaken by the Federal Department of Town and Country Planning, in particular in relation to green infrastructure, which also includes nature-based solutions in terms of climate-change adaptation. Line ministries also provide the policy direction for implementation at the state and local levels. This systematic enabling environment allows for coordination across the various scales and levels of government.

Weaknesses. Despite the systematic planning structure, the implementation level suffers from various challenges. Firstly, as highlighted repeatedly, the lack of an adaptation action plan is the main obstacle, as there is no overarching plan as to guide implementation and resource mobilisation. Secondly, because Malaysia has a federal system, challenges arise in translating it down (and vice versa) to the state level. Physical planning and projects are the responsibility of states. The agenda on climate-change adaptation is, however, largely driven from the federal level, and there is little evidence of it being implemented at the state and local levels except for on specific flood-mitigation projects. Institutionally, there is still a lack of space for interactions between the state and federal levels.

Opportunities. The Ministry of Water and Environment is planning to set up the Climate Action Council, which includes the state governments. This provides an opportunity to address the federal–state institutional challenge and an avenue for both inputs from the state level on the adaptation needs as well as coordination at the federal level.

Threats. Firstly, the threat is the capacity at the state and local levels in mainstreaming understanding and awareness of climate-change adaptation challenges. Through interviews, many challenges – such as the increasing frequency and intensity of floods – are usually not attributed to climate change. Secondly, there is a lack of information to guide decision-making on adaptation, which results in non-evidence-based assessments on climate-change adaptation.

In terms of the enabling environment for private finance, the economic impact of COVID-19 remains a threat for the government to provide strong support for its intention to become a sustainable financial hub. There is a risk that the focus and policy incentives are directed to more tangible social initiatives or continue to focus on climate-change mitigation projects rather than adaptation projects.

6. Policy Recommendations

Using the information covered in previous sections, below is a set of policy recommendations that strive to enhance Malaysia’s financing frameworks for climate-resilient infrastructure development and climate-change adaptation more broadly.

Table 4.4. Summary of Preliminary Policy Recommendations

Area	Recommendations
Planning	<ul style="list-style-type: none"> • Produce a national adaptation plan, including for specific infrastructure needs • Produce risk assessments and vulnerability maps for key sectors and vulnerable localities to aid infrastructure planning • Provide a road map to go beyond the water sector for climate-change adaptation
Financial	<ul style="list-style-type: none"> • Leverage Malaysia’s intention to become a sustainable financial hub to find blended finance mechanisms to address funding climate-change adaptation infrastructure • Improve taxonomy related to climate-change adaptation infrastructure • Build capacity of the financial industry to address risks related to climate-change adaptation
Policy and Institutional	<ul style="list-style-type: none"> • Leverage the proposed Climate Action Council as an avenue to promote state-level financing for climate-change adaptation projects • Provide informational guidance at the state and local levels on vulnerability and infrastructure needs • Build capacity and awareness on climate-change adaptation at the state and local levels • Provide incentives for private financial institutions to incorporate climate-change adaptation in sustainable financing initiatives

Source: Authors.

7. Effects of COVID-19 Pandemic

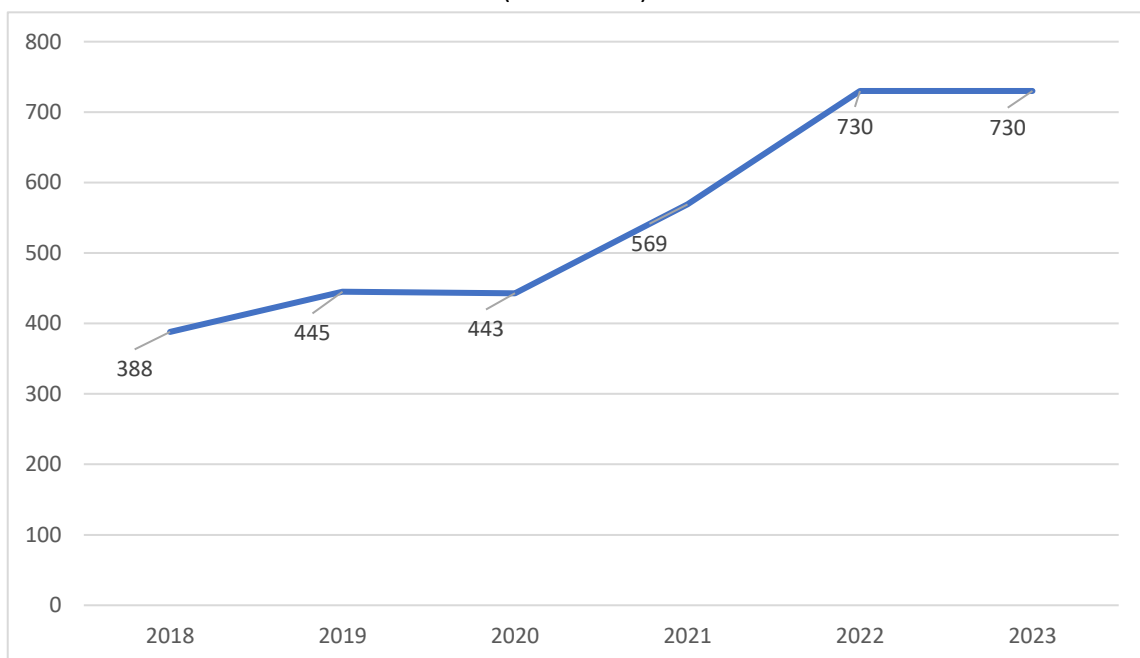
The COVID-19 pandemic has been detrimental to achieving sustainability in the region. The progress towards the Sustainable Development Goals has stalled and even been reversed (UNESCAP, 2022). Environmental sustainability, in particular, has been undone, including progress towards climate change. This is due to the changing priorities despite the need to build back better (UNESCAP, 2022). The 2022 budget totals RM730 million, and although the exact amount is unclear, the 2023 budget is estimated to be RM700 million.

The devastating 2021–2022 floods were a result of various factors. Tropical Depression 29W caused heavy rainfall, which reportedly was a 1-in-100-year event. Many natural geological processes – like landslides – thus occurred, as the volume of rainfall exceeded the absorption capacity of the soil. While these are natural phenomenon, it was exacerbated by development, in particular, due to land clearing in the highlands (Lim, Jamaluddin, Komoo, 2019). The floods

were also blamed on anthropogenic impacts, such as deforestation, development, and urbanisation. Although these linkages with climate change and adaptation are not completely proven, the narrative has resulted in an increased focus on adaptation, especially in relation to flood mitigation. Finally, as the floods occurred during the pandemic, awareness of the need to ensure resilience in light of disasters and shocks was highlighted.

In line with this, Malaysia’s focus and expenditure on flood protection has increased. However, it is difficult to ascertain whether an increase in expenditure for other climate-change adaptation measures have been made.

Figure 1.4. Budget Allocation for Flood Mitigation Plans and Urban Drainage, 2018–2023
(RM million)



Source: Authors.

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