CHAPTER 5

THRUST 2: SPATIAL SUSTAINABILITY AND CLIMATE CHANGE RESILIENCE

> *Green growth that fosters balanced development and ensures optimal resource management including the building of the nation's capacity in tackling climate change*

In line with global conventions, Malaysia has made spatial sustainability and climate change resilience as among its main focuses in ensuring balanced and sustainable growth of the nation. This bodes well for the country efforts towards tackling climate change issues and strengthening of urban big data centre. While previous national policies and action plans have often focused on mitigative measures to address existing issues such as flood, coastal erosion and drought. NPP4 emphasises on adaptive measures to increase the country's readiness to face climate change in the future. This adaptive approach includes the conservation of natural resources, especially forest area and water resource which are an essential catalyst for economic and social activities. The adaptive approach also looks at the importance of providing infrastructure and development with the least or minimum impact on the environment, ensuring optimum resource management and reducing wastage. Increasing awareness at various levels of planning, development and management is also important especially in achieving the various targets outlined in NPP4 including forest conservation and greenhouse gas emissions. This Thrust 2 of NPP4 also give priority to disaster risk management through viable mitigation and adaptation measures.

Pulau Kukup National Park, Johor

Spatial sustainability and climate change resilience focus on holistic land use planning, sustainable management of national resources, supported by low-carbon development towards a carbon neutral nation.

Thrust 2 Spatial Sustainability and Climate Change Resilience has three (3) strategic directions namely:

SR 1 Holistic Land Use Planning

Holistic land use planning is required to ensure optimal land use can be achieved without jeopardising the country's ecological assets. NPP4 projects the need for up to 11.4% of new built-up areas by 2040. Therefore, this strategic direction outlines several strategies for future development that include the implementation of urban renewal in existing areas to achieve development intensity that is more sustainable, especially in development focus areas. These strategies are being supported by the Malaysian Urban Observatory (MUO) initiative in formulating solutions to address urban issues and problems. Additionally, the management of disaster risk areas is also emphasised in land use planning in order to increase the country's resilience to climate change.

SR 2 Sustainable Management of Natural, Food and Heritage Resources

The sustainable management of natural resources, food resources and heritage resources is vital in order to ensure the diversity of natural resources and assets are preserved. This is important to support the continuous economic growth of the country in a sustainable manner. Thus, NPP4 sets forth various targets, including an increase in forest cover of up to 50% of Peninsular Malaysia total land area by 2040. This strategic direction also outlines several resource management strategies covering the preservation and conservation of the country's ecological assets, management and development requirements particularly of Environmentally Sensitive Areas (ESAs). At the same time, it also introduces several new ideas in sustainable development such as the 'Sponge City' and the 'no nett loss of biodiversity' concepts. Emphasis is also given to the sustainable management of water resources, geological resources, food resources and marine habitat conservation to drive sustainable development in the future.

SR 3 Development Towards A Carbon Neutral Nation

The low-carbon development towards a carbon neutral country is among the efforts to mainstream the sustainable development agenda in order to address climate change issues. Actions related to low-carbon development are strengthened with the involvement of various parties, including the state and local authority who implement green practices in the development of the areas under their administration. At the same time, this strategic direction also aims at expanding the low-carbon framework, increasing collaboration between stakeholders, encouraging the increase use of Renewable Energy (RE) and ensuring the provision of sustainable infrastructure. The implementation of this strategic direction will allow for the development of ecosystem resilience to support economic activities which are more competitive and sustainable.

Malaysia World Risk Index (WRI) 2020 ranking

WRI identifies the disaster risk level of a country. For 2020, Malaysia recorded a high risk level of 7.71 in the World Risk Index. This puts Malaysia as the 72nd at-risk country in the world. In comparison, neighbouring countries such as Indonesia ranks 40th, Thailand 90th and Singapore 164th.

Source: World Risk Index 2020 report, published by Bündnis Entwicklung Hilft

Overview of the Spatial Sustainability and Climate Change Resilience Thrust

03

Strategic Directions

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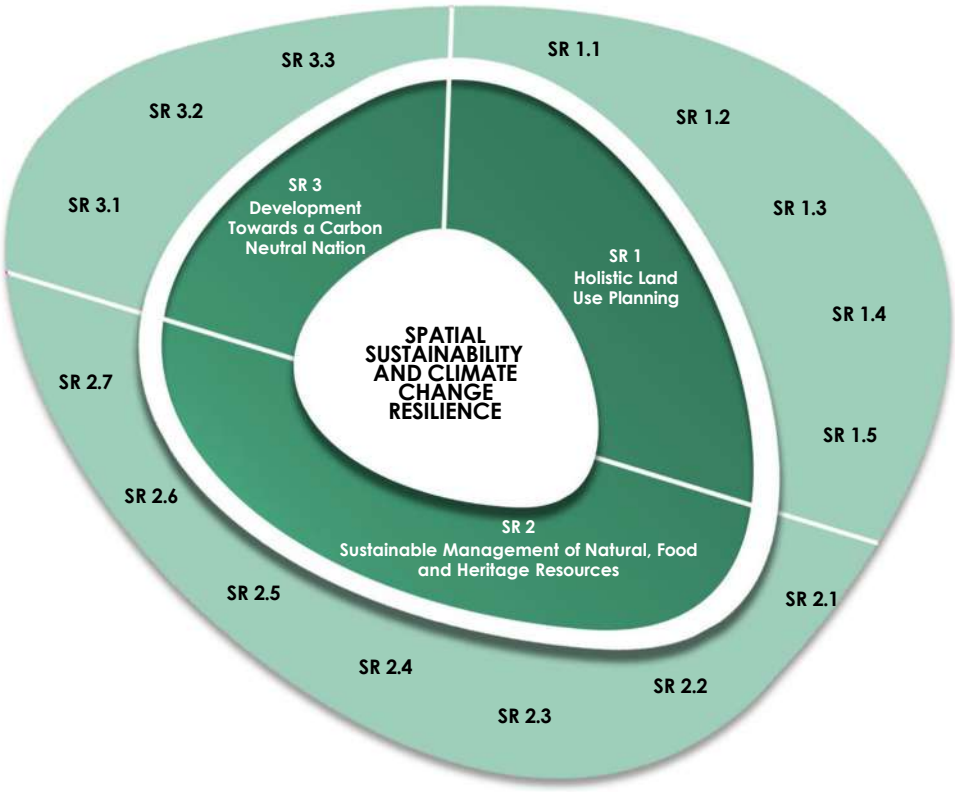


HOLISTIC LAND USE PLANNING

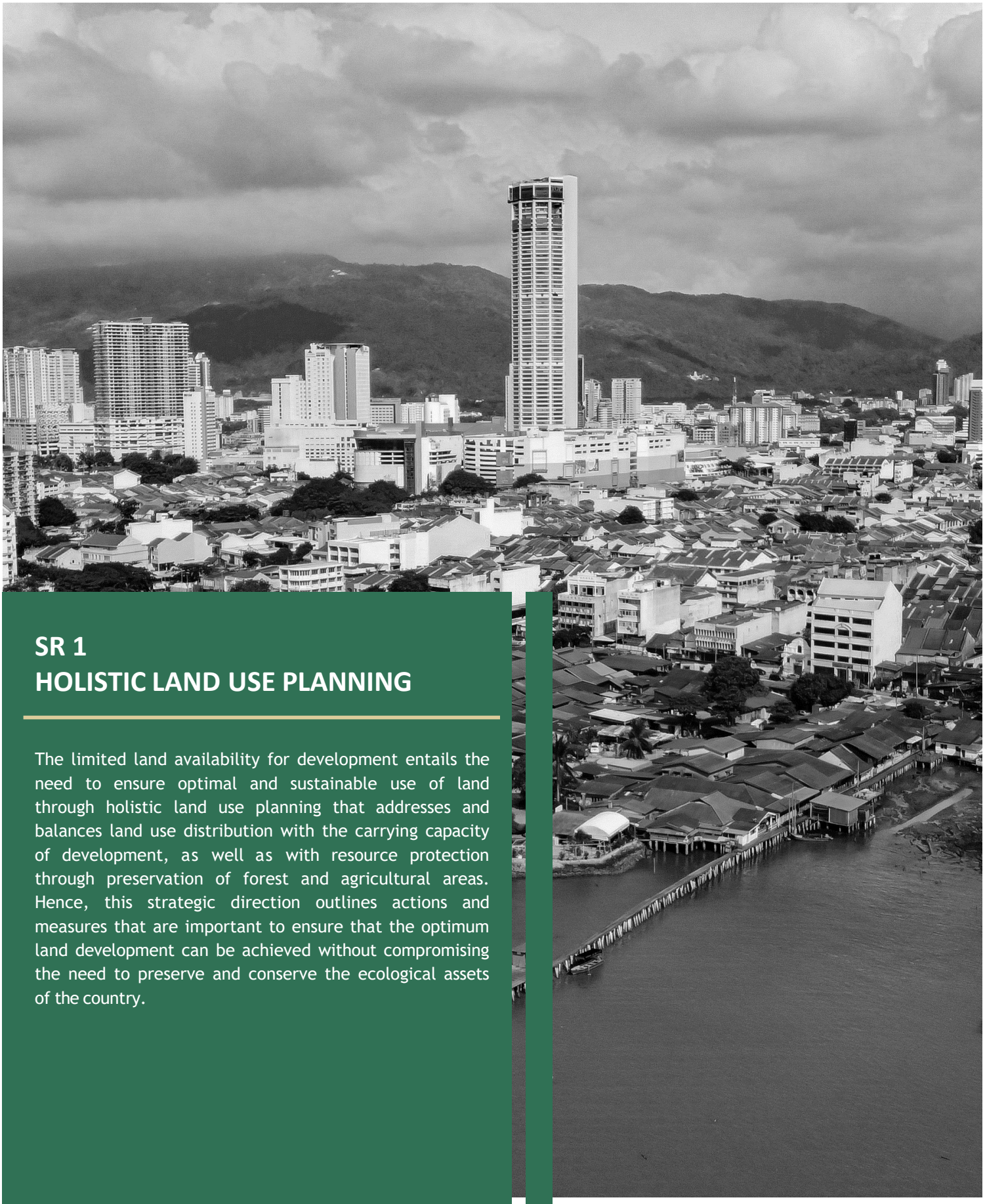
- **SR 1.1** Optimal Land Development Planning
- **SR 1.2** Prioritise Urban Renewal in Existing Built-up Areas
- **SR 1.3** Ensure Development Focus Areas are developed in a Sustainable Manner
- **SR 1.4** Implement the Establishment of Malaysia Urban Observatory (MUO) as an Urban Big-Data Centre and National Smart City Platform
- **SR 1.5** Implement Mitigation Efforts to Reduce the Risk of Natural Disasters and Climate Change

SUSTAINABLE MANAGEMENT OF NATURAL, FOOD AND HERITAGE RESOURCES

- **SR 2.1** Preserve and Conserving National Ecological Assets
- **SR 2.2** Manage and Regulate Development in Environmentally Sensitive Areas (ESAs)
- **SR 2.3** Ensure Sustainability of Water Resources
- **SR 2.4** Manage Geological Resources and Diversity
- **SR 2.5** Ensure National Food Security
- **SR 2.6** Strengthen the Preservation, Conservation and Protection of National Cultural and Natural Heritage Site
- **SR 2.7** Ensure the Preservation and Protection of Cultural Heritage in Physical Planning and Development Control Process

DEVELOPMENT TOWARDS A CARBON NEUTRAL NATION

- **SR 3.1** Expand the Implementation of the low-carbon Cities Framework
- **SR 3.2** Improve the Management of Sustainable Alternative Energy Sources
- **SR 3.3** Strengthen Efficient and Sustainable Waste Management



SR 1
HOLISTIC LAND USE PLANNING

The limited land availability for development entails the need to ensure optimal and sustainable use of land through holistic land use planning that addresses and balances land use distribution with the carrying capacity of development, as well as with resource protection through preservation of forest and agricultural areas. Hence, this strategic direction outlines actions and measures that are important to ensure that the optimum land development can be achieved without compromising the need to preserve and conserve the ecological assets of the country.

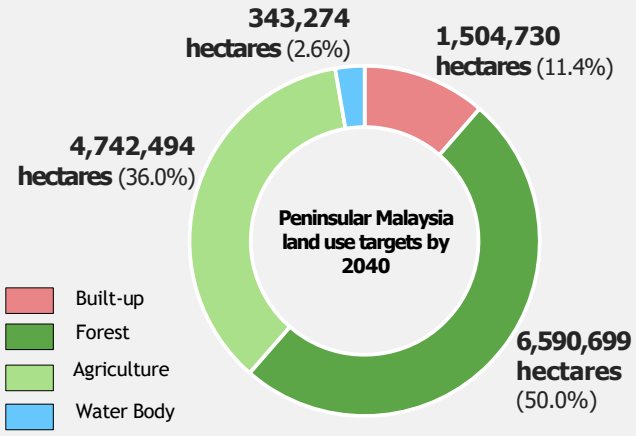


Figure 5-1: Peninsular Malaysia land use targets by 2040

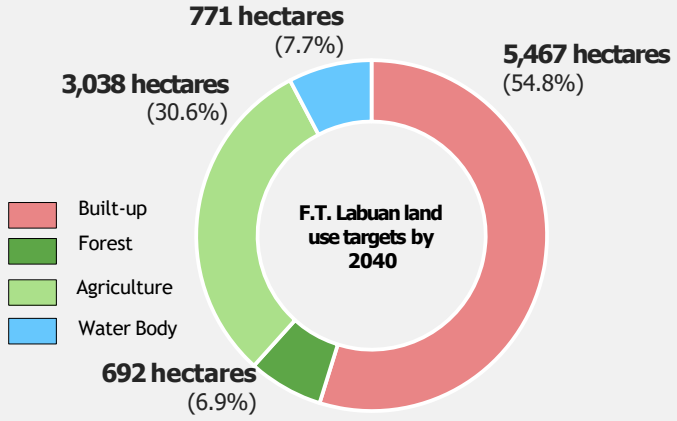
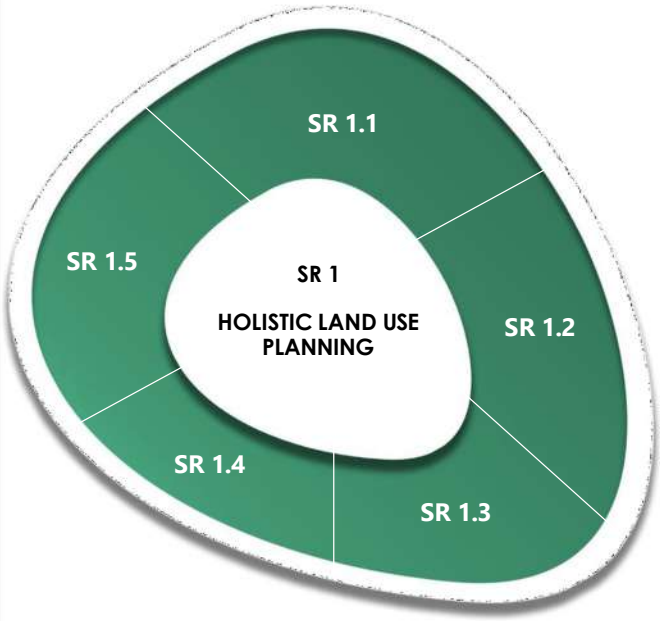


Figure 5-2: F.T. Labuan land use targets by 2040

NPP4 projects an increase in built-up land use by up to 11.4% in Peninsular Malaysia and 54.8% in F.T. Labuan. To ensure that these projected targets can be achieved, effective land development strategies has to be formulated in managing urban development. This is important so that the various needs of the country and the people including the need for land development, the need for food security and the need for environmental protection can be catered and addressed in a balanced, integrated and sustainable manner.

This strategic direction formulates a holistic land use development strategy according to the needs and suitability of the local area. It also emphasises the needs for effective development control for coastal zones and natural disaster risk areas.



Strategic Direction SR 1

HOLISTIC LAND USE PLANNING

SR 1.1	Optimal Land Development Planning
SR 1.2	Prioritise Urban Renewal in Existing Built-up Areas
SR 1.3	Ensure Development Focus Areas are developed in a Sustainable Manner
SR 1.4	Implement the Establishment of Malaysia Urban Observatory (MUO) as an Urban Big-Data Centre and National Smart City Platform
SR 1.5	Implement Mitigation Efforts to Reduce the Risk of Natural Disasters and Climate Change

STRATEGY
SR 1.1

OPTIMAL LAND DEVELOPMENT PLANNING

RELATED SDGs
- SDG11
- SDG12

Optimal and sustainable land use development requires a balanced distribution of the various land use activities based on the needs of a given time, while at the same time maintains the balance of the environmental ecosystem. The increase in the number of people living in the city each year is one of the factors that require city to continue to grow. By 2040, Malaysia's urbanisation rate is expected to increase to 85% (refer ~~to~~ **Figure 5-3**). This rapid urban growth has created new challenges that require a more systematic, planned and efficient urban planning and management to ensure a harmonious urban development and a prosperous community.

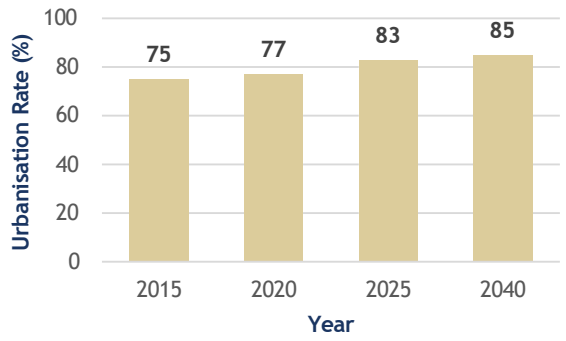


Figure 5-3: Malaysia's urbanisation rate target (%)

Therefore, future land use planning should encourage and prioritise compact development in existing built-up areas to prevent excessive new urban development on green areas that could affect the sustainability of agriculture land and forest area. Effective and efficient planning and management is required to ensure that urban development grows strategically and in a controlled manner.

ACTION SR 1.1A

Prioritise mixed-use development and multi-use development activities in built -up areas

The concept of mixed-use development is one of the elements of smart growth (refer to **Figure 5-4**). This concept ensures optimum land use through the provision of various suitable land use activities within a building or a neighbourhood.

The placement of various land use activities such as residential business and recreational spaces within close proximity reduces the dependence on motorised vehicles for local movement and makes other alternatives such as walking and cycling more suitable. Studies also show that neighbourhoods with mixed development elements are friendlier and safer for pedestrians.

Figure 5-4: Mixed-use development concept

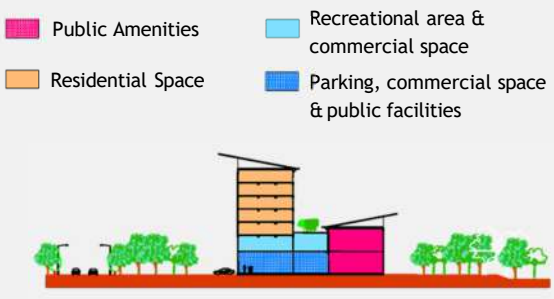


Figure 5-5: Multi-use development concept

Mixed-used development can also contribute to economic development. For example, the adjacent placement of business and residential areas in a mixed-use development will stimulate the economic activities in the area by the presence of the population. At the same time, adjacent placement of the land use activities can increase the land value and thus the tax revenue of the local authority.

Multi-use development can be translated on the ground through the flexible use of building or space for appropriate activities such as combining businesses and recreational activities in the same space, without compromising the existing facilities (refer to **Figure 5-5**). Multiple and flexible use of buildings and spaces reduces the amount of land required for urban development, thereby reduces the pressure of urban sprawl.

In this context, during emergency, natural disaster or pandemic, a multi-use building or space can be converted or used as emergency facility such as medical, evacuation or quarantine centre. The COVID-19 pandemic that is affecting the world, illustrates the importance of creating a flexible and multi-use function of a building or an area.

In Malaysia, existing buildings such as convention centres have been used as temporary hospital spaces to accommodate large number of patients. Similarly, in other parts of the world, public spaces such as open spaces, public parks, pedestrian spaces, parking spaces and roads have been converted into temporary spaces for treatment and quarantine in combatting COVID-19 pandemic. At other times, these public spaces also have the potential to be converted as alternative spaces for business and social activities.

The concepts of mixed-use development and multi-use development have to be applied in future developments in major cities, especially those located in the Conurbations, the PDZs and the Catalyst Centres. To encourage the implementation of mixed-use and multi-use development, several measures are proposed as listed below:

1. Prepare mixed-use zoning plan with detail land use classes that also allow for multi-use development. These zoning plan and land use classes should be included in Local Plan (LP).
2. Redevelop brownfield areas as a mixed development area.
3. Incorporate mixed development elements in development plans at the state and district levels.
4. Spaces at infrastructure facilities may be expanded to incorporate with other economic activities such as agriculture.
5. Explore the best mechanism to implement multi-use development and review existing Acts and planning guidelines.
6. Promote innovations in building design to provide flexible space for other uses especially during emergencies.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• PLANMalaysia@Negeri • Local Authority	• Ministry of Housing and Local Government (KPKT) • PLANMalaysia

ACTION SR 1.1B

Prioritise transit-oriented development (TOD) in Conurbations, Global Cities and Regional Cities

Transit-oriented development (TOD) refers to development that is within walking distance (approximately 400m) of a transit transportation station, terminal or hub (refer to **Figure 5-6**). Therefore, the implementation of this Action SR 1.1B requires a comprehensive integration between land use planning and public transport system.

Through this action, the general public would have a choice of various modes of transportation for mobility. It would also reduce private transport dependency among the community and encourage them for alternative modes of transport such as cycling and walking. This can help in reducing the rate of carbon emissions into the atmosphere.

Future planning should encourage transit, walking and cycling especially in high-density development area. This can help address the issue of traffic congestion especially in urban area. The cost of road construction can also be reduced and the fund can be allocated for provision of public transport infrastructure, pedestrian and bicycle paths.

A pedestrian and bicycle-friendly environment can also help save transportation cost, especially for the B40 and M40 groups. Neighbourhood that encourages community walking and cycling will also able to create a vibrant atmosphere. In addition, it can support local business activities, encourage social interaction and create a safe urban environment (refer to **Box 5-1**). Transit-oriented development needs to be supported with mixed-used development activities to encourage community to walk and cycle to work.

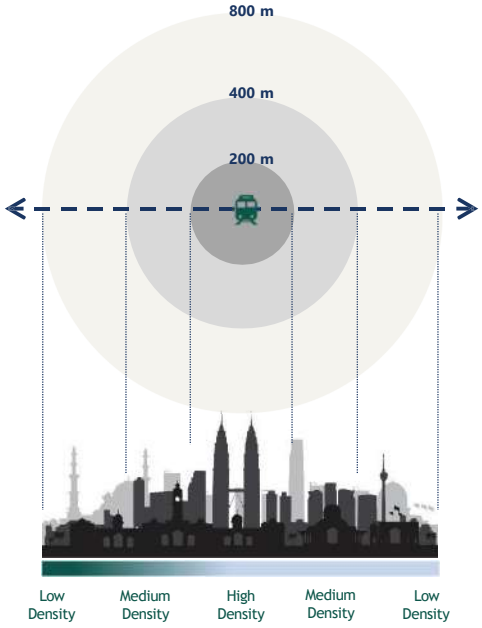


Figure 5-6: Transit-oriented development (TOD) concept

BRIEF FACTS

To encourage transit-oriented development (TOD) in Kuala Lumpur, the Kuala Lumpur City Hall (DBKL) provides plot ratio incentives for development within a radius of 400m from selected transit stations. DBKL has set a modal split target of 60:40 between public and private transport by 2040.

Source: Kuala Lumpur Structure Plan 2040

The measures to be implemented for TOD are:

1. Encourage mixed-used and high-intensity land use activities in TOD zones.

2. Develop a multi-modal transportation system at centre of employment.

3. Provide connected, safe and conducive walkway and cycling path networks throughout the city.

4. Provide walkways of appropriate width and integrated with supporting business activities.

5. Encourage the application of green technology in the construction of walkways and cycling paths.

6. Apply innovations in building layout and design to encourage community to walk and cycle.

7. Promote the preparation of basic guidelines and master plans for pedestrian and cycling paths at local authority level.

8. Provide pedestrian and cycling paths that adopt green neighbourhood features that emphasise safety, comfort and interconnectivity.

Box 5-1: TOD Case Study: Hopkins, Minnesota

Hopkins, Minnesota is a pedestrian, bike and transit friendly city. City managers and local communities are committed in creating the pedestrian and bicycle-friendly environment as a key measure in reviving the city's economic activities and in improving the quality of life of residents.

Among the actions taken was to improve the connectivity between pedestrian and bicycle paths with the city centre. This has managed to attract more residents to shop and walk in the city centre, thus driving the growth of the local economy.

Among the achievements and awards won by the City of Hopkins are:

1. Ranked 3rd for walkable city in Minnesota.
2. Ranked 13th for The Friendliest City in the United States.
3. Awarded the best suburban area for young professionals.
4. Considered as one of the best places in Minnesota to start a business.

Source: www.mnrealestate.com

AGENCIES INVOLVED

Main Agencies

- Ministry of Housing and Local Government (KPKT)
- State Authority
- Local Authority

Supporting Agencies

- Ministry of Transport Malaysia (MOT)
- Land Public Transport Agency
- PLANMalaysia

ACTION SR 1.1C

Utilise airspace and basement for appropriate development

Limited land availability requires creativity in the planning of land uses to achieve efficient use of land and space. This includes applying the concept of vertical development through the use of air and basement spaces at suitable areas and for appropriate uses (refer to **Figure 5-7**). The implementation of vertical development should be given priority to areas within key growth nodes with limited land availability for development and to high-density areas. The use of air and basement spaces should only be allowed as long as it does not have a negative impact on the environment and the quality of life of the residents. There are several measures that can be implemented such as:

1. Use underground space for :
   i. Public transport facilities, such as city rail, integrated with appropriate commercial activities.
   ii. Infrastructure tunnels (common utility tunnels), pedestrian walkways and parking lots.
   iii. Warehouse and commercial space at suitable locations.

2. Encourage future development proposals to consider airspace as part of developable area by taking into account:
   i. Provisions for use of airspace that may require amendments to the National Land Policy.
   ii. A study on the methods of using airspace under different land titles.
   iii. Placement of communication towers on top of buildings.
   iv. Provision of helipad facilities for air transport purposes especially for emergency.
   v. Provision of infrastructure facilities such as elevated roads, and pedestrian and bicycle bridges.

3. The Guidelines for Underground Planning and Development prepared by PLANMalaysia in 2020 should be used as a guide in implementing underground development. GIS database should also include detailed underground mapping.

Box 5-2: Case Study: Ibis Hotel, Amsterdam Central Station, Belanda

The use of airspace is seen as one of the strategies towards more optimum use of land space. An example of use of airspace is in Amsterdam, Netherlands where a hotel was constructed above a railway line.

AGENCIES INVOLVED

Main Agencies

- Ministry of Housing and Local Government (KPKT)
- Department of Director General of Lands and Mines (JKPTG)
- PLANMalaysia@Negeri
- Local Authority

Supporting Agencies

- PLANMalaysia

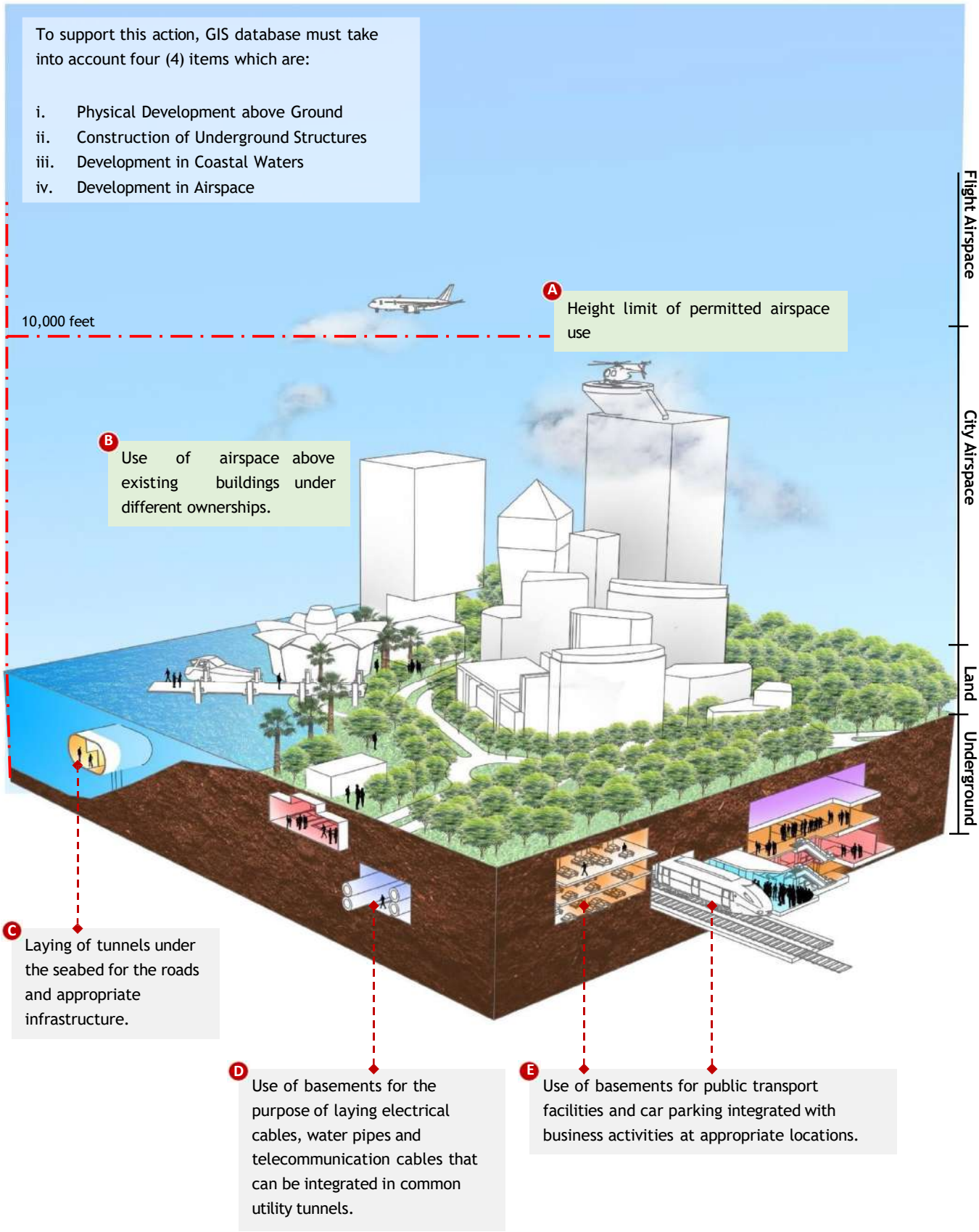


Figure 5-7: Description of the use of airspace and basement for appropriate development activities.

ACTION SR 1.1D

Leverage on *waqf* land in development planning at the State and Local Authority levels

Waqf land is one of the main assets for Muslims community and needs to be developed optimally. The development of *waqf* land can also generate the economy of the Muslim community.

Currently, the size of *waqf* land in Malaysia is 11,091.82 hectares, of which 4,836.50 hectares is general *waqf* land and 6,225.32 hectares is specific *waqf* land. Based on 2018 data, the states with the highest amount of *waqf* land are Johor and Terengganu, with 28% and 22% of total *waqf* land in Malaysia, respectively.

In Malaysia, *waqf* land has not been developed optimally. Some of the *waqf* land are being left idle, and some are not being developed due to interior locations with low economic value.

BRIEF FACTS

There are two (2) categories of waqf (endowment) land, namely:

Specific *Waqf*
- Restricted to certain uses or purposes as intended by the *waqf* such as sites for mosques, *suraus*, schools, and orphanages.

General *Waqf*
- Can be developed without particular limitation.
- The developed land become the property of the State Islamic Religious Council (Majlis Agama Islam Negeri, MAIN).
- Can be leased for up to 99 years. Only Muslims can buy property on *waqf* land but can be rented to non-Muslims.

The measures to leverage on *waqf* land are:

1. Provide inventory and mapping of *waqf* land location in each state.

2. Indicate the location and intended (specific) use of *waqf* land in the land use zoning plan at the LP preparation stage. This is to ensure that the status of the *waqf* land is in accordance with the LP proposed zoning plan.

3. Develop general *waqf* land with appropriate activities based on the surrounding development and current needs.

4. Strengthen the strategic cooperation between *waqf*-related agencies and other agencies.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• State Islamic Religious Council (MAIN) • Department of Wakaf, Zakat and Hajj (JAWHAR) • Local Authority	• State Authority • PLANMalaysia@Negeri

ACTION SR 1.1E

Encourage development on Malay Reserve Land (MRL)

Although part of the Malay Reserve Land (MRL) is located in urban areas and areas with development potential, the restrictions imposed on its ownership as well as on its sale and purchase reduce MRL attractiveness to developers to develop the land. MRL can also be difficult to develop due to multiple ownerships of each land parcel, making it difficult to achieve consensus among the many owners including in terms of the type of development, the compensation or benefits to owners, and the ownership of the development. This indirectly also affects the overall planning for physical and economic development of the area.

Cooperation between various parties at the federal, state and local levels plays an important role in developing MRL. The role of Bumiputera agencies can be highlighted to become facilitators in developing MRL especially those located in key growth areas that have high development potential.

The measures that need to be implemented to encourage the development of MRL are:

1. Identify MRL with development potential especially in key development focus areas. MRL needs to be developed with appropriate activities to improve the economy for the benefit of the Malays but in line with the area land use zoning.

2. Review the existing legal requirements to facilitate development and of MRL that are more dynamic and beneficial to MRL landowners.

Current development pressure poses the need to develop MRL. In line with the strategy to ensure optimal land use, the development of MRL must be strategically planned. The need to develop MRL is not only to benefit landowners, but also to improve the country's economic competitiveness.

BRIEF FACTS

Land that can be gazetted as Malay Reserves are as follows:

- Government land;
- Permanent forest reserve;
- Land reserved for public purposes;
- Private-owned land including land in group settlement areas (GSA) - Section 33(2) of the GSA Act, 1960

Every amendment to the Malay Reserves Enactment shall be made in accordance with the procedure prescribed in article 89 Clause 1, Federal Constitution, namely:
"Shall obtain a 2/3 majority vote in the State Legislative Assembly from the members of the State Legislative Assembly who are present and voted and approved by both Houses in Parliament".

Source: Land Management and Legislation Division, JKPTG

AGENCIES INVOLVED

Main Agencies

- Department of Director General of Lands and Mines (JKPTG)
- State Authority
- Local Authority

Supporting Agencies

- PLANMalaysia@Negeri

STRATEGY
SR 1.2

PRIORITISE URBAN RENEWAL IN EXISTING BUILT-UP AREAS

RELATED SDGs
SDG3 SDG17 SDG16

Optimum and sustainable land use development requires economical and efficient use of land that correspond to the potential and value of land in the locality. Areas that are on decline with unviable activities economically and experiencing economic, physical, environmental and social decline require urban renewal to improve the image, liveability and productivity of such area.

The need for urban renewal is due to the following factors:

1. The increasingly limited supply of land requires more efficient planning for urban land uses.
2. To meet the needs of local people in order to improve the quality and liveability of the surrounding.
3. To generate employment opportunities and economic activities that are more vibrant as well as creating a new economy.
4. To inject new synergies through realignment of existing built-up areas to be in line with current and future needs.
5. To encourage optimum use of existing infrastructure and restore the liveliness and charm of the old downtown areas.
6. To reduce development pressure on greenfield areas in order to address the issue of urban sprawl.
7. To implement urban renewal at sites that have been identified in the development plan.

The existing scenarios and conditions that require actions through urban renewal are:

1. Old buildings.
2. Abandoned development projects.
3. Areas with activities which are not economically viable.
4. Areas experiencing property depreciation.
5. Areas facing social problems.
6. Areas experiencing deteriorating infrastructure and facilities.

Box 5-3: Case Study: *Waterfront Wharf Project*, Washington DC, United States of America

- 27 acres in size.
- Public-private partnership initiative.
- Redevelopment of low-density business areas into mixed-used integrated with waterfront development.
- Development impact:
  a) Created an estimated 2,000 job opportunities.
  b) Increased local authority revenue through tax collection.
  c) Improved the socio-economic status of the local population.

Source: *developingresilience.uli.org*

ACTION SR 1.2A

Encourage urban renewal development in appropriate areas

Urban renewal refers to a comprehensive and integrated method to address the issues of economic recession, physical, or environmental decline as well as social obsolescence of a city. Urban renewal is required to ensure that the image of a city is preserved while increasing the productivity and liveability of a city. There are four (4) categories of urban renewals, namely:

i. Urban Redevelopment;
ii. Urban Regeneration;
iii. Urban Revitalisation; and
iv. Urban Conservation.

The measures that need to be implemented are:

1. Identify areas that require urban renewal at the SP and LP preparation stage.
2. Encourage mixed development in the redevelopment of abandoned and derelict areas.
3. Formulate the Implementation Guidelines for Urban Regeneration as a guide for implementation and management of urban renewal.
4. Propose appropriate incentives to developers and landowners to encourage urban redevelopment in abandoned and dilapidated areas.

Box 5-4: Case Study: Ibrahim International Business District *(*IIBD*)*, Johor Bahru, Malaysia

IIBD is a border town located in the south of Peninsular Malaysia. To maximise the development potential of IIBD, Johor Corporation in collaboration with the Johor Bahru City Council introduced the IIBD Transformation Plan which aims to strengthen IIBD's role as a leading trade centre at the international level.

- Total Area: **250 acres**
- Major land use zoning: **Business**
- Development components:
  i. Sungai Seget Revitalisation Project (IRDA)
  ii. Coronation Square

Figure 5-8: Categories of urban renewal

Urban Redevelopment	Urban Regeneration	Urban Revitalisation	Urban Conservation
Holistic redevelopment Redevelop the whole of a large site **Characteristics** • Changes in existing physical structure • Land use change • High density development	Restoration of an old, dilapidated and abandoned site **Characteristics** • Physical change ➢ Without destroying the entire design, layout and functionality ➢ Site activity modification work ➢ Landscape and infrastructure work • Land use changes • TOD-based economically viable development	Integrated and comprehensive upliftment Uplift of a building **Characteristics** • Physical change ➢ Upgrade and maintenance of the building • Changes in building activities to be more attractive and economically viable. • Beautification and landscaping work	Preservation of a heritage and historic site/building **Characteristics** • Physical change ➢ Conservation work / physical maintenance of buildings / sites • Changes in building / site activities to be more interesting • Preserve the heritage and historical values of the site / building
DEVELOPMENT / IMPLEMENTATION PLAN			
• Layout / building plan • Special Area Plan (SAP) • Other plans such as master plan, action plan	• Layout / building plan • Special Area Plan (SAP) • Other plans such as master plan, action plan	• Layout / building plan	• Special Area Plan (SAP) • Conservation Management Plan (CMP) • Master plan

Source: Draft Guidelines for the Implementation of Urban Renewal, PLANMalaysia, 2021

AGENCIES INVOLVED

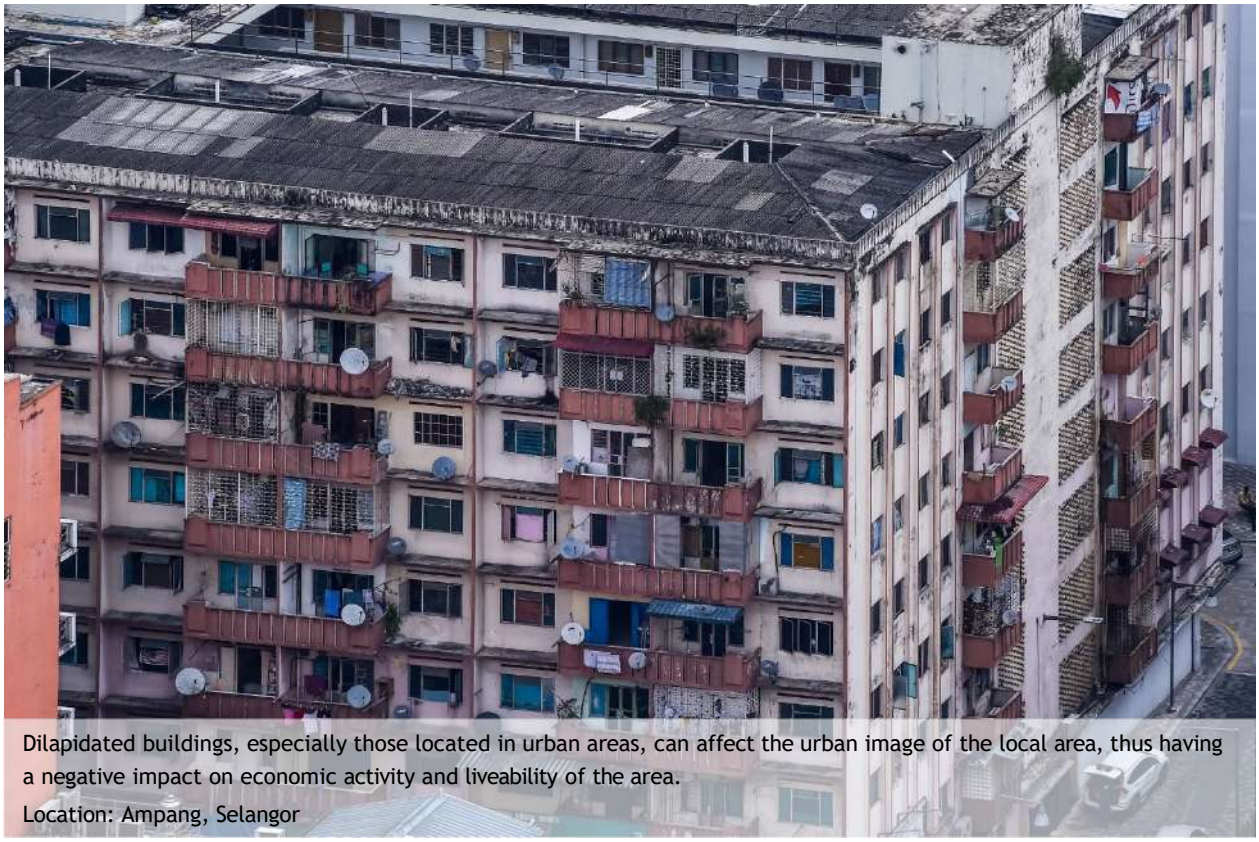
Main Agencies	Supporting Agencies
• State Authority • PLANMalaysia@Negeri • Local Authority	• Ministry of Housing and Local Government (KPKT) • PLANMalaysia

ACTION SR 1.2B

Review current legislation to enable en-bloc consent for urban redevelopment

Existing legal provisions require the consent of all owners before redevelopment can be implemented. This complicates redevelopment efforts because without the consent of all land or parcel owners, the proposed redevelopment cannot be implemented. Therefore, the current legislation needs to be reviewed so that a more appropriate mechanism can be provided to facilitate redevelopment efforts to be carried out in dilapidated areas.

An en-bloc agreement means that the redevelopment of a building or area can be carried out with the consent of the majority of the owners. NPP4 recommends that a review of the current legislation be carried out taking into account the appropriateness of the en-bloc agreement provisions to facilitate the redevelopment of dilapidated areas. In cases where consents are difficult to obtain, the acquisition of strata parcels under the Land Acquisition Act 1960 can be implemented subject to the approval of the State Authority.



Dilapidated buildings, especially those located in urban areas, can affect the urban image of the local area, thus having a negative impact on economic activity and liveability of the area.

Location: Ampang, Selangor

AGENCIES INVOLVED	
Main Agencies	**Supporting Agencies**
• Department of Director General of Lands and Mines (JKPTG)	• Attorney General's Chambers • PLANMalaysia • Local Authority

STRATEGY
SR 1.3

ENSURE DEVELOPMENT FOCUS AREAS ARE DEVELOPED IN A SUSTAINABLE MANNER

RELATED SDGs
- SDG11
- SDG12

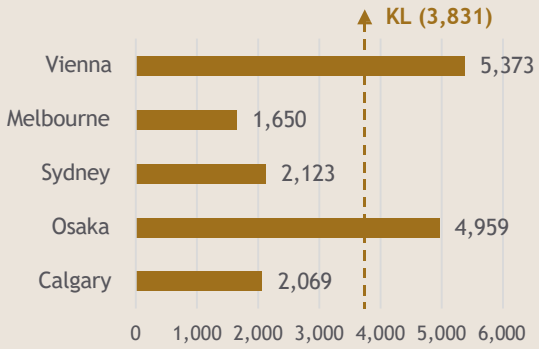
One of the strategies in land development is to promote optimum development through the determination of appropriate development intensity for an area.

Ensuring development is optimum can reduce the development pressure on rural areas and greenfield, as well as mitigate urban sprawl.

Increasing the intensity of development is one of the methods in ensuring optimum development can be achieved. However, excessive increase in development intensity can have a negative impact on the local population. Accordingly, the determination of the development intensity of an area must be evaluated using appropriate methods and techniques, and properly planned in detail.

BRIEF FACTS

Population density is one of the criteria measured in assessing liveable cities. The following shows the population density (people/km^2) of Kuala Lumpur compared to five (5) topmost Most Liveable Cities in the world.



Source: *Demographia World Urban Areas, 16th Annual Edition, 2020*

Box 5-5: Central Park Sydney, Australia

Central Park Sydney is a development with sustainable density located in Sydney City Centre and close to the Central Station. It is a redevelopment project consisting of mixed development activities that include residential and business space with building height between 8 to 35 stories.

Its redevelopment master plan revolves around the 6,440 square metres city park located in the middle of the project site. Among the sustainable design components adapted in this development are solar panels, roof gardens as well as third generation pipes and water tanks.

ACTION SR 1.3A

Ensure growth areas within the Conurbation and Promoted Development Zone (PDZ) are developed sustainably

Sustainable and efficient urban management is important in ensuring a competitive and sustainable city. Effective urban planning and governance need to be implemented in efforts to spur development in the growth areas identified in the Conurbation and PDZ areas. The implementation of the Urban Sustainability Assessment Programme can assist the local authorities in collecting information and data for monitoring, evaluating and determining the level of urban sustainability. Through this programme local authorities as city managers and administrators can monitor, plan and manage the administration of cities more efficiently and effectively.

The measures to be implemented are as follows:

1. Intensify efforts towards a sustainable city through increased participation of local authorities (LA) in the MURNInets programme.

   The implementation of the MURNInets 2.0 programme can help local authorities determine the level of urban sustainability identify weaknesses and strengths of each city, and suggest improvements. It is also a tool to measure the performance of urban management in a local authority. Through MURNInets 2.0 local authorities can monitor, plan and manage the administration of cities more efficiently and effectively.

2. Strengthen and maintain the quality of municipal services

   In order to maintain the sustainability status in a local authority area, a high level of continuous commitment is very important. Effective governance is a key pillar that needs to be strengthened, especially in terms of institutional strengthening, enforcement and monitoring.

3. Improving the quality of the environment, safety and social well-being.

   Sustainable urban development needs to balance environmental, social, economic and physical aspects of an area. To ensure that each city achieves sustainable status, local authorities and technical departments/ agencies either at the state level or the federal level need to play their roles towards improving the quality of life and the liveable environment. Continuous commitment and action from all parties is very important to ensure that each city is sustainable.

Figure 5-9: The MURNInets website provides various relevant information including the sustainability statuses of local authorities

AGENCIES INVOLVED	
Main Agencies	**Supporting Agencies**
• State Authority • Local Authority	• PLANMalaysia@Negeri

ACTION SR 1.3B

Identify the needs of development index to assess saturation level of urban areas

NPP4 identifies the need to conduct a development index study to assess saturation level of cities in order to determine the maximum increase in density Appropriate urban planning and management are required for cities that have reached saturation level. Hence, increasing density in the area requires due consideration to minimize the impact of development. Excessive increase in density can contribute to crowded surroundings obstruction to natural lighting and ventilation, inadequate facilities, noise pollution, traffic congestion and the occurrence of urban heat island.

Development index studies should be conducted in major cities located in development focus zones (Conurbations and PDZs). The evaluation of the development index should be made based on the city boundaries that have been identified. The study should also take into account the level of provision of infrastructure, public transportation network, population density and intensity of development in an area. Urban areas that have reached saturation level need to emphasise on urban management as well as ensure that new development do not affect the quality of life of urban residents.

Box 5-6: Case Study: *Kowloon Walled City*, Hong Kong

Kowloon Walled City was once a popular case study on unsustainable high-density development due to its excessively high density as well as inefficient urban management. The development was located on a 2.2 hectares of land and housed an approximately 300 connected building blocks with heights ranging from 10 to 14 storeys.

The city had the highest population density in the world at 1.2 million people per square kilometre. Excessive increase in density had resulted in the living space not receiving sunlight as well as limited natural ventilation.

Kowloon Walled City has now been redeveloped as a recreational park known as Kowloon Walled City Park. Some artifacts from the old building structure are also preserved as historical relics that are unique to this park.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• PLANMalaysia	• Ministry of Housing and Local Government (KPKT) • PLANMalaysia@Negeri

STRATEGY
SR 1.4

IMPLEMENT THE ESTABLISHMENT OF MALAYSIA URBAN OBSERVATORY (MUO) AS AN URBAN BIG-DATA CENTRE AND NATIONAL SMART CITY PLATFORM

RELATED SDGs
SDG9 SDG12
SDG11

The country's urbanisation rate has reached 77 percent by 2020. This has put pressure on cities to provide for the needs of the population. The imbalance between the demand from the population and the capacity of cities has led to various urban issues such as conversion of greenfield into urban development ; increasing demand for basic resources and declining quality of urban environment and urban life.

The Malaysian government has seen the importance of a holistic system to be established to monitor and manage urban issues as well as to assist city administrators in decision making. To manage the city more effectively, an efficient and reliable data and information management system is needed. Malaysia Urban Observatory (MUO) became a central database platform that applies an Integrated Smart Information System to support sustainable urban development. The MUO is the primary framework for developing a network of urban information sharing at the national level and a national smart city platform.

ACTION SR 1.4A

Develop the MUO system into an urban big-data centre and the country's smart city platform

The MUO system is a platform for spatial planning big-data analytics through an integrated smart information sharing network. It also serves to implement the national sustainability agenda. With increasingly complex urban issues, the MUO system provides the platform that expedites the process of making sound planning decisions.

The measures that need to be implemented are:

1. Plan, design and implement MUO system that are user-friendly, stable, highly accessible, able to handle all data formats, integrated, shareable, can be updated automatically and equipped to execute geo-analytics quickly.

2. Develop a national smart city platform module that integrates and connects smart cities throughout Malaysia.

3. Implement the MUO implementation plan which contains three (3) phases from 2021 to 2035 as outlined in the MUO Development Study report.

AGENCIES INVOLVED	
Main Agencies	**Supporting Agencies**
• Ministry of Housing and Local Government (KPKT) • PLANMalaysia	• PLANMalaysia@Negeri • State Authority • Local Authority

ACTION SR 1.4B

Establish on MUO Operation Centre at PLANMalaysia to manage and develop MUO as a data control and management center at the National level

The Malaysia Urban Observatory (MUO) is a platform that enables agencies involved in urban management to share information and data to address urban issues. This smart and integrated data and information sharing ensures that development planning and management can be undertaken more efficiently and effectively, with periodic and effective monitoring.

The measures to be implemented :

1. Restructure PLANMalaysia to establish the MUO Operation Centre Division.
2. Embark on programmes to develop expertise in the fields of transportation, economy, environment, social as well as infrastructure and utilities.
3. Establish State Urban Observatory in each state and Local Urban Observatory in each local authority to support and channel data and information to the National MUO Operation Centre.

AGENCIES INVOLVED	
Main Agencies	**Supporting Agencies**
• Ministry of Housing and Local Government (KPKT) • PLANMalaysia	• PLANMalaysia@Negeri • State Authority • Local Authority

ACTION SR 1.4C

Institute strategic partnerships between government agencies, private sector, professional bodies, HEIs and community-based organisations

Strategic sharing of data and information between stakeholders is critical in ensuring a faster and more efficient management system. Community access to data and information also needs to be enhanced to strengthen the role of the community in development planning process as well as to ensure inclusivity.

The measures to be implemented :

1. Sign Memorandum of Understanding (MoU), Note of Cooperation or Letter of Intent with co-owners and smart partners.
2. Implement integration, interfacing and collaboration under strategic partnerships.
3. Conduct MUO awareness and publicity programmes.

AGENCIES INVOLVED	
Main Agencies	**Supporting Agencies**
• Ministry of Housing and Local Government (KPKT) • PLANMalaysia • Relevant professional bodies • Higher education institutions	• PLANMalaysia@Negeri • State Authority • Local Authority

STRATEGY
SR 1.5

IMPLEMENT MITIGATION EFFORTS TO REDUCE THE RISK OF NATURAL DISASTERS AND CLIMATE CHANGE

RELATED SDGs
- SDG11
- SDG13

Malaysia is committed to implementing the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR, 2030). The framework has identified four (4) priority actions to be implemented namely:

i. Understanding of disaster risk;
ii. Strengthening disaster risk governance to manage disaster risk;
iii. Investing in disaster risk reduction for resilience and
iv. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

Malaysia must improve her disaster preparedness and build resilience to climate change. The phenomena of floods, landslides and droughts are among the episodes of natural disasters that often resulted in losses and threaten the well-being of the people especially in high-risk areas. Malaysia is also surrounded by the Pacific Ring of Fire and thus is vulnerable to the threat of tsunamis caused by earthquakes.

Natural disasters occur as a result of interactions between **natural hazards** and local **vulnerability** characteristics and factors (refer to **Box 5-7**). Natural hazards such as heavy rains can result in disasters such as flooding or landslides in an area. Areas affected by disasters are also more fragile and vulnerable to **subsequent hazards** if no effective and build back better recovery and mitigation efforts are implemented.

Disaster risk reduction measures, including both **non-structural measures** such as land use planning, preparation of guidelines and risk mapping and **structural measures** such as engineering control for disaster protection must be emphasised.

Natural Hazards

The result of natural physical process influenced by weather, landform and geological properties of an area that can result in disasters such as floods, storms and landslides.

Subsequent Hazards

The aftermath of a natural hazard that could threaten an area that has been affected from a catastrophic episode. Examples are exposed slopes and damaged building structures.

Landslide that occurred in the State of Pahang

Box 5-7: Risk, Vulnerability & Natural Hazards Concept

Disaster risk to Malaysia, especially due to climate change, is influenced by the relationship between **vulnerability** due to human activities and **exposure** that interacts with **natural hazards.**

Most of the effects and impacts of disasters stem from the interaction between the hazardous events and the vulnerability that characterise a community, system or asset that makes it vulnerable to danger with disastrous implications. For example, a flooding (as a disaster) can occur after rain (as a natural hazard) which is not necessarily heavy, but due to vulnerability factors such as widespread deforestation, development in the flood-plains or ineffective solid waste management that increase the flow of surface water and reduces surface water seepage into the ground. Social fragility such as residents living in flood basins or the poor who are forced to inhabit unsafe areas, also makes them more vulnerable to disaster.

The distinction between risk, fragility and hazard is important in the context of disaster risk management and climate adaptation as it provides the ability to assess vulnerability factors in terms of socioeconomic, political, cultural, environmental and internal threats in creating a more comprehensive solution. **Figure 5-10** shows the interaction between climate-related risks, human resilience and the environment.

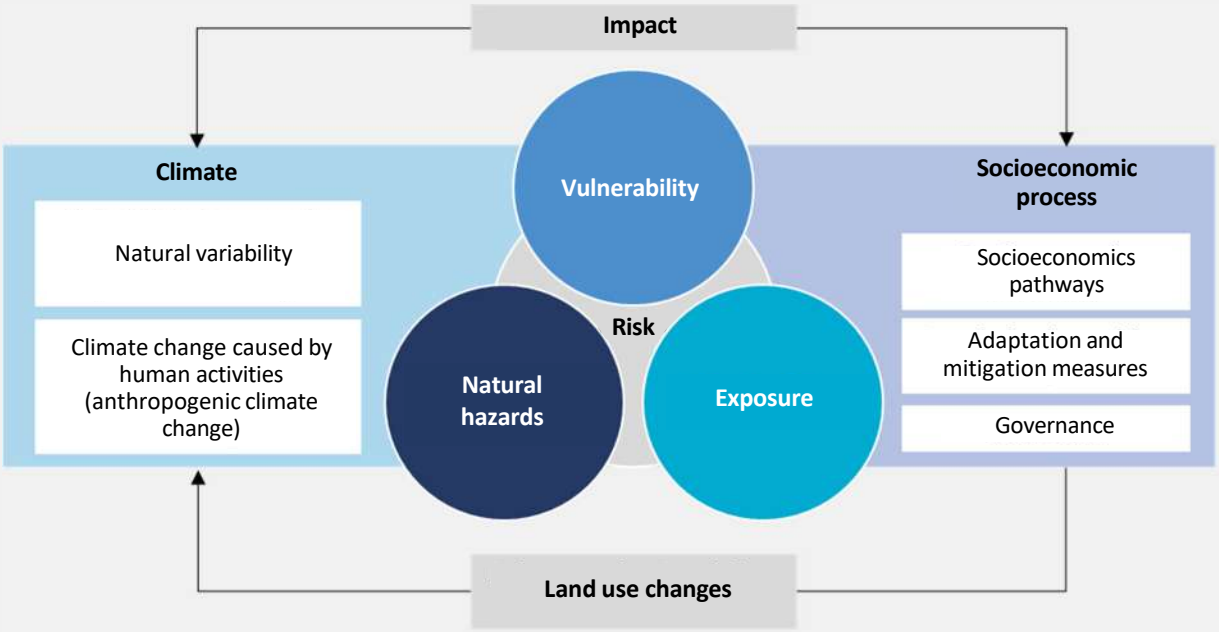


Figure 5-10: The result of the interactions between climate-related risks, human resilience and the environment
Source: IPCC Fourth Assessment Report ,2014

PLANMalaysia has published the Planning Guidelines on Disaster Resilient Cities 2019 to be used as a guide by agencies responsible for urban planning and development as a guide to in implementing risk reduction and increasing disaster resilience of city, urban and settlement areas.

Most natural disasters are often intensified by climate change. Malaysia faces various challenges due to the climate crisis which has changed the nature of rainfall in terms of its pattern, intensity and distribution. This has led to more extensive impact and posed significant risk to the economy, public health and the environment. Extreme weather phenomena has also resulted in huge socioeconomic losses. This can be seen during the series of flooding that occurred in 2014 to 2015 and the droughts following the El Nino Phenomenon in 2015 and 2016.

NPP4 emphasises on **mitigation for disaster risk reduction** through a more holistic land use and physical planning by taking into account local factors including causes factors, exposure and vulnerability. Emphasis is also placed on creating disaster resilience through enhancing the ability to withstand, absorb, accommodate and recover.

The actions outlined in this strategy aim to increase overall disaster preparedness. Nevertheless, specific actions may need to be taken as it is subject to the type of disaster. This includes flood basin area management, coastal resilience and areas at risk of drought, landslide, forest and peat fire, earthquake and tsunami.

Damaged road due to flood in Kg Tanjung Kuala, Tumpat, Kelantan.

ACTION SR 1.5A

Improve resilience and readiness for natural disasters and the threat of climate change

Disaster resilience and preparedness should be enhanced through risk-based spatial and physical planning. Based on the Sendai Framework 2015-2030 (SFDRR, 2030), national disaster preparedness needs to be enhanced to ensure a more effective disaster risk management before during and after disaster.

The approach of redevelopment, rehabilitation, rejuvenation and rehabilitation following a disaster can restore the affected areas and increase their resiliency, hence making them more effective in performing their functions and services to the public.

Plan 5-1 shows a Multi-Hazard Risk Plan generated based on the results of risk category assessment using the Simple Additive Weightage (SAW) technique. This technique helps in classifying risk categories according to level; high, medium and low, which are further refined using overlay technique based on the scores obtained.

This action requires the following measures to be implemented:

1. Prepare multi-hazard disaster risk map

Disaster risk mapping at the local level should be prepared to facilitate risk-based planning. The mapping should take into account the following:

i. Identify all natural hazards in the local area such as flood, tsunami, landslide and the composite interaction between all these hazards.
ii. Consider the characteristics of local vulnerability in assessing local risk level.
iii. Consider climate change factors and projections in terms of sea level rise, and changes in the size of areas affected by flood and drought in determining the frequency and intensity of natural hazards.

Disaster risk map should be used as a basis for land use planning in determining the suitability of future land use, mitigation measures as well as the provision of effective and resilient infrastructure and utility facilities.

Suspension bridge destroyed by water surge in Titi Hayun Recreation Centre, Yan, Kedah.

2. Implement risk-based planning.

i. Adapt planning guidelines according to local risks to facilitate risk-based planning.

ii. Provide and upgrade related facilities and infrastructure in accordance with these requirements of the planning guidelines to increase the level of disaster preparedness and resilience.

iii. Undertake **risk & vulnerability assessment** studies for development projects in disaster risk areas, especially for development of infrastructure of national interest.

The requirement for **Risk and vulnerability** assessment can be implemented through:

- As a condition for planning permission.
- Use assessment results in cost-benefit analysis in determining the feasibility of a development proposal or in identifying its project mitigation measures.
- Use assessment results as the basis for in the preparation of project disaster risk management plan.

3. Establish a disaster management training centre for local residents.

In areas identified as having a high disaster risk, disaster management training centres should be established to facilitate the Community-Based Disaster Risk Management (CBDRM) programme in order to empower local people for disaster preparedness. The development of this training centre should emphasise on:

i. Provision of facilities and equipment that encourage interactive learning modules.

ii. Renovation of existing facilities such as community centres, schools, flood evacuation centres and so on.

iii. Design of inclusive training centres to provide learning methods that are accessible to all parties in the community including women, children, the elderly and people with disabilities (PWDs).

Disaster preparedness needs to be nurtured at various levels of the community, including children.

4. Identify evacuation centres that are resistant to disaster.

For areas with high disaster risk, appropriate evacuation centres for must be identified. There are two (2) categories of evacuation centres for disaster victims, namely permanent evacuation centres and temporary evacuation centres. The following need to be emphasised in the provision of evacuation centres:

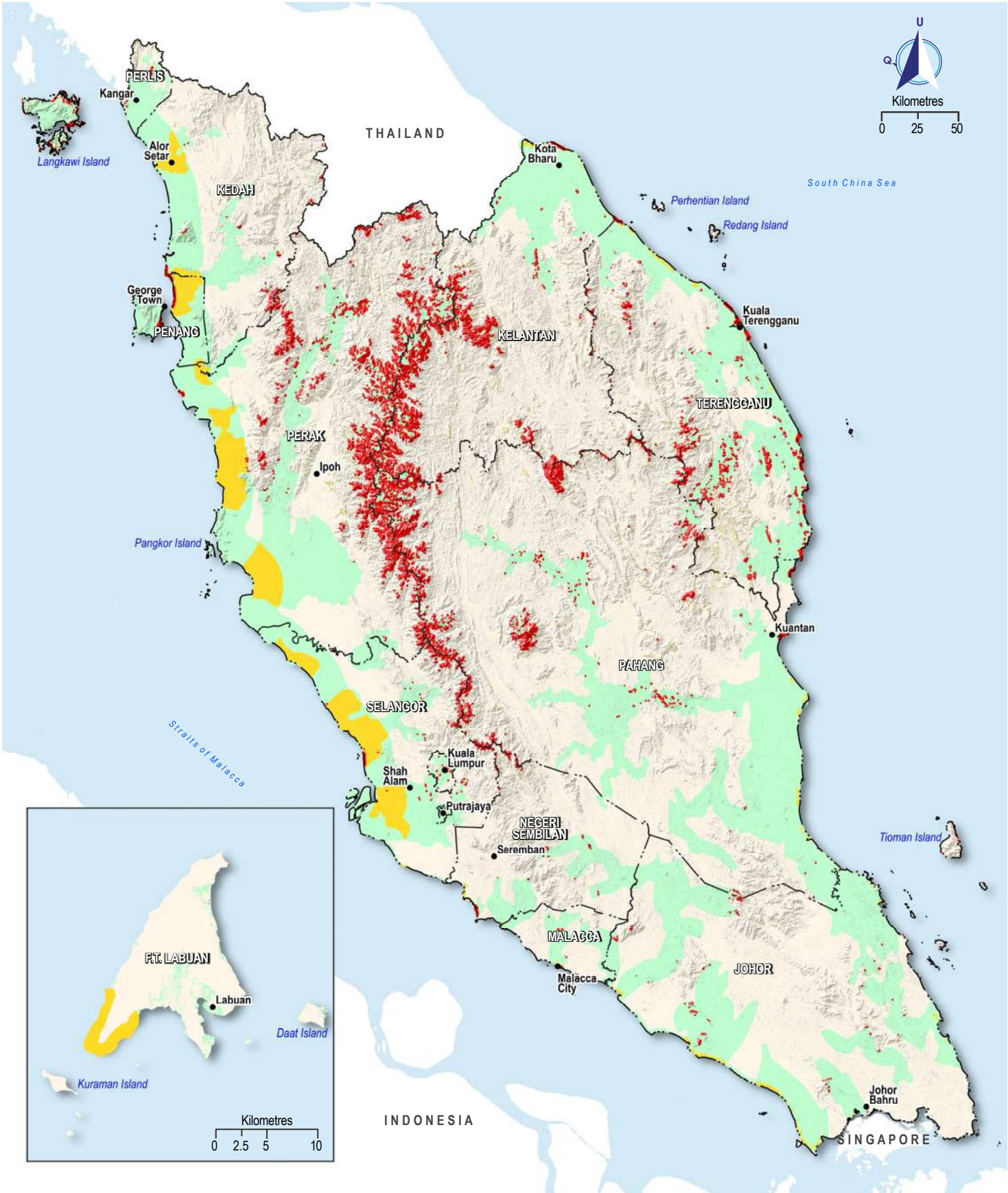
i. Disaster-resistant permanent evacuation centre

- Must be located in a safe location and free from the effect of the disaster.
- Easily accessible either on foot or is connected to easy-to-reach road network.
- Easily accessible by the aid team and all sections of the community such as the elderly, the PWDs, women, children and so on.
- Need to be equipped with comprehensive support facilities to increase efficiency in disaster management either before, during and after the disaster.
- Every district with high disaster risk should have at least one permanent evacuation centre.

ii. Temporary evacuation centre

- Identify existing buildings such as schools, public halls, community halls and government institutions to accommodate all evacuation needs and disaster victims.
- Each temporary evacuation centre should have adequate facilities to meet the needs of the disaster victims.
- Retrofitting work must be done if the evacuation centre is not able to accommodate disaster victims in terms of number and length of stay. The provision of additional water tanks, additional toilets, cooking space, treatment rooms etc. should be taken into account.
- The location of the centre should be suitable and easily accessible either by foot, land or air.

AGENCIES INVOLVED	
Main Agencies	**Supporting Agencies**
• National Disaster Management Agency (NADMA) • National Security Council • Local Authority	• PLANMalaysia@Negeri



MAP 5-1: DISASTER RISK AREAS IN PENINSULAR MALAYSIA AND F.T OF LABUAN

Risk Category
- High risk
- Medium Risk
- Low Risk

Others
- State Capital
- State Boundary

Source:
' National Physical Plan 4, 2020

ACTION SR 1.5B

Minimise the impact of flood disasters on settlements and municipalities located in flood basin areas

Flooding is the most frequent natural disaster to hit Malaysia. Among ASEAN countries, Malaysia experienced 88 flood occurrences in 2020, the second highest frequency of flooding after Indonesia (Asean Risk Monitor and Disaster Management Review, 2020). An estimated 5.7 million people or 21% of the population in Malaysia live in flood-prone areas. Various efforts have been undertaken by the government to address flood issues such as the establishment of the Permanent Flood Control Commission (PFCC), flood disaster relief mechanisms, river basin studies, flood mitigation plans and flood warning systems.

The climate crisis is expected to change the weather patterns, where heavy rains will occur in a shorter period of time. According to NAHRIM, 13 of the 15 river basins in Malaysia will experience an increase in flood area coverage. Urban areas are expected to experience more lightning storms. Rapid development and increasingly unpredictable weather conditions require smarter, more innovative and more responsive flood management.

Floods, if managed well, will provide various opportunities to adapt to the climate crisis. Flooding should be seen as a natural process in the water cycle. Rainwater can be collected and utilised through nature-based solutions that are integrated with traditional infrastructure.

BRIEF FACTS

2018 large flood in Malaysia

One of the biggest flood in the history of Malaysia where 11 states and more than 70 urban areas were affected.

RM 2.9 bilion
infrastructure damage

541,896
people affected

6,696
houses damaged

25
(death directly due to flooding)

Source: NADMA Annual Report, 2018

The management of flood basin areas that take into account the changes in weather pattern due to climate change must be carried out through effective mechanism to increase the preparedness of the communities in the areas. Location: Penampang, Sabah

Measures to minimise the impact of flood in flood basin areas are as follows:

1. Prepare flood risk, hazard and vulnerability map

Risk-based mapping is one of the mitigation measures in development planning to assess the level of vulnerability and flood risk to the community, the economy and the environment of an area. Until 2020, a total of 41 flood hazard maps have been produced by the Department of Irrigation and Drainage (DID) for Peninsular Malaysia river basins. Additionally, a total of 5 flood risk maps have also been produced. **Plan 5-2** shows the flood risk areas that can be used as a reference in implementing this measure.

The preparation of a flood risk map should involve the following aspects:

i. Establish and expand an integrated database for the purpose of mapping flood hazard and flood risk to all river basins at risk of flooding.

ii. Translate a flood hazard map to a flood risk map that takes into account hazard factors, exposure and vulnerability.

iii. Translate the results of the mapping exercise into policy and planning in the preparation of sectoral policies, national development plans and other development plans.

iv. Integrate Climate Change Factor (CCF) with future land use patterns based on the latest mapping studies by NAHRIM to predict future flood. This mapping also needs to be updated periodically taking into account climate change projections.

This Flood Risk Map shows flood risk areas in Bandar Pekan, Pahang with the river water level is at the "Danger" level at Lubuk Paku Station, Maran.
Source: Flood Management Division, DID, 2013

MAP 5-2: FLOOD RISK AREAS IN PENINSULAR MALAYSIA

Flood Risk

- Flood Risk Areas
- River

Others

- State Capital
- Main Towns in Flood Prone Areas
- State Boundary

Source:
- Irrigation and Drainage Department, 2018
- National Physical Plan 4, 2020

2. Apply the concept of "Living with Flood“

"Living with Flood" is an approach to adapt the local community to the risk of floods. This include adaptive measures such as nature-based solutions (NbS), flood mitigation works and adaptation of the physical environment. These measures should be applied depending on the intensity of the flood (refer to **Figure 5-11**).

If NbS and flood mitigation works are ineffective, adaptation of the physical environment adaptation should be given priority such as the construction of flood-friendly building structures. The construction of this type of structure helps the implementation of the "Living with Flood“ concept.

Figure 5-11: Adaptive measures to reduce flood risk

3. Manage flash floods through the concept of ‘Sponge City’

‘Sponge City’ is a concept of large-scale rainwater storage and use that helps reduce the risk of flash floods and increase the amount of water that can be reused. Therefore, this concept is a responsive measure that needs to be utilised in urban areas that often experience flash floods and water supply disruptions. The application of the Sponge City concept is different between cities depending on local needs and context. **Box 5-8** shows some of the key features of Sponge City.

The Sponge City concept which aims to reduce flood risk more holistically can be practiced in Malaysia through the use of existing flood management assets such as retention ponds or detention ponds.
Location: Selangor MACC Complex, Shah Alam, Selangor

Box 5-8: Sponge City Main Characteristics

1. **Use of artificial wetlands and natural reservoirs**
   Construction of artificial wetlands to distill and store rainwater. These areas can also be used as recreational areas and help carbon absorption in line with the concept of low-carbon city.

2. **Green and blue continuity**
   Green areas, parks, rivers, channels and ponds that are interconnected in the neighbourhood can naturally store and distill water as well as increase biological diversity and create areas for leisure, recreation and cultural purposes.

3. **Porous design**
   Porous design involving the construction of bio-swales and bio-retention systems as well as porous road and pavement surfaces facilitates surface runoff infiltration into the ground. The drainage system helps surface runoff to flow into the green space for natural distillation and absorption.

4. **Green roof**
   The green roof concept involves the planting of suitable plants on rooftops to store rainwater and distill it naturally before being reused or released for absorption into the ground.

5. **Water saving and water reuse in building ~~blocks~~**
   Involves efforts to increase water recycling especially sullage and the use of rainwater harvesting systems in buildings. Water savings can also be enhanced through water tariff increases, awareness campaigns, and the use of smart monitoring systems to identify water leaks and wastage.

6. **Rainwater storage**
   Rainwater storage through the construction of lakes, former mines, off-river storage reservoirs (OSP) and coastal reservoirs.

7. **Flood water storage**
   Floodwater storage through the use of dual-functional structures such as playground areas.

Source: *fastcompany.com & seequent.com*

4. Conduct Land Use Planning Study for Sponge City Development

Land use planning guidelines for the development of "Sponge City" need to be prepared so that disaster risks can be reduced in future development, besides ensuring a more orderly and systematic land use. These guidelines will assist the responsible agencies, especially local authorities, in implementing the development of Sponge City in terms of planning, development, legislation, management and enforcement.

The study should also identify cities that often experience flash floods and serious water shortages. This allows potential cities to be identified as pilot projects undergoing transformation and renovation as Sponge City (read together with **Action SR 2.3C**)

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Department of Irrigation and Drainage • National Disaster Management Agency (NADMA) • PLANMalaysia@Negeri • Local Authority	• Ministry of Environment and Water (KASA) • Public Works Department • State Forestry Department • PLANMalaysia

ACTION SR 1.5C

Implement comprehensive coastal land use planning and development plan

Coastal areas are dynamic areas that are influenced by natural physical factors such as ocean currents, waves and coastal erosion, human activities, and climate change. Malaysia has a coastline of almost 5,000km and it makes an important economic, social and ecological zone. In 2020, a total of 5,929,698 people (23.9% of the population) are estimated to live within the boundaries of the coastal zone of Peninsular Malaysia and F.T. Labuan.

NPP4 emphasises the use of the 2nd National Coastal Zone Physical Plan (RFZPPN2) as the main reference in risk-based planning in coastal zones in order to plan, coordinate and develop land uses in the areas. Coastal zone protection efforts should also prioritise environmentally friendly methods that are adapted accordingly to the local needs and characteristics.

BRIEF FACTS

1,347.6km
or 30% of Malaysia's coastline being affected by erosion.

Source: *National Coastal Erosion Study*, JPS, 2015

40%
70 out of 175 Coastal Zone Planning Units (UPZP) are at Very High and High vulnerability (NCVI) levels.

Source: RFZPPN2

0.21 metre
Maximum sea level rise in Peninsular Malaysia by 2050.

Source: National Communication Report -3, 2018

20,670.03 hectares
Coastal areas in Peninsular Malaysia will be affected by sea level rise by 2030.

Source: NAHRIM, 2020

Integrated development planning and coastal protection will create a balance in environmental conservation and economic growth of coastal areas. Location: Pulau Kapas, Terengganu

Measures to improve land use planning and development in coastal zones are as follows:

1. Adopt the 2nd National Coastal Zone Physical Plan as the main reference in the planning and development control of coastal areas.

RFZPPN2 is a strategic land use plan with detail policies and strategies aimed at the conservation and management of coastal resources in Peninsular Malaysia and F.T. Labuan. As a subset of NPP4, RFZPPN2 should be read together with NPP4 for planning and development strategies involving coastal zones. RFZPPN2 should be the used as the main guide to land use planning, development control and coastal conservation. The RFZPPN2 strategies need to be translated into development plans such as SP, LP and SAP.

For states with Integrated Coastal Zone Management (ICZM), the translation and implementation of RFZPPN2 policies and strategies must consider the ICZM. The Coastal Vulnerability Index (CVI) should become the basis in the preparation of more detailed disaster hazard and risk maps that will guide planning and management of disaster risks, and in determining suitable areas for development (refer to **Box 5-9** and **Plan 5-3**).

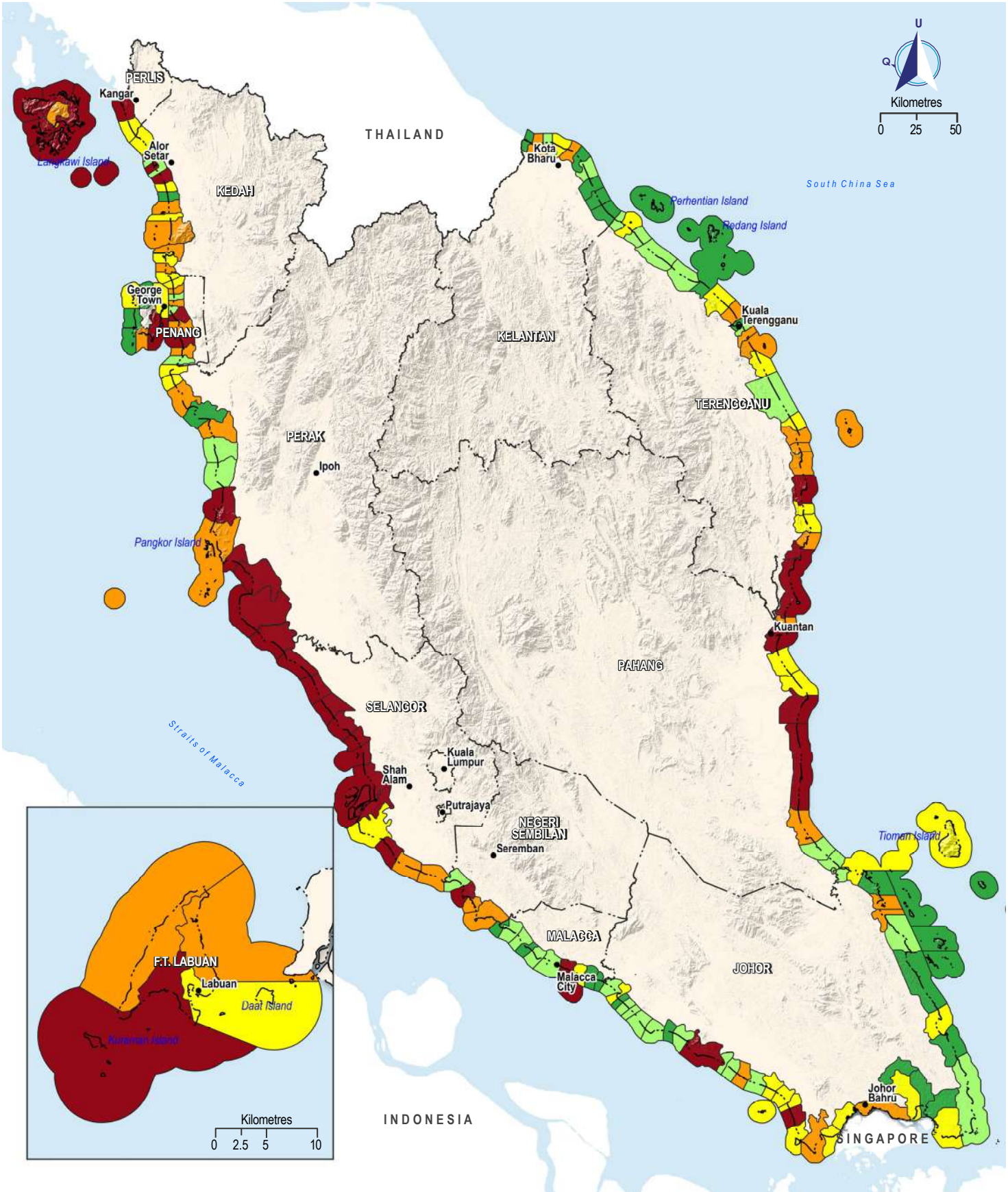
Coastal development in George Town, Penang

Box 5-9: Coastal Vulnerability Index (CVI) of RFZPPN2

RFZPPN2 has produced the Coastal Vulnerability Index (CVI), an index to determine the vulnerability level of coastal zones. This index is made up of three (3) main components namely:

- Coastal Physical Vulnerability Index (CVI-F)
- Coastal Biodiversity Vulnerability Index (CVI-B)
- Coastal Socio-economic Vulnerability Index (CVI-S)

A total of 18 parameters are being used to measure the indexes with 5 vulnerability levels.



MAP 5-3: NATIONAL COASTAL VULNERABILITY INDEX (NCVI) IN PENINSULAR MALAYSIA AND F.T. OF LABUAN

National Coastal Vulnerability Index (NCVI)

- >10.74 (Level 5-very high)
- >7.58 to ≤10.74 (Level 4- high)
- >5.70 to ≤7.58 (Level 3-moderate)
- >4.05 to ≤5.70 (Level 2-low)
- ≤ 4.05 (Level 1- very low)

Others

- State Capital
- State Boundary

Source:
- Draft National Coastal Zone Physical Plan, 2020

2. Undertake coastal risk and vulnerability assessment against sea level rise

A detailed local risk and vulnerability assessment specific to sea level rise need to be carried out immediately. To date, NAHRIM has produced a Coastal Vulnerability Index (CVI) through the Climate Change Impact Study on Sea Level Rise for Kuala Terengganu, Langkawi Island, Port Klang and Batu Pahat (refer to **Box 5-10**).

This study should be extended to other areas along the coast of Malaysia, especially areas that are expected to be inundated by sea water by 2030 and 2050. This is important to facilitate risk-based development planning and determine appropriate adaptation measures for those areas.

The following are the areas that are vulnerable to the threat of sea level rise in Peninsular Malaysia that need to undergo a detailed CVI study based on data from NAHRIM, 2020.

i. Kuala Kedah and Kuala Muda in Kedah
ii. Along the coast of Seberang Perai in Penang
iii. Seri Manjung and Bagan Datuk in Perak
iv. Along the coast of Melaka
v. Port Dickson and Batu Melintang in Negeri Sembilan:
vi. Pontian, Kukup, Mersing, Kuala Rompin and Endau in Johor
vii. Tumpat in Kelantan
viii. Marang, Setiu and Besut in Terengganu
ix. Pekan in Pahang

Box 5-10: CVI study on sea level rise in Batu Pahat, Johor

NAHRIM has conducted a CVI study along a 70km coastline and 4km inland in Batu Pahat to assess the level of vulnerability to sea level rise until 2100. Based on the study, it is expected that 40% of the area will be inundated by sea water by 2100. To mitigate, several ecosystem-based adaptation (EbA) options amounting to USD $59 million have been proposed until 2040. This study concludes that construction of seawall, construction of elevated infrastructure and relocation of population are adaptation measures which are more cost effective and better suited to the local characteristics.

Key areas along the Batu Pahat CVI study area:

- Fisherman village
- Aquaculture ponds
- Jetty
- School
- Oil palm plantation
- Coconut plantation
- Recreational and tourism areas

Sea level rise until 2100 will affect:

40% The coastal area will be inundated
60% Road
46% Mangrove areas
47% Residential areas
70% Residents to be relocated

Coastal development in Port Dickson, Negeri Sembilan

3. Prioritise nature-based solutions for coastal protection

Nature-based solution should be given priority as ecosystem-based adaptation (EbA) in the protection of coastal zones from erosion, storms, and sea level rise. Various benefits can be derived from the EbA method including contributing income to the local community.

Nature-based coastal protection can be done through:

BRIEF FACTS

Mangrove Tree Planting Program And Suitable Species in the National Coastline

A total of 292,634 hectares of coastal area have been planted with 6.8 million mangrove trees under the National Coastal Mangrove and Suitable Species Planting Program as a natural fortification to protect the coastline from tsunamis, coastal erosion and waves.

Source: KeTSA,2020

i. Protecting coastal habitats through the gazettement of mangrove swamp forests, peat swamp forests and freshwater swamp forests as protected areas listed in RFZPPN2.

ii. Protecting areas affected by erosion through planting of mangrove to act as breakwater, and replacing concrete seawall with natural wall such as shell and seagrass reefs.

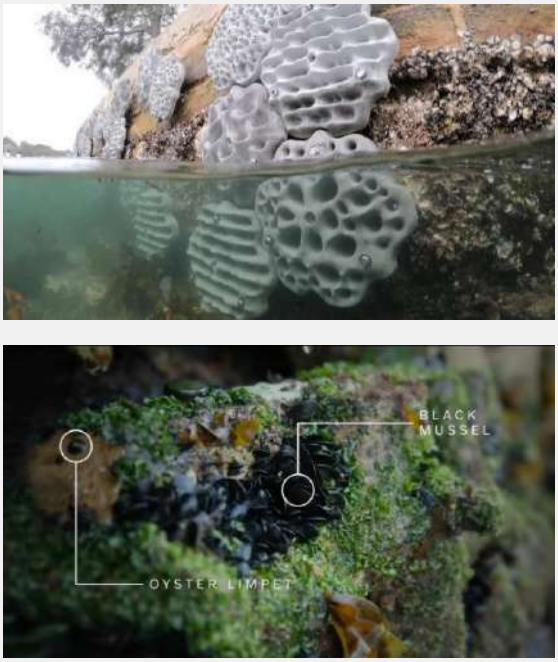
iii. Combining natural and artificial infrastructure (green-grey infrastructure) through biomimicry and innovative techniques (refer to **Box 5-11**)

Box 5-11: Case Study: Biomimicry Implementation; Living Seawall Project in Sydney, Australia.

The Living Seawall is a project implemented by the Volvo company in collaboration with the Sydney Institute of Marine Science and Reef Design Lab. It provides an alternative to existing coastal defense structures such as concrete and steel fortifications.

Through 3D printing technology, hundreds of artificial tiles have been produced and pasted on seawalls along Sawmillers Reserve and Bradfield Park in the northern part of Sydney. Living Seawall with biomimicry method of mangrove root structure provides natural habitat for marine life such as barnacles, snails, seaweed and oysters along the coastline.

This increases biological diversity and attracts organisms such as oysters and mollusks. These organisms permeate and filter pollutants such as heavy metals and fine dust to improve water quality. It is also a source of food for fish in the ocean. The tile is expected to be installed until 2038, where researchers are monitoring its level of effectiveness.



Examples of biomimicry implementation

Source: www.volvocars.com

4. Implement coastal land use development and coordination based on appropriate adaptation methods.

Appropriate adaptation methods need to be implemented for coastal areas that are, or are expected to be, affected by sea level rise and coastal erosion. There are three (3) adaptation methods that need to be considered depending on the risk assessment and local characteristics of an area.

Figure 5-12 describes the three (3) methods which consist of:

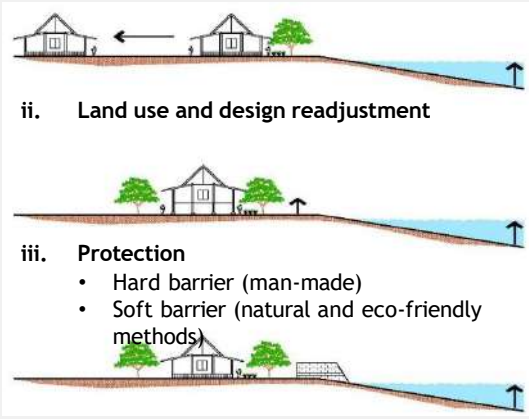


Figure 5-12: Coastal adaptation methods against ~~to~~ sea level rise
Source: Parry et al.2009

i. Retreat and Abandonment

For coastal areas to be developed, a setback distance should be established depending on the projected sea level rise until 2100. For undeveloped coastal areas retreat and abandonment is the most appropriate measure if other measures would incur higher cost ~~,~~ than the value of development and socio-economic activities in the areas.

ii. Readjustment

Adaptation can also be implemented through **readjustment** where land use and design adaptation methods can be implemented by accommodating sea level rise and by allowing water intrusion. These include building houses or buildings on stilts and provision of elevated infrastructure. For agricultural activities, climate-smart methods can be implemented such as converting paddy fields to other salt-resistant crops or into fish ponds.

iii. Protection

This adaptation method is appropriate for coastal areas that have developed rapidly or have critical infrastructure that needs to be developed along the coast such as power stations or jetties. Environmentally friendly methods (soft approach) should be given priority such as mangroves ~~s~~ and coral reefs and beach nourishment. Beach nourishment should adopt methods that do not upset the ecosystem of the coastal area.

Depending on the characteristics of the beach, if natural protection methods are not feasible, hard structures such as seawalls and breakwaters can be implemented. Another method that can be adopted is a combination of green-grey infrastructure (refer to **Action SR 1.5B**).

5. Improve tsunami preparedness of coastal areas

In general, Peninsular Malaysia is considered seismically stable and has a low risk of earthquakes. However, its location being surrounded by the Pacific Ring of Fire and tectonic plate movements could cause a tsunami that may affect its coastal areas. According to KASA (2020), there are 56 locations across the country that are found exposed to tsunami risk. Tsunami preparedness should be focussed on settlement areas with **Coastal Socio-Economic Vulnerability Index (CVI-S)** identified in RFZPPN2 and that are vulnerable to tsunami threat. These include areas along the west coast of Peninsular Malaysia in Perak, Penang, Kedah and Perlis.

Measures to increase tsunami preparedness are:

i. Preserve mangrove swamp forests

Mangrove swamp forests must be preserved, maintained and restored as the most effective major natural defense to reduce the impact of the tsunami.

ii. Implement tsunami risk mitigation through Local Plans and Special Area Plans by taking into account the principles of risk reduction, namely:

- Understand the characteristics of tsunami hazards and impending damage.
- Avoid new development in tsunami-prone areas.
- Site planning, building design and provision of infrastructure and utility facilities should take into account the direction and speed of the tsunami current.
- Redevelop and retrofit existing development in tsunami-prone areas.

iii. Prepare pecial evacuation plan that takes into account:

- Set up of a tsunami early warning system and emergency response plan, and conduct regular emergency drills among local residents.
- Establish safe routes to be used for logistics by security forces to transport equipment, essential goods and evacuate residents during emergency.
- Provide dedicated evacuation centres as safe and comfortable temporary shelters for evacuees, located away from tsunami risk areas.
- Implement continuous and regular tsunami risk awareness programmes, especially to the residents within tsunami risk areas (refer to **Action SR 1.5A**).

AGENCIES INVOLVED	
Main Agencies	**Supporting Agencies**
• Department of Irrigation and Drainage • National Disaster Management Agency (NADMA) • Local Authority	• Ministry of Works (KKR) • State Authority • National Hydraulic Research Institute of Malaysia (NAHRIM) • State Forestry Department • PLANMalaysia@Negeri

ACTION SR 1.5D

Ensure sustainable management of water resources to reduce the impact of drought

Climate change is expected to cause prolonged episodes of drought. According to NAHRIM projections, Peninsular Malaysia will experience 36.3% less rainfall by 2050. Critical drought episodes are expected to occur between 2025 to 2035. The areas that are expected to be most affected are the Sungai Dungun and Sungai Kemaman basins in Terengganu which will experience reduced rainfall of up to 48.4%. Therefore, efforts to reduce the impact of drought risk due to climate change need to be intensified to ensure that the country has a sustainable and continuous supply of fresh and potable water.

Measures to reduce the impact of drought risk on settlements, urban and agriculture areas are as follows:

1. Control the physical development in the dam catchment areas and gazette the dam areas, including their catchment areas as ESA. This is to ensure a secure and quality sources of water, especially during the dry season.

2. Implement the National Water Balance Management System (NAWABS) developed by DID and the Water Resources Index to predict and monitor water adequacy and drought for river basins that are exposed to greater drought risk such as Sungai Muda, Sungai Melaka and Sungai Kedah basins.

3. Explore and diversify alternative water sources to reduce dependence on river water and dams. These include rainwater recycling riverside water reservoirs (TAPS), off-river storage (OSP), reuse of abandoned mines and groundwater extraction. Additionally, water management mechanisms need to be established to store rainwater during the rainy season for use during the dry season.

Klang Gate Dam catchment area, Gombak, Selangor

4. Create large-scale rainwater storage system at the regional and local levels such as the Sponge City to supply water for domestic use and for usage during the dry season.

5. Assess the impact of climate change on water supply dams to determine the risk of dam overflow during heavy rainfall and the critical dam water level during drought. Priority should be given to dams that have experienced such disruptions previously.

6. Improve agriculture water use efficiency and reduce irrigation water loss by promoting best agricultural practices.

7. Determine the level of pollution load reduction in river basins that experience reduced river water volume during the dry season to ensure the integrity of the river ecosystem.

8. Assess the need to implement raw water distribution projects between basins in a state, or between states if necessary, especially for areas that have experienced critical drought episodes.

Irrigation for paddy fields.

AGENCIES INVOLVED

Main Agencies

- State Water Regulatory Agency
- State Water Operator Center
- Local Authority

Supporting Agencies

- Ministry of Environment and Water (KASA)
- National Water Services Commission (SPAN)
- Department of Environment
- Department of Irrigation and Drainage
- Department of Minerals and Geosciences Malaysia (JMG)

ACTION SR 1.5E

Regulate development activities in landslide risk areas

Landslides are influenced by various factors such as topography, soil properties, rock types, geological structure and rainfall intensity. It often occurs in highlands and areas with steep slope that are disturbed by human activities such as development and deforestation. Landslides usually cause damage to buildings, infrastructure and utilities, with indirect impacts of clogging rivers leading to downstream flooding. Landslides can also cause loss of lives. Between 2007 and 2016, Malaysia has recorded a total of 171 landslide cases with an average of 18 cases per year (JKR, 2017). **Plan 5-4** shows the highland and landslide risk areas for Peninsular Malaysia and F.T. Labuan.

Measures in regulating development activities in landslide risk areas are:

1. Prepare Slope Hazard and Risk Maps for slope 'hotspot' areas identified in the National Slope Master Plan 2009-2023. These 'hotspots' need to be mapped out in detail in the Local Plan and taken into account in the planning of the area.

2. Make it compulsory for planning application involving slope areas to be referred to the Technical Committee for the Development of Environmentally Sensitive Areas (JTPESA), and conditions set by the Committee should be regarded as conditions for planning approval. This mechanism is being practiced in Selangor and should be expanded and adopted in other states too.

3. Prohibit the change of use of forest land that are located in the highlands above 1,000 metres above sea level, except in the Highland Special Management Areas (SMA) namely Cameron Highlands-Kinta-Lojing, Genting Highlands-Bukit Tinggi-Janda Baik and Bukit Fraser.

4. Limit logging in the highlands to only heli-logging method and ensure it does not damage the natural ecosystem.

5. Prohibit development in Class 3 and Class 4 slope areas, including agricultural development, as stipulated/identified in the Guidelines for Development in Hilly and Highland Areas (2009) prepared by PLANMalaysia.

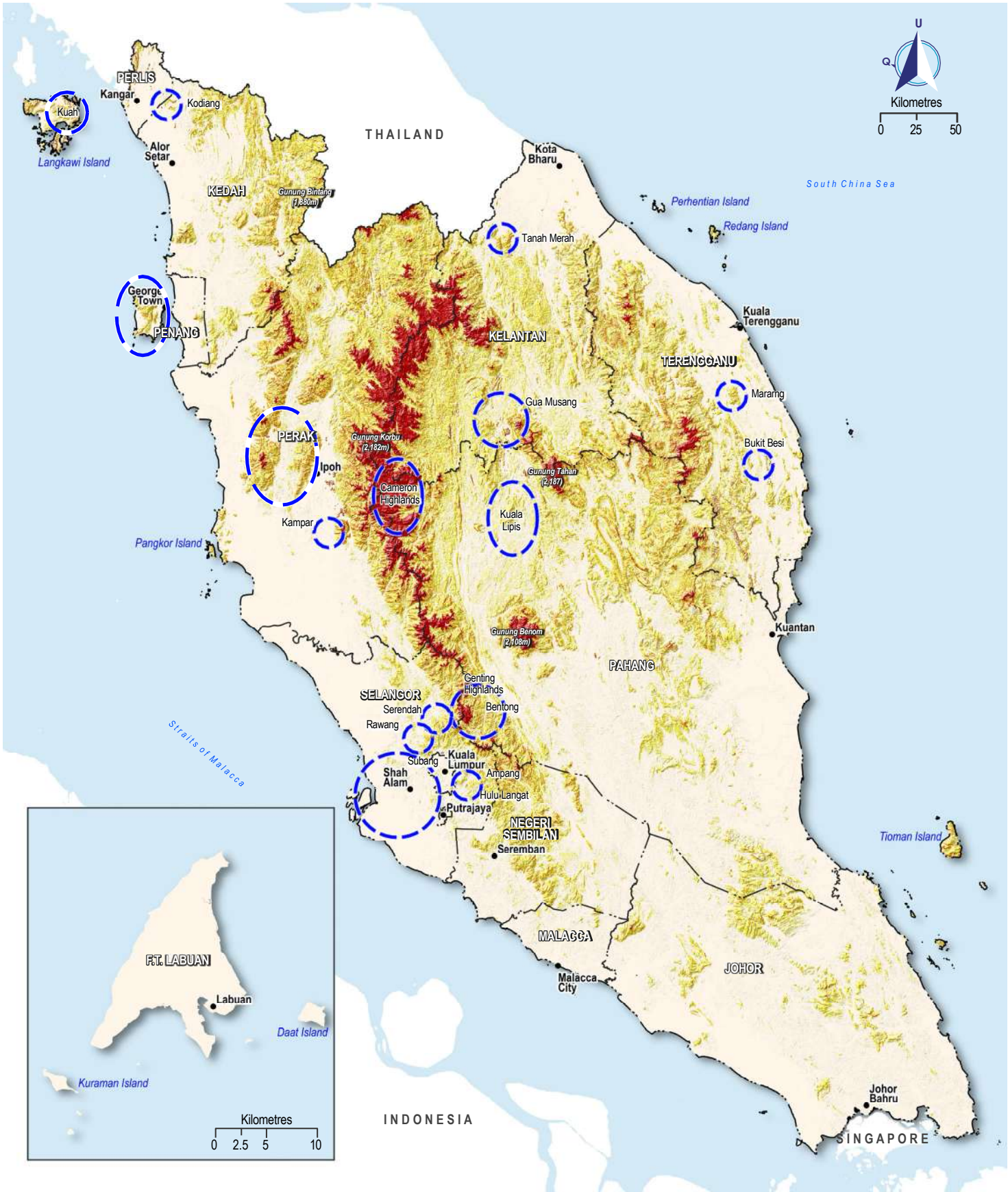
6. Impose compulsory requirement for planning permission application to restrict the opening of new agricultural land in areas with slope of more than 25 degrees.

7. Encourage local community involvement in landslide management through community-based landslide management approach.

8. Rehabilitate exposed and degraded slope areas through bioengineering and environmentally friendly methods.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Department of Minerals and Geosciences Malaysia (JMG) • Public Works Department • Local Authority	• Ministry of Works (KKR) • PLANMalaysia



MAP 5-4: HIGHLAND AND LANDSLIDE RISK AREAS IN PENINSULAR MALAYSIA AND F.T. OF LABUAN

Landslide Risk Areas

- Landslide Location
- Landslide Risk (Slope>25°)
- Highland(>1,000m)
- Low Risk

Others

- State Capital
- State Boundary

Source:

- National Slope Master Plan 2009-2030
- Shuttle Radar Topography Mission, 2018
- National Physical Plan 4, 2020

ACTION SR 1.5F

Avoid forest and peat fire risks through land use planning solutions

The intensity and frequency of forest fires are driven by natural factors during the dry season and by human activities such as open burning. Climate change due to the global climate crisis will cause prolonged droughts and increase the risk of forest fire especially in peatland areas.

Malaysia has a total of 2.56 million hectares of peatland area covering 7.74% of the country's land area (DOE, 2019). Peat soil is flammable because it contains a high content of organic matter that is easy to dry and burn during the dry season.

BRIEF FACTS

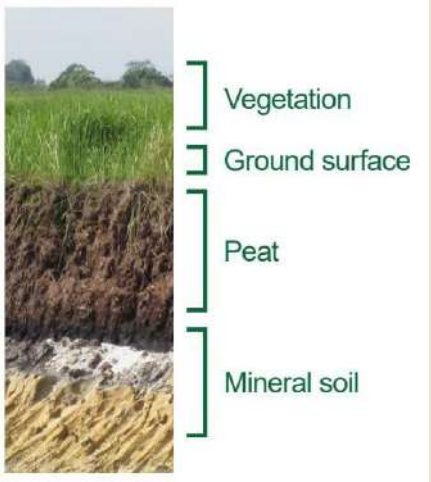
68,832
peat fire incidents from 2014 to July 2019 in Malaysia.

464
Number of peat fire hotspots from 2011 to July 2019.

Source: Fire and Rescue Department of Malaysia and Department of Environment, 2019

This risk is increased when peatland drying occurs through land use change, illegal land clearing and open burning. Forest and peat fires have negative implications on soil quality, water catchment areas, community income sources and biodiversity. Forest fires are also the cause of the local haze phenomenon that affects the health of the people. NPP4 emphasises integrated forest and peatland management to reduce fire risk and to increase community awareness of the fire hazard.

BRIEF FACTS



The peat soil layer consists of vegetation, surface soil, peat soil and mineral soil. Peat land plays an important role in the hydrological cycle, which acts as a 'giant sponge' and is able to absorb and accommodate large amount of peat water content. Among the initiatives to prevent and control peat fires are as follows:

- Construct clay dyke.
- Use piezometer to measure peat water pressure.
- Employ the use of drones and monitoring teams to monitor peat fires.
- Issue Fire Risk Weather Forecast (FDSP).

Source: Peatland Fire Prevention Program Book to Overcome Haze in Malaysia, Department of Environment, 2019

Measures to control forest and peatland fires through land use planning are:

1. Prepare a peat map to detail out the distribution and depth of peatland in each state. These information need to be included in development plans such as State Structure Plans and Local Plans. **Plan 5-5** showing Forest and Peatland Fire Risk Areas in Peninsular Malaysia and F.T. Labuan, which can be used as a reference for implementing this measure. The peatland mapping must be based on the categories outlined in the Planning Guidelines for Selangor Peatland Area (2018), namely:

   i. **Non-Disaster Risk Zone:** areas of peat soil with a thickness of less than 3 metres are allowed for development.

   ii. **Disaster Risk Zone:**
   - Areas of peat soil with a thickness exceeding 3 metres can be considered for development taking into account the potential impact of disasters, engineering solutions and the feasibility of the proposed development.
   - Areas of peat soil with a thickness of less than 3 metres but covering an area of more than 250 acres can be considered for development taking into account the potential for disaster, engineering solutions and the feasibility of the proposed development.

2. Prepare an Integrated Peat Swamp Forest Management Plan for each peat swamp forest in Malaysia for the purpose of conservation and sustainable management. Most of these areas have been gazetted as Permanent Forest Reserves (HSK) and some HSKs already have specific management plans such as the Kuala Langat Forest Reserve (North & South) in Selangor.

3. Provide infrastructure such as drainage barriers, tube wells, observation towers, reservoir ponds and water pipelines in locations where peat fires frequently occur to increase the water level in the soil and drainage. This helps underground and surface moisture and reduce peat fire risk.

4. Use the latest technology in the monitoring of forest fire and open burning. For example, drone technology can be used for fire monitoring and extinguishing work. While IoT sensors and smart applications can be employed for real-time monitoring.

5. Encourage community-based fire prevention programme through collaboration with local communities and leverage on traditional knowledge in forest fire management. This can also be an opportunity to develop green entrepreneurship such as nursery management, handicraft production and ecotourism.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Department of Minerals and Geosciences Malaysia (JMG) • Forestry Department of Peninsular Malaysia • State Forestry Department • State Authority	• PLANMalaysia@Negeri • Fire and Rescue Department of Malaysia • Department of Environment • Malaysian Meteorological Department • Local Authority

MAP 5-5: FOREST AND PEAT SOIL FIRE LOCATION IN PENINSULAR MALAYSIA AND F.T OF LABUAN

Fire Location

- Fire location
- Peat Soil
- Forest Area

Others

- State Capital
- State Boundary

Source:

- FIRMS, January - December, 2019
- National Physical Plan 4, 2020

ACTION SR 1.5G

Implement integrated planning and management of earthquake risk areas by involving community and stakeholders

An earthquake is tremor that occurs on the earth's surface due to the sudden release of energy from the earth's crust that produces seismic waves. In general, Malaysia is considered seismically stable and has a low earthquake risk. However, the probability of Malaysia experiencing small to large scale earthquakes is high in the future due to the country's position near the Pacific Ring of Fire. Nowadays, earthquakes occur only in areas that have been identified to have active fault lines such as in Kundasang, Ranau and Lahad Datu areas in Sabah as well as some areas in Sarawak and Peninsular Malaysia. In Peninsular Malaysia, there are several areas along the active fault line that are likely to experience small-scale earthquakes, namely in:

i. Manjung and Temenggor in Perak
ii. Lake Kenyir in Terengganu
iii. Bukit Tinggi and Janda Baik in Pahang
iv. Kuala Pilah in Negeri Sembilan

Measures to improve the planning and management of earthquake risk areas are as follows:

1. Make the Seismic Hazard Map 2019 by the Department of Minerals and Geosciences Malaysia and Malaysia National Annex to MS EN 1998-1: 2015, Eurocode 8: Design of Structures for Earthquake resistance-Part 1: General rules, seismic actions and rules for buildings by the Department of Standards Malaysia as references in development planning and design of earthquake resistant buildings and structures.

   The seismic hazard map identifies the zones that are expected to have hazard levels based on PGA (Peak Ground Acceleration) values (refer to **Plan 5-6**) and will be used in development planning and design of earthquake-resistant buildings throughout the country.

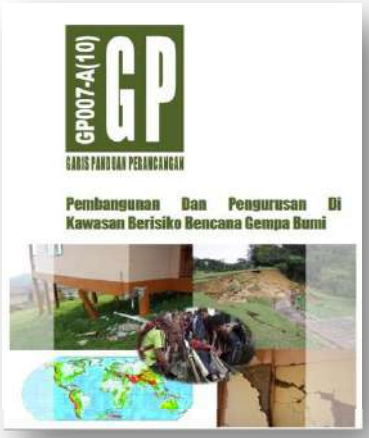
2. Generate Earthquake Risk Map

   This map should integrate land use zones, geological maps, earthquake fault line maps and slope risk maps, and need to be produced at the Local Plan (LP) level for earthquake risk areas.

Planning and management of earthquake risk areas will help prevent serious damage to existing buildings and protect lives. Location: Sichuan, China

3. Implement the Planning Guidelines for Development and Management of Earthquake Risk Areas 2018 and the Planning Guidelines for Disaster Resilient Cities 2019 published by PLANMalaysia.

   These guidelines should form the basis for development planning and design for areas with earthquake risk or located close to the active fault lines. For old structures and vulnerable settlement areas, improvement through retrofitting or modifications need to be carried to reduce the effect of earthquake on them.



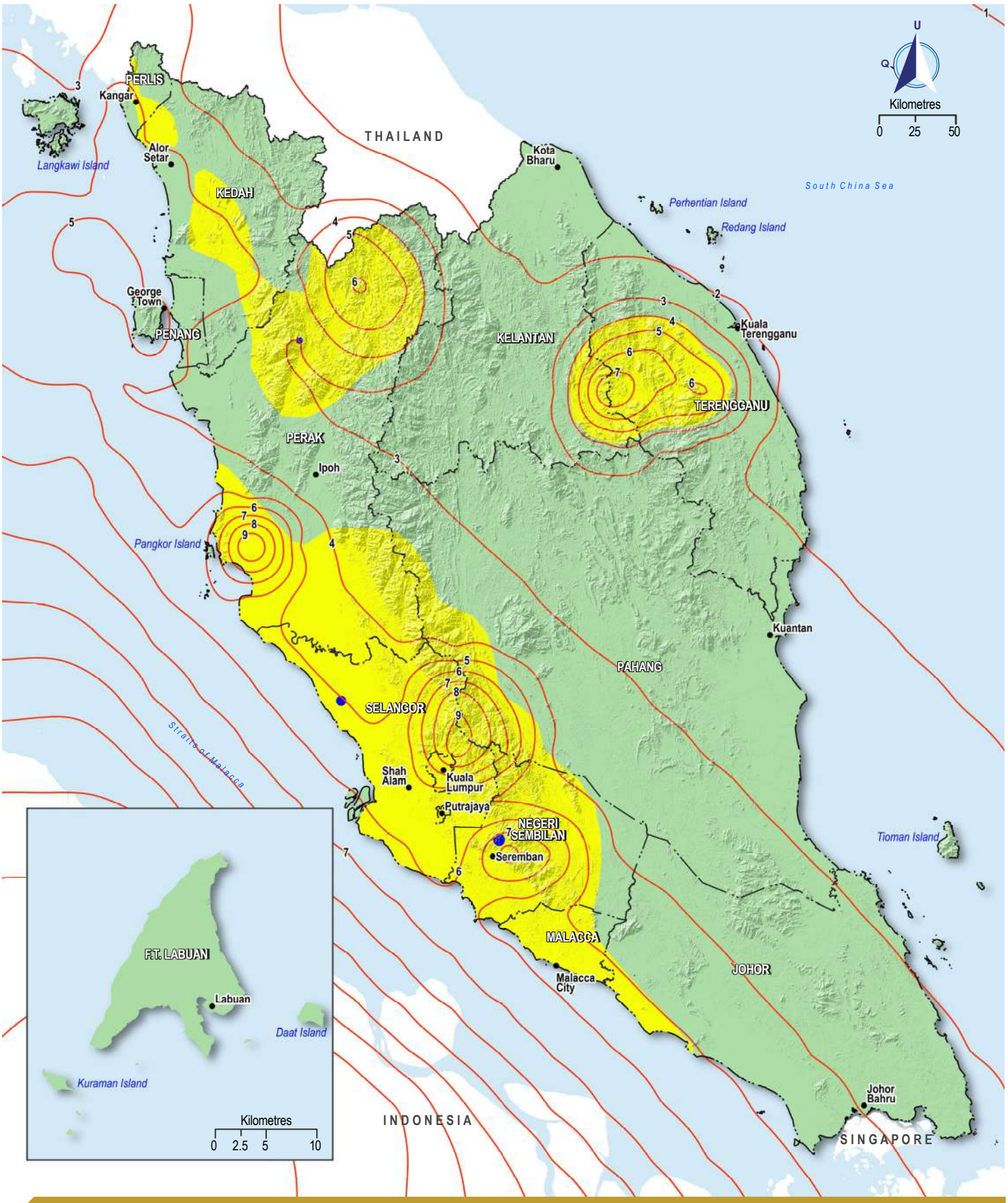
4. Implement earthquake-resilient disaster planning and management throughout the country

   Earthquake-resilient disaster management and planning for built-up areas and communities should be implemented nationwide based on the seismic hazard zone category and applied in all development planning and implementation of infrastructure works.

The application of relevant guidelines and good disaster management and planning will provide disaster protection to the community, especially in populated areas. Location: Japan

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Department of Minerals and Geosciences Malaysia (JMG) • PLANMalaysia@Negeri • Local Authority	• Malaysian Meteorological Department • National Disaster Management Agency (NADMA) • PLANMalaysia



MAP 5-6: SIESMIC DANGER ZONE FOR GEODISASTER MANAGEMENT IN PENINSULAR MALAYSIA AND F.T. OF LABUAN

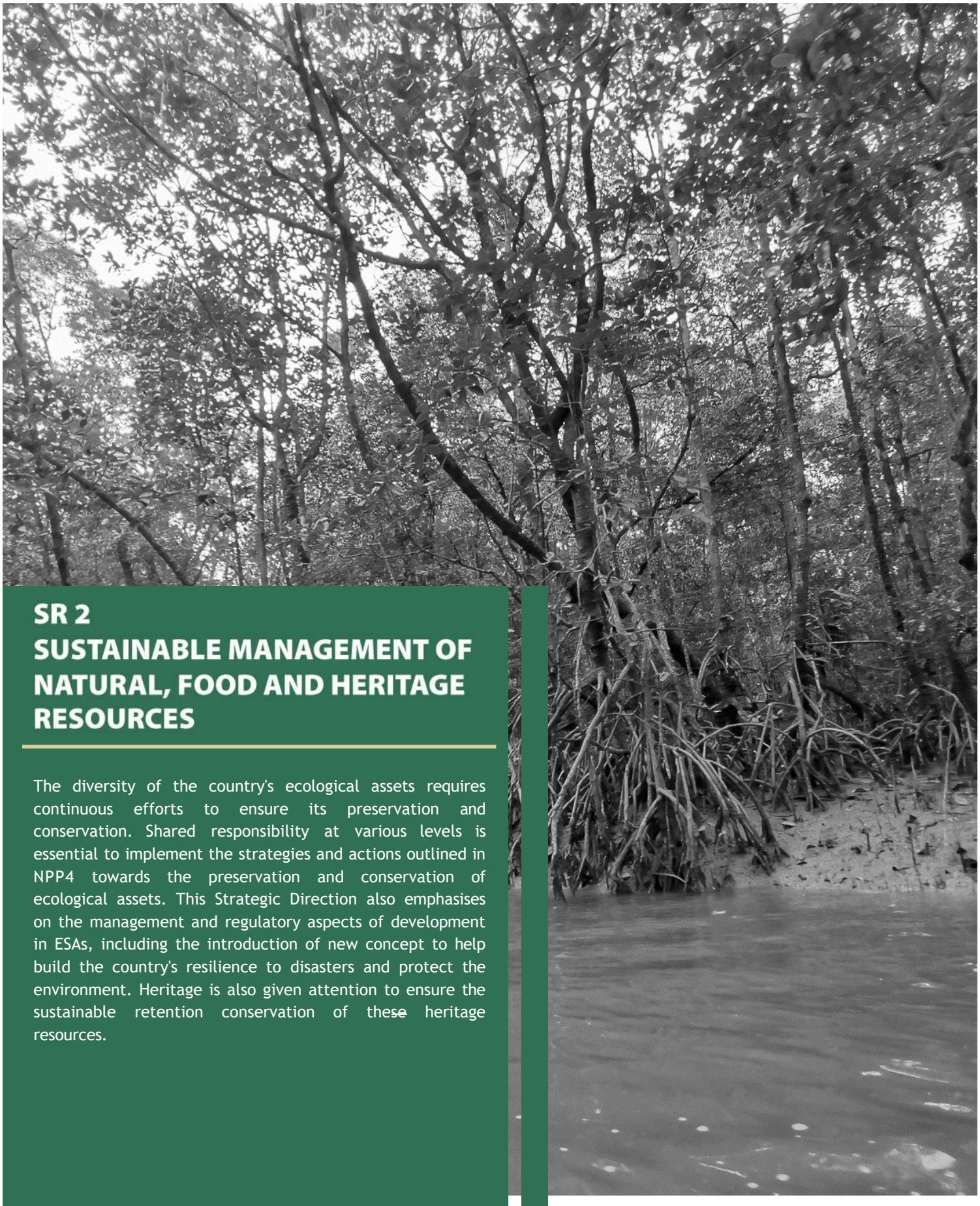
Code Zone (UBC)	PGA (%g)	(%)
2A	8 - 8.4	0.2
1	4 - 8	28.8
0	0 - 4	71.0

Others
- Fault Line
- State Capital
- State Boundary

Zone Uniform Code (UBC)	*Peak Ground Acceleration (PGA),g*
Zon 2A	8% - 10% (EC8 For DCM)
Zon 1	4% - 8% (EC8 For DCL)
Zon 0	0% - 4% (No EC8 Requirement in general)

Source:
- Department of Mineral and Geoscience Malaysia, 2019

Nota: *This leads to the adoption of three levels of absorving energy;*
Ductility Class High (DCH) - *Allows even higher level of ductility and are responsive strict and complicated designs demands.*
Ductility Class Medium (DCM) - *Allows high level of ductility and are responsive designs demands.*
Ductility Class Low (DCL) - *Does not require delayed ductility and resistance to seismic loading is achieved through the capacity of structure.*



SR 2
SUSTAINABLE MANAGEMENT OF NATURAL, FOOD AND HERITAGE RESOURCES

The diversity of the country's ecological assets requires continuous efforts to ensure its preservation and conservation. Shared responsibility at various levels is essential to implement the strategies and actions outlined in NPP4 towards the preservation and conservation of ecological assets. This Strategic Direction also emphasises on the management and regulatory aspects of development in ESAs, including the introduction of new concept to help build the country's resilience to disasters and protect the environment. Heritage is also given attention to ensure the sustainable retention conservation of ~~the~~se heritage resources.

Forest cover status and targets for Peninsular Malaysia

47.3%

Current forest cover of Peninsular Malaysia

Source: i-PLAN, 2020

43.5%

Current forest cover of Peninsular Malaysia

Source: Forestry Department of Peninsular Malaysia, 2019

50%

Forest cover target for Peninsular Malaysia by Year 2040

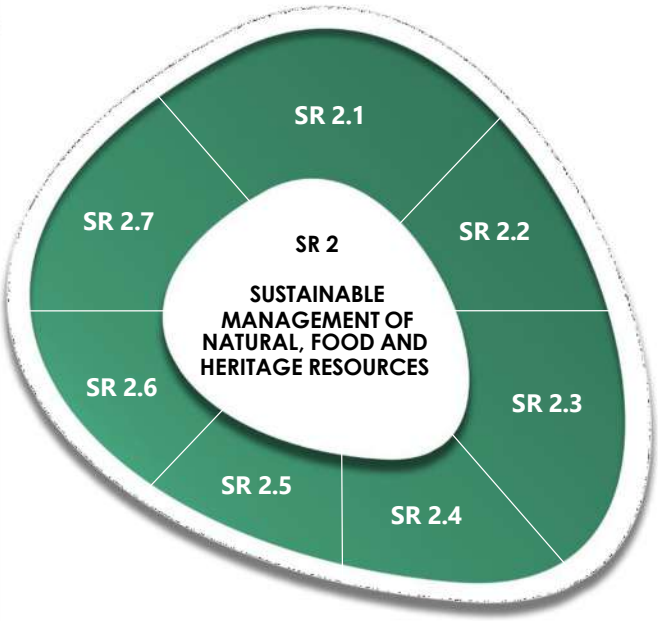
Note: For the purpose of setting the forest cover target for Peninsular Malaysia by 2040, the projection was based on the 2019 forest cover data provided by the Forestry Department of Peninsular Malaysia, which was 5,734,083 hectares (43.5%). This acreage refers to gazetted forest areas only.

4.812 million hectares

The current Permanent Forest Reserve (HSK) area in Peninsular Malaysia has reached 96% of the target

Source: Annual Report Forestry Department of Peninsular Malaysia, 2019

This Strategic Direction outlines the need for physical planning and development control in order to conserve the country's valuable resources. It aims at achieving balanced development through the preservation of diversity of ecological assets by developing sustainable management of mineral resources, strengthening food production areas and adding value to the cultural and natural heritage sites so that they continue to be preserved as national treasures. The country's commitment at the national and global levels is also focused in NPP4, especially in maintaining 50% of Malaysia's forested areas. Food security is also given emphasis in this Strategic Direction.



Strategic Direction SR 2

SUSTAINABLE MANAGEMENT OF NATURAL, FOOD AND HERITAGE RESOURCES

SR 2.1	Preserve and Conserving National Ecological Assets
SR 2.2	Manage and Regulate Development in Environmentally Sensitive Areas (ESAs)
SR 2.3	Ensure Sustainability of Water Resources
SR 2.4	Manage Geological Resources and Diversity
SR 2.5	Ensure National Food Security
SR 2.6	Strengthen the Preservation, Conservation and Protection of National Cultural and Natural Heritage Sites
SR 2.7	Ensure the Preservation and Protection of Cultural Heritage in Physical Planning and Development Control Process

STRATEGY
SR 2.1

PRESERVE AND CONSERVING NATIONAL ECOLOGICAL ASSETS

RELATED SDGs
SDG13 SDG15
SDG14

Malaysia is a country rich with valuable ecological assets, which consist of various terrestrial, coastal and marine ecosystems. In terms of spatial management, most of these assets have been gazetted as protected areas which include permanent forest reserves (HSK), wildlife reserves, marine parks, national parks, state parks and prohibited fishing areas. These ecological assets will continue to be preserved to ensure permanent supply of ecosystem services that are important for the well-being of the people and the economic development of the country. **Figures 5-13** and **5-14** show the importance of forest, marine and coastal areas in Peninsular Malaysia.

Figure 5-13: The importance of forest areas in Peninsular Malaysia

Royal Belum State Park, Perak covers about 117,500 hectares. The State Park also borders Bang Lang National Park, Thailand and Hala Bala Wildlife Sanctuary, Thailand.

80%

of the Central Forest Spine forest complex is a water catchment area and supply water to 23.3 million people.

Source: *Project Document: Improving Connectivity in the Central Forest Spine (CFS) Landscape (IC-CFS)*, 2017.

3 major forest landscapes

as the main habitat for tigers. The tiger population is estimated to be less than 200 in Peninsular Malaysia.

Source: Preliminary Study National Tiger Survey, 2020

83% greenhouse gases (GHG)

emissions have has been absorbed by forests in Malaysia with an estimated value of 264 million tonnes of GHG (2015).

Source: 3rd National Communication Report, 2018

RM 6.9 billion

the total contribution of the forestry and logging sector, which contributed 0.3% to Malaysia's GDP and an important source of revenue for states government in 2018.

Source: Economic Outlook Report 2020

Forests in Malaysia are home to 15,000 species of vascular plants, 742 species of birds, 242 species of amphibians, 567 species of reptiles, 449 species of freshwater fish, 306 species of mammals and 150,000 species of invertebrates.

Source: Malaysia CBD Sixth National Report, 2019

Figure 5-14: The importance of marine and coastal areas in Peninsular Malaysia

912,300 hectares

total size of Important Marine Mammal Area

Source: Malaysia CBD Sixth National Report ,2019

4,006 km²

estimated coral reef coverage area

Source: Marine Parks and Resource Management Division, Department of Fisheries Malaysia, 2015

612

number of coral reef species that have been identified, which is 77% of the total number of reef species in the world

Source: Marine Parks and Resource Management Division, Department of Fisheries Malaysia, 2015

84,449 people

registered fishermen in Peninsular Malaysia and F.T. Labuan which depend-on marine produce in the fisheries sector

Source: Marine Parks and Resource Management Division, Department of Fisheries Malaysia, 2019

RM 8.7 billion

Total Economic Value (TEV) of Marine Parks in Peninsular Malaysia

Source: Marine Parks and Resource Management Division, Department of Fisheries Malaysia, 2019

RM 56.25 million

the value of coastal protection offered by coral reefs and mangrove swamps on islands against geohazards

Source: Marine Parks and Resource Management Division, Department of Fisheries Malaysia, 2019

Coral reefs protect coastal areas from strong waves and provide habitats for various species of marine life.

ACTION SR 2.1A

Increase forest cover to reach the target of up to 50% in Peninsular Malaysia

Most of the ecological assets in Peninsular Malaysia are concentrated in inland and coastal forest areas that are the habitats for various flora and fauna. They are also important providers of ecosystem services. Malaysia is committed to maintaining 50% of its land area as forest, in line with the Earth Summit agreement signed in Rio de Janeiro in 1992.

This Action (SR 2.1A) uses forest data as provided by the Forest Department of Peninsular Malaysia (JPSM). As of 2019, data from JPSM indicates that forest made up 55.1% of Malaysia's total land area. However, in Peninsular Malaysia only 43.5% (5,734,083 hectares) of the land area were covered by forest compared to the states of Sabah and Sarawak where forest covered more than 50% of the states total land area (refer to **Table 5-1**). Based on JPSM data, NPP4 targets that by 2040, forest will make up 50% (6.59 million hectares) of Peninsular Malaysia total land area. **Figure 5-15** shows a breakdown of forest categories in more detail.

Several measures have been outlined to achieve the long-term target of 50% forest cover in Peninsular Malaysia. The achievement of this target is important for:

i. Enhancing regional cooperation with the states of Sabah and Sarawak in forest conservation;
ii. Leveraging natural climate solutions for carbon sequestration and ecosystem-based adaptation (EbA) to deal with floods, sea level rise and droughts; and
iii. Ensuring the supply of ecosystem services from natural forests.

If this target is achieved and the states of Sabah and Sarawak also maintain their existing forest cover, Malaysia, as a country, will have almost 58% of its total land area being covered by forest. Based on current data, to achieve the 50% forest cover target will require an additional 856 thousand hectares of forest area in Peninsular Malaysia.

BRIEF FACTS

Forests are no longer considered only as a source of timber production for the socio-economic development of the country. In fact, forest resource protection is becoming more important in the preservation of biological diversity and environmental stability, as well as in cultural preservation of the society. Therefore, new development with regard to water and food security, climate change, environmental stability and living standard improvement must be taken into account in the formulation of forestry policies and laws in Malaysia.

In this context, the formulation of the Peninsular Malaysia Forestry Policy will cover aspects of sustainable forest management, conservation and protection of biodiversity and forest ecosystem services, mitigation and adaptation of the effects of climate change, strengthening research and development and information sharing.

Source: Malaysian Forestry Policy, 2021

Table 5-1: Current and targetted forest areas in Malaysia

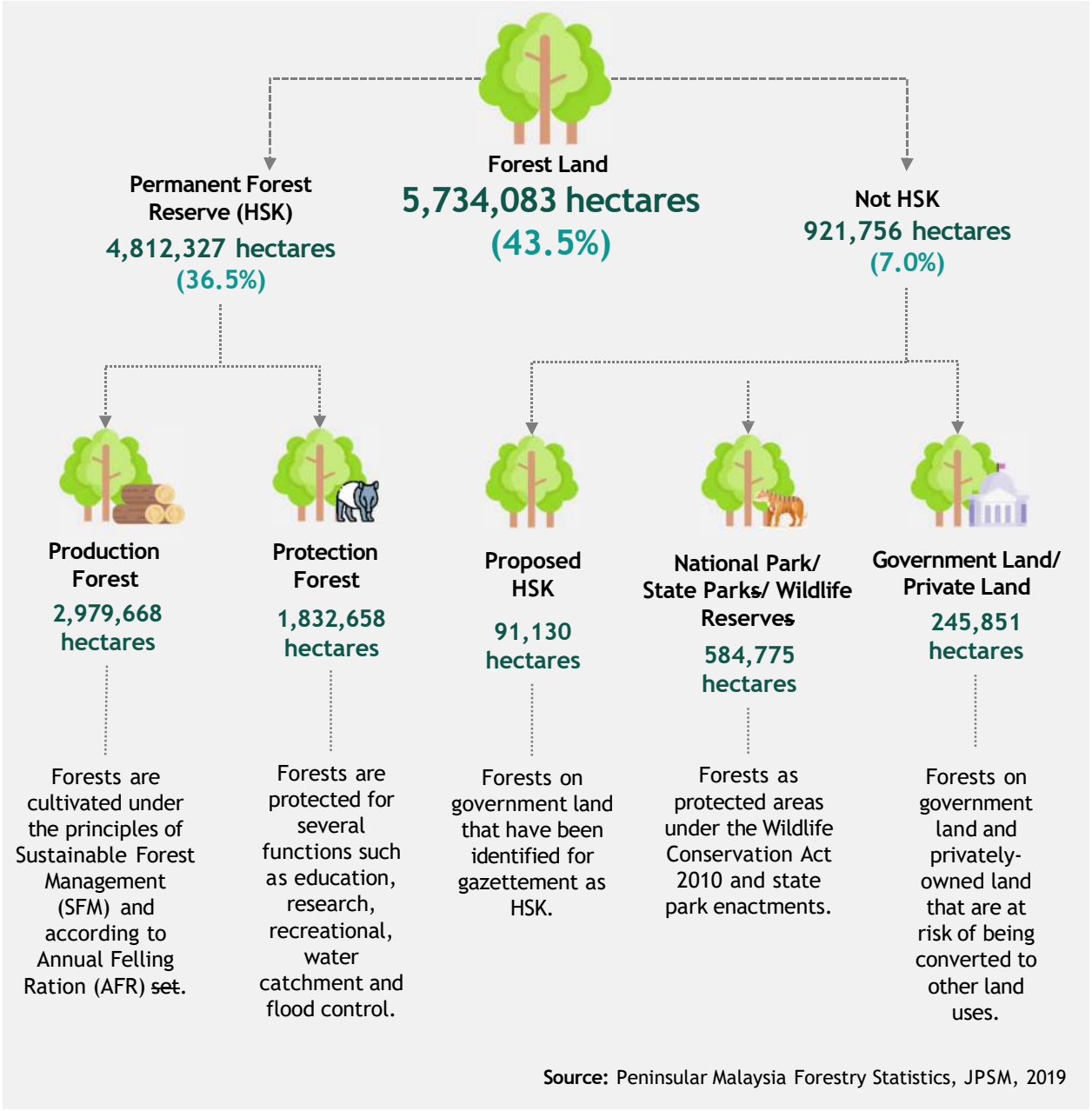
Area	Peninsular Malaysia	Sabah	Sarawak	Total
Current				
Total land area (hectares)	13,181,197 [1]	7,431,050	12,397,311	**33,009,558**
Forest area (hectares)	5,734,083 [2]	4,435,990 [3]	8,034,000 [3]	**18,204,072**
Percentage (%)	43.5%	59.7%	64.8%	**55.1%**
NPP4 target (if current forest areas in Sabah & Sarawak are maintained) by 2040				
Total land area (hectares)	13,181,197 [1]	7,431,050	12,397,311	**33,009,558**
Forest area (hectares)	6,590,599 [4]	4,435,990	8,034,000	**19,060,589**
Percentage of land area (%)	50.0% [4]	59.7% [4]	64.8% [4]	**57.7%**

Source:
1) I-PLAN, PLANMalaysia, 2018
2) Forestry Statistics of Peninsular Malaysia, JPSM, 2019
3) Ministry of Energy and Natural Resources, 2019

In Peninsular Malaysia, only three (3) states have forest areas exceeding 50% of the state land area, namely Kelantan, Pahang and Terengganu. Of the total forest area in Peninsular Malaysia, 83.9% (4.8 million hectares) are gazetted as Permanent Forest Reserves (HSK) under the National Forestry Act 1984 and fall under the management of the Forestry Department of Peninsular Malaysia (refer to **Figure 5-15**). Forest areas and protected areas in Peninsular Malaysia and F.T. Labuan are as in **Plan 5-7**.

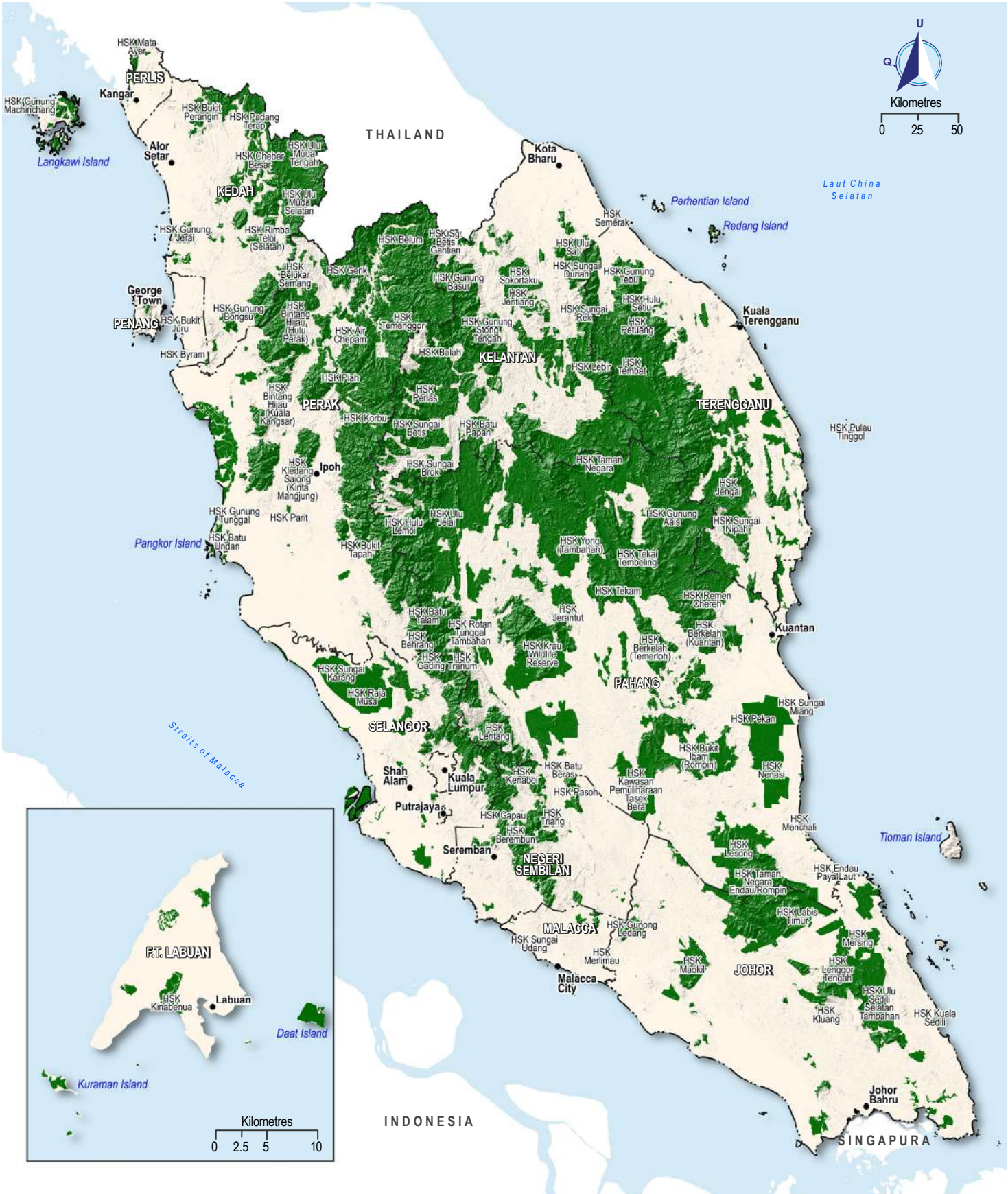
Setiu Wetlands State Park, Terengganu

Figure 5-15: Forest area in Peninsular Malaysia in 2019



Source: Peninsular Malaysia Forestry Statistics, JPSM, 2019

Royal Belum State Park, Perak



MAP 5-7: FOREST RESERVE IN PENINSULAR MALAYSIA AND F.T OF LABUAN

Forest Reserve

- Forest Reserve

Others

- State Capital
- State Boundary

Forest Reserve Area by State

Perlis State	10,628.30 hec	Pahang State	1,550,687.14 hec
Kedah State	341,976.00 hec	Selangor State	250,207.39 hec
Penang State	5,100.93 hec	F.T. of Kuala Lumpur State	68.27 hec
Perak State	988,591.03 hec	Negeri Sembilan State	155,492.02 hec
Kelantan State	629,775.13 hec	Malacca State	5,199.49 hec
Terengganu State	540,308.80 hec	Johor State	334,292.46 hec

Note: Forest area for F.T. Labuan is 691.67 hec as per the existing land use plan year 2018 (Plan 2-2)

Source:

- Peninsular Malaysia Forestry Department, 2018
- Labuan Development Blueprint, 2030

To achieve the target of 50% forest cover for Peninsular Malaysia is a major challenge that requires the long-term commitment and cooperation from all the stakeholders. At the same time NPP4 proposes the following measures to be implemented in order to increase forest cover in Peninsular Malaysia:

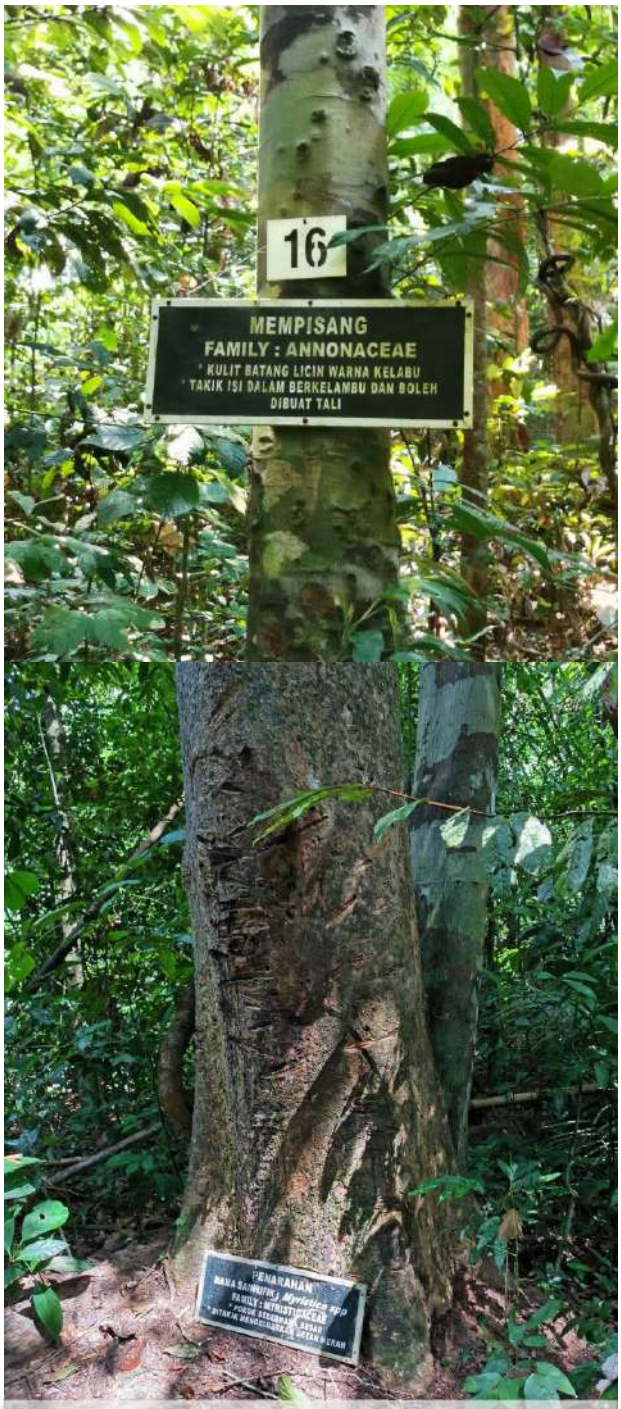
1. Accelerate the process of gazetting new proposed HSK that have been identified in the states of Johor, Kedah, Pahang, Perak, Perlis, Penang, Terengganu and Selangor.

2. Prohibit the degazettement of HSK. However, if necessary, application for HSK degazettement must go through a special HSK public hearing, in addition to the public hearing for change of LP land use zoning. This special public hearing process is applicable to all states and its implementation will require the approval of the State Authorities (PBN). It will also necessitate amendments to the National Forestry Act, 1984 and the Forestry Enactment at the state level.

3. Replace HSK which have been degazetted with forests of equivalent size, biodiversity value, and ecosystem services. At the same time, HSK degazettement process must be made stricter in all states to prevent HSK degazettement.

4. Gazette other endangered terrestrial habitats especially mangrove swamp forests and peat swamp forests with Government Land status. These areas need to be clearly identified and mapped in the SP and LP.

5. Intensify the conservation and replanting of trees along the coast as a key measure in addressing coastal erosion, geohazard risks and climate adaptation.



Among the tree species found in Royal Belum State Park, Perak

6. Identify and rehabilitate infertile areas, agricultural areas with expired lease and idle areas into natural forests. Under the concept of agroforestry, the forests can be developed as community forests where the local communities may carry out farming activities in the forests to earn income. The forests, in turn, can be turned into ecotourism attractions to promote best agricultural practices and biodiversity.

7. Implement the Tree Preservation Order (TPO) in accordance with the provisions of Part VA, Act 172, which also covers preservation of trees in recreational parks. This provides the potential of creating urban forests to form parts of the network under the **BiodiverCity** concept.

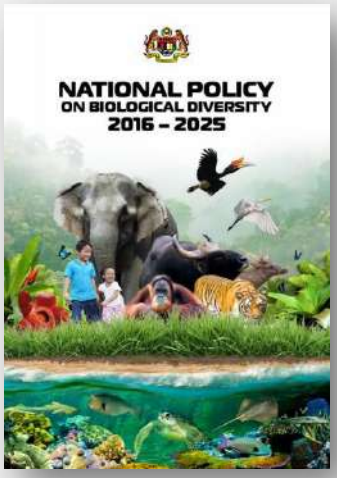
8. Encourage the Local Authority (LA) to establish the mechanism to increase the number of urban forests that are connected to other green networks including river reserves and other public parks as park connectors (refer to **Action SR 2.1B**). The network of green strips should be considered as part of the land use of forest areas.

9. Establish and implement immediately a mechanism to provide fiscal incentives to states that maintain or increase their forest areas.

The **BiodiverCity** concept centres on the use of green landscape in urban areas to support and develop the sustainability of important habitats. Biodiversity conservation is also embedded in the New Urban Agenda (NUA).

New Urban Agenda: Article 13 (h) - Protect, conserve, restore and promote their ecosystems, water, natural habitats and biodiversity, minimise their environmental impact and change to sustainable consumption and production patterns

The emphasis on the conservation of green landscape in urban areas is also in line with the goals of the National Biodiversity Policy 2016-2025.



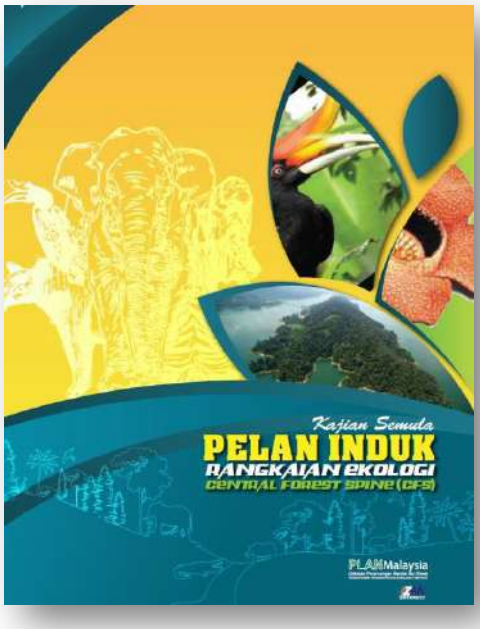
AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Forestry Department of Peninsular Malaysia • State Forestry Department • State Authority • Local Authority	• Ministry of Energy and Natural Resources (KeTSA) • Department of Irrigation and Drainage • State Land and Mineral Office

ACTION KD 2.1B

Maintaining the connectivity of forest landscape through the preservation of ecological networks

The main purpose of maintaining the continuity of the forest landscape is to ensure the survival of wildlife. This is important to preserve ecosystem functions and increase the resilience of natural habitats. Forest landscape connectivity also strengthens the resilience of wildlife and plant populations to the effects of environmental change.



The review of the **Central Forest Spine Ecological Corridors (CFS) Master Plan 2020** aims to ensure that the forest network of Peninsular Malaysia and the country's biodiversity will continue to be feasibly and effectively preserved. The CFS 2020 area includes coastal forests to further enhance the connectivity of the CFS area and its surroundings. This study has identified **37 ecological corridors** for the purpose of maintaining the connectivity of the forest landscape.

To date, there have been many efforts by the government and stakeholders to make the Central Forest Spine initiative a success, among them are:

i. **Gazettement of ~~a~~ new Permanent Forest Reserves**
Bukit Saiong Forest Reserve (Kedah), HSK Ibam - HSK Kedondong - HSK Pekan - HSK Nenasi (Pahang) and HSK Amanjaya (Perak)

ii. **Construction of three (3) wildlife crossings by the Public Works Department (JKR))**
1) D-PL2 Taman Negara - HSK Tembat, Ulu Terengganu, 2) C-PL1 HSK Tanum - Sg. Yu, 3) A-PL1 HS Temengor - Royal Belum State Park and A-PL3 Baling - Gerik Highway

iii. **Safe Wildlife Crossing Initiative by PERHILITAN**
Construction of signage, solar amber light, vehicle speed limit control and electric fencing to reduce the risk of human-wildlife conflict and 'roadkill'.

iv. **Establishment of my-CFS**
A coalition of environmental NGOs in Malaysia that coordinate activities and leverage on joint ventures to assist in the implementation of CFS.

v. **Involvement of private stakeholders**
Yayasan Hasanah has channeled financial resources to carry out various communication and public awareness activities, and database set up to assist in the implementation of CFS.

The Central Forest Spine initiative is also being translated at various stages of development plans such as SP and LP. In the Selangor, the Hulu Selangor District Local Plan 2025 and the Selangor State Structure Plan 2035 have taken this initiative into account in creating development plans that emphasise the continuity of the forest landscape (refer to Box 5-13). Selangor has also prepared the State's CFS management plan, which is an action that should be emulated by other states in Peninsular Malaysia and F.T. Labuan (refer to Box 5-12).

Box 5-12: Penyediaan Rancangan Pengurusan *Central Forest Spine* Negeri Selangor 2020-2029.

A management plan that focuses on the preservation of the CFS ecological corridor in the State of Selangor through four (4) Thrusts; Land Use, Management, Biodiversity and Public Awareness & Education. The preparation of this action plans had involved various stakeholders.

Box 5-13: Implementation of CFS ecological network conservation in development plans

LOCAL LEVEL

Central Forest Spine in Selangor

Source: Selangor State Structure Plan 2035

Hulu Selangor District Local Plan 2025 (RTHS 2025)

Aims to connect the corridor between HSK Hulu Selangor, Bukit Belata, Bukit Tunggal and Bukit Tarek through the Hulu Selangor CFS Plan

STATE LEVEL

Selangor State Structure Plan 2035 (SPNS 2035)

Emphasise the importance of forming a network of wildlife pathways systems for HSK areas in Selangor that are not part of the CFS including:

i. Bukit Kutu
ii. Taman Rimba Templer
iii. Bukit Melawati
iv. Klang Gate

BRIEF FACTS

Review of the Central Forest Spine Ecological Corridors Master Plan 2020

The review began in 2019 and is expected to be completed in 2021. Among others, the review produces a plan that contains improved strategies and new proposed corridors. This plan should be read together with NPP4's **Action SR 2.1B**.

Measures to ensure the continuity of the forest landscape are:

1. Preserve the connectivity of critical CFS ecological networks;

   There are endangered CFS ecological networks that require conservation efforts due to changes in existing land uses, increase in agricultural areas, and forests fragmentation due to agricultural activities or infrastructure (refer to **Plan 5-8**).

   The following development control and conservation works should be undertaken to reinforce the function and role of the ecological corridors:

   i. Adopt the CFS 2020 Ecological Network Master Plan Review as the main guideline in the planning and control of development in forest areas.

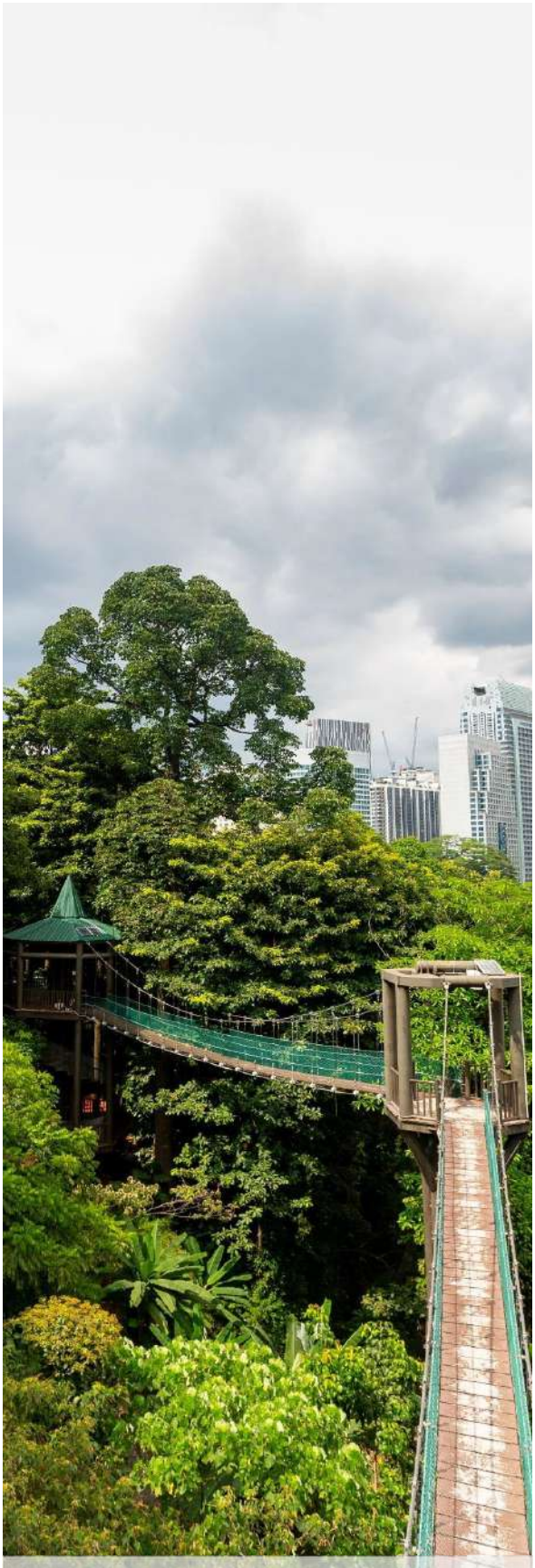
   ii. Maintain existing permanent forest reserves (HSK) and prohibit their degazettement.

   iii. Identify degraded HSK around the CFS ecological corridors, and undertake forest conservation and reforestation works.

   iv. Gazette the existing forests on Government Land as HSK of Protection Class and ensure that these HSK are maintained in the planning at the SP and LP level.

   v. Prepare Special Area Plans (SAP) for ecologically endangered network areas.

   vi. Implement best management practices for private-owned land such as providing green corridors in agricultural farms and adopting the concept of agroforestry in agricultural activities.



Kuala Lumpur Eco-Forest Park located in the Bukit Nanas Forest Reserve, Kuala Lumpur.

vii. Design linear infrastructure such as roads, railways and power lines in an environmentally friendly manner with the provision of viaducts, electric fences, signage, speed breakers and solar lighting. Existing infrastructure within the CFS ecological network need to be made friendlier to the CFS ecosystem through modification and retrofitting such as constructing.

viii. Leverage collaboration with stakeholders such as the locals, plantation operators and the private sector within the CFS area to conduct conservation efforts together. The involvement of international organisations, academics and non-governmental organisations should also be encouraged.

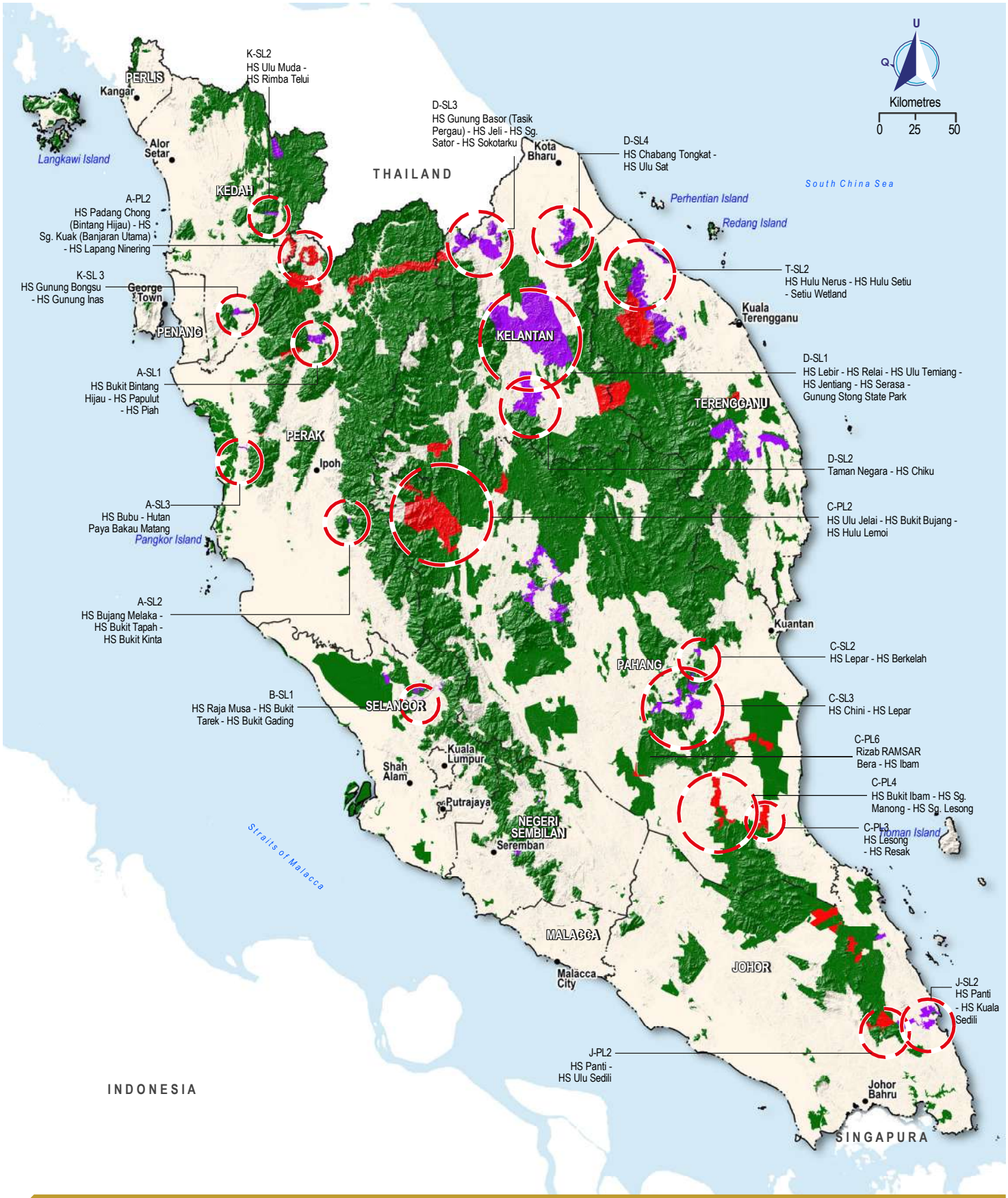
2. Identify new ecological networks.

Apart from the CFS ecological network, there are other ecological areas in Peninsular Malaysia and F.T. Labuan with the potential to contribute to the continuity of the forest landscape. Proposed new ecological networks that can be considered include :

i. Agricultural areas such as oil palm plantations, rubber, horticultural crops and fruit orchards that are located in between deforested fragmented or isolated forest complexes can be proposed as new ecological corridors to connect the forest habitats and the wildlife habitats. Private landowners for these areas can take the initiative to carry out appropriate crops. In South Africa, private landowners are given incentives for planting certain types of crops or adopting certain land uses to create a more effective biodiversity protection (refer **Box 5-14**).

ii. Ecological corridors for small animals such as birds and insects can be created within the river buffer zone by creating habitat for flora and fauna through the planting of appropriate trees. This buffer zone needs to be gazetted under the National Land Code 1965 to prevent land use change.

The river buffer zone has the potential to be a corridor and habitat for small animals. Location: Tanjung Rambutan, Perak.



MAP 5-8: THREATENED CENTRAL FOREST SPINE (CFS) ECOLOGICAL CORRIDOR IN PENINSULAR MALAYSIA

Link Category
- Primary Link (PL)
- Secondary Link (SL)

Natural Resources
- Threatened CFS Ecological Link
- Forest Reserve

Others
- State Capital
- State Boundary

Source:
- Peninsular Malaysia Forestry Department, 2018
- CFS Ecological Link Masterplan , 2020

Box 5-14: Case Study: Initiatives to increase protected areas for biodiversity conservation in South Africa

Most (up to 80%) of the land in South Africa is privately owned. They include areas that have been identified as having ecological and biodiversity importance that need to be protected. However, the government had not been fully successful in the implementation of the Protected Areas Act 2003 due to several constraints such as inconsistent legal and institutional frameworks, changes in procedures and financial constraints.

Based on **Figure 5-16**, protected areas in South Africa (2016) consist of:

- Private land (35%)
- Government land (60%)
- Community land (5%)

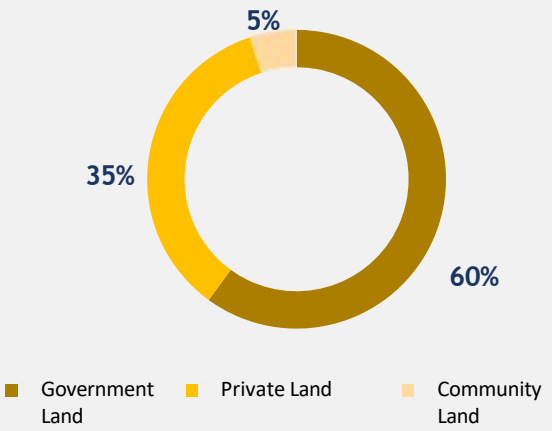


Figure 5-16: Ownership of protected areas in South Africa, 2016

Since some of areas that need to be protected are privately owned, the South African government has taken a community-based management approach. With the help of the South African National Biodiversity Institute (SANBI), the National Biodiversity Stewardship Initiative was developed. Through this initiative, land use management plans to determine the location and extent of these privately-owned protected areas were developed at the national and state levels.

Under the initiative, private landowners receive incentives from the government to preserve their land for a period of 30 to 99 years and the land is recognised as a protected area under the Protected Areas Act 2003 or the Biodiversity Act 10 2004. The financial resources for this initiative are garnered from coalition of government, non-governmental organisations; NGOs (e.g. BirdLife International), private parties and landowners.

This initiative lays down a number of conditions for the use and management of land through valid contracts between landowners and the government. The more conditions imposed on landowners, the more benefits they will receive.

Incentives offered to landowners

- Area biodiversity management advisory services including pest control and fire control
- Financial rewards
- Income tax and land tax exemptions.

Bird habitat area

Source: South African National Biodiversity Institute, 2015 & Centre for International Forestry Research, 2001

3. Strengthen the network of green areas and urban parks in urban areas

Each major city needs to create and conserve new urban parks as well as strengthen the network of green areas so that they can be connected to nearby forest habitats. This will help in creating urban habitats and making biodiversity preservation in urban areas more effective. This measure focusses on urban parks under the supervision of the Local Authority in order to support biodiversity.

i. Green, Blue and Brown Corridors Concept

The concept of Green, Blue and Brown Corridors needs to be introduced to create a more effective network of green areas and urban parks in urban areas. Most cities have land gazetted as recreational parks, botanical gardens and recreational fields. These open spaces and parks can be connected to nearby forest areas through:

- Green corridor (tree planting),
- Blue corridors (tributaries, ditches, bodies of water); or
- Brown corridors (infrastructure such as bridges, roads or railways).

The proposed implementation of the Green, Blue and Brown Corridors concept in each city is expected to create new ecological networks that will function as connectors between the urban areas, the suburbs and the nearby CFS forest complex. The major habitat areas in the CFS forest complex can serve as the genetic sources and areas of distribution of wildlife and vegetation. **Box 5-15** shows the landscape connectivity in the Kuala Kubu Bharu urban area which is a secondary network in supporting CFS connectivity.

This is in line with the actions outlined in the National Biodiversity Policy 2016-2025 and also emphasized in the New Urban Agenda (NUA) under UNHabitat.

NATIONAL BIOLOGICAL DIVESPITY POLICY 2016-2025	
Action 6.5	Encourage the conservation of green areas in the city in order to attract more diversity of animals and plants.

Green corridor; tree planting

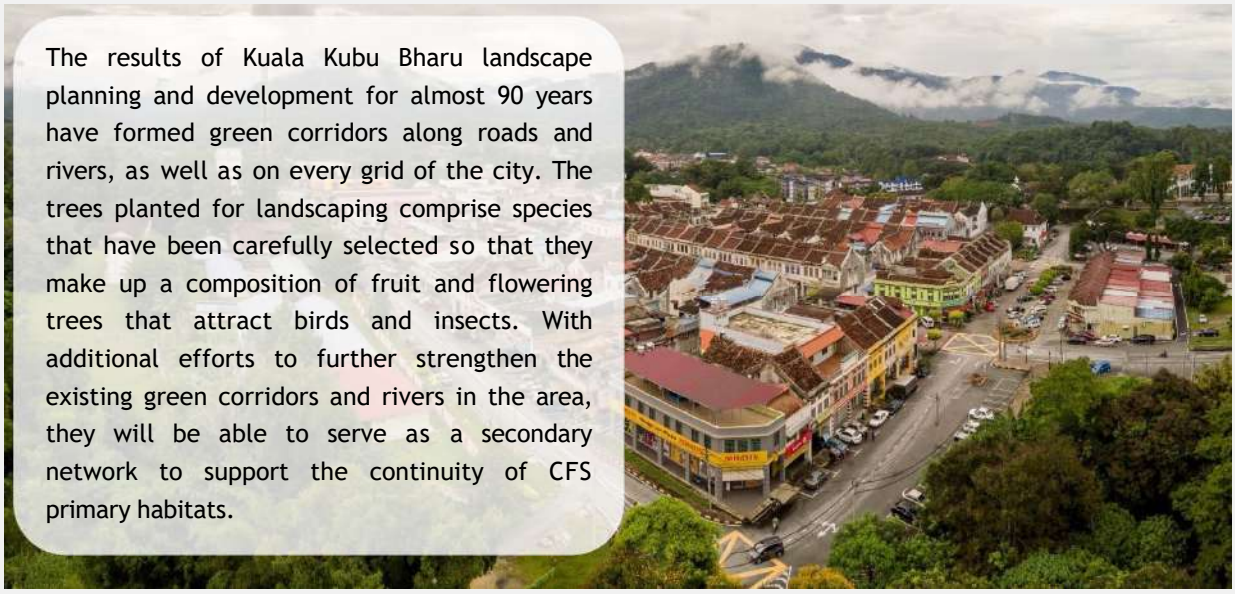
Blue corridor; tributaries, ditches, bodies of water

Brown corridor; bridge, road and railway

Box 5-15: Case Study: Bandar Kuala Kubu Bharu, Selangor

Creating green corridors

The results of Kuala Kubu Bharu landscape planning and development for almost 90 years have formed green corridors along roads and rivers, as well as on every grid of the city. The trees planted for landscaping comprise species that have been carefully selected so that they make up a composition of fruit and flowering trees that attract birds and insects. With additional efforts to further strengthen the existing green corridors and rivers in the area, they will be able to serve as a secondary network to support the continuity of CFS primary habitats.



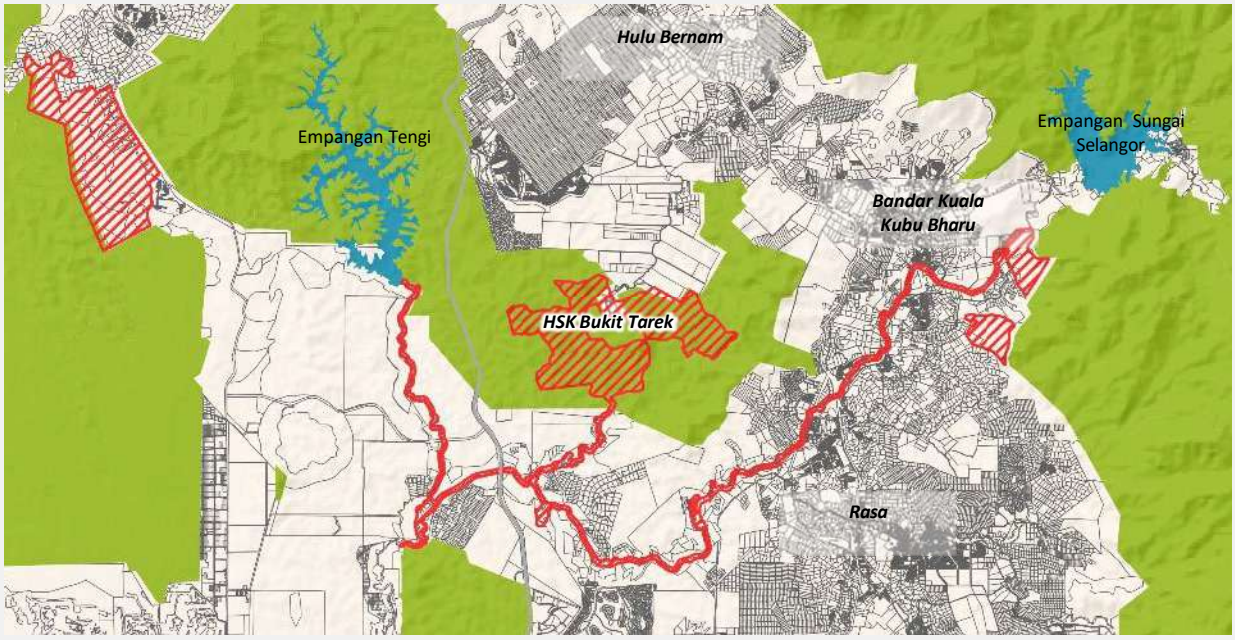


Figure 5-17: The location of Kuala Kubu Bharu Town which is surrounded by Permanent Forest Reserves

AGENCIES INVOLVED

Main Agencies

- Forestry Department of Peninsular Malaysia
- State Forestry Department
- Department of Wildlife and National Parks (PERHILITAN) Peninsular Malaysia
- State Authority
- PLANMalaysia@Negeri
- Local Authority

Supporting Agencies

- Ministry of Energy and Natural Resources (KeTSA)
- National Landscape Department
- Department of Irrigation and Drainage
- Public Works Department
- PLANMalaysia

ACTION SR 2.1C

Intensify the implementation of the National REDD Plus strategy

REDD Plus refers to reducing greenhouse gas (GHG) emissions from deforestation activities and forest degradation, as well as the role of conservation, sustainable forest management and increasing forest carbon stocks in developing countries. It becomes an important guideline because forests play a role in tackling climate change. Forests are also important short- and medium-term solutions for GHG reduction.

Thus, the REDD Plus mechanism was developed under the United Nations Framework Convention on Climate Change (UNFCCC) aimed at providing incentives to developing countries to protect, conserve and manage forests sustainably. Malaysia, a party to UNFCCC, had formulated its National REDD Plus strategy in 2017.

The three (3) main objectives of the National REDD Plus strategy are:

i. To promote consistency and synergies in the implementation of climate change, forest and biodiversity related policies between federal and state levels;
ii. To measure, report and verify (MRV) REDD Plus results and as part of efforts to achieve the Nationally Determined Contribution (NDC); and
iii. To develop a sustainable financing mechanism for REDD Plus implementation.

Source: Handbook of REDD Plus Implementation in Malaysia, KeTSA, 2020

Table 5-2: National REDD Plus strategy targets by 2025

National REDD Plus strategy targets	
1. Reduction of carbon dioxide (CO_2) emissions by 15 to 25 thousand tonnes per year between 2016 to 2025	
2. Consistency and synergies in the implementation of climate change, forest and biodiversity related policies between the Federal and State levels • The level of public awareness on the importance of biodiversity has been doubled compared to 2016 level. • At least 500,000 youth and children are participating in nature-based activities each year.	4. Reduction of emissions from degraded forests • 20%, as compared with 2020 level) of all degraded vulnerable ecosystems identified are under rehabilitation programmes. • Support the implementation of the National Peatland Actions Plan in conserving 10,000 hectares of degraded peat swamp forests.
3. Sustainable management of forest • 100% of all timber and timber products are managed sustainably and certified under schemes such as MTCS, FSC and others. • Perverse subsidies in the agriculture and forestry sector have been identified and rationalised.	5. Conservation of forest carbon stocks* • 20% of the country's land surface and inland waters are conserved as protected areas or other effective area-based conservation measures. • The number/size of community conserved areas has doubled compared to the 2016 level. • 10 primary ecological corridors under the CFS initiative have been fully implemented

Note: * refers the National Biodiversity Policy 2016-2025 targets.

Source: National REDD Plus Strategy Report, 2017 & REDD Plus Implementation Handbook in Malaysia, KeTSA, 2020

The measures for implementation are:

1. Implement the REDD Plus Finance Framework (RFF) which consists of:

   i. The Forest Conservation Certificate (FCC) is a non-market carbon approach and is an incentive for forest managers or owners to be given recognition in the form of certification for initiatives that contribute to forest conservation. The FCC is applicable internationally and locally.

   ii. Forest Carbon Offset (FCO) is a carbon market approach that allows the offset of carbon emissions of an activity with carbon uptake by forests. Currently, FCO is only open to domestic investors.

2. Strengthen the governance of REDD Plus as a regulatory body to ensure the rate of GHG emission reduction and transparency of activities at the local level (state or private agencies).

   The REDD Plus unit reports on carbon reduction achievements as a result of data findings from various agencies and ministries at the national level. Under this implementation measure, it is proposed that data verification to be conducted at the local level. This data verification is an important part of REDD Plus strategy to measure, report and verify (MRV).

3. Review policies and Acts such as the National Climate Change Policy and the Forestry Act to support REDD Plus strategy.

   The review is in line with the implementation of MPFN No. 1/2019 decisions related to the need for establish fiscal incentives for activities aimed at enhancing food security and natural resources conservation in Peninsular Malaysia. Activities eligible for incentives as identified in the REDD Plus Strategy will contribute directly to the national carbon intensity reduction target and indirectly will retain or increase forest cover in the country. **Box 5-16** describes an example of central government financial incentive to states that have successfully reduced GHG emissions and maintained forest cover in India.

The preservation of existing forest and creation of new forest areas are national priorities to achieve the national carbon intensity reduction target and to preserve the habitat of flora and fauna.

Box 5-16: Case study: India

India is among the countries with the highest deforestation rate and is ranked 3rd as a contributor to greenhouse gas (GHG) emissions. The Indian government has pledged to reduce the intensity of GHG emissions by 33% to 35% by 2030 compared to the emission rate in 2005 (0.47 metric tonnes of CO2 per $1,000 of national GDP) by increasing the country's forest area.

Year 2030 India is targeting an increase in forest cover to absorb carbon emissions.

33% The national forest cover target is an increase to 109 million hectares compared to 79 million hectares (24% coverage) in 2013.

7% The contribution of increasing forest cover in India in net increase in global forest cover between 2000 and 2017.

$174 per hectares Financial incentives from the central government to states that maintain or increase forest cover under the Finance Commission (FC) Incentive mechanism.

Source: India INDC, 2015 (www4.unfccc.int), UN-REDD, 2018 (www.un-redd.org/post/2018/01/05)

The Royal Belum State Park, Perak contributes to carbon absorption.

AGENCIES INVOLVED

Main Agencies

- Ministry of Energy and Natural Resources (KeTSA)
- Ministry of Environment and Water (KASA)
- Forestry Department of Peninsular Malaysia
- State Forestry Department

Supporting Agencies

- PLANMalaysia
- Local Authority

ACTION SR 2.1D

Create a network of sustainably managed and integrated marine protected areas

Malaysian coastal and marine areas are rich in biological, geological and socio-cultural diversity that becomes part of a heritage that needs to be well managed. They are also sources for livelihood for the coastal population, especially for those involve in the fisheries and tourism sectors. NPP4 emphasises the establishment of a wider network of marine protected areas and to be integratedly and holistically managed through the concept of 'seascape' to control development activities and resource utilisation of the areas. Under the current approach, Marine Parks are only designated at two nautical miles from the lowest tide. The proposed 'seascape' approach is more effective and holistic as it covers the entire coastal and surrounding marine areas.

The concept of a network of marine protected areas (Seascape)

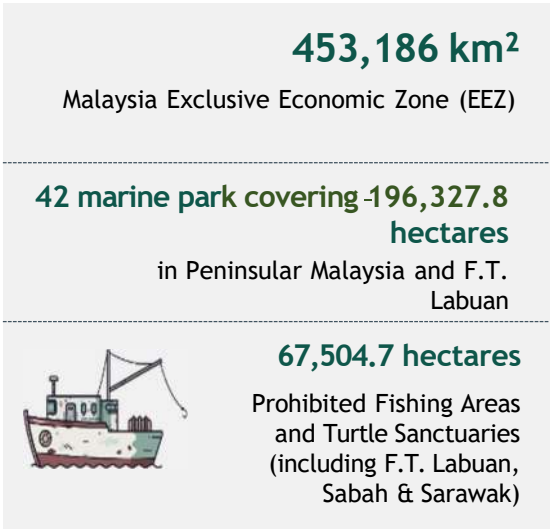


Figure 5-18: Malaysian coastal waters facts
Source: Department of Fisheries Malaysia, 2019

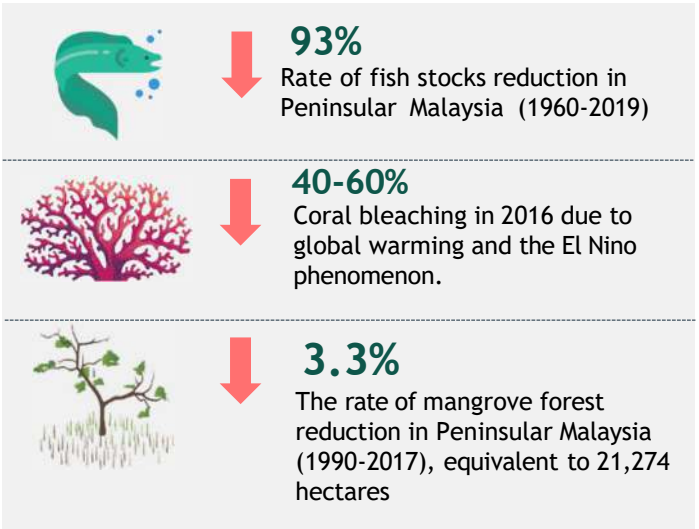


Figure 5-19: Malaysian marine ecosystem challenges
Source: Department of Fisheries Malaysia, 2019,
3rd National Communication Report, 2018,
Forest Research Institute Malaysia (FRIM) 2017

The measures to create a network of marine protected areas that adopt the seascape concept are:

1. Establish marine and coastal protected areas

Extensive protected areas need to be established covering the islands and the waters between the islands to create continuity between the marine habitat and the coastal habitat. These areas should be divided into zones based on local needs and characteristics.

The establishment of the protected areas is in line with the Category VI protected area under the International Union for Conservation of Nature (IUCN) which allows for the sustainable use of natural resources. The best example of such protected area in Malaysia is the Tun Mustapha Marine Park, Sabah (refer to **Box 5-17**).

The benefits of this approach are:

i. Enables holistic control and management of coastal and marine development.
ii. Ensures sustainable marine fishing activities.
iii. Generates community income sources and creates employment opportunities.
iv. Enhances marine life by maintaining the life cycle of species and avoiding the capture of premature fish populations.
v. Ensures the sustainability of sea-based food stocks and national food security.
vi. Accelerates the achievement of marine protected area targets at the national and global levels.

10%
of the country's total marine protected area (via gazettement as a Marine Protected Area)

*This is the 2025 target for marine protected area coverage as determined by the **National Biodiversity Policy 2016-2025** by 2025 in line with the Aichi Biodiversity Targets under the Convention on Biological Diversity (CBD).

3.27%
1,510,037.3 hectares
The total area of the country's Marine Protected Areas (including Sabah & Sarawak) in 2019

1.1%
244,956.9 hectares
Area of Marine Protected Areas in Peninsular Malaysia and F.T. Labuan in 2019

▲ **8.08%**
+2,224,200 hectares
The contribution of the proposed Marine Protected Areas under NPP4 to the total size of the marine protected areas nationally

Figure 5-20: National target and size of marine protected areas
Source: Ministry of Energy and Natural Resources (KeTSA), 2020

The protection of marine areas assures availability of food sources for marine life

Box 5-17: Case Study: Taman Laut Tun Mustapha (TMP), Sabah

With an area of 898,763 hectares and covering 50 islands, Tun Mustapha Marine Park (TMP) is the largest Marine Park in Malaysia when it was gazetted as a multi-use protected area in May 2016. The establishment of TMP is the result of 13 years of negotiations and collaborations between state authorities, international partners, local communities and NGOs including WWF-Malaysia.

While the area is important to the marine ecosystem and supports the livelihoods of 80,000 coastal residents, it is often threatened by overfishing, piracy and pollution.

The Sabah State Government has formulated three (3) main objectives for TMP, namely:

1) To eradicate poverty;
2) To develop sustainable economic activities; and
3) To preserve endangered habitats and species.

Negotiation and engagement with the local community and the fisheries industry is critical in the establishment of the TMP which involves management zones, fisheries management, awareness, capacity building and alternative economic programmes. The zoning process went through three (3) stages (prioritisation, review & negotiation) before four (4) main zones were finally established.

TMP is the first Category VI area under the IUCN to be gazetted by the Sabah State Government under the Sabah Parks Enactment 1984, which previously stated that no resource extraction is allowed except for recreational activities. Under the new section of this Enactment, the requirements for zoning have been taken into account in TMP's coastal and marine activities.

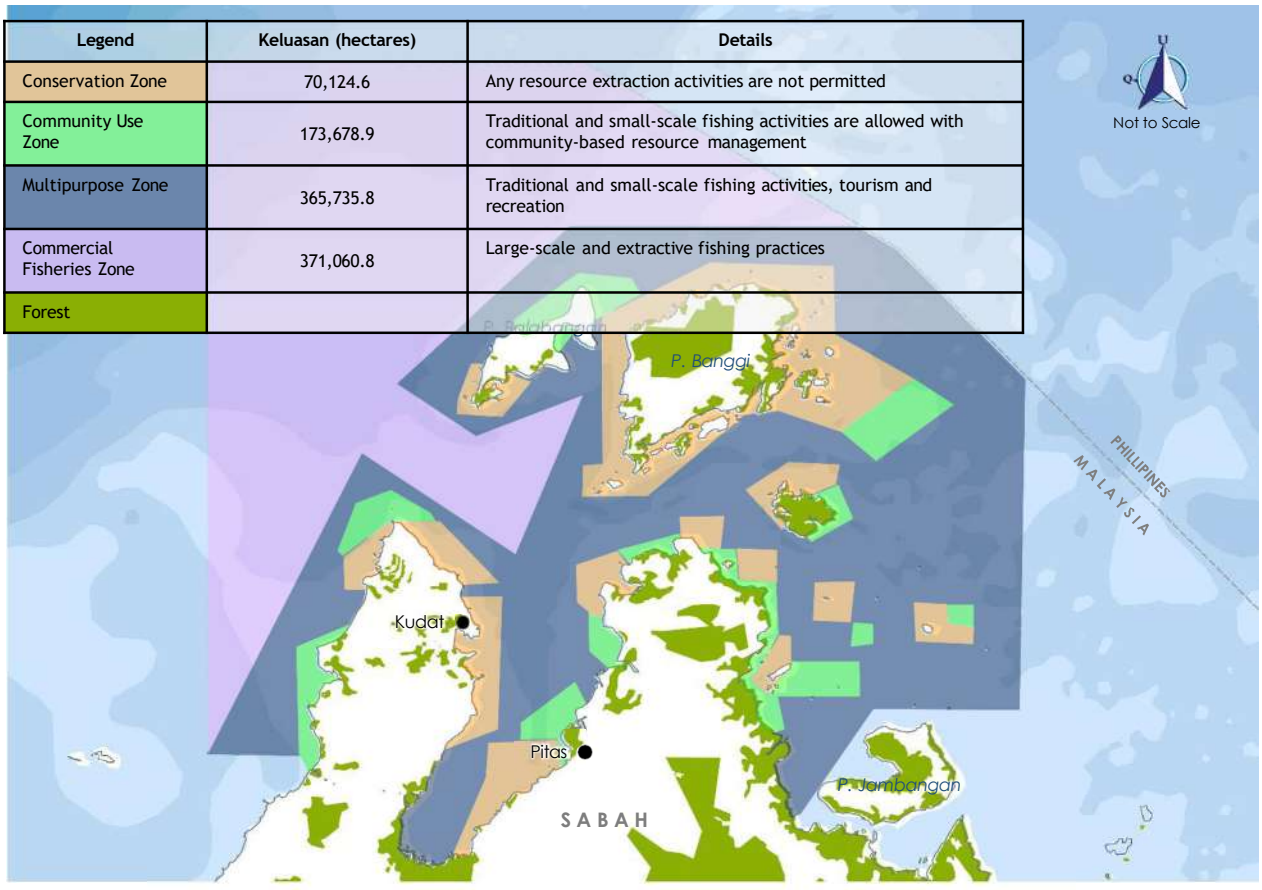


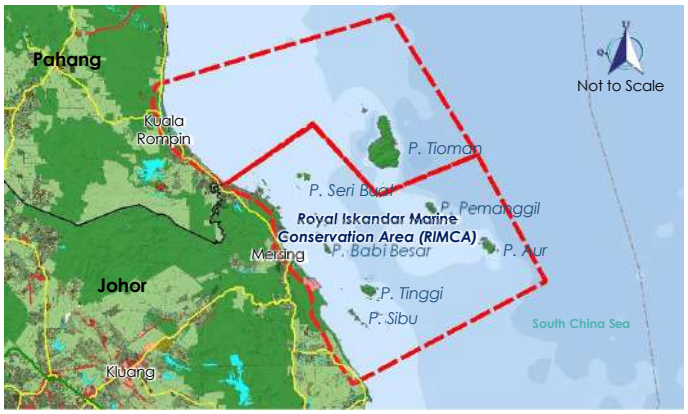
Figure 5-21: Zoning plan at Tun Mustapha Marine Park, Sabah. **Source:** WWF-Malaysia; *Coral Triangle Initiative*

NPP4 has identified five (5) areas to be established as marine protected areas through integrated marine corridor management. The designation of these five (5) areas, covering a total of two (2) million hectares in size, will increase the national marine protected areas from 3.27% to 8.08% of the Malaysian waters. The five (5) areas are:

i. Royal Iskandar Marine Conservation Area (RIMCA)

Location: Mersing Islands, Johor
Estimated Area: 596,100 hectares
Characteristics and uniqueness:

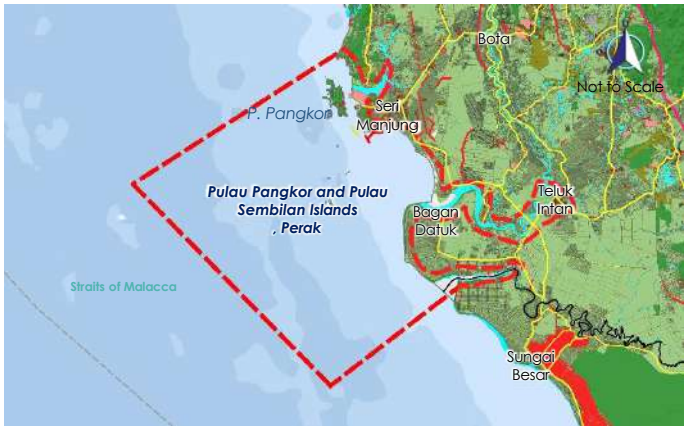
- 13 marine parks.
- Sensitive habitats such as coral reefs, geological sites and seagrass beds that are important habitats for dugong populations.
- Important Marine Mammal Area.



ii. Pulau Pangkor and Pulau Sembilan Islands

Location: Pulau Sembilan and Pulau Pangkor, Perak
Estimated Area: 580,100 hectares
Characteristics and uniqueness:

- Pulau Sembilan State Park is famous for the Blue Tears phenomenon where plankton clusters produce blue glow in the coastal area at night.
- Mangrove forests along the coast of Bagan Datuk.
- Coral reefs.



iii. Northern Islands (include the waters of Perlis and Kedah)

Location: A cluster of 99 islands located in the waters of Langkawi, Kedah
Estimated Area: 963,371 hectares
Characteristics and uniqueness:

- Important Marine Mammal Area.
- Potential to be expanded into a cross-border protected area with the Ko Tarutao archipelago in Thailand.
- Includes Perak Island, Kedah

iv. Matang Mangrove Forest, Perak

Location: Matang, Perak
Estimated Area: 238,600 hectares
Characteristics and uniqueness:

- Matang Mangrove Forest (40,288 hectares) is the largest mangrove forest in Peninsular Malaysia.
- Rich in various species of marine life and a major source of quality seafood and charcoal.
- Important Marine Mammal Area.

v. Eastern Islands (include the waters of Kelantan and Terengganu)

Location: Setiu, Terengganu
Estimated Area: 463,900 hectares
Characteristics and uniqueness:

- Setiu Wetland which contains nine (9) distinct ecosystems including *gelam (Melaleuca cajuputi)* forest.
- Contains various wildlife habitats in the coral reef around the Terengganu Marine Park (Pulau Redang, Pulau Perhentian & other islands) and the Setiu Wetland.
- Seagrass areas in the waters of Kelantan

The protection of marine areas helps protect biodiversity, increase marine resilience and ensure the sustainability of ecosystem services.

2. Maintain the Waters Gazette Zone as a protected zone

Five (5) zones have been gazetted in waters off Peninsular Malaysia and F.T. Labuan to protect underwater cultural heritage treasures. These waters need to be protected to ensure more controlled maritime development, keep sites in the water and preserve natural assets. The five (5) water zones that have been gazetted are:

i. Tanjung Tuan Waters Gazette Zone

This zone covers the area between Teluk Kemang and Pasir Panjang, Port Dickson, Negeri Sembilan, with an area of 141.4 sq km.

ii. Pulau Upeh Water Gazette Zone - Pulau Besar

This zone covers the waters between Tanjung Kling and Merlimau, Melaka, covering an area of 364.47 sq km.

iii. Tioman - Mersing Waters Gazette Zone

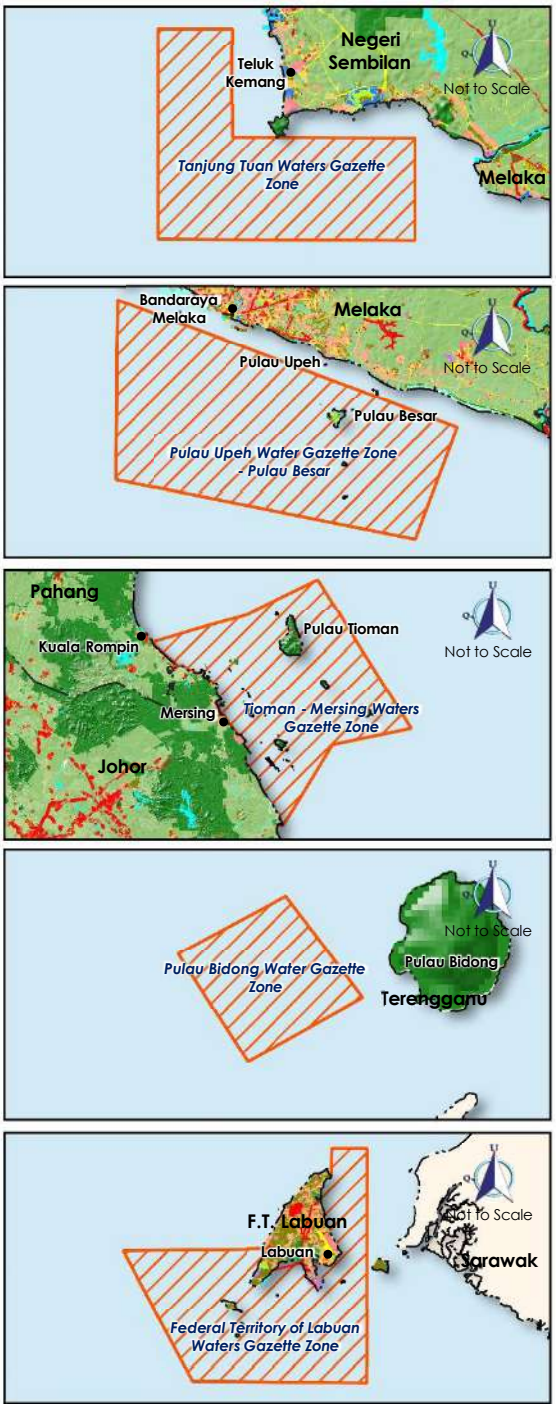
This zone is the largest Protected Zone with an area of 7,047.6 sq km. This zone is located between Kuala Rompin and Tanjung Sedili and covers the islands of Tioman and Mersing between Pulau Tioman and Pulau Aur.

iv. Pulau Bidong Water Gazette Zone

The Pulau Bidong Protected Zone is only 4 sq km and is located in the western waters of Bidong Laut Island.

v. Federal Territory of Labuan Waters Gazette Zone

This zone covers the waters on the east from Tanjung Kubong to the south and west to Sungai Pagar. The area of this zone is 526.24 sq km.



Source: Malaysian Maritime Enforcement Agency

3. Gazette extensive marine protected areas

Plan 5-9 shows the proposed extended marine protected area. Appropriate laws at the state level should be applied for the purpose of gazetting these marine protected areas. Gazettement can be done through existing enactments such as the State Parks Enactment or through a new enactment. These existing or new enactments should include additional rules and clauses to manage marine protected areas to facilitate the establishment of management zones and provide mechanisms for joint management and enforcement. It should also take into account other relevant laws such as the Fisheries Act 1985.

4. Manage marine protected areas comprehensively

The establishment of Marine Protected Area (MPA) requires an integrated approach that takes into account the ecological, economic, cultural and social aspects in its planning. The involvement of all stakeholders as a whole, especially the local community, is very important. Therefore, the planning towards the establishment of MPA and the determination of their management zones should take into account the following aspects:

i. Prepare management plans for marine protected areas

A management plan should be prepared for each to mark its boundaries and zoning areas. The plan should also include components of governance, protection and enforcement, ecosystem management, capacity empowerment, stakeholder engagement frameworks, and funding mechanisms. This management plan needs to be developed inclusively and through a comprehensive engagement process.

ii. Consider the needs of the local population

Designated management zones must consider the needs of the local community, resource use patterns, cultural characteristics and values. The rules and restrictions that may be imposed on fishing activities within MPA will affect the local fishing industry. Thus, new employment opportunities in the services sector need to be created, especially in the ecotourism sector.

iii. Determine Ecologically or Biologically Significant Areas (EBSA)

EBSA areas need to be identified and designated in MPA based on the sensitive ocean biological components and the criteria of biological and ecological significance.

iv. Manage fishing activities

The existence of extensive conservation areas provides an opportunity to implement the Ecosystem Approach to Fisheries Management (EAFM) projects. EAFM is an extension of conventional fisheries management approaches that aims to plan, manage, and develop the fisheries industry holistically. EAFM helps maintain the long-term sustainability of marine ecosystems and fish stocks in order to meet the needs of the community on a sustainable basis.

The fishing management zones enforced by the Department of Fisheries Malaysia must also be taken into account in efforts to coordinate fisheries activities in MPA. The fishing zones differ from the west coast to the east coast of Peninsular Malaysia due to differences in the size of the Exclusive Economic Zones on located both sides of the peninsular. **Figure 5-22** shows the designated fishing zones in Peninsular Malaysia.

BRIEF FACTS

Fishing zones in Peninsular Malaysia

The fishing zone system was first introduced through a licensing policy in 1983. This system was improved in 2001 to conserve the mud flats on the west coast of Peninsular Malaysia (Kedah, Penang, Perak and Selangor). Mud flats and mangrove swamps are important breeding grounds for marine life. Therefore, the coastline up to 1 nautical mile has been zoned for conservation, and for aquaculture activities to increase marine resources. The use of fishing nets in this zone is not allowed.

Source: www.fao.org

v. Prepare a Marine Spatial Plan to protect marine natural resources.

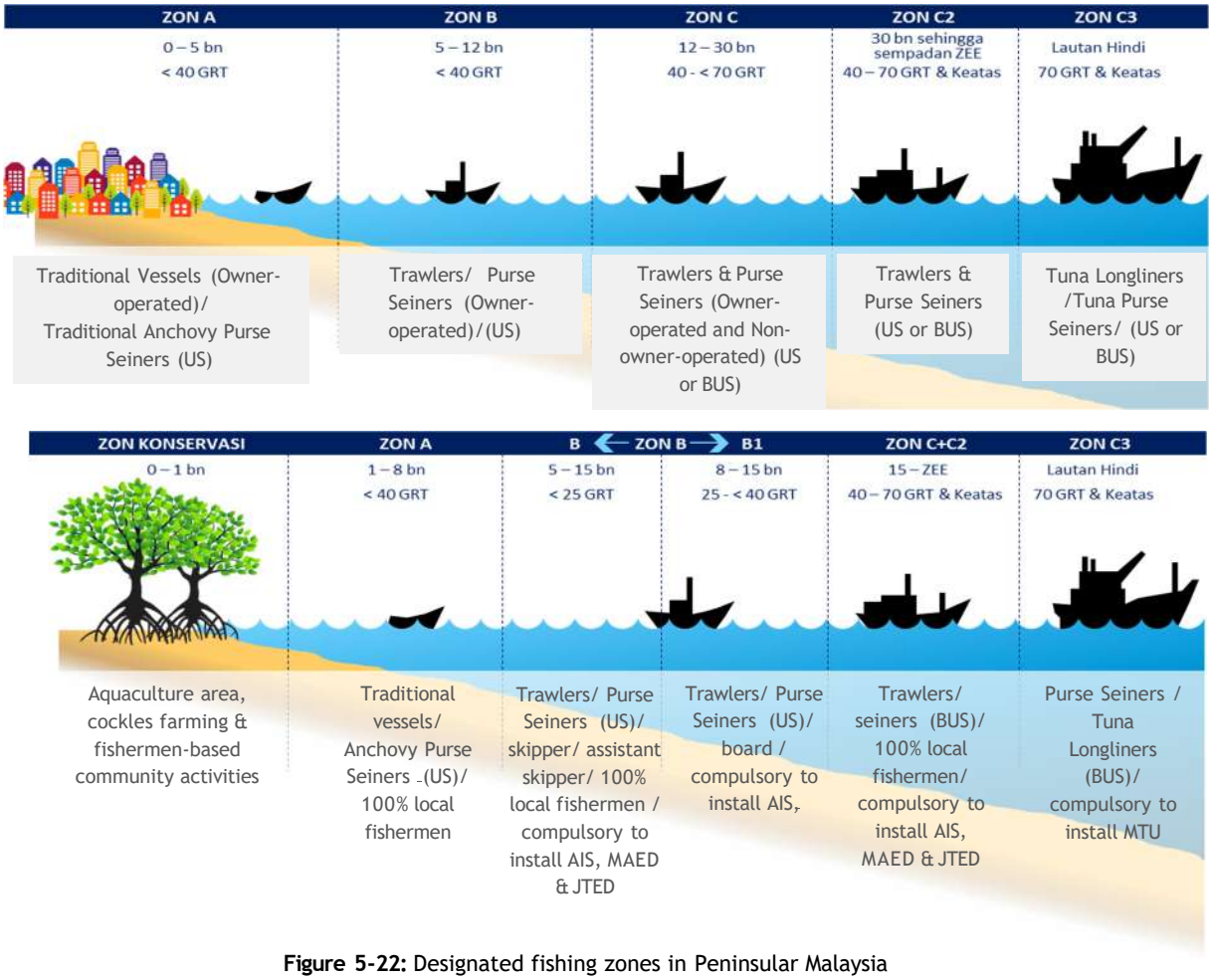
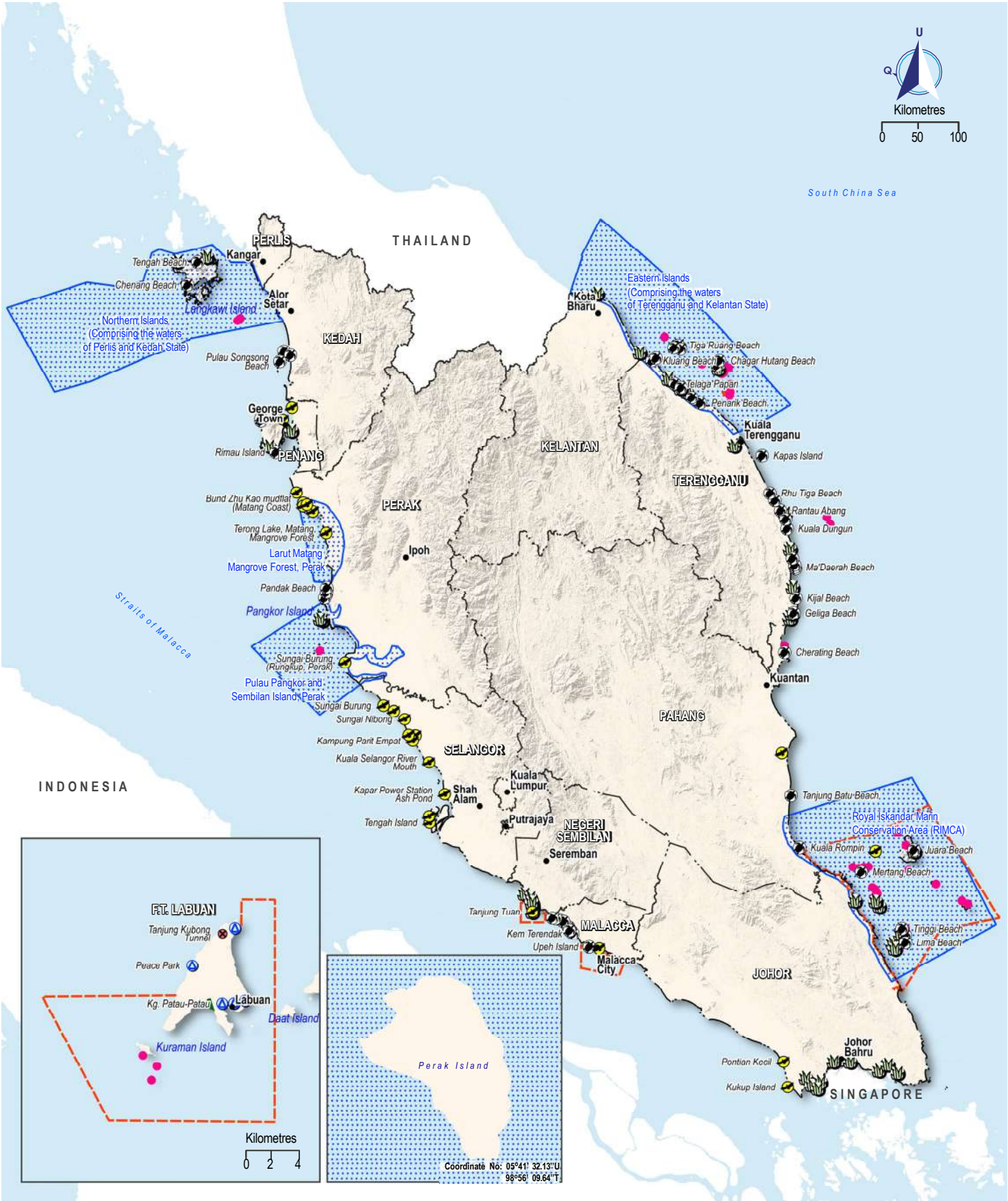


Figure 5-22: Designated fishing zones in Peninsular Malaysia
Source: Department of Fisheries Malaysia, 2018



MAP 5-9: GAZETTED CONSERVATION ZONE AND MARINE PROTECTION AREAS PENINSULAR MALAYSIA AND F.T OF LABUAN

Natural Resources
- Turtle Landing Location
- Important Bird Area
- Seaweed Areas
- Coral Reef Areas
- Gazette Waters Zone
- Proposed Marine Corridor Area

Others
- State Capital
- State Boundary

Source:
- Department of Marine Park Malaysia, 2018
- National Heritage Department, 2019
- National Physical Plan 4, 2020

5. Identify network of cross-border marine protected areas

Marine Protected Areas (MPAs) that cross international borders need to be strengthened through a marine ecosystem management system for the Southeast Asian region. Regional cooperation should be leveraged for the protection of marine habitats located close to neighboring countries.

Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF), or better known as CTI, is an existing platform involving regional cooperation between Malaysia, the Philippines, Indonesia, Papua New Guinea, Timor-Leste and the Solomon Islands. CTI aims to conserve an area of 6 million square kilometers of oceans that have the highest value of marine biodiversity in the world. This area includes the waters off Sabah and the eastern waters off Peninsular Malaysia in Terengganu and the East Coast of Johor (refer to **Figure 5-23**).

The establishment of cross-border MPAs can enhance inter-state relations, reduce environmental conflicts, optimise resource utilisation and improve security at national borders. So far, only one cross-border MPA has been established, namely the Turtle Island Heritage Park (TIHPA) between Malaysia and the Philippines.

Cross-border MPS requires regional and joint management efforts. NPP4 proposes that the area in the Northern Waters of Langkawi-Thailand, which covers the Satun-Langkawi Archipelago, to be established as a cross-border MPA. The area is an important habitat for marine mammals namely dugongs and dolphins.

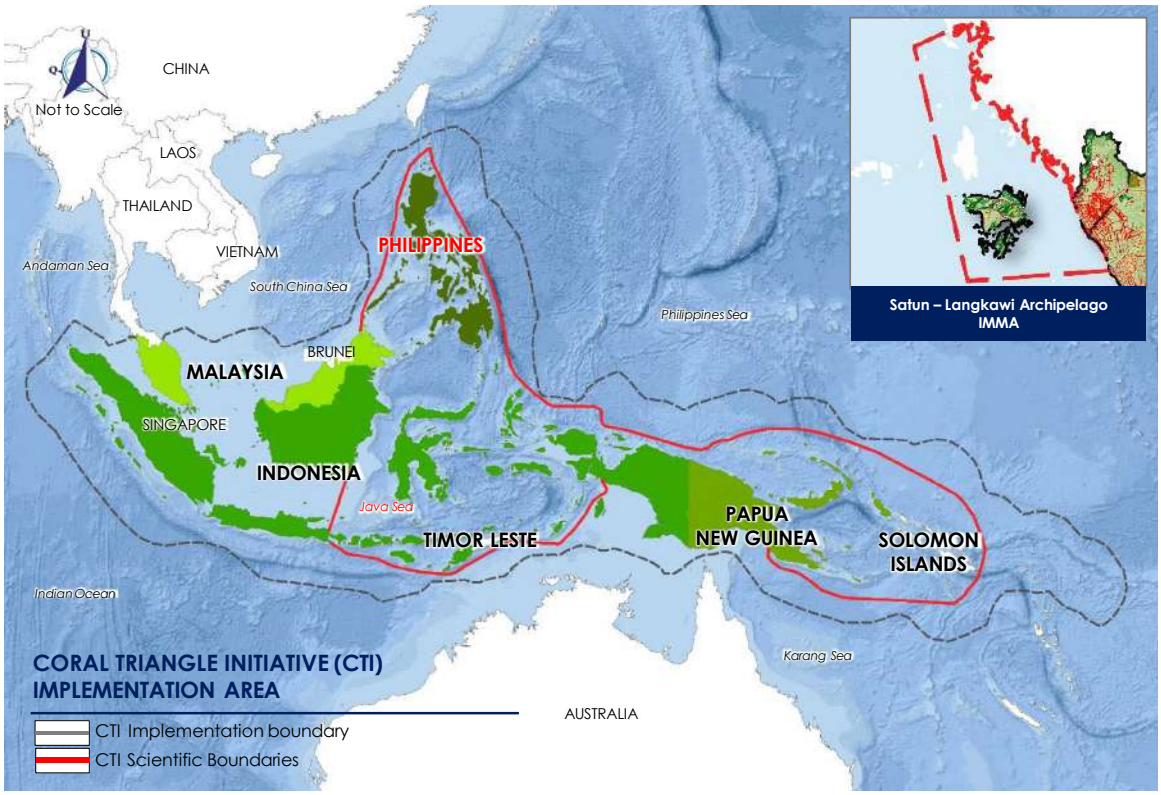


Figure 5-23: Coral Triangle Initiative Implementation Area
Source: *coraltriangleinitiative.org*

Coral Triangle Initiative (CTI) Implementation Area

The boundaries of CTI are conceptual in nature and are not bound by any legislations. This is because the exact boundaries (between the CTI implementation boundary line and the coastal line etc.) are not specified on map. There are also overlapping boundaries and absence of information on the boundary line of CTI implementation for Brunei Darussalam. Singapore is not a party of the CTI.

Source: *coraltriangleinitiative.org*

Sabah waters is part of the CTI implementation area.

AGENCIES INVOLVED

Main Agencies

- Department of Fisheries Malaysia
- Malaysian Maritime Enforcement Agency
- Department of National Heritage
- State Authority

Supporting Agencies

- Ministry of Foreign Affairs
- Department of Wildlife and National Parks (PERHILITAN) Peninsular Malaysia
- Forestry Department of Peninsular Malaysia
- Malaysian Maritime Enforcement Agency
- Malaysian Marine Department
- National Hydraulic Research Institute of Malaysia (NAHRIM)
- Department of Minerals and Geosciences Malaysia (JMG)
- Local Authority

ACTION SR 2.1E

Encourage the management of natural resources with the local community

People living in rural areas are highly dependent on natural resources such as forests and rivers for income, well-being and survival. Therefore, communities living in rural areas need to play an important role in assisting the conservation and protection of natural habitats and natural resources. In urban areas, community involvement in conservation work is increasing through volunteerism.

Community involvement in natural resource management is in line with the Indigenous and Local Community Conserved Areas (ILCA) approach that is being practiced around the world where local communities are given the responsibility to manage natural habitats.

The establishment of the ILCA involves the gazettement of protected areas, the transfer of management rights to the local community and the formulation of community management plans. This ILCA approach also helps to reduce the management burden on government agencies.

The steps and principles that can be used to make ILCA a success are:

1. Identify areas for ILCA implementation

   Inland settlement areas located close to nature conservation areas that have the potential to become an ILCA need to be identified and its implementation to be facilitated.

BRIEF FACTS

Indigenous and Local Community Conserved Areas **(ILCA)**

ILCA can be translated as a natural and/or modified ecosystem of biodiversity value and significant ecosystem services, conserved voluntarily by indigenous and local communities (resident or migrant), through customary laws or other effective means.

The designation and management of ILCA areas is based on the FPIC (Free, Prior and Informed Consent) concept which emphasises specific rights in the form of community consensus in allowing or withholding project proposals that may affect them or their territories.

This concept is centered on a universal understanding of the right to self-determination. This concept is recognised at the United Nations Declaration on the Rights of Indigenous People (UNDRIP) conference.

The three (3) main thrusts of an ILCA are:

i. The community's close relationship with natural areas.

ii. Indigenous local communities are key stakeholders in making decisions related to the protected areas.

iii. Development carried out within the protected areas should (directly and indirectly) be geared towards the preservation and conservation of the protected area.

2. Establish an ILCA involving local community and government agencies

The involvement of the local community is a key component to the successful establishment of ILCA. Government agencies need to hold engagement sessions to explain the objectives of the proposed ILCA and to provide insights to obtain local community's approval. The ILCA can be established after both parties have agreed on matters related to local issues, namely:

- Determination of ILCA boundaries and zones;
- Strengthening of management protocols; and
- Provision of technical and financial support.

Box 5-18 provides examples of the collaboration between local community and government agencies in establishing.

3. Utilise the knowledge of the local community

The establishment of an ILCA should be built upon the understanding and agreement that the knowledge of the local community should become the basis in establishing the ILCA. The principle of Free, Prior and Informed Consent (FPIC) needs to be emphasised in the ILCA establishment process so that every individual in the community is given the opportunity to participate in any decisions that will affect them.

Box 5-18: Case Study: Kota Damansara Community Forest Reserve and Kinabalu Ecolinc, Bundu Tuhan, Sabah

Kota Damansara Community Forest (KDCF) Association

KDCF is a community association established to represent the views of the local community and stakeholders in order to establish effective forest management through cooperation and collaboration with other relevant agencies. The association also has the role of providing awareness and education to the local community as well as conducting research in improving environmental conservation.

This forest area is managed and developed by the local community of Kota Damansara together with the Forestry Department of Peninsular Malaysia. The Kota Damansara Community Forest Reserve was gazetted in 2013.

Source: kotadamansaraforest.org

Kinabalu Ecolinc in Bundu Tuhan, Sabah

Kinabalu Ecolinc is an ILCA that is located between Kinabalu Park and Crocker Range Park. It was established in 2012 and is being managed by the local community.The area was established as an ecological corridor aimed at strengthening the connectivity between the two parks. Hunting activities are prohibited and only limited resource utilisation is allowed in this area.

Source: www.sabahparks.org

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Forestry Department of Peninsular Malaysia • State Forestry Department • Department of Orang Asli Development • Local Authority	• Ministry of Energy and Natural Resources (KeTSA) • State Park Corporations • Non-government organisation • District and Land Office • PLANMalaysia@Negeri

STRATEGY
SR 2.2

MANAGE AND REGULATE DEVELOPMENT IN ENVIRONMENTALLY SENSITIVE AREAS (ESAs)

RELATED SDGs
SDG13 SDG15
SDG14

Environmentally Sensitive Area (ESA) is defined as special area that is highly sensitive to any form of change to its ecosystem due to natural processes or activities in or around it, where its level of sensitivity is determined based on the integration of disaster risk, life support value, and heritage value ESA is typically sensitive to development and encroachment due to human activities. This sensitivity can have adverse effects on ESA as well as on humans and other living things. Generally, new development is discouraged in ESAs especially activities that can result in significant land use and density changes. However, development in a controlled manner can be considered in less sensitive ESA.

Development activities within the ESA need to be managed and regulated so that these areas can provide important ecosystem services to support the country's economic development and the lives of the people. Since the first NPP, ESA related policies have always been emphasised especially in terms of the need for the integration of ESA in the planning and management of sustainable land use and natural resources.

ACTION SR 2.2A

Strengthen the ESA framework as the basis for regulating development

The ESA framework is an important spatial planning framework to guide land use planning for sustainable development at the state and local levels. Since the first NPP, the ESA framework was made up of three (3) levels, each of which has its own general management criteria.

To strengthen the framework, NPP4 has made several improvements to the ESA framework especially in terms of management criteria, activity details and classification, and addition of new marine and food security areas as part of ESA.

Table 5-3 lists the general classification of protected areas in Malaysia that benefit from the application of the ESA framework.

Kenaboi Forest Reserve, Negeri Sembilan

Table 5-3: General Classification of Protected Areas in Malaysia

Area	Type of Protected Area	Act / Enactment
Peninsular Malaysia	1. Forest Reserve • Timber Production Forest under Sustained Yield • Soil Protection Forest • Soil Reclamation Forest • Flood Control Forest • Water Catchment Forest • Forest Sanctuary for Wildlife • Virgin Jungle Reserve • Education Forest • Research Forest • Forests for Federal Purposes • State Park 2. Prohibited Fishing Areas 3. Wildlife Reserve 4. Wildlife Sanctuary 5. National Park 6. State Park 7. Marine Park	• Wildlife Conservation Act 2010 • National Forestry Act 1984 • Fisheries Act 1985 • National Parks Act 1980 • State Parks Corporation Perak Enactment 2001 • National Parks Corporation (Johor) Enactment 1989 • National Parks (Kelantan) Enactment 1938 • National Parks (Pahang) Enactment 1939 • Terengganu State Parks Enactment 2017 • National Land Code 1965
Sabah	1. Amenity Forest 2. Protection Forest 3. Virgin Forest Reserve • Protection Forest • Commercial Forest • Domestic Forest • Amenity Forest • Mangrove Forest • Wildlife Reserve 4. Conservation Area 5. Wildlife Hunting Area 6. Wildlife Reserve 7. Wildlife Sanctuary 8. National Park	• Sabah Forest Enactment 1968 • Wildlife Conservation Enactment 1997 • Sabah Parks Enactment 1984
Sarawak	1. Permanent Forest Estate • Forest Reserve • Protected Forest • Communal Forest Reserve 2. Nature Reserve 3. Wildlife Sanctuary 4. National Park	• Sarawak Forest Ordinance 1958 • Wildlife Protection Ordinance 1998 • National Parks Ordinance 1998

Source: Ministry of Energy and Natural Resources, Sabah Forestry Department & Sarawak Forest Department

Measures to strengthen the ESA framework as the basis for regulating development are:

1. Improve the ESA framework

   NPP4 has improved the existing ESA framework by dividing each of the levels in the framework into ESA categories with their own management criteria. This framework should be ~~fully~~ adopted in whole to ensure its stronger effect in development planning (refer to **Table 5-4**).

ESA Level		
		
ESA Level 1 Important areas that have been gazetted. No degazettement, change of land use and development activity is allowed other than the prescribed conditions and uses subject to the relevant Acts and Enactments.	**ESA Level 2** Areas that have not yet been gazetted but have been identified by the government and academia as important habitats. Gazettement should be given priority along with strict development control.	**ESA Level 3** Areas of sustainable use and development that require close monitoring and control over the activities undertaken within the areas.

Table 5-4: The ESA framework for Peninsular Malaysia and F.T. Labuan.

NO.	AREA	MANAGEMENT CRITERIA
	LEVEL 1: GAZETTED IMPORTANT AREAS	
1.	Existing inland and marine protected areas that have been gazetted: • National Park • State Park • Wildlife Reserve • Permanent Forest Reserve (Protection Forest) • Marine Parks • Prohibited Fishing Areas • *Gamat* Protection Area • Turtle Sanctuary	• Degazettement of protected areas is not allowed (if degazettement is necessary, its application must go through a strict process; • New development, expansion of existing development or extraction of mineral resources (all forms of mining) is not permitted; • An Integrated Management Plan must be prepared for these areas; and • Ecotourism, research, education and low-impact development are permitted but subject to provisions of the related Enactments and Acts.

Continued

NO.	AREA	MANAGEMENT CRITERIA
	LEVEL 1: GAZETTED IMPORTANT AREAS	
2.	Existing and proposed dam catchment areas	• Land use change is not permitted; • Infrastructure facilities other than dam infrastructure are not permitted; and • Logging and agricultural activities are not allowed.
3.	Highland area above 1,000m	• Logging and agricultural activities are not allowed; • New urban and agriculture development in the highlands are only allowed in two (2) Special Management Areas (KPK) namely: i. Cameron Highlands-Kinta-Lojing ii. Genting Highlands-Bukit Tinggi-Janda Baik • For KPK Cameron Highlands-Kinta-Lojing and Genting Highlands-Bukit Tinggi-Janda Baik, new agricultural development is only allowed outside forest reserves and water catchment areas; • New development is not allowed within the Fraser Hill KPK; • Existing development must comply with the strategies and guidelines contained in the Fraser Hill Development Coordination Study; • For developed highland areas, Special Area Plan (SAP) must be prepared to control coordinate development and • All types of development and agriculture activities in areas above 1,000m must comply with existing and future rules and guidelines comprehensively.
4.	Forest Plantation Zone within a Permanent Forest Reserve (Production Class)	Only allowed in HSK areas that have been designated as forest plantation zone by the 68th National Land Council dated 9 August 2012 where: • Forest plantation areas in HSK shall be established in forest plantation zones that have been identified by the State Forestry Department, which cover a total area of 439,189 hectares; • The forest plantation areas shall not exceed 5% of the total natural forest area in the HSK for a period of 7 years as stipulated in the Forest Management Certification Standards under the Malaysian Timber Certification Scheme; and • The establishment of forest plantations shall be in accordance with the Circular of the Director-General of Forestry Peninsular Malaysia No. 01/2010, dated 22nd December 2010 related to the 'Guidelines for Assessment of Areas in Permanent Forest Reserves for the Establishment of Forest Plantation and the 'Environmental Quality Act 1974; NPP4 recommends that forest plantations apply the concept of agroforestry and mixed agriculture.

Continued

NO.	AREA	MANAGEMENT CRITERIA
	LEVEL 2: AREAS THAT HAVE NOT YET BEEN GAZETTED BUT IDENTIFIED AS IMPORTANT HABITATS	
1.	Areas of biodiversity interest but not gazetted as protected areas • High value Government land forests (coastal swamp forest, peat swamp forest, freshwater swamp forest & *gelam* forest) • Geological sites • Limestone outcrops • Quartz ridges • Turtle & river terrapin landing sites • Seagrass beds • Coral reef outside marine park • Important bird areas • Mud flats	• Endangered habitats outside of Protected Areas shall be identified at the Structure Plan and Local Plan levels; • A management plan should be prepared where habitats are identified and gazetted; • New physical development, expansion of existing development and extraction of mineral resources (all forms of mining) are not permitted; and • Low-impact ecotourism, research, education and physical development are allowed.
2.	All forests and wetlands outside Protected Areas	• Physical development and agriculture activities are not allowed; • Sustainable logging which is based on the principles of Sustainable Forest Management (SFM) is allowed; • Low-impact ecotourism is allowed but subject to local limitations; • Sustainable logging activities should be given emphasis in monitoring and enforcement; and • There should be no net loss of biodiversity for changed forest landscape.
3.	Permanent Forest Reserves (Production Class)	Sustainable logging which is based on the principles of Sustainable Forest Management (SFM) is allowed.
4.	Recognised Terrestrial Ecological Corridors such as the Central Forest Spine ecological network	• Any development should observe the strategies and guidelines of the Central Forest Spine Ecological Network Master Plan 2021; • Special Area Plans (SAP) must be prepared for critical ecological networks as identified in the Central Forest Spine Ecological Network Master Plan 2021; • Only conservation agriculture is allowed and wildlife corridors should be established; • Only the development of infrastructure of national interest is allowed such as highways, railways and electricity transmission lines. However, the infrastructure facilities must be designed and constructed in an environmentally friendly manner and must not result in habitat fragmentation; and • There should be no net loss of biodiversity for changed forest landscape.

Continued

NO.	AREA	MANAGEMENT CRITERIA
	LEVEL 2: AREAS THAT HAVE NOT YET BEEN GAZETTED BUT IDENTIFIED AS IMPORTANT HABITATS	
5.	Areas of peat, soft soils, sinkholes and former underground mines	• Mapping of this area at the Structure Plan and Local Plan levels; • A site suitability study should be conducted before these areas can be developed; and • Development applications can be considered, but must consider potential impact of disaster, engineering solution methods, development feasibility and approval conditions.
6.	Islands and Marine Parks	All development on islands and Marine Parks must comply with existing and future rules and guidelines comprehensively.
7.	Areas between 300m to 1,000m	• All physical development and agriculture activities in the area must comply with existing and future rules and guidelines comprehensively; and • These areas need to be identified, mapped and particularised at the Structure Plan and Local Plan levels.
8.	Recognised Marine Ecological Corridors such as Ecologically and Biologically Sensitive Marine Areas (EBSA) and Important Marine Mammals Areas (IMMA)	• An Integrated Management Plan should be prepared to identify corridor boundaries and to outline specific management measures; and • Management zones should be established based on uses beneficial to local needs and requirements such as conservation, ecotourism, fisheries and sustainable use.
9.	River reserves	• Retain land adjacent to rivers as state land and to be gazetted as river reserves; based on minimum width recommended by the Department of Irrigation and Drainage; and • Existing development that operate without licenses and permissions need to be identified. The State Authorities may consider legalisation of these development if appropriate, or relocation/demolition if they pollute the rivers or create nuisances to the local surroundings.

Continued

NO.	AREA	MANAGEMENT CRITERIA
	LEVEL 3: SUSTAINABLE USE AREA	
1.	Water intake catchment areas and groundwater recharge zones	• Water intake catchment areas and groundwater recharge zones need to be identified at the Structure Plan and Local Plan levels; and • Undertake control and monitoring of water extraction.
2.	Areas between contours 150m to 300m	All physical development and agriculture activities must comply with existing and future rules and guidelines comprehensively.
3.	Coastal areas	All coastal development must comply with RFZPPN2, state ICZM, existing and future guidelines comprehensively.
4.	Important areas for food security: • National Rice Bowl • Permanent Food Production Park • Aquaculture Industrial Zone	• These areas cannot be converted to other types of land uses except for habitat restoration activities for uncultivated areas; • Sustainable agricultural and fishing activities are allowed; • Sustainable extraction or use of resources is permitted; and • Agricultural Best Management Practices must be implemented by the agricultural operators with close monitoring by the authorities.

2. Manage and control development in ESA based on the following conditions:

i. All ESAs that have been identified by NPP4 need to be particularised in the state and local planning and included in the SP and LP. Other important ESAs at the state and local levels need to be included in ESA framework at the SP and LP levels.

ii. All ESA boundaries need to be mapped in SP and LP. Their boundaries should be differentiated based on the three ESA levels.

iii. Each development in ESA must require planning permission, EIA, SIA, and Erosion and Sediment Control Plan (ESCP) as the main mechanism for impact mitigation.

iv. Review the current Planning Guidelines for Environmentally Sensitive Areas (ESA) Conservation to be in line with the revised ESA framework.

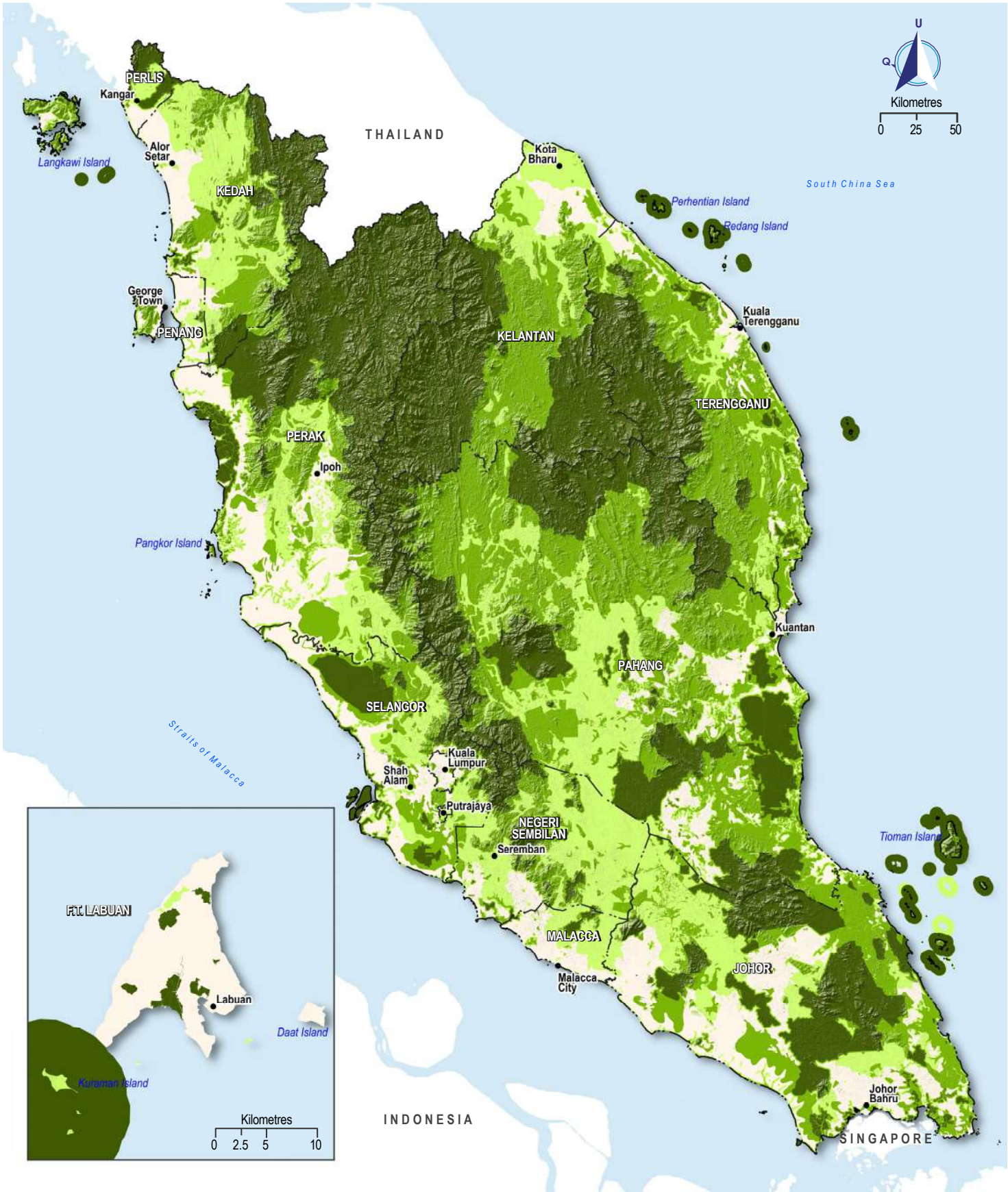
AGENCIES INVOLVED

Main Agencies

- Department of Environment
- Department of Agriculture
- Department of Minerals and Geosciences Malaysia (JMG)
- PLANMalaysia@Negeri
- Local Authority
- State Authority

Supporting Agencies

- Ministry of Environment and Water (KASA)
- Ministry of Agriculture and Food Industry (MAFI)
- PLANMalaysia
- State Parks Authority



MAP 5-10: ENVIRONMENT SENSITIVE AREAS (ESA) IN PENINSULAR MALAYSIA AND F.T OF LABUAN

ESA Levels

- Level 1
- Level 2
- Level 3
- Not included in ESA level

Others

- State Capital
- State Boundary

Source:
- National Physical Plan 4, 2020

Note:

ESA Level 1-Important areas that have been gazetted.
ESA Level 2-Areas not yet gazetted but have been identified by government and academicians as important habitat.
ESA Level 3-Sustainable development areas.

ACTION SR 2.2B

Establish the requirement for buffer zone outside ESA Level 1 boundaries

A buffer zone is an area of land designated mainly for environmental protection or to separate conflicting land uses such as industry, agriculture and mining from sensitive areas such as ESA. Buffer zones are important to protect natural habitats from the impact of development activities. This Action SR 2.2B aims at standardising the minimum buffer zone distance between ESA Level 1 and surrounding development.

Only buffer zone for ESA Level 1 is determined under this action as they are the most important ESA that require protection. Through this action, the management of buffer zones can be improved through the determination of appropriate minimum buffer zones, but subject to guidelines provided by other relevant agencies

The measures for creating buffer zone outside the boundaries of ESA Level 1 are:

1. Provide basic buffer zone guidelines for development activities adjacent to the boundaries of ESA Level 1

   Any new development adjacent to ESA Level 1 must provide buffer zone based on the minimum buffer zone allocation as proposed by NPP4 (refer to **Table 5-5**).

   For the provision of buffer zones that have existing development or other land uses, landowners are advised to adhere to the environmental conservation guidelines provided by the relevant agencies.

   For example, the owner of an oil palm plantation that is located adjacent to the boundary of a mangrove forest (regardless whether it is a gazetted HSK) is advised to implement good agricultural practices such as controlling the use of chemical fertilisers and pesticides in this buffer zone. Malaysian Good Agriculture Practices (MyGAP), Malaysian Sustainable Palm Oil (MSPO) and Roundtable on Sustainable Palm Oil (RSPO) certification guidelines can be used as a reference.

Table 5-5: Proposed minimum allocation for buffer zones adjacent to ESA Level 1

LAND USE ACTIVITIES	MINIMUM BUFFER ZONE REQUIREMENTS (metre)
Agriculture	100
Cultivation outside Permanent Forest Reserve (HSK)	100
Housing	100
Infrastructure	100
Industry	100
Dam	500
Mining / Quarry	500

Note:
- The demarcation of the minimum buffer zone is based on land parcel boundary or gazetted boundary.
- The minimum buffer zone requirements were derived from the technical agencies' feedback during FGD sessions and meetings throughout the NPP4 study.

Another example would be a recreational activity such as a resort that is located within the buffer zone of an existing dam catchment area must consider appropriate protection measures such as ensuring that there are no logging activities, new construction or earthworks that can cause soil erosion and sediments being deposited into the dam.

The guidelines provided by the DOE and the principles of sustainable forest management by JPSM should also be applied to ensure proper protection in the buffer zones.

2. Conduct a study to identify and evaluate buffer zones adjacent to ESA Level 1

A study to specifically identify the ecosystem value of buffer zones adjacent to ESA Level 1 need to be conducted. This study should also evaluate the current integrity of the buffer zones such as their degradation levels and changes of land uses, if any. Land use planning or the existing use of this boundary area should also be considered in determining the suitability of the buffer zone area.

Table 5-5 only provides the basic guidelines for the determination of buffer zones adjacent to ESA Level 1 boundary. Planned and existing land uses of the adjacent areas should also be considered in determining the appropriate buffer zone minimum allocation.

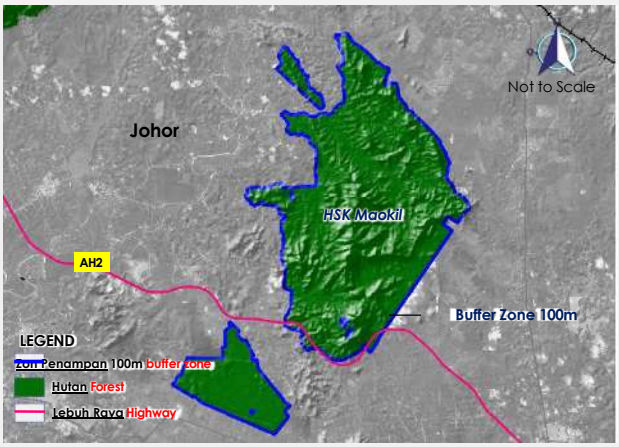


Illustration of the minimum buffer zones adjacent to HSK boundaries

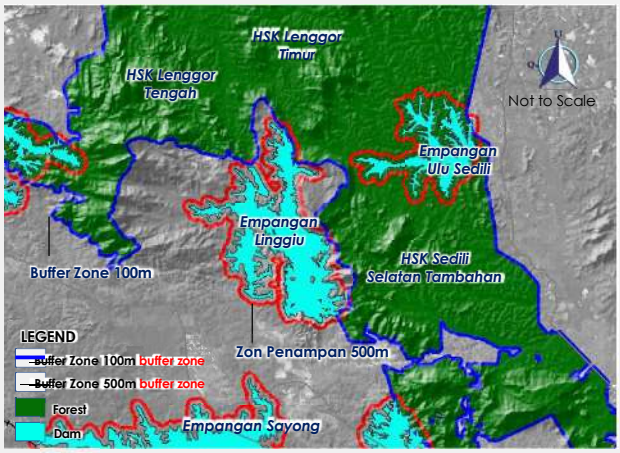


Illustration of the minimum buffer zones adjacent to dam boundaries (500m) and HSK boundaries (100m)

The illustrations above indicate the minimum buffer zone allocation for areas adjacent to ESA Level 1 boundaries which will be detailed out in relevant guidelines.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Department of Environment • PLANMalaysia • Local Authority	• State Authority

ACTION SR 2.2C

Introduce the concept of "no net loss of biodiversity" to ensure biodiversity loss through development projects are replaced

The loss of biodiversity at areas affected by development projects must be replaced through the implementation of conservation efforts. This is important to ensure overall habitat quality and _equivalent biodiversity composition and ecosystem services of an area.

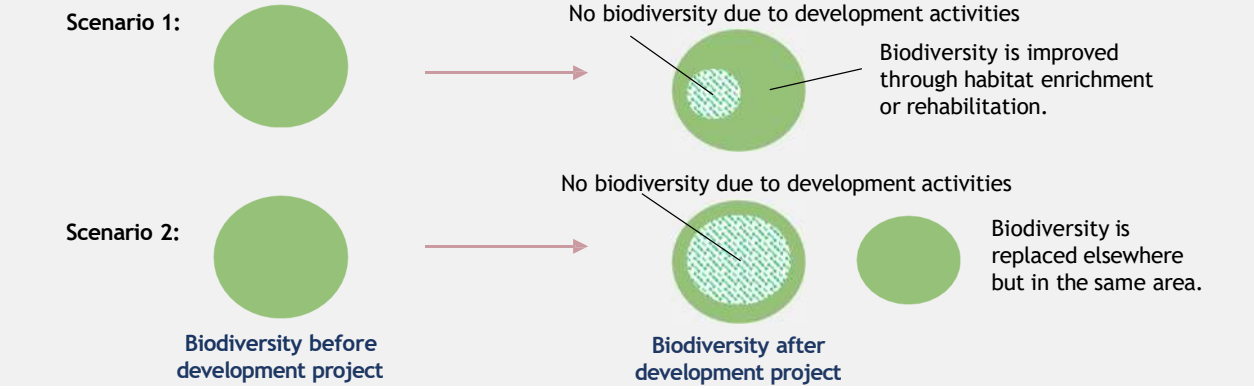


Figure 5-24: "No net loss of biodiversity" implementation scenarios

In general, biodiversity loss due to development projects can be replaced through methods as illustrated in **Figure 5-24**. Scenario 1 shows that biodiversity loss is offset **at the same location** of the development project through habitat enrichment or rehabilitation. Meanwhile, under Scenario 2, biodiversity loss is replaced **at other location** but within the same area of the development.

Biodiversity replacement ~~is~~ has to be made compulsory for planning applications involving the following areas:

i. Environmentally Sensitive Areas where development projects are not permitted based on the ESA NPP4 framework and the RFZPPN2 framework.
ii. Areas within the coastal management protection zone.
iii. Areas with high biodiversity value according to the Coastal Vulnerability Index (CVI) in RFZPPN2.
iv. Sensitive areas identified in the SP, LP, ICZM and other relevant plans.

Pulau Kukup National Park, Johor is the second largest mangrove forest island in the world and is one of the RAMSAR sites that needs to be protected from activities that may reduce its biodiversity value.

Measures to replace the loss of biodiversity due to development projects are:

1. Provide guidelines to strengthen the implementation of biodiversity replacement for the long term. The guidelines should involve stakeholders engagement in their preparation process, and to outline the biodiversity valuation techniques, biodiversity currency, principles, criteria and implementation framework.

2. Ensure that development projects apply mitigation hierarchy managing the impacts on biodiversity and the environment. Development projects must consider avoidance, minimisation and rehabilitation mitigation methods before considering mitigation through offset.

3. Impose biodiversity replacement conditions for development projects in areas with high biodiversity value. The method and level of replacement should be discussed with and approved by, the technical agencies.

Gunung Tebu Forest Reserve, Terengganu

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• State Authority • Department of Environment • State Forestry Department • Local Authority	• Department of Fisheries Malaysia

ACTION SR 2.2D

Regulate land reclamation and activities in coastal areas

Coastal land reclamation practices have widespread environmental, socio-cultural and geopolitical impacts. These activities should be well planned and strictly regulated to prevent the loss and degradation of coastal and marine habitats, including biodiversity value and ecosystem services, which ultimately affect the source of income and quality of life of local people.

Land reclamation of coastal areas also pose a sedimentation and soil erosion risks along the coastline. Therefore, any land reclamation activities in coastal areas must comply with the published guidelines to meet the planning requirements, to consider the environmental sensitivity and to fulfil the imposed development conditions.

The measures in regulating land reclamation in coastal areas are as follows:

1. Land reclamation activities are not allowed in the following areas:
    i. Natural marine and coastal habitats that have been gazetted as Protected Areas.
    ii. Environmentally Sensitive Areas (ESA) Level 1 and Level 2 according to the ESA framework (refer to **Action KD 2.2A**).
    iii. Coastal Protection Zones that have been identified in NPP4 (refer to **Table 5-6** and **Plan 5-11**).
    iv. Areas prohibited for reclamation and high biodiversity value according to RFZPPN2.
    v. Other areas recognised as having high biodiversity, cultural and socioeconomic values.

However, land reclamation are allowed for two (2) types of development as below:

i. Development of infrastructure of national importance (such as ports, airports, coastal reservoirs and power stations).
ii. Development in the interest of national security and safety.

2. Land reclamation may be considered in the Coastal Development Zone but with conditions (refer to **Table 5-6** and **Plan 5-11**).

3. Include the planning for high impact and of national importance coastal reclamation projects in state development plans to ensure that they will be well-planned and in line with land use requirement.

Reclamation project in Johor Bahru, Johor

4. The planning of land reclamation should incorporate studies on the following:

   i. Social and Environmental Cost Benefit Analysis (SCBA) as a basis for evaluating and comparing the benefits and impact of the project as a whole from the economic, social and environmental aspects. Evaluation of biodiversity benefits and ecosystem services should use the Total Economic Value (TEV) method to determine the total value of natural capital that will be affected by the land reclamation project. The assessment should at least takes into account:

      - Impact on coastal erosion and sedimentation determined through coastal hydrological and hydraulic engineering analysis.
      - Impact on coastal natural habitats and marine ecology as well as animal and plant populations.
      - Impact on fishery resources.
      - Impact on income sources and quality of life of local communities.

   ii. Climate change risks, including sea level rise for a period of not less than 100 years.
   iii. The suitability of the design with the existing coastal surrounding.
   iv. The use of reclaimation materials that do not pollute and without negative impact on the environment.
   v. Coastal access and right of way to the local community (except for restricted areas).

5. Make biodiversity replacement compulsory

   Development projects must ensure that the loss of biodiversity in the affected areas will be replaced with a similar biodiversity value to achieve the goal of 'no nett loss of biodiversity'. The level of replacement is based on local biodiversity characteristics and replacement methods must be discussed with, and approved by, technical agencies.

6. Ensure that development proposals involving land reclamation are brought to the National Physical Planning Council (MPFN) for review and approval consideration.

The conservation of coastal areas is important, not only as natural habitats for marine life, but also as contributors socio-economic well-being of the local population. Location: Pulau Perhentian, Terengganu

MAP 5-11: COASTAL DEVELOPMENT AND PROTECTION AREA IN PENINSULAR MALAYSIA AND F.T. OF LABUAN

Coastal Zone Category

- Development Zone
- Protection Zone

Others

- State Capital
- Reclaimed area
- State Boundary

Note:

Development Zone - Can be developed with specific conditions and supporting studies that maybe imposed.
Protection Zone - Considered under conditions and supporting studies.

Source:
- National Physical Plan 4, 2020

Table 5-6: Coastal Protection Zones and Coastal Development Zones

Characteristics	Coastal Protection Zone	Coastal Development Zone
Areas Involved	1. Endangered important habitats : • Bird Stopover Sites • Seagrass Areas • Turtle Landing Sites • Wetlands with unique ecosystem 2. Coastal Environmental Sensitive Areas in RFZPPN2 namely: • Mangrove areas; • Mud Flats; • Freshwater Swamp Forests; • Peat Swamp Forests; • Lowland Forests; • Seagrass areas; • Coral Reef; • Islands; • Turtle Hatchery Sites; • River Terrapin Sites; • Important Bird Areas and • Prohibited Fishing Areas. 3. Coastal ESAs that have been gazetted in Structure Plans and Local Plans. 4. Important habitats identified in other studies.	1. Areas without endangered habitats as described in NPP4 and other studies. 2. Areas outside ESAPP as specified in RFZPPN2 and outside the ESA specified in Structure Plan and Local Plan. 3. Existing and proposed port or terminal areas. 4. Existing reclamation / approved by the State/Federal Government.
Management Approaches	1. Preserve the natural environment within the Protected Zone to enable them to perform their natural functions well. Any development, including land reclamation, that may alter or affect the natural environment in this zone is **not permitted.**	1. Permitted activities can only be carried out in coastal areas within 5km inland and 3 nautical miles beyond the coastline (source RFZPPN2, PLANMalaysia) 2. Implement controlled development and EIA report requirement to ensure all development in the area is productive and pollution-free with minimal disruption to coastal assets.

Continued

Characteristics	Coastal Protection Zone	Coastal Development Zone
Management Approaches (continued)	2. Undertake coastal protection work for areas affected by coastal erosion to protect important coastal habitat out to protect this important habitat. 3. Coastal erosion protection within this zone must adopt environmentally friendly methods such as: • Beach sand reclamation; • Mangrove replanting; and • Installation of geotextile tubes and others. 4. Any type of hard structure coastal protection that could alter the natural condition within the zone is not permitted.	3. Permitted types of development must be in line with the ESA framework, RFZPPN2, state ICZM, and existing and future coastal area guidelines. 4. All proposed development / reclamation projects within this zone in Peninsular Malaysia and F.T. Labuan must be brought to the MPFN for review and approval. 5. Besides satisfying imposed development conditions and requirements, proposed reclamation projects must also consider the following: • The impact of climate change, including sea level rise, for a period of not less than 100 years; • The suitability of the design with the existing shape of the coastline; • The use of uncontaminated reclaimation materials to avoid contamination of coastal and marine natural habitats; and • The right of way for local community to access the beach (except for restricted areas).

AGENCIES INVOLVED

Main Agencies

- PLANMalaysia
- PLANMalaysia@Negeri
- Department of Environment
- State Authority
- Local Authority

Supporting Agencies

- Ministry of Housing and Local Government (KPKT)

STRATEGY
SR 2.3

ENSURE SUSTAINABILITY OF WATER RESOURCES

RELATED SDGs
- SDG6
- SDG15
- SDG12

Malaysia is a country rich in water resources, but need to be well managed to ensure their sustainability. Demand for water supply is expected to increase in line with population growth and the rate of urbanisation. Coverage of current water supply sources in Peninsular Malaysia and F.T. Labuan is 96.6%. Meanwhile, urban areas received 96.7% coverage and rural areas 96.4% (SPAN Water Services Industry Report 2017). In terms of water management infrastructure, as of 2017, the design capacity of water treatment plants was 16.426 million litres per day, with 14.157 million litres of water treated daily. This gives a reserve margin of 13.8%.

The country's water resources are vulnerable to the climate crisis, which is expected to result in reduced river water flow and dam water levels in the future, especially during dry season. Weather pattern is also changing towards the extreme with heavier rains in shorter period of time, causing an increase in flood intensity. In addition, river pollution also affects water sources and can cause water supply disruption, especially in urban areas.

Thus, effective and innovative water resource management is one of the main focuses in NPP4 to ensure sustainability of water resources in line with the National Water Resources Policy 2010-2050. This Strategy SR 2.3 emphasises on the need to implement effective management of water catchment areas and river basins to ensure adequate clean water supply and to control pollution of water resources. Attention is also given to the aspects of provision of water management infrastructure, the need to explore alternative water supply sources and the importance of implementing water reuse practices.

BRIEF FACTS

National Water Resources Policy 2010-2050

Ensuring the safety and sustainability of water resources must be a national priority in ensuring adequate and safe water supply for all through sustainable use, conservation and effective management of water resources. This can be achieved through collaborative efforts involving stakeholders. The three (3) principles contained in this Policy are:

i. Water Resources Security
ii. Water Resources Sustainability
iii. Collaborative Governance

BRIEF FACTS

Water Resources in Malaysia

972.78 bcm annual rainfall (runoff, sublimation & groundwater compensation)

63.45 bcm of groundwater storage (aquifer)

3,345 million litres /day man-made reservoirs (dams)

Source: National Water Resources Study 2000 - 2050 (2010)

BRIEF FACTS

Water Supply Situation in Malaysia

Demand for water supply in Malaysia is estimated to **increase by 1.2% annually** from 17.4 billion litres per day to 21.1 billion litres per day by 2050.

Source: National Water Resources Study 2000-2050

82.4% of the country's water supply for domestic, industry and agriculture uses depend on rivers, **16.1%** from dams and **1.5%** from groundwater.

42 districts expected to experience **water stress** by 2030, especially in the West Coast of Peninsular Malaysia due to inability of existing sources of water supply to meet demand.

Source: Malaysia Water Industry Guide, 2018

The pollution of the Kim-Kim River in Johor in 2019 affected the health of 6,000 local residents and schoolchildren. In 2019, the Klang Valley area experienced frequent water supply disruptions due to pollution of Sungai Selangor and Sungai Semenyih in Selangor.

Source: Newspapers and media

The climate crisis is expected to result in a prolonged episode of drought in which there is a **36.3% reduction in rainfall** over a 5 to 10 year return period. The Sungai Dungun and Sungai Kemaman basins in Terengganu are expected to be reduced by up to 48%.

Source: 3rd National Communications Report, 2019

The per capita water consumption of Malaysians is 201 litres per day, higher than the minimum rate of 165 litres per day recommended by the World Health Organization (WHO).

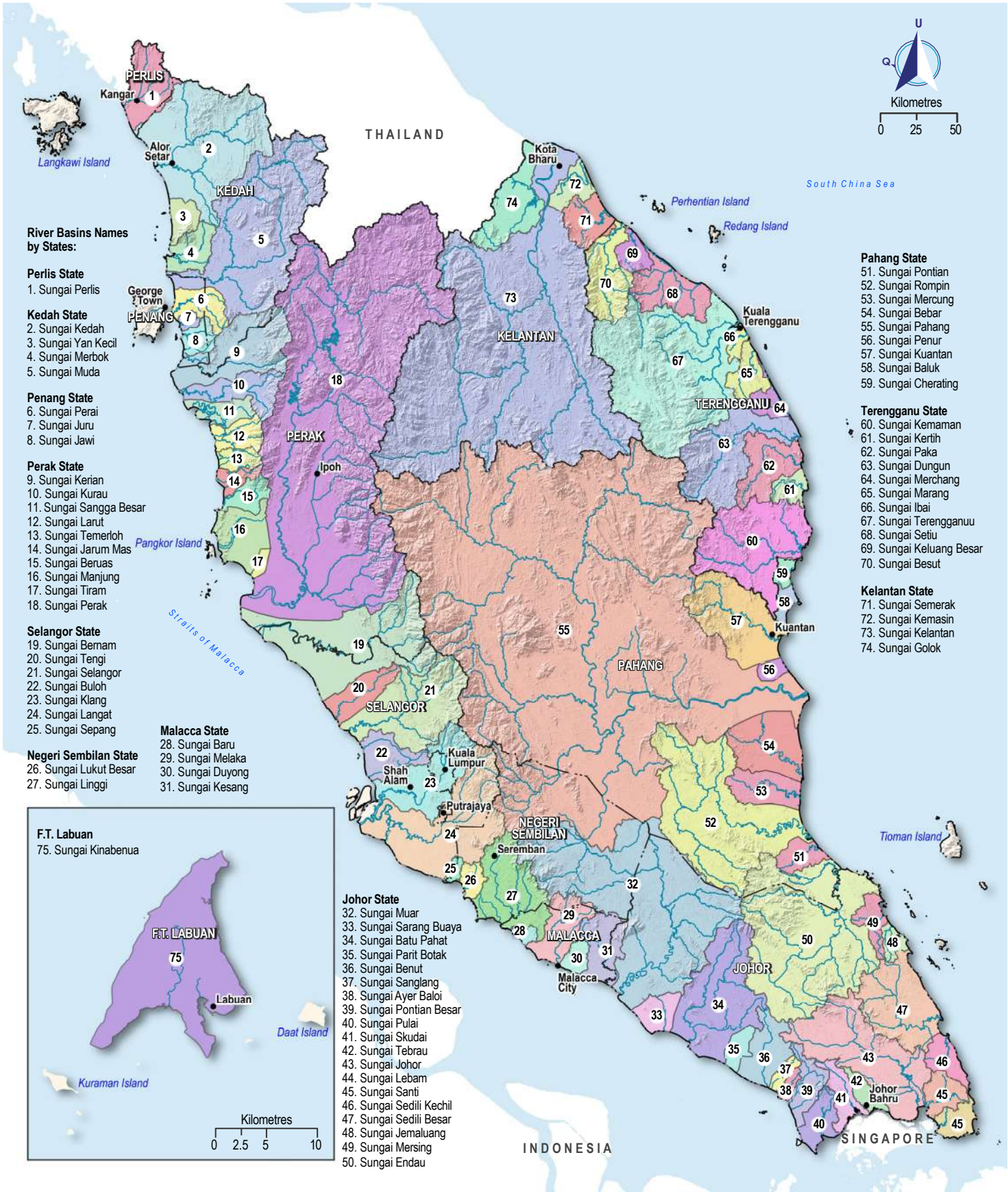
Source: National Water Services Commission

ACTION SR 2.3A

Implement the Integrated River Basin Management approach for river basins planning and development

There are a total of 1,235 river basins in Peninsular Malaysia, of which 74 are major river basins, and one in F.T. Labuan. River basins are areas with dynamic human activities and land uses, and thus often at risk to water pollution caused by sewage treatment, industrial effluent discharge, solid waste disposal and soil erosion.

Integrated River Basin Management (IRBM) is an approach in managing river basins that involves the conservation, management and development of water, land use and other resources. Effective river basin management can achieve economic and social benefits without compromising the river basin system (refer to **Plan 5-12**).



River Basins Names by States:

Perlis State
1. Sungai Perlis

Kedah State
2. Sungai Kedah
3. Sungai Yan Kecil
4. Sungai Merbok
5. Sungai Muda

Penang State
6. Sungai Perai
7. Sungai Juru
8. Sungai Jawi

Perak State
9. Sungai Kerian
10. Sungai Kurau
11. Sungai Sangga Besar
12. Sungai Larut
13. Sungai Temerloh
14. Sungai Jarum Mas
15. Sungai Beruas
16. Sungai Manjung
17. Sungai Tiram
18. Sungai Perak

Selangor State
19. Sungai Bernam
20. Sungai Tengi
21. Sungai Selangor
22. Sungai Buloh
23. Sungai Klang
24. Sungai Langat
25. Sungai Sepang

Negeri Sembilan State
26. Sungai Lukut Besar
27. Sungai Linggi

Malacca State
28. Sungai Baru
29. Sungai Melaka
30. Sungai Duyong
31. Sungai Kesang

Johor State
32. Sungai Muar
33. Sungai Sarang Buaya
34. Sungai Batu Pahat
35. Sungai Parit Botak
36. Sungai Benut
37. Sungai Sanglang
38. Sungai Ayer Baloi
39. Sungai Pontian Besar
40. Sungai Pulai
41. Sungai Skudai
42. Sungai Tebrau
43. Sungai Johor
44. Sungai Lebam
45. Sungai Santi
46. Sungai Sedili Kechil
47. Sungai Sedili Besar
48. Sungai Jemaluang
49. Sungai Mersing
50. Sungai Endau

Pahang State
51. Sungai Pontian
52. Sungai Rompin
53. Sungai Mercung
54. Sungai Bebar
55. Sungai Pahang
56. Sungai Penur
57. Sungai Kuantan
58. Sungai Baluk
59. Sungai Cherating

Terengganu State
60. Sungai Kemaman
61. Sungai Kertih
62. Sungai Paka
63. Sungai Dungun
64. Sungai Merchang
65. Sungai Marang
66. Sungai Ibai
67. Sungai Terengganuu
68. Sungai Setiu
69. Sungai Keluang Besar
70. Sungai Besut

Kelantan State
71. Sungai Semerak
72. Sungai Kemasin
73. Sungai Kelantan
74. Sungai Golok

F.T. Labuan
75. Sungai Kinabenua

MAP 5-12: MAIN RIVER BASIN AREAS IN PENINSULAR MALAYSIA AND F.T OF LABUAN

River Basin Location
- River Basin
- River

Others
- State Capital
- State Boundary

Source:
- Irrigation and Drainage Department, 2018

Note : River basin is the land area over which surface run-off flows through river, streams or lakes and ends at sea through river mouth, estuary and delta.

Cross Border River Basins Names by States:

Perlis State
1. Sungai Perlis

Kedah State
2. Sungai Kedah

Penang State
3. Sungai Perai
4. Sungai Jawi

Perak State
5. Sungai Kerian

Selangor State
6. Sungai Bernam
7. Sungai Buloh
8. Sungai Klang
9. Sungai Langat
10. Sungai Sepang

Negeri Sembilan State
11. Sungai Linggi

Malacca State
12. Sungai Melaka
13. Sungai Kesang

Johor State
14. Sungai Muar
15. Sungai Endau

Pahang State
16. Sungai Pahang

River Basins Crossing Malaysia-Thailand border:

Kelantan State
17. Sungai Golok

MAP 5-13: CROSS BORDER RIVER BASIN AREAS IN PENINSULAR MALAYSIA

River Basin Location
- River basin
- River

Others
- State Capital
- State Boundary

Source:
- Irrigation and Drainage Department, 2018

Note : River basin is the land area over which surface run-off flows through river, streams or lakes and ends at sea through river mouth, estuary and delta.

The measures in implementing IRBM in the planning and development of river basins are:

1. Implement the IRBM master plan and monitor its performance.

   The IRBM master plan serves to manage river basin through coordinated efforts between the government agencies involved. To strengthen the IRBM management mechanism, the following are proposed:

   i. The establishment of the IRBM Implementation Committee is placed under the jurisdiction of the State Government. The function of this committee is to implement the strategies of the IRBM master plan and monitor their performance. For river basins that cross state borders, sharing of responsibilities between the agencies must be encouraged and coordinated.

   ii. Local authorities and government agencies need to adopt the Water Resource Conservation Plan published by DID for several major river basins through the Water Balance Development Programme for National Water Resources Management.

   iii. Prepare a Conduct an Action Plan Study on Integrated River Basin Land Use Development to guide systematic and holistic river basin land use planning and to reduce disaster risks. The results of this study need to be integrated into SP and LP so that spatial and physical planning for the plan areas include integrated planning of river basins.

BRIEF FACTS

DID is in the process of producing more IRBM studies. To date, there are 24 IRBM studies that have been completed, namely:

1. Sg. Klang River Basin, Selangor
2. Sg. Langat River Basin, Selangor
3. Sg. Selangor River Basin, Selangor
4. Sg. Bernam River Basin, Perak & Selangor
5. Sg. Perak River Basin, Perak
6. Sg. Kerian River Basin, Perak
7. Sg. Melaka River Basin, Melaka
8. Sg. Linggi River Basin, Negeri Sembilan
9. Sg. Kedah River Basin, Kedah
10. Sg. Muda River Basin, Kedah
11. Sg. Merbok River Basin, Kedah
12. Sg. Perlis River Basin, Perlis
13. Sg. Perai River Basin, Pulau Pinang
14. Sg. Bandau River Basin, Sabah
15. Sg. Muar River Basin, Johor, Pahang, Melaka, Negeri Sembilan
16. Sg. Pahang River Basin, Pahang
17. Sg. Kuantan River Basin, Pahang
18. Sg. Kemaman River Basin, Terengganu
19. Sg. Terengganu River Basin, Terengganu
20. Sg. Kelantan River Basin, Kelantan
21. Sg. Skudai River Basin, Johor
22. Sg. Tebrau River Basin, Johor
23. Sg. Padas River Basin, Sabah
24. Sg. Miri River Basin, Sarawak

Source: Department of Irrigation and Drainage, 2020

Sungai Pahang, Pahang

iv. The local community needs to be involved in IRBM to leverage on local collaboration and knowledge through approaches such as the Public Outreach Programmes (POP) and community-based natural resource management programmes. Community Based Organisations (CBOs), local champions and representatives from the Village Community Management Council (MPKK) can be made members of the IRBM Implementation Committee.

2. Control land use and development activities in water catchment areas

Water catchment areas are the main areas for water retention. Water catchment areas need to be managed separately in order to ensure high quantity and quality of water for consumers and for natural ecosystems. Integrated management and development control of water catchment areas are essential to preserve the areas and to control disaster risks (refer to **Plan 5-14**). Initiatives to control development and activities in water catchment areas are:

i. Identify suitable areas within HSK to be classified as Water Catchment Forests These must include all areas upstream of gazetted river basins that are sources of raw water. For water catchment areas that are still not gazetted, Water Catchment Forests to be established at strategic upstream locations.

ii. Gazette catchment areas for existing and proposed dams to prevent unsuitable development from being developed in the areas.

iii. Identify degraded forests and barren land in water catchment areas for conservation and reforestation for the purpose of land rehabilitation.

iv. Ensure water quality at the water intake points does not exceed Class IIA (water requires conventional treatment) of the National Water Quality Index through strict development control to ensure compliance to existing guidelines and legislations.

v. Development of new industries and land use activities that are potential sources of water pollution is not allowed in water catchment areas. Existing industries need to adopt the best environmental management measures to avoid water pollution.

vi. Install a continuous pollution monitoring mechanism to establish an early warning system at water treatment plant intake points. This mechanism needs to use the latest technology through the setting up of stations to detect odor and pollutants. The stations need to be built in strategic locations and priority should be given to critical areas especially downstream of premises with high pollution risks.

BRIEF FACTS

There are several types of dams in Malaysia built by various agencies for different purposes:

1. Irrigation, drainage and flood mitigation dams
2. Agriculture dams
3. Recreational dam
4. Hydroelectric dams
5. Water supply dams
6. Private dams

Source: Ministry of Environment and Water, 2020

Bakun Hydroelectric Dam, Sarawak

MAP 5-14: WATER RESERVOIR IN PENINSULAR MALAYSIA AND F.T OF LABUAN

Water Reservoir Types

- Existing Dam
- Proposed Dam
- Dam Reservoir
- Water Body

Others

- State Capital
- State Boundary

Source:

- National Water Service Commision, 2019
- Department of Environment and Water, 2020

3. Conserve and control development along river riparian reserves and corridors

The conservation of river reserves is important because they act as buffer zones that provide various ecosystem services such as surface water flow control, pollutants filtration and natural habitat space. The conservation and development control of the river riparian reserves and corridors can be implemented based on the concept of 'Make Room for Water'. This concept involves the conservation of river reserves to provide sufficient space for river channels to accommodate surface runoff. The National River Trail Programme by KASA (refer **Box 5-19**) can be integrated with the following river reserve management measures:

i. Gazette river reserves under Section 62, National Land Code and clearly indicate the reserve areas in LP. For states with Water Enactment, river reserves can be gazetted as protection zones under the Water Enactment, for example in Selangor under Section 28 of the LUAS Enactment 1999.

ii. The minimum width of river reserve must be as shown **Table 5-7**.

Table 5-7: Minimum width of river reserve

River channel width (metre)	Minimum width of river reserve on both river banks (metre)
More than 40	50
30 - 40	40
20 - 30	20
10 - 20	10
Less than 5	5

Source: Department of Irrigation and Drainage, 2009

iii. Use SP, LP and SAP as control documents for development activities at state and local levels. This can be done by identifying river reserves that are suitable to be developed as recreational areas through provision of trails and river beautification activities.

iv. Restore green areas along the river by replacing impervious surfaces such as concrete paths to natural riparian zones to increase attractiveness to residents living along the river.

v. Create dual function linear gardens or rain gardens in the riparian zone to retain rain water during rainy season to prevent flood and as recreational area during other seasons.

The provision of river reserves is important in ensuring the natural importance of rivers

Box 5-19: National River Trail Programme

The National River Trail Programme (DSK) is an initiative by the Ministry of Environment and Water (KASA) to prevent river water pollution by using nature-based solutions at the source. Through the construction of trails by the river, it will indirectly encourage leisure activities such as picnics, fishing and cycling among the local community and foster awareness of the importance of the river. DSK also has the potential to contribute to the development of local ecotourism.

The programme will be conducted in collaboration with stakeholders such as the local community, non-governmental organisations and the private sector. The programme also include various other components including river water quality research, river education, tree planting and natural landscaping to maintain the sustainability of rivers. The DSK programme targets the establishment of 10,000 kilometres of river trails nationwide by 2030. In 2020, pilot projects have been undertaken at several rivers such as Sungai Pengkalan Datu in Kelantan and Sungai Damansara in Selangor.

Pengkalan Datu River Trail in Kubang Kerian, Kelantan launched in October 2020

AGENCIES INVOLVED

Main Agencies

- Ministry of Environment and Water (KASA)
- Department of Irrigation and Drainage
- Forestry Department of Peninsular Malaysia

Supporting Agencies

- PLANMalaysia@Negeri
- Department of Environment
- Local Authority

ACTION SR 2.3B

Control pollution loads and restoring river water quality

Each river in Malaysia has its own limited assimilative capacity to absorb pollution loads depending on the size and depth of the river. Any pollution control and effluent discharge systems must be developed based on the capacity of the river using the Total Maximum Daily Load (TMDL) approach. Through TMDL, river pollution will be controlled by setting water quality targets and limiting pollution loading of the river.

Measures to control the pollution load and restore river water quality are:

1. Set water quality targets for rivers

Water quality target must be set for each river in the river basins. For water catchment areas upstream of river basins, the river water quality should be ~~in~~ Class I (under natural conditions) as per the National Water Quality Standards for Malaysia. For water catchment areas upstream of water intake point, river water quality must be at least ~~in~~ Class IIA (water requires conventional treatment).

BRIEF FACTS

River Water Quality in Malaysia

Of the 638 rivers monitored, 51 rivers were found to be polluted at Class III (water requires intensive treatment; 23 rivers), Class IV (only for irrigation purposes; 27 rivers) and Class V (severely polluted water; 1 river)

Source: Environmental Quality Report, Department of Environment, 2018

2. Conduct a Study on Total Maximum Daily Load (TMDL) to identify pollution load

For rivers with water quality below the target set in action 1 above, especially those with critical pollution level, will require TMDL study. This study needs to take into account the sources of pollution that could potentially contribute to the pollutant loading of the river. The TMDL study needs to be standardised for all river basins. The TMDL pilot study for Sg. Semenyih conducted by the Department of Environment in 2019 should be used as a guide and basis for the development and implementation of TMDL in other river basins in Malaysia (refer to **Box 5-20**).

BRIEF FACTS

Total Maximum Daily Load Amount (TMDL)

The Total Maximum Daily Load (TMDL) determines the maximum amount of pollutants that can be accepted by a body of water without affecting water use or set water quality targets.

Source: Water and Marine Division, Department of Environment (2021)

Box 5-20: Case Study: TMDL study for Sungai Semenyih, Selangor

TMDL study was conducted for the first time in Malaysia to develop and implement a pollution load reduction programme in Sg. Semenyih and Sg. Beranang as well as to identify and resolve technical and institutional challenges.

This study has formed a framework for the implementation of pollution load reduction programme in Sg. Semenyih and will be used as a guide to other TMDL studies in other river catchments in Malaysia.

Sg. Semenyih Profile:

- Selection factors: Has a major water treatment plant for water supply to the Klang Valley, Selangor and Putrajaya.
- Location: Selangor
- Catchment area: 1,987.7 sq km, 78km long and 20km to 51.5km wide.

Sg. Semenyih River is one of the main rivers in the Semenyih basin. The river system in this basin crosses two (2) states, which are Selangor and Negeri Sembilan.

Six (6) strategies have been formulated for the implementation of TMDL and pollution load control in the Semenyih basin. These strategies cover the aspects of pollution control, public awareness, legislation, financial incentives and capacity building.

The action plan will also be implemented at the federal, state and district levels according to the following timeframes:

- Short (1 to 2 years)
- Intermediate (2 to 5 years)
- Long (5 to 10 years)

Sg. Semenyih, Selangor

AGENCIES INVOLVED

Main Agencies

- Ministry of Environment and Water (KASA)
- Department of Irrigation and Drainage
- Department of Environment
- National Water Services Commission (SPAN)
- Local Authority

Supporting Agencies

- State Water Regulatory Agency
- Department of Agriculture
- State Forestry Department

ACTION SR 2.3C

Apply the concept of 'Sponge City' in municipal water management

Overall, the average annual rainfall for the states in Peninsular Malaysia is high at 32,430 mm (DID, 2017). This makes rainwater has the potential to be used as an alternative water source that can be used during water supply disruptions or during the dry season. The concept of 'Sponge City' can be adopted in the implementation of large-scale rainwater reuse project. Sponge City is a comprehensive concept in managing the water cycle in urban areas as well as in mitigating the risk of flash floods (read with **Action SR 1.5B**)

This concept serves as an ecosystem -based, EbA adaptation in sustainable urban management. It also helps reduce the risk of water pollution, address the problem of heat islands and improve the provision of recreational areas and green areas which in turn improves the quality of life of urban dwellers and increases biological diversity.

The steps that need to be implemented to apply the concept of Sponge City are:

1. Determine the feasibility study of Sponge City

   Sponge City feasibility studies should be conducted for cities that often experience flash floods and serious water shortages. Suitable cities need to be identified to become the pilot projects to undergo transformation and renovation as Sponge City.

2. Adopt sustainable urban drainage system

   Sustainable Urban Drainage System (SUDS) such as Bio-Ecological Drainage (BIOECODS) is an environmentally friendly concept to control rainwater runoff. Methods that can be used include rain-garden, bioswales, constructed wetlands and bioremediation.

   The Manual for Environmentally Friendly Drainage (MSMA) Edition 2.0 published by the Department of Irrigation and Drainage (DID) should be fully adopted for all new development projects to ensure 'zero net runoff'. For existing development, environmentally friendly drainage systems need to be adapted taking into account their current conditions and land use potential.

BRIEF FACTS

The function and role of Sponge City in the urban drainage system

- During floods: Rapid release of rainwater
- During rain: Absorption of runoff
- Normal hours: Water treatment/ purification and storage
- During drought: Release of water for supply

Source: *Discussion on Sponge City construction under the circumstance of urban waterlogging*, Lyu et al. 2017

Rain gardens help in collecting rainwater in addition to adding aesthetic value to an area

3. Collaborate among stakeholders in the planning and implementation of Sponge City

   Collaboration of various parties including the government, private sector, local communities, NGOs and academics is required to ensure the effective planning and implementation of Sponge City. The role and cooperation of key agencies are important since urban planning, integrated flood management and climate adaptation are cross-sectoral in nature.

4. Provide appropriate technical expertise and support on an ongoing basis to assist in the implementation of Sponge City

   The implementation of Sponge City in each city may differ depending on local characteristics and needs. Therefore, the appropriate type of support needs to be identified based on the Sponge City implementation needs of a city. These include technical expertise, smart partnerships, technology and knowledge transfer, and investment opportunities with the private sector.

Figure 5-25: *Sponge City Concept*
Sumber : *https://focus.cbbc.org/*

Box 5-21: Case Study: Sponge City Project, China

In China, cities like Beijing and Jinan often experience water shortages even after floods. In 2019, China selected 30 cities as sites for Sponge City pilot projects as a comprehensive measure to address various issues including flash floods, water shortages, water pollution, degradation of green areas and urban sprawl. Provision is also made for the implementation of water management and retrofit strategies in stages.

Target implementation of Sponge City at the national level

By 2020, 80% of cities will should absorb and reuse 70% rainwater as public water supply.

International cooperation in the implementation of Sponge City

Various countries such as Russia, the United States and Indonesia began working with architects from China to learn this method of urbanisation. Every city in China has set different methods to achieve the target depending on the local conditions. For example, Shanghai set a target of 400,000 square meters of green roof gardens due to land constraints to produce new green areas.

Source: *China's Sponge City Program, Austrade, 2016 & SuDS & Sponge Cities: A Comparative Analysis of the Implementation of Pluvial Flood Management in the UK and China,* Lashford.C, et al, 2019

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Department of Irrigation and Drainage • Department of Environment • Local Authority	• Ministry of Environment and Water (KASA) • PLANMalaysia

ACTION SR 2.3D

Explore sustainable groundwater resources

Groundwater reserves in Peninsular Malaysia are estimated at 1.99 trillion cubic meters while F.T. Labuan has 1.5 billion cubic meters, yet only accounts for less than 3% of the country's water supply. In Kelantan, groundwater makes more than 40% of public water supply (National Water Resources Study, 2000-2050). Groundwater resources have the potential to be utilised as alternative water sources during emergencies and in areas that often experience water supply rationing.

The measures in developing groundwater resources sustainably are:

1. Intensify the mapping of groundwater resources

   The National Groundwater Reserve Assessment study by JMG has identified the amount of groundwater storage and sustainable extraction rates in certain areas in Peninsular Malaysia (refer to **Plan 5-15**). Other areas with groundwater potential need to be identified and mapped too.

   In the long run, a database containing detailed hydrogeological maps and groundwater information should be made available for use by stakeholders. This is to ensure that groundwater exploration is done systematically in order to provide a continuous supply.

2. Map recharge zones in SP and LP, and specify land use details.

   SP and LP need to identify potential groundwater intake point catchment areas and recharge zones for unconfined and confined aquifers as ESA Level 3. These areas need to be identified, demarcated and subjected to specific land use management to maintain permeability

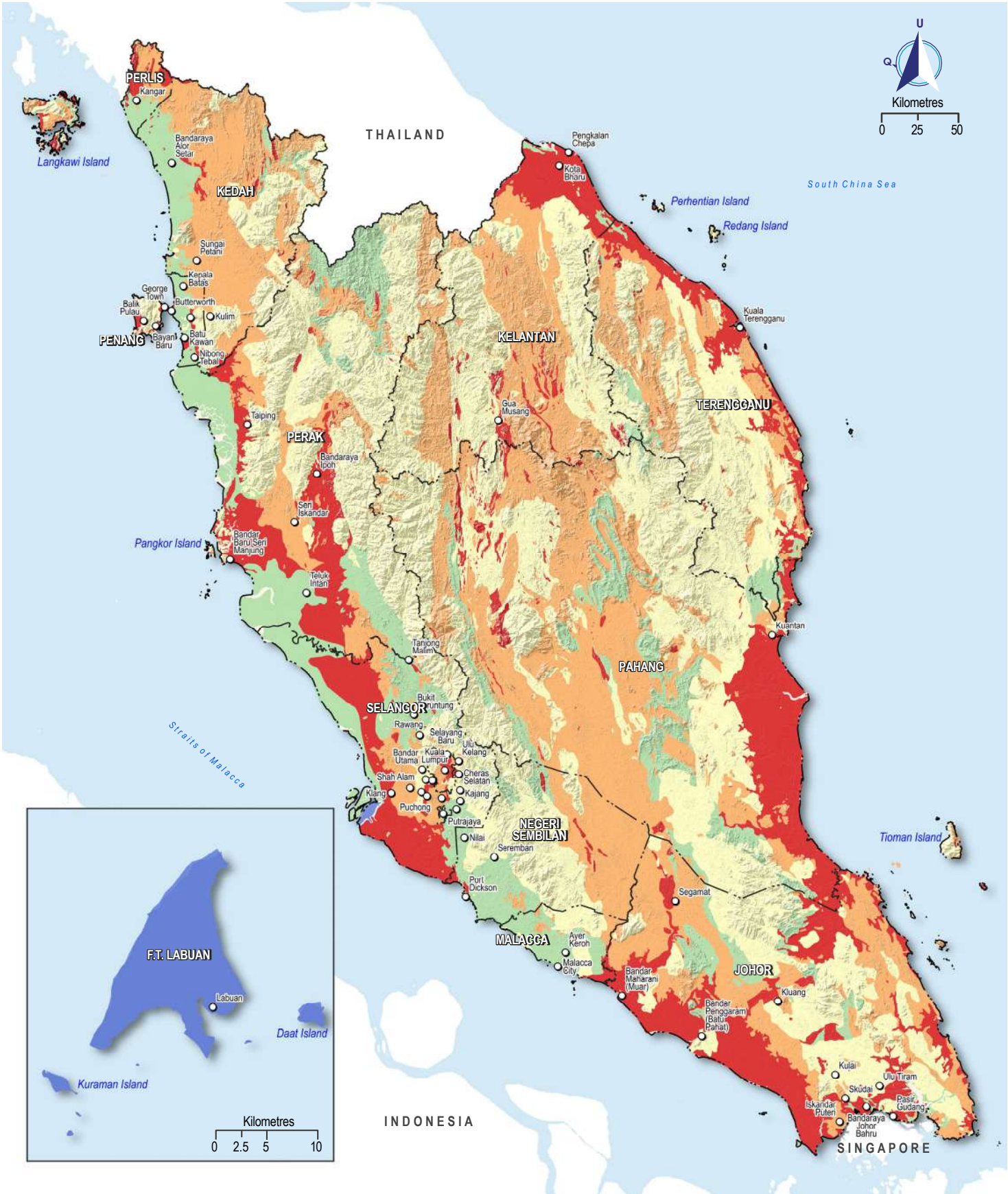
   to allow rainwater to seep into the recharge zone and maintain the water cycle. The type and level of development in these areas must be planned and implemented carefully, and ensure the use of environmentally friendly building materials with permeable pavement and grass surfaces.

3. Establish a groundwater protection zone

   Areas identified as having groundwater resources should be recognised as groundwater protection zones based on abstraction structures such as boreholes and wells to ensure that this water supply is safe to use. A management plan should also be prepared.

   The entire groundwater recharge areas should be recognised as Resource Catchment Protection Zone including catchment areas for confined aquifers. Land use and pollution control in Resource Catchment Protection Zones needs to be developed and implemented.

AGENCIES INVOLVED	
Main Agencies	**Supporting Agencies**
• Ministry of Energy and Natural Resources (KeTSA) • Department of Minerals and Geosciences Malaysia (JMG) • State Water Authority	• Department of Environment • Department of Irrigation and Drainage • National Hydraulic Research Institute of Malaysia (NAHRIM) • PLANMalaysia • Local Authority



MAP 5-15: GROUNDWATER/ AQUIFER SOURCE PENINSULAR MALAYSIA AND F.T OF LABUAN

Aquifer Level

- Very High
- High
- Moderate
- Low
- No groundwater source

Others

- Main towns
- State Boundary

Note : Aquifer level is the underground layer or geological formation that stores and produces water with useful quantity for well use.

Source:
Department of Mineral and Geoscience, 2005

ACTION SR 2.3E

Strengthen water resources management

The management of existing water resources needs to be strengthened to ensure adequate water supply for the use of the population while reducing dependence on existing and future water resources. This Action SR 2.3E outlines various measures to ensure sustainable and quality water resources management can be achieved.

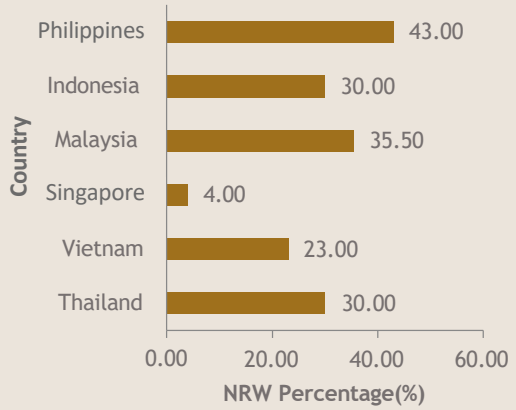
The measures that need to be taken to strengthen water resources management are:

1. Reduce Non-Revenue Water

   Non-Revenue Water (NRW) is one of the indicators to assess the management efficiency of a water supply system. NRW is commonly caused by water pipe leakages, faulty and outdated water meters, water theft and illegal water tapping, and even the use of outdated technology to identify the location of water leaks (refer to **Figure 5-26**). The average value of NRW in Malaysia recorded in 2019 is 35.5% and among the highest compared to other ASEAN countries. The National Water Services Commission (SPAN) targets NRW reduction to 31%.

BRIEF FACTS

Percentage of Non-Revenue Water in Malaysia compared to other ASEAN countries



Malaysia recorded a high NRW percentage of 35.5% compared to neighboring countries such as Singapore (4.0%) and Indonesia (30.0%)

Source: National Water Services Commission, 2019

Pipe leaks are among the causes of NRW

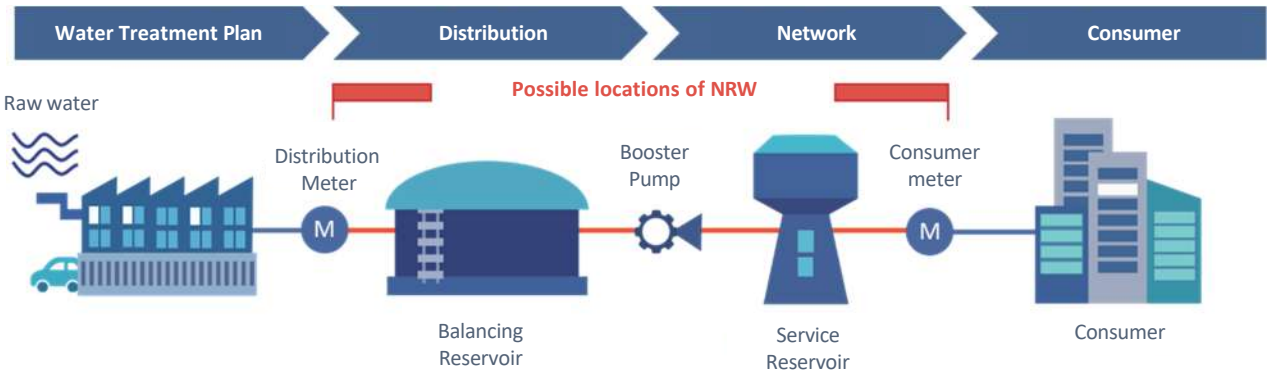


Figure 5-26: Possible locations of NRW in the water supply system
Source: Water Malaysia, Malaysian Water Association, 2019

In 2018, a two-level NRW reduction approach was introduced (**Table 5-8.**) as part of the national NRW reduction initiatives by focusing on:

i. Replacement of old asbestos cement water pipes to new pipes that are safer and leak-resistant;
ii. Replacement of old water meters to new and efficient meters;
iii. Establishment of District Metering Zone (DMZ);
iv. Establishment of databases and digital mapping of water resources networks;
v. Repair and replacement of damaged water tanks; and
vi. Utilisation of the latest technology faster detection of water pipe leaks and hidden water leaks.

Table 5-8: Types of approaches to reduce NRW

State	Level I Approach	Level II Approach
States	States with NRW rates above 40% are: • Pahang • Kedah • Kelantan • Perlis • Sabah	States with an NRW rate of less than 40% are: • Melaka • Pulau Pinang • Johor • Terengganu • Perak • Selangor • Negeri Sembilan • F.T. Labuan • Sarawak
Implementation of the approach	Grant funding to water operators	Reimbursement of 50% to 75% (~~of~~ from the investment value to reduce NRW) if the target is achieved and confirmed by SPAN.
Relevant agencies	Water Supply Department & Ministry of Environment and Water (KASA)	National Water Services Commission (SPAN)

Note:
The list of states specified for the Level 1 and Level 2 approaches is based on the NRW Rate of each state in 2017 from SPAN

Source: National Water Services Commission, 2018

2. Prevent pollution of water supply sources to avoid disruptions to consumer water supply and increased cost of water treatment.

3. Distribute water resources optimally between states to enable states with abundant water resources to be given permission to sell raw water to states with less water resources.

4. Expanding Improve downstream raw water collection systems by including new technology and approaches such as off-river water storage to ensure sustainability of water supply and to reduce dependence on dam water.

5. Utilise groundwater sources as an alternative water source

   As noted in **Action SR 2.3D**, groundwater has the potential as an alternative source of water source. This source should be used only during emergencies such as during droughts or in the event of contamination of the main water supply source. This is because excessive and uncontrolled groundwater extraction is likely to cause other geological disasters such as soil subsidence and saltwater intrusion.

6. Undertake saltwater desalination

   In areas where there is still a shortage of water, saltwater desalination can be considered as an alternative source of water. The concept of seawater desalination can be implemented in Malaysia but needs to begin in small scale such as on resort islands that lack surface water ~~re~~sources but receive a high number of tourists. The desalination plant can be operated using renewable energy to reduce the cost of energy consumption for the desalination process.

7. Upgrade and improve sewage treatment plants to enable wastewater reuse.

   In line with the emphasis on wastewater reuse, the administrative and operational aspects of sewage treatment plants also need to be enhanced in the following ways:

   i. Receive industrial trade effluent at public sewage treatment plants to reduce enforcement and monitoring costs by relevant agencies, as well as to integrate treatment plants in the future.

   ii. Develop the necessary policies, legislation and guidelines in relation to trade effluent and sewage. Wastewater reuse must be in accordance with the standards set for drinking water quality by relevant agencies and authorities such as SPAN and the Ministry of Health Malaysia.

   iii. Integrate sewage treatment plants and water treatment plants for the purpose of sewage effluent reuse by targeting 1/3 of bio-effluent to be recycled from the sewerage treatment process in line with the Green Technology Master Plan 2017-2030.

BRIEF FACTS

Wastewater treatment technology

It is targeted that by 2030 100% sludge and 33% treated effluent are recycled.

Source: Green Technology Master Plan 2017-2030 (2017)

8. Conduct a study on National Water Spatial Management Plan

This measure translates the strategy of the National Water Resources Policy that identify the need to prepare a physical plan to conserve and protect water resources. The preparation of this plan should involve the mapping of sensitive water resources and supported by the development of a database to provide information on water resources sensitivity level to be considered in the planning process.

BRIEF FACTS

National Water Resources Policy

NWRP has outlined Key Focus 1: Water Resources Security where its implementation is supported by a series of –Thrusts, Targets, Strategies and Strategic Action Plans. The need to prepare plans for the purpose of conservation and protection of water resources can be found in the following sections:

Thrust 2: Water Resources Integrity

Target 6:
Develop Water Resources Conservation Plans for Strategic, Sensitive and Critical Water Resources Areas and Bodies.

Strategy 9:
Determine resiliency of water bodies and areas to stress, risks and hazard events.

Strategy 10:
Determine measures based on adaptability for controlled development in areas earmarked for development.

Strategic Action Plan (PTS):
PTS18: Profile characteristics and nature of stress, risks, threats and hazards;
PTS19: Identify water resources conservation options, targets and action plans;
PTS20: Identify levels and classifications of sensitivity and delineate sensitive areas and zones; and
PTS21: Identify key catchment areas and zoning options

Strategic Action Plan (PTS):
PTS22: Profile measures to aid adaptability;
PTS23: Develop water resources sensitivity databases and maps; and
PTS24: Incorporate data related to sensitivity in physical and national development planning process, including the evaluation, review and assessment of development programmes and projects.

Source: Dasar Sumber Air Negara (DSAN), 2012

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• National Water Services Commission (SPAN) • Department of Environment • State Water Management Agency • PLANMalaysia • State Authority • Local Authority	• Ministry of Environment and Water (KASA) • Ministry of Health Malaysia(MOH) • PLANMalaysia@Negeri • Department of Irrigation and Drainage

ACTION SR 2.3F

Implement water recycling

The process of water reuse can be carried out on individual basis through the installation of water treatment systems either at homes, in office buildings or commercial buildings. This process can also be done on a large scale involving planned new development. For existing developments, the retrofitting of the system can be implemented. Water reuse can reduce the demand for treated water resources.

The measures to implement water reuse are:

1. Reuse rainwater

Rainwater reuse can be implemented through the installation of the Rainwater Harvesting and Reuse System (SPAH). The use of this system is now mandatory for every new development in Kuala Lumpur, Perak, Selangor, Kelantan and Melaka based on development approval at the local authority level for these states. The use of this system should be expanded to all states in Peninsular Malaysia and F.T. Labuan on a larger scale.

SPAH can treated water consumption and overcome water supply problems. The system should also be used in an integrated manner in buildings with large roof surface such as buildings in industrial areas. Subsidies can also be given to private premises to install SPAH. **Box 5-22** shows the subsidy for private SPAH installation in foreign countries.

Box 5-22: Case Study: Subsidies for SPAH installation in Spain, Australia and Germany

In Spain, residents who install rainwater harvesting systems on their own premises are eligible for a subsidy of up to €1,200.

Source: Domènech et. al, 2011

In Australia, several incentives are available through rebates for the installation of rainwater harvesting systems such as the Home Water Wise Rebate in Queensland.

Source: Ahmed et. al, 2011

In Germany, 1/3 (or a maximum of €2,000) of the total rainwater harvesting system installation cost is subsidised by the government.

Source: Schuetze, 2013

2. Reuse greywater as an alternative water source (non-drinking source)

Greywater is wastewater from washing machines, sinks and bathrooms that is without fecal contamination. Recycled greywater can be used as alternative source of water for other purposes than drinking such as toilet flushing, landscaping, fire fighting and car washing.

Greywater recycling system reprocessing technology and equipment can be installed in individual homes and other existing buildings. **Box 5-23** and **Figure 5-27** show a schematic example of greywater reuse in foreign countries. Water reuse can also be carried out through the use of water from water catchment ponds, on-site detention tanks and retention ponds. However, these infrastructure needs to be modified for large-scale or comprehensive use. Water from water catchment ponds or on-site detention tanks can be reused as an alternative water source as the water is collected from surface rainwater runoff.

***Box 5-23**: Installation of treatment equipment for greywater in Italy*

Wastewater generated from from personal hygiene activities is known as greywater. It can be reused after being treated via various treatment processes such as biological treatment, ultra filtration and ultraviolet (UV) sterilisation. Treated greywater can be used for non-drinking purposes such as toilet flushing, car washing, landscaping, and outdoor cleaning.

A company in Italy offers greywater treatment system installation services according to the level of greywater treatment required including filters (primary filter, oxidation & ultrafiltration, UF), storage space, multi-stage filter and activated carbon, and ultraviolet disinfection. The treatment system requires easy and minimal maintenance by using automatic backwash system.

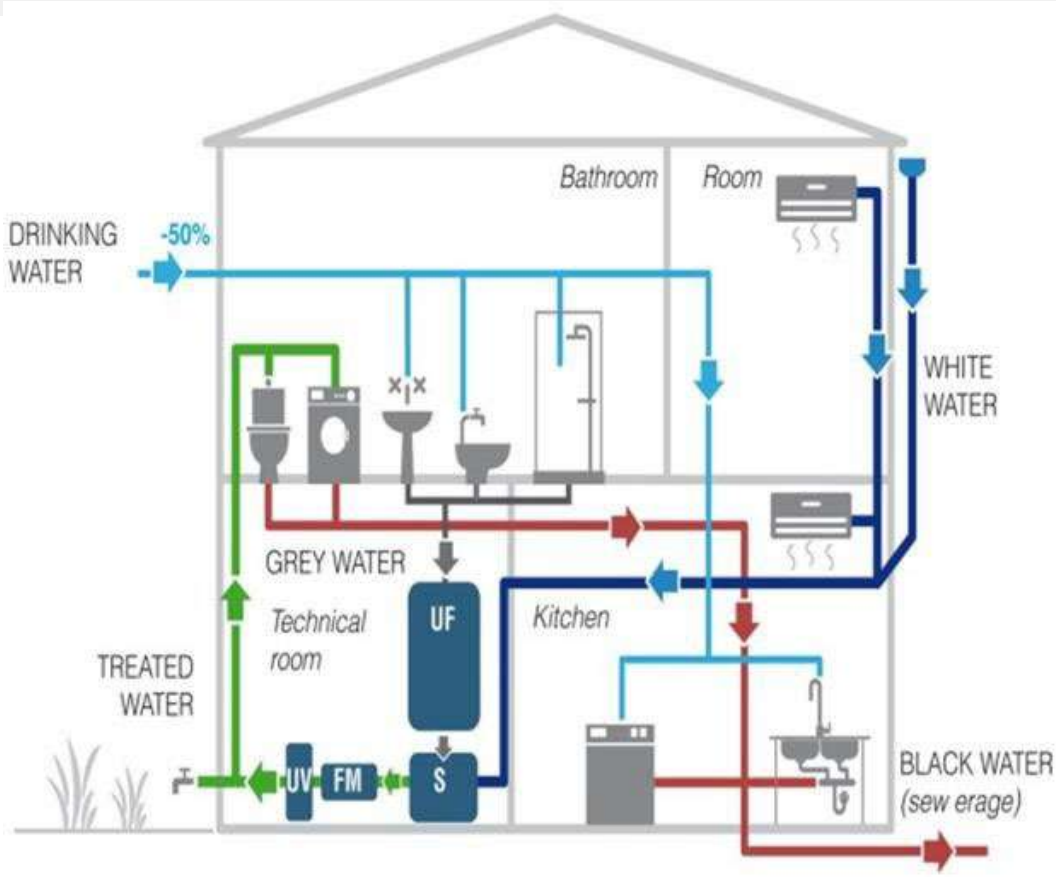


Figure 5-27: Schematic diagram of greywater recycling system
Source: https://redi.eu/greywater-recovery-system/, 2018

AGENCIES INVOLVED	
Main Agencies	**Supporting Agencies**
• Ministry of Housing and Local Government (KPKT) • Department of Irrigation and Drainage • National Hydraulic Research Institute of Malaysia (NAHRIM) • Local Authority	• Ministry of Environment and Water (KASA) • PLANMalaysia@Negeri

ACTION KD 2.3G

Improve the wastewater treatment system

The majority of sewage in Malaysia is channeled to sewage treatment plants (STP). However, there is still sewage that is being channeled directly to the river or to septic tanks, especially in unplanned development areas, squatters and old buildings. Sewage treatment is important to remove pollutants and produce treated effluents that are safe for the environment, including ensuring that rivers and drainage systems are always clean and unpolluted.

Measures to improve the wastewater treatment system are:

1. Upgrade sewerage treatment plants

   Existing and obsolete sewage treatment plants need to be upgraded to be more efficient and effective to greater sewage capacity in the future. Upgrading works need to be in line with the growth of new development areas.

2. Undertake sewerage network maintenance.

   Sewerage network, including the pipelines, must be regularly maintained to ensure the efficiency and effectiveness of wastewater treatment process.

3. Rationalise sewerage treatment plant and sewerage pipeline network.

   Ensure that each development area is connected to the sewerage system and nearby sewerage treatment plant. This will facilitate the maintenance of sewerage pipes and can prevent sewage from being discharged directly into the open drainage system. The implementation of this measure can ensure good water quality in the rivers and in the drainage system.

4. Build a Regional Sewerage Treatment Plant (RSTP)

   The construction of RSTP is important to consolidate several sewerage treatment systems into one area or facility. This method will contribute to land use savings. RSTP also provides opportunities for operators to explore new innovations in the sewage treatment industry.

BRIEF FACTS

Langat Centralised Sewage Treatment Plant (CSTP)

Langat Centralised Sewage Treatment Plant (CSTP) with a capacity of 920,000 PE will be completed in 2021. The wastewater generated from the sewage treatment process is estimated at 2000m^3 and will be used for the purpose of cleaning tanks and sewage treatment equipment, odor control systems, polymer preparation processes and landscape area.

Source: www.langatstp.com

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Department of Sewerage Services • National Water Services Commission (SPAN) • Local Authority	• Ministry of Environment and Water (KASA)

ACTION SR 2.3H

Minimise the use of treated water

Demand for treated water supply needs to be controlled to help reduce the impact and pressure on the water supply resources and systems. Malaysians consumed 216 liters/capita/day of treated water in 2017. This exceeded the rate recommended by the United Nations (UN) recommendation of 165 liters/capita/day (SPAN via Bulletin 2019). Therefore, the issues of excessive use and wastage of treated water need to be addressed.

Measures to minimise treated water consumption are:

1. Encourage the use of water-saving devices

The installation of water-saving devices in buildings will reduce the use of treated water. Penang was the first state in Malaysia to make it mandatory for all new developments to install water-saving devices. Following the installation of this device in a building owned by Perbadanan Bekalan Air Pulau Pinang Sdn. Bhd (PBAPP) since 2012, it has recorded water saving between 14% to 87% (**Table 5-9**).

The water saving devices introduced by PBAPP allows users to save water automatically without having to change the daily practices or routines of users. These devices can be used in plumbing fittings, shower heads, toilet fittings and urinal fittings.

The water-saving devices have since been used in 'water-friendly' premises in Penang, such as public toilets in major shopping malls, as well as several factories and office complexes. Among the features of these devices are:

- Water-saving taps and shower heads equipped with flow regulators that reduce water flow.
- Water-saving closets with features such as a double-flush system that allows 'half-flush' that uses only 3 litres of water and 'full-flush' that consumes 6 litres of water.
- Water-saving urinals equipped with and/or 'springs' that minimise water consumption during flushing.

Table 5-9: PBAPP building total water saving with the use of water saving devices

Type of Equipment	Before (litres/minute)	After (litres /minute)	Water Saving (%)
Basin Tap	12 - 16	Self-shutting type: 2	83 - 87
		Tip touch type: 6	50 - 63
Bib Tap	12 - 15	5	58 - 67
Shower Head	14 - 20	12	14 - 40
Sink Tap	12 - 18	6	50 - 67

Source: Penang Water Supply Corporation Sdn. Bhd, 2017

2. Review water tariff rates

   Water tariff rates also need to be reviewed to be in line with the amount of supply required. This measure can help in reducing the demand and wastage of treated water. Progressive tariff rates need to be implemented more effectively for this purpose but taking into account the needs of the lower income households.

3. Limit the use of treated water for non-drinking purposes during emergency.

   The use of treated water for non-drinking purposes should restricted especially during water crises such as in the dry season. Australia has begun implementing regulations to limit the use of treated water for certain purposes such as for landscaping and car washing. For the purpose of implementation in Malaysia, especially in major conurbations with high population density, the Australian rules and experiences can be used as references and adapted to suit local conditions and local.

BRIEF FACTS

The National Water Services Commission (SPAN) has introduced a water-saving product labeling scheme or Water-Efficient Products Labeling Scheme. SPAN intends to make the labelling mandatory to help in efforts to increase water savings.

Source: National Water Services Commission

Plant watering does not necessarily require the use of treated water. Alternatively, rainwater can be used for the same purpose and thus, promote water conservation in the community.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• National Water Services Commission (SPAN) • State Water Management Agency • Local Authority	• Ministry of Environment and Water (KASA) • Malaysia Green Technology Corporation

STRATEGY
KD 2.4

MANAGING GEOLOGICAL RESOURCES AND DIVERSITY

RELATED SDGs
- SDG12
- SDG15

The formation of the earth's surface and the wealth of geological resources have influenced and defined our landscapes and lives. The wealth of geological resources in Peninsular Malaysia and F.T. Labuan is also one of the factors that affect the development of the country. The production and processing as well as the protection of these resources have greatly contributed to the national economy.

Geological resources are among the non-renewable abiotic resources that are vulnerable and sensitive to their surroundings. These resources are the basis of the ecosystem service cycle that is important for the consumption of the people (refer to **Figure 5-28**). NPP4 recommends that the management of the country's geological resources be enhanced to protect the unique geological features. Additionally, a more comprehensive and effective management and enforcement needs to be implemented to ensure that the country's mineral industry is managed sustainably for the sustainability of the country's geological resources.

BRIEF FACTS

550 Million Years
The age of the oldest rock formation in Peninsular Malaysia
Source: langkawigeopark.com

21 National Archaeological and Natural Heritage Site
Source: data.gov.my

200 Year
The age of mineral industry in Peninsular Malaysia
Source: web.archive.org

RM10.67 billion
Production value of the country's mining and quarrying industry
Source: Department of Statistics, 2016

18.9%
Annual Compound Growth Rate of the country's mining and quarrying industry in 2015
Source: Department of Statistics, 2016

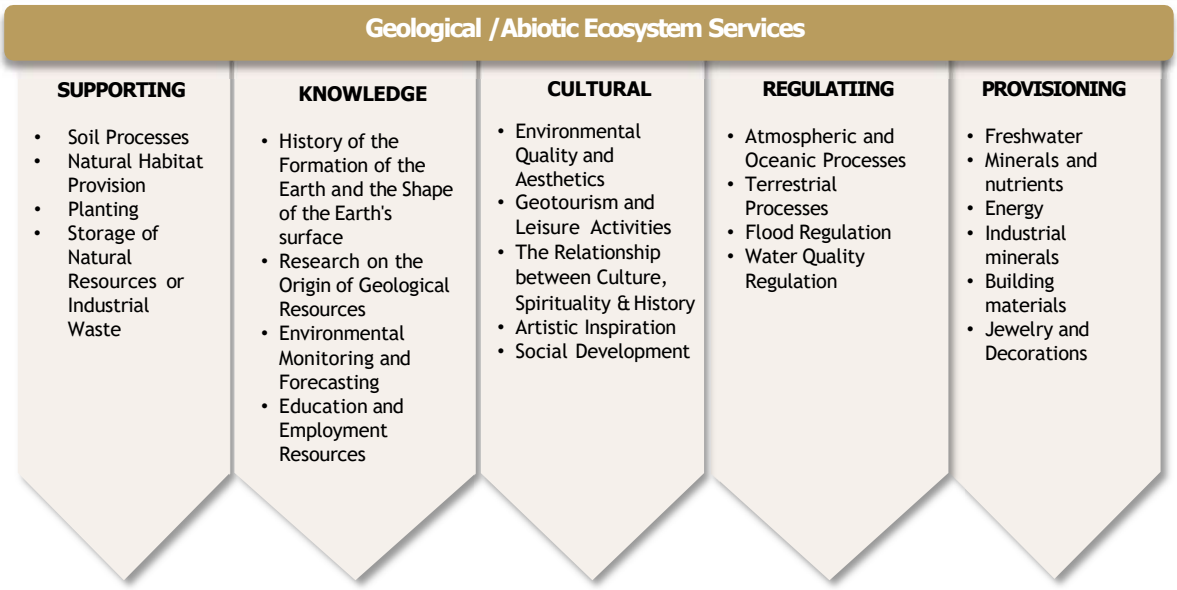
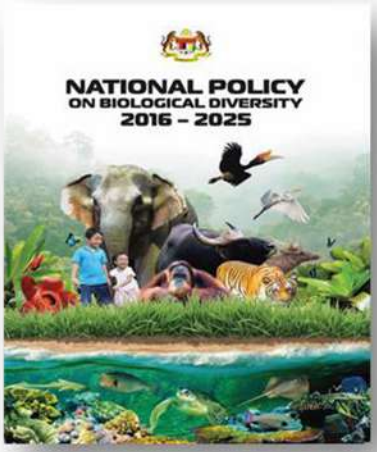


Figure 5-28: Geological or abiotic ecosystem services network diagram
Source: Gray, Murray & Gordon, John & Brown, Eleanor. (2013)

ACTION SR 2.4A

Identify, recognise and manage sites of geological interest



Geological resources and features are among the largest components in abiotic ecosystem services that contribute to the development and economic importance of the country, the well-being of the people and the sustainability of the country's biodiversity. However, geological resources and features are very vulnerable and sensitive to changes in the surrounding nature and need to be protected.

Measures to enhance efforts to protect sites of geological importance are:

1. List, evaluate and update geo-site listing

   The listing, characterisation and periodic updating of the inventory of potential geo-site areas are essential to ensure the inventory is accurate and up-to-date. Geo-site are not necessarily limited to the purpose of tourism development, but also to the interests of science and the local community. To date, new potential sites are still being discovered in Peninsular Malaysia and F.T. Labuan. Newly found sites with potential to be listed as geo-sites are:

   i. Sauropod footprint fossils in Bukit Panau, Tanah Merah, Kelantan
   ii. Artesian Hot Spring in Kampung Jawa, Hulu Langat, Selangor
   iii. Bukit Baginda Granite (wave rock), Batu Kikir, Kuala Pilah, Negeri Sembilan

2. Protect geo-sites as heritage sites and geoparks

   The majority of geo-sites found in Peninsular Malaysia and F.T. Labuan are already under some form of protection as most of them are located in forested areas that are being protected under the National Forestry Act 1984 (Act 313). However, there are also geo-sites located outside protected areas that are vulnerable to the threat of damage due to land use change or infrastructure development.

BRIEF FACTS

The need to protect and conserve geological resources and features is outlined in:

The **National Biodiversity Policy 2016-2025** which emphasises the protection and conservation of landscapes and important geological features such as wetlands, karst landscapes and coral reefs identified as important wildlife habitats.

The **National Ecotourism Policy 2016-2025** states the need to protect and develop sites of geological importance for ecotourism purposes.

BRIEF FACTS

The discovery of seven (7) Sauropod footprint fossils in Bukit Panau, Tanah Merah, Kelantan.

Source: sinarharian.com, 2020

Therefore, it is appropriate for each geo-site to be protected as a geopark to preserve the geological value of the site as well as to ensure the continuity of ecosystem services for the benefit of the people and the country. For example, the recognition of existing national and international geoparks such as the Langkawi UNESCO Global Park and the Jerai Geopark in Kedah, and the Kinta Valley Geopark in Perak (refer to **Figure 5-29**).

The geo-sites identified as potential geoparks are as follows:

i. Gombak-Hulu Langat, Selangor

The Gombak-Hulu Langat area is unique due to the existence of the estimated 200 to 400 years old quartz ridge , which is also the longest quartz ridge in Southeast Asia (approximately 14km). This geo-site has many complexes of waterfalls, hot springs and coal that indicate high geological heritage values and need to be protected.

ii. Mersing, Johor

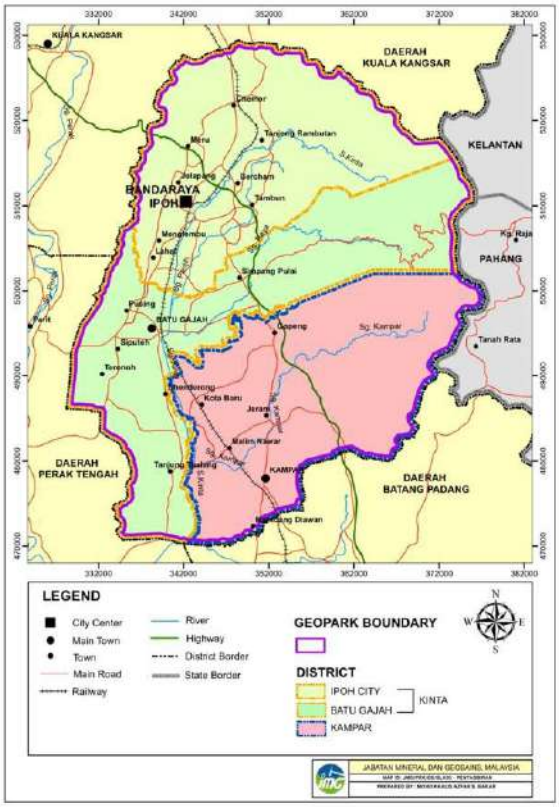
Covers part of the geo-site in the Endau-Rompin National Park and the surrounding islands which consists of the earth's history in the form of volcanic rocks, sediments and old volcanic rocks that are estimated to be 350 to 200 million years old.

iii. Lenggong Valley, Perak

Covers part of the Archaeological World Heritage Site and its surroundings with the existence of morphological and suevite rock sites due to impacts that are 1.84 million years old.

iv. Gunung Stong-Jeli

The area consists of a granite complex and the uniqueness of the highest waterfall in Peninsular Malaysia which its geological age is estimate around 93 to 88 million years.



Jerai Geopark (top) and Kinta Geopark (below)
Source: JMG, wikiwand.com & upload.wikimedia.org

v. Pasoh Cave Cluster, Jelebu

The area consists of limestone rocks with unique caves and waterfalls that are estimated to be around 300 to 200 million years old.

vi. Merapoh Karst Complex - Gua Musang

The karst complex in Merapoh consists of cavernous limestone hills that attract various wildlife species that roam around this area and the Pahang National Park to the east of this complex.

Tanjung Kubong Beach geo-site F.T. Labuan contains Belait rock formation of over 15 million years old.
Source: jmg.gov.my

Tasik Cermin in Ipoh, Perak. This lake area is part of the Kinta Valley Geopark which was gazetted in 2014.

3. Recognise Heritage Sites and Geoparks at the national level and subsequently obtain international recognition (UNESCO Global Geopark).

In order to obtain international recognition for Heritage Sites or Geoparks, they must first be gazetted as National Heritage Sites at the national or state level. Therefore, potential Geoparks need to be gazetted quickly under appropriate mechanisms such as existing legislations, i.e. Act 645 or any other related regulations, to qualify them for international nomination as UNESCO Global Geopark sites (refer to **Action SR 2.6A**). Additionally, management plans must be prepared to ensure that the management of the sites will be well-planned and well-administered.

Geoparks that have been recognised as National Geoparks are Jerai Geopark in Yan, Kedah and Lembah Kinta Geopark in Ipoh, Perak (State Park). Both Geoparks are also in the process of obtaining recognition as UNESCO Global Geoparks.

The geo-sites that are in the process of being gazetted as National Heritage Sites or Geoparks are:

i. Mersing Geopark, Johor (potential as a UNESCO Global Geopark)
ii. Lenggong Valley Geopark, Perak (potential as a UNESCO Global Geopark)
iii. Gombak-Hulu Langat Geopark, Selangor (potential as a UNESCO Global Geopark)

Other sites that have the potential to be National Geoparks are:

i. Tanjung Batu Beach, F.T. Labuan
ii. Gua Kelam, Perlis
iii. Merapoh-Gua Musang, Kelantan
iv. Kenyir Lake, Terengganu
v. Mount Stong-Jeli, Kelantan
vi. Pasoh Caves, Jelebu, Negeri Sembilan

Tasik Kenyir, Terengganu

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• State Department of Minerals and Geosciences • Malaysian Maritime Enforcement Agency • State Authority	• Ministry of Energy and Natural Resources (KeTSA) • State Forestry Department • Local Authority

ACTION SR 2.4B

Develop mineral mining and quarrying industry in a sustainable manner

Malaysia has produced various mineral resources including metallic minerals, industrial minerals and energy minerals. Mining quarrying activities are often perceived as environmental-damaging industry that led to significant alteration in the shape of the earth's surfaces. Therefore, resource mining and quarrying activities need to be implemented and managed in a systematic and planned manner. The measures that need to be implemented are:

1. Revise and update the country's mineral resources mapping

   The use of technology such as remote sensing and airborne geophysical survey can speed up the process of mapping mineral resources as well as reduce the use of human resources in mapping efforts. The storage system and the electronic map display also need to be improved to facilitate access to the country's geoscience data. **Plans 5-16** and **5-17** show the distribution of metallic and non-metallic mineral resources in Peninsular Malaysia.

2. Identify the need for the establishment of a body that regulates the country's mineral resources development

   The establishment of a regulatory body is important to drive the growth of the country's mineral industry as well as to regulate mineral development activities to ensure that they are implemented safely and sustainably.

BRIEF FACTS

The metallic mineral resources in Malaysia have their own importance, namely:

1. **Antimony** - Used in various fields of industry, including as alloy in lead batteries, metal balls, pewter and welding. It is also used as an agent in the manufacturing of cast iron.
2. **Bauxite** - Bauxite is widely used in industries such as transportation, packaging such as beverage containers manufacturing, construction, electrical equipment manufacturing, and others.
3. **Copper** - Copper has good thermal and electrical conductivity and thus, commonly used as heat and electricity conductor. Copper is also used in the production of alloy such as brass and bronze.
4. **Gold** - Gold is used in jewelry, ornaments, electronic devices and as currency reserves. It is also used in the fields of dentistry and electronics.
5. **Iron ore** - Iron is a good conductor of heat and electricity. Iron is used in the manufacturing of stainless steel, vehicles, shipbuilding, machine parts, surgical equipment and building components.
6. **Lead** - Lead is widely used as water pipes, pots and in car batteries.
7. **Tin** - Tin is used in the canning industry and as a alloy component in the manufacturing of pewter and welding.

Source: Book of Rocks, Minerals and Fossils, JMG, 2018

3. Ensure mining and quarrying activities compliance with policies, frameworks, acts, rules and standard operating procedures (SOPs).

   The implementation of existing Government policies, frameworks and guidelines in relation to the mining and quarrying industry as well as the enforcement of relevant laws need to be tightened so that mining and quarrying activities are carried out systematically and sustainably (refer to **Table 5-10**).

Table 5-10: Legislations and guidelines related to mining and quarrying activities

LEGISLATION AND GUIDELINES	DETAILS
Mineral Development Act 1994 (Act 525)	The Department of Minerals and Geosciences Malaysia is responsible for regulating all exploration and mining activities for minerals and mineral ores and other related matters.
National Land Code 1985 (NLC 1985)	Act to amend and consolidate laws relating to land and lease periods, registration of land grants and related matters and collection of revenue therefrom and any related matters. This Act is the principal act of the state quarrying rules which describe the extraction, transfer and transportation of any rock material (other than for the purpose of obtaining metals or minerals from it).
States Minerals Enactment (EMN)	Enactments implemented at the State Government level to provide for mineral tenements and for purposes connected therewith.
Mineral Development Act (APM) 1994 (Act 525) and regulations under it	Act enacted to provide for the inspection and regulation of exploration, exploration and mining of minerals and mineral ores and for other matters connected therewith. This Act is implemented at the Federal level through JMG Malaysia. Meanwhile, the Mineral Development Regulations detail out the legal and implementation requirements provided in the APM 1994. There are seven (7) regulations in the APM 1994 enacted and enforced, namely: • Mineral Development (Operational Mining Schemes, Plans and Record Books) Regulations 2007 • Mineral Development (Blasting) Regulations 2013 • Mineral Development (Safety in Exploration and Surface Mining) Regulations 2015 • Mineral Development (Licensing) Regulations 2016 • Mineral Development (Effluent) Regulations 2016 • Mineral Development (Statistical Return) Regulations 2019 • Mineral Development (Compounding of Offences) Regulations 2019
Guidelines and Standard Operating Procedures of the Department of Minerals and Geosciences Malaysia	A guideline document issued by JMG to ensure that geological resource investigation work is carried out in a safe condition, and to ensure the sustainability and well-being of the environment.
Standard Operating Procedures (SOP) for Bauxite Mining and Export Activities by the Ministry of Energy and Natural Resources (KeTSA)	A comprehensive document that serves as a guide for a more comprehensive, controlled, efficient and sustainable bauxite mining activities.
Operational Mining Scheme	A comprehensive document of the proposed development of the mining area with emphasis on aspects of activity planning as well as occupational safety and the environment, including control and rehabilitation elements.

Continued

PERUNDANGAN DAN GARIS PANDUAN	PERINCIAN
State Quarry Rules	Regulations enacted under Section 14 of the National Land Code 1994 (KTN). These rules are intended to provide for the control of quarry operations in terms of safety while extracting rock material.
Guidelines for Planning and Development of Environmentally Sensitive Areas (ESA)	New mining and quarrying activities are not permitted except in ESA Level 3 areas and must be carried out with strict control. Existing mining activities operating within the ESA Level 1 and 2 areas need to employ low-impact methods such as Best Available Technology Not Entailing Excessive Costs (BATNEEC)
Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015	The mining activities specified in Activity 8 of the First Table and Activity 8 of the Second Table are subject to the preparation of an Environmental Impact Assessment (EIA) Report.
Environmental Impact Assessment (EIA) Report.	The preparation of EIA Report should be in accordance with the requirements of the Guidelines of Environmental Impact Assessment (EIA) in Peninsular Malaysia.
Environmental Management Plan (EMP)	State Governments are encouraged to require every application for mining activities that are not subject to EIA to provide an environmental management plan (EMP).

4. Conserve and redevelop former mines with low impact development

Former mines have the potential to be redeveloped with low-impact development for recreational, tourism, low-density settlements or flood control. Former mines identified for development must be studied and assessed in detail to ensure that the development proposal meets the permitted planning requirements. In Malaysia, there are several former mining areas that have been successfully redeveloped as tourism and public recreation sites in Selangor and Perak (refer to **Box 5-24**).

Box 5-24: Case Study: Redevelopment of former mines

Sunway Lagoon, Selangor

It is a former tin mine covering an area of **35.6 hectares (88 acres).** The former mine has been developed as Sunway Lagoon which is the leading theme park in the country. The theme park offers more than 90 attractions and it was also awarded Asia's Best Attraction for four (4) consecutive years by the International Association of Amusement Parks and Attractions (IAAPA).

Sunway Lagoon, Selangor

Box 5-24: Case Study: Redevelopment of former mine area (continued)

Taman Alam Kinta, Perak

Taman Alam Kinta is a 900 hectare former mining area reclaimed into a natural park. Tourist attraction in the park include water birds such as pheasants, kingfisher, woodpeckers, white-breasted waterhen and common moorhen. The park is recognised by the Malaysian Nature Society as an area that is home to more than 1,381 water bird from 150 species.

Birds in Taman Alam Kinta

Taman Alam Kinta, Perak

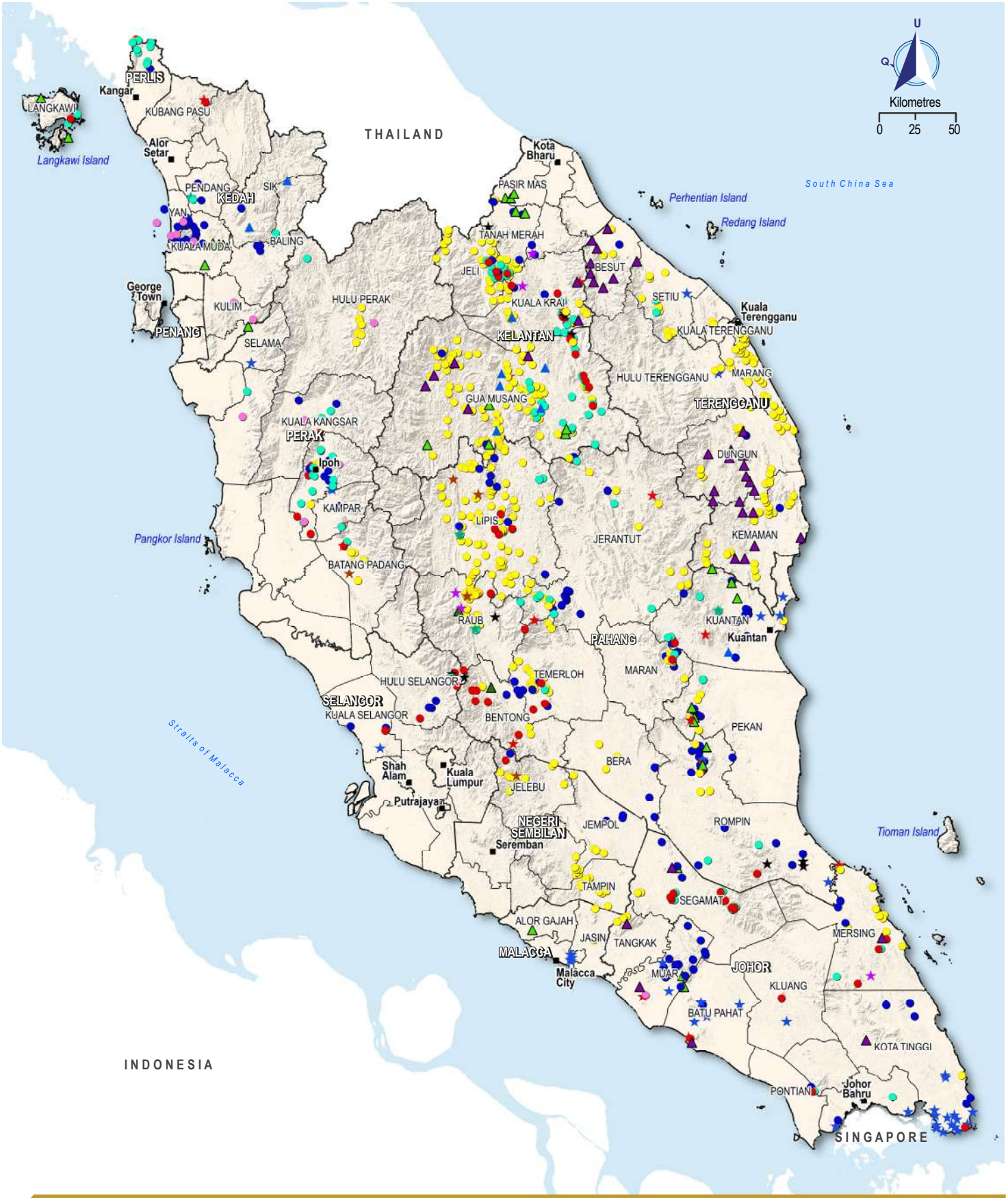
AGENCIES INVOLVED

Main Agencies

- Land and Mines Department
- State Department of Minerals and Geosciences

Supporting Agencies

- Ministry of Energy and Natural Resources (KeTSA)



MAP 5-16: DISTRIBUTION OF METAL MINERAL SOURCES IN PENINSULAR MALAYSIA

Types of Metal Mineral Sources

- Antimony - 5 locations
- Bauxite - 43 locations
- Cromium - 5 locations
- Uranium - 10 locations
- Mercury - 6 locations
- Molybedenum - 14 locations
- Niobium-Tantalum - 13 locations
- Copper - 65 locations
- Gold - 438 locations
- Iron - 163 locations
- Lead - 106 locations
- Nickel - 2 locations
- Rare Earth - 10 locations
- Tin - 40 locations
- Manganese - 30 locations

Others

- State Capital
- State Boundary
- District Boundary

Source:
- Department of Mineral and Geoscience, 2007
- Kangar Perlis Municipal Council Draft Local Plan 2035 (Replacement)

MAP 5-17: DISTRIBUTION OF NON-METAL MINERAL SOURCES IN PENINSULAR MALAYSIA

Types of Non-Metal Mineral Sources

- Ball Clay - 91 locations
- Baryte - 29 locations
- Clay - 189 locations
- Dimension Stone - 68 locations
- Limestone - 18 locations
- Silica - 62 locations

Others

- State Capital
- State Boundary
- District Boundary

Source:

- Department of Mineral and Geoscience, 2007
- Kangar Perlis Municipal Council Draft Local Plan 2035 (Replacement)

STRATEGY
SR 2.5

ENSURE NATIONAL FOOD SECURITY

RELATED SDGs

- SDG1
- SDG2
- SDG3
- SDG11
- SDG12

Food resources depend on agricultural land for crops (paddy, fruits & vegetables), livestock and fisheries including aquaculture where it is located under the agro-food economic sector. National food security is a global agenda to ensure the sustainability of food supply in the future. The Cabinet Committee on the National Food Security Policy adopts the definition of food security as a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life

The National Food Security Framework (KSMN) was formulated by the Government as an effort to ensure the country's continuous and adequate food supply. The government has also formulated various policies to transform the agricultural sector as an engine of economic growth as well as to make Malaysia a major food producer in the world. The Cabinet Committee on National Food Security Policy (JKKDSMN), chaired by the Prime Minister, was has been established on 25 March 2020 to formulate holistic and sustainable food security policies in ensuring the stability of the country's food supply. This Committee is responsible to comprehensively examine issues related to food security covering various aspects including supply chain, manpower, technology applications, financial resources, investment, land use and infrastructure.

BRIEF FACTS

Agro-Food Products


Paddy crops for rice


Fisheries


Vegetables


Livestock


Fruits

Food security agenda

- Adequate supply
- Affordable
- Safe
- Nutritious

BRIEF FACTS

National Food Security Framework (KSMN)

KSMN was formulated based on recommendations by the Food and Agriculture Organization of the United Nations (UNFAO) based on four (4) dimensions of food security, namely Availability, Access, Utilisation and Stability. As a strategic measure to ensure the effective implementation of policies and strategies outlined under this framework, four (4) clusters or technical working groups have been established across the Ministry's agencies, namely:

1. **Availability Cluster** under the Secretariat of the National Agricultural Advisory Council (MPPN), Ministry of Agriculture and Food Industry
2. **Accessibility Cluster** under the Secretariat of the National Council for Subsistence Actions (NACCOL), Ministry of Domestic Trade and Consumer Affairs
3. **Food Safety and Nutrition Cluster** under the Secretariat of the National Food Safety and Nutrition Council (MKMPK), Ministry of Health Malaysia
4. **Stability and Sustainability Cluster** under the Secretariat of the Cabinet Committee on the National Food Security Policy, the Ministry of Agriculture and Food Industry and the National Security Council.

NPP4 focuses on land use planning for agro-food production by taking into account the increase in current production productivity and self sufficiency level (refer to **Table 5-11**). To implement this Strategy SR 2.5, NPP4 proposes the implementation of actions related to the preservation of national food resources, especially rice fields, increasing food self-sufficiency (rice and other foods) to reduce dependence on imports and expanding the use of the latest technology to increase agricultural productivity.

Table 5-11: Level of self -sufficiency in Malaysia

Primary food commodities	Self - sufficiency level 2018 (%)	DAN self-sufficiency target 2011-2020(%)	Estimated Area[1] (hectares)	MAFI self - sufficiency target 2025 (%)[3]	NPP4 self-sufficiency projection 2040 (%)[4]
Crops					
Paddy	68.7	70.0	890.2	75.0	80.0
Vegetables	44.6	67.6	29.6	70.0	80.0
Fruits	80.24	78.4	298.4	80.0	90.0
Livestock					
Beef/ Buffalo meat	22.9	32.7	1,135.4 (including pastures)[2]	30.0 (for ruminant livestock)	30.0 (for ruminant livestock)
Lamb/ Mutton	10.9	30.9	*None*		
Chicken/ Duck	104.0	131.6	*None*	110.0	135.0
Chicken eggs/ Duck Eggs	116.8 eggs	119.1 eggs	*None*	120.0 eggs	139.1 eggs
Milk	61.3 thousand/litre	63.0 thousand/litre	*None*	100 thousand/litre	100 thousand/litre
Pork	90.0	93.0	*None*	*None*	96.0
Fish					
Fish (food)	92.1	110.4	21.8	95.0	115.0

Source:
1. National Agro-Food Policy (DAN) 2011-2020
2. Priorities and Strategies, 2019-2020, Ministry of Agriculture and Food Industry
3. Ministry of Agriculture and Food Industry, 2020

Note: The projected self-sufficiency level for 2040 is based on discussions with stakeholders and requires a review of relevant policies, particularly the National Agro-Food Policy 2.0. For the category of vegetables and fruits, especially those that require temperate climate such as apples, oranges and onions, it is still dependent on imports to meet domestic needs. The crops are not suitable or uneconomical to grow in Malaysia.

ACTION SR 2.5A

Preserve country's food resource area

Rice cultivation, which includes wet- and dry-rice cultivation, is among the main focus in the country's spatial planning and management in line with the national food security agenda. NPP4 takes proactive steps in an effort to maintain the country's food resources through the preservation of paddy fields, especially in the main rice granary areas of the country. Paddy production must continue to be given attention because it is the staple food of the country.

MARDI also projects that paddy production will continue to increase with the use of appropriate methods and technologies despite the reduction in paddy field area until 2048 (refer to **Figure 5-30**). **Figure 5-31** shows the production and average yield in the rice granary areas compared to the national rate for 2018.

Paddy fields in Balik Pulau, Penang

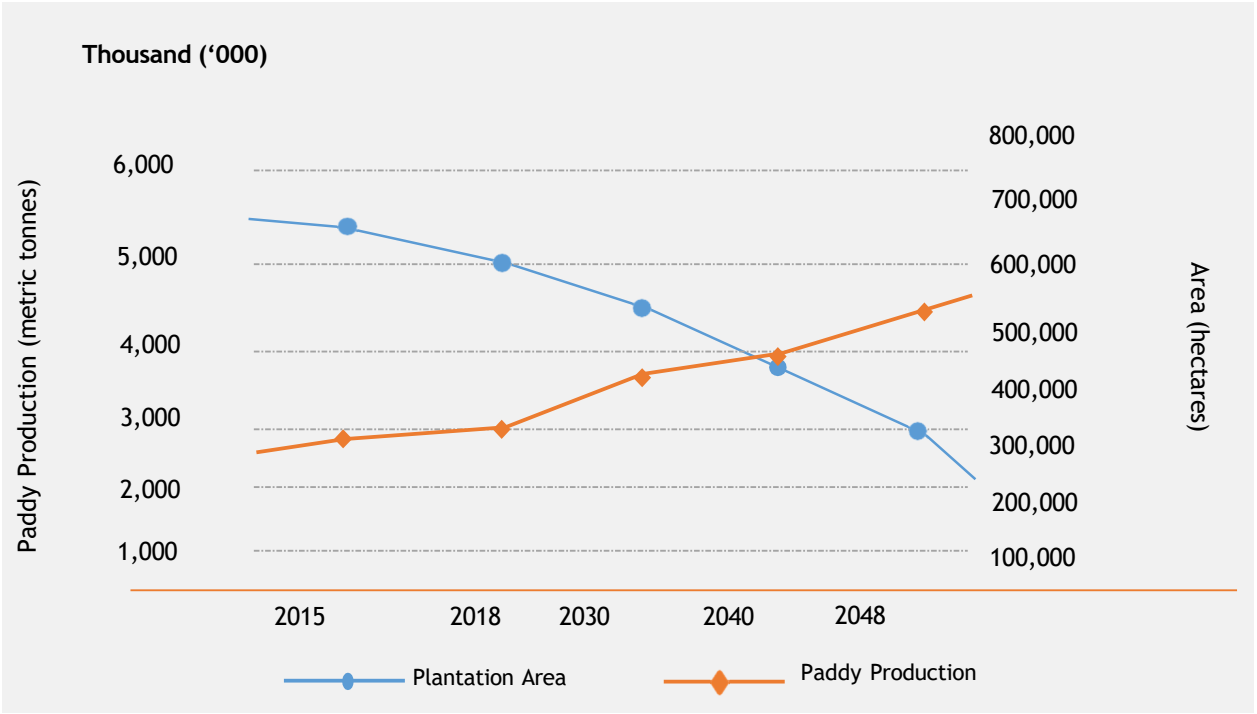


Figure 5-30: Projected paddy production and paddy area
Source: MARDI, 2017

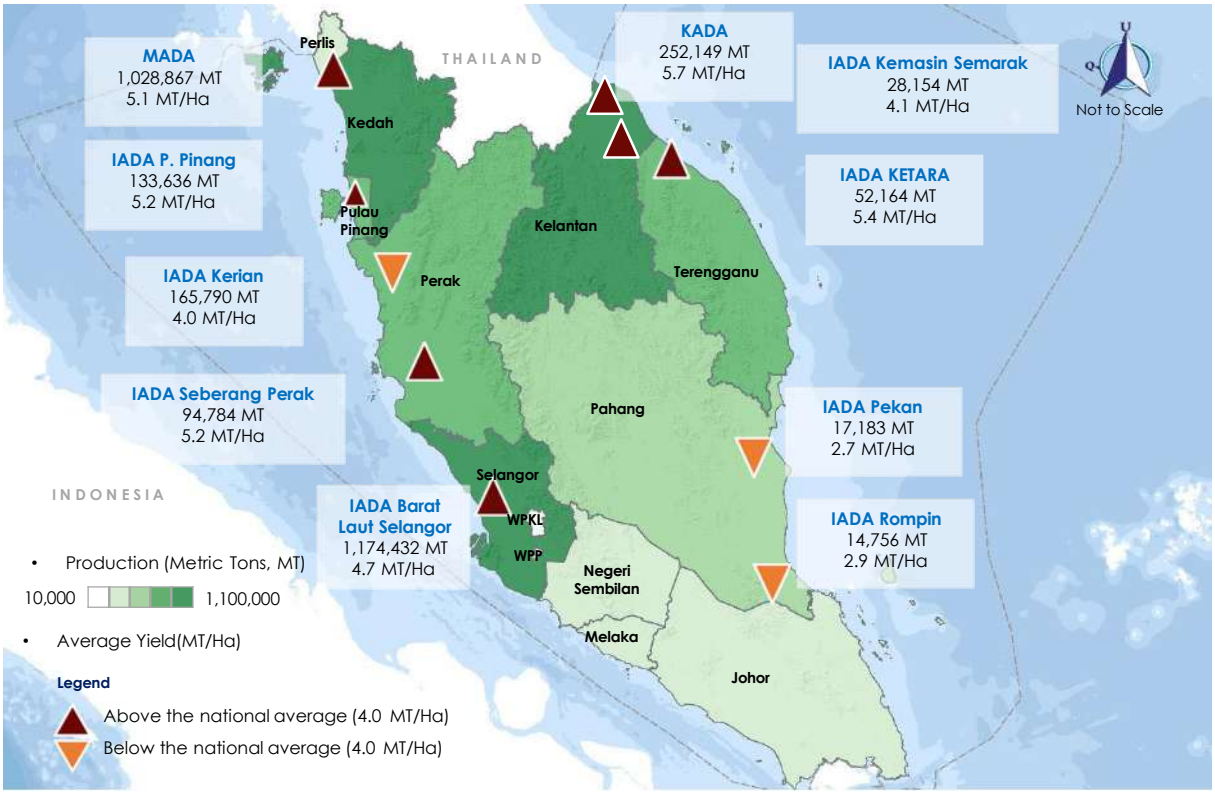


Figure 5-31: Production and average yield of rice granary areas in Peninsular Malaysia in 2018
Source: Agrofood Statistics, Department of Agriculture, 2018

Seven (7) of the main rice granary areas recorded average yield consistently above the national average and the designation of these areas takes into account the area of land suitability. The increase in paddy yield is contributed by the paddy cropping intensity practice that potentially can produce in excess of 8.6 metric tonnes /hectare.

The effective conservation of rice granary areas requires the involvement and commitment of various parties to ensure the country's food security. Location: Tanjung Piandang, Perak

The measures that need to be implemented for this action are:

1. Protect rice granary areas through legal instruments.

   Effective protection of rice granary areas requires legal instruments. The National Land Code 1965 gives power to the State Authority to draw up and gazette land use zoning. The power to enforce protection of agriculture land to prevent the decline in rice cultivation area is also contained in the National Land Code 1965 which involves the change of use/condition of land (express & implied).

   Existing legislations also facilitate initiatives to increase the productivity of commercial-scale paddy production such as through land consolidation for estate or plantation management (Large Scale Paddy Field programme/Sawah Berskala Besar (SBB) and activities that support the generation of paddy industry ecosystems. Until now, the gazetting only involves irrigation areas under the supervision of DID.

BRIEF FACTS

Large Scale Paddy Field Programme / Sawah Berskala Besar (SBB)

SBB is one of the government's initiatives to optimise resource use, and increase the efficiency and productivity of rice cultivation and post-harvest paddy production. This involves the consolidation of paddy fields through agriculture contract or leasing under one management. This initiative is expected to assist the country in achieving the rice SSL of 75% as targeted by the Twelfth Malaysia Plan (12MP) of 75%.

Source: www.mafi.gov.my

2. Retain 10 rice granary areas involving a total of 208,080 hectares (excluding Sabah & Sarawak) and paddy fields outside the rice granaries (176,788 hectares) to meet the rice needs of the Peninsular Malaysia until 2040.

   The identified 10 rice granary areas in Peninsular Malaysia are as follows:

   i. Kedah Muda Agricultural Development Authority (MADA)
   ii. Kemubu Agricultural Development Authority (KADA)
   iii. Penang Integrated Agricultural Development Area (IADA)
   iv. Kerian Integrated Agricultural Development Area (IADA)
   v. Seberang Perak Integrated Agricultural Development Area (IADA)
   vi. Northwest Selangor Integrated Agricultural Development Area (IADA)
   vii. Rompin Integrated Agricultural Development Area (IADA)
   viii. Pekan Integrated Agricultural Development Area (IADA)
   ix. North Terengganu Integrated Agricultural Development Area (KETARA)
   x. Kemasin-Semarak Integrated Agricultural Development Area (IADA)

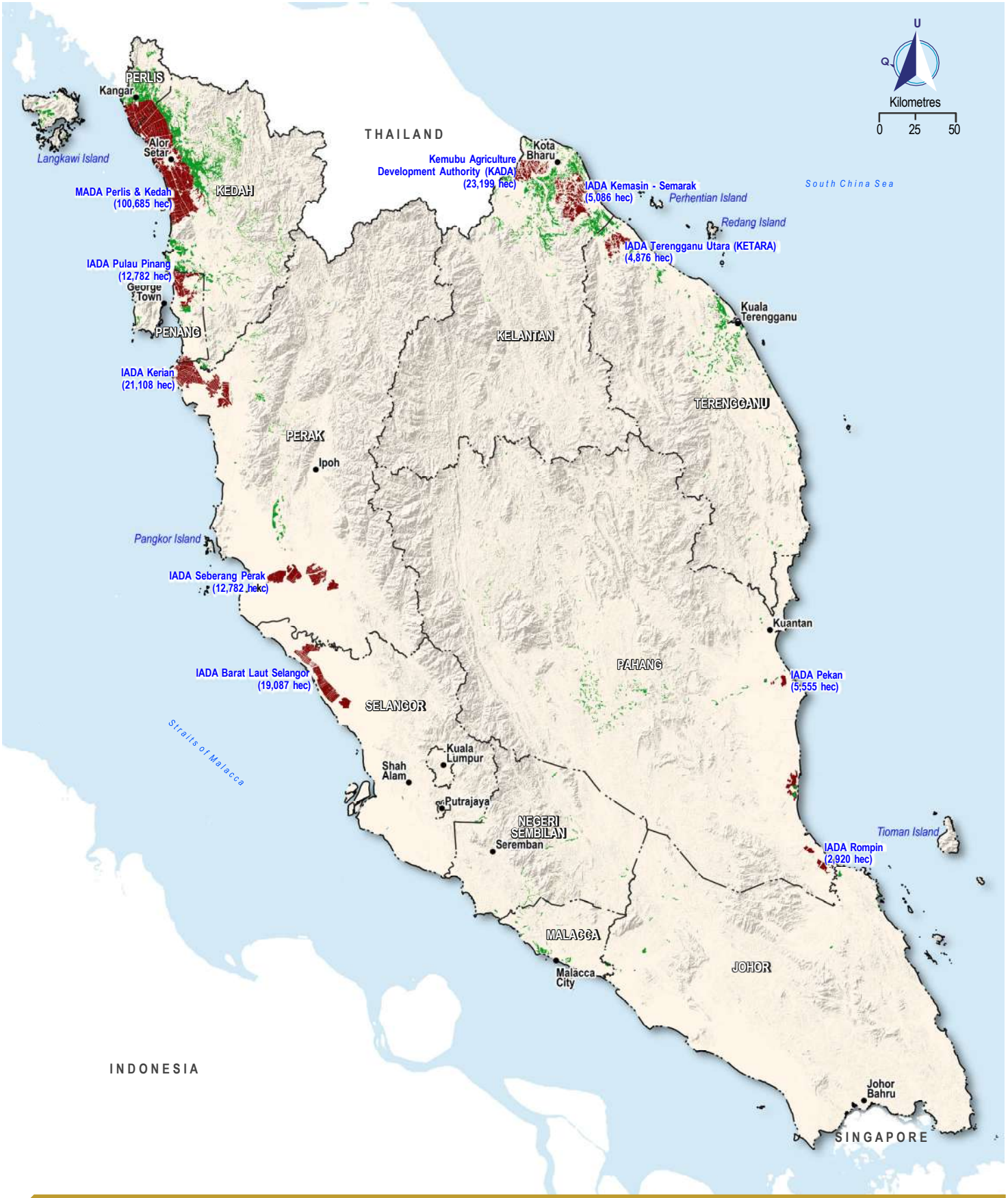
Paddy area in Tanjung Karang which is part of IADA Northwest Selangor.

3. Implement fiscal incentives for states that maintain paddy granary areas in line with the decision of the 31st National Physical Planning Council (MPFN) Meeting (No. 1/2019) through appropriate mechanisms, formulas and methods as recommended by the Ministry and responsible agencies.
4. Prohibit change of land condition for paddy fields in rice granary areas including change of LP land use zoning for areas identified for food security.
5. Undertake land use planning study for national food security areas as part of integrated planning, management and development control of the areas .
6. Collaborate with existing universities, such as those in the Northern Region, to establish a research centre dedicated to conducting research to improve the management and productivity of rice cultivation and paddy production.

Part of the rice cultivation area in Baling District, Kedah.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Ministry of Agriculture and Food Industry (MAFI) • Ministry of Energy and Natural Resources (KeTSA) • Integrated Agricultural Development Area (IADA) • Muda Agricultural Development Authority (MADA) • Kemubu Agricultural Development Authority (KADA) • Department of Agriculture • Department of Irrigation and Drainage • PLANMalaysia • Land and Mineral Office	• State Authority



MAP 5-18: RICE BOWL AREA IN PENINSULAR MALAYSIA

Rice Bowl Categories

- National Rice Bowl (208,080 hectares)
- Paddy Field outside Rice Bowl (176,788 hectares)

Others

- State Capital
- State Boundary

Source:
- Department of Agriculture, 2018

ACTION SR 2.5B

Increase the level of self sufficiency (paddy)

The self-sufficiency level of rice in 2018 was 68.7%. This was based on of 2,639,202 metric tonnes toral paddy production and 699,980 hectares of paddy fields (both within and outside of rice granary areas).

Based on the paddy production, 1,700,000 metric tonnes of rice were produced. This amount cannot fully meet the rice needs of the country. Meanwhile, Padiberas Nasional Berhad (BERNAS) imports 776,127 metric tonnes of rice a year, which is 30% of the country's total rice consumption.

Based on the Twelfth Malaysia Plan's rice self-sufficiency level target of 75% by 2025, NPP4 has projected the rice self-sufficiency level by 2040 to 80%. This translates to 3.5 million metric tonnes of paddy production per year and 2.28 million metric tonnes of rice production per year to meet the demand from 41.5 million Malaysian population. Based on current or business-as-usual rice cultivation practices, to realise the projected rice self-sufficiency level would require a total of 400,000 hectares of paddy field.

BRIEF FACTS

Consumption of rice per capita

Per capita rice consumption for the Malaysian population is 76.5kg, which is more than the world's per capita rice consumption rate of 54.6kg.

Source: FAO, 2018-2027

Areas of rice cultivation that need to be preserved [1]

>284,047 hectares

Rice self-sufficiency level target for 2025[1]

75%

Projected rice self-sufficiency level for 2040[2]

80%

Source :
1. MAFI, 2020
2. NPP4, 2020

The projected rice self-sufficiency level for 2040 is based on:

1 Rice Consumption Per Capita

- 70 kg has no significant change by taking the trend of per capita consumption (2013-2017) compared to 76.5 kg in 2018.

2 Productivity of Rice Cultivation in Rice Granary Areas Productivity

- 7-10 tonnes per hectare

3 Productivity of Rice Cultivation outside Rice Granary Areas

- Remain at 2.6 tonnes per hectare.

Measures to increase the rice self-sufficiency level are:

1. Preserve a minimum of 284,047 hectares of paddy field within and outside of rice granary areas.

2. Undertake technological interventions to increase annual paddy yield per hectares. Paddy production must increase above the maximum target yield for rice granary areas, which is currently in the range of 7 to 10 tonnes per hectare per year (based on paddy yield targets set by MADA, KADA and IADA agencies).

3. Enhance paddy irrigation and drainage system to improve rice cultivation and paddy yield in the rice granary areas.

Paddy field in Kuala Perlis, Perlis.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Ministry of Agriculture and Food Industry (MAFI) • Ministry of Energy and Natural Resources (KeTSA) • Integrated Agricultural Development Area (IADA) • Kedah Muda Agricultural Development Authority(MADA) • Kedah Muda Agricultural Development Authority(KADA) • Department of Agriculture • Department of Irrigation and Drainage • PLANMalaysia • Land and mineral Office	• State Authority

ACTION SR 2.5C

Improve food self-sufficiency level (other than rice)

Apart from rice, the self-sufficiency level of other foods which include vegetable, fruit, seafood and livestock also needs to be improved. **Plan 5-19** shows the location of the Permanent Food Production Park (TKPM), Aquaculture Industrial Zone (ZIA) and food-based agricultural areas.

Proposed measures to increase food self-sufficiency level include:

1. Strengthen the Permanent Food Production Park (TKPM) by :

   i. Gazetting existing TKPM to prevent them from being taken over or transferred to individuals or companies.
   ii. Intensifying the highly potential TKPM programme involving a total of 68 TKPMs and covering a total area of 9,506.79 hectares.
   iii. Establishing centralised TKPM at district and state levels to optimise the use of land such as collection and marketing centres.
   iv. Encouraging the use of technology and good agricultural practices to increase production.

2. Provide new cultivation areas focusing on:

   i. Crops that are of high demand.
   ii. Commercial urban farming and community gardens programmes in small and abandoned urban spaces using vertical planting methods to support the needs of the urban population.
   iii. Intensification of the use of latest agricultural technology at new planting areas.

3. Strengthen the Aquaculture Industry Zone (ZIA) by :

   i. Preserving existing ZIA areas and increasing their productivity to achieve the target of 50% contribution to the country's fish supply by 2030.
   ii. Encouraging the opening of new clustered ZIA areas according to species type, taking into account land use change approvals, Planning Permission, temporary occupation license (TOL) and permits to carry out aquaculture activities.
   iii. Encouraging research to increase fish seedling diversity to increase yield and reduce costs.
   iv. Encouraging restocking and stock enhancement programmes for appropriate species in waterways, paddy fields, mines and lakes.
   v. Implementing good aquaculture practices in line with myGAP guidelines.

Vertical planting method is suitable for residential area in the city.

4. Stregthen the Permanent Ruminant Production Park (TKPR) for by:

   i. Implementing the Ruminant Meat Strategic Plan

   ii. Selecting appropriate livestock breeds and providing suitable grazing areas.

   iii. Strengthening feedlot management to contribute to 60% of meat production. This will require an estimated area of 80 hectares (3 square metres of barn space per cow).

   iv. Integrating oil palm plantations that are rich in Asystasia and Paspalum grass as ruminant grazing areas.

5. Increase the production of dairy commodities for the country's fresh milk supply by :

   i. Implementing the National Dairy Industry Development Strategic Plan with the provision of optimal space.

   ii. Encouraging optimal use of infrastructure such as the integration of satellite farms for dairy cattle with the network of dairy commodity processing facilities including milk collection, handling, storage and transportation centres.

   iii. Providing support to fodder crop planting within a radius of the dairy farm.

BRIEF FACTS

NAEZ Development Concept

1. Focuses on enhancing economic growth, providing high value employment opportunities and encouraging technological innovation.
2. Facilitate high value private sector investment along the value chain for upstream and downstream activities.
3. Prioritize crops to be more cost competitive as a critical component of downstream activities.
4. Includes three (3) types of geographical space, namely:
   - Downstream Hub; locate residential areas, businesses, public facilities and downstream industries for agribusiness
   - Upstream Area; crop/ livestock area of more than 100,000 hectares
   - Research and Development (R&D) Hub which can also be located outside the NAEZ area

Source: NCER Malaysia, 2020

6. Develop NCER Agri Economic Zone (NAEZ)

   NAEZ focuses on agribusiness to strengthen key agricultural products and to drive economic growth. NAEZ also serves as a catalyst for cross-state new agricultural exploration in the Northern Corridor Region. A detail study is required to identify suitable locations and to prepare a concept master plan for a better-planned development that will attract external investors.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Ministry of Agriculture and Food Industry (MAFI) • State Authority • Corridor Authority	• Farmers' Organization Authority • Malaysian Fisheries Development Authority

MAP 5-19: FOOD BASED AGRICULTURAL AREAS IN PENINSULAR MALAYSIA

Types Of Food Based Agricultural

- Food Based Agricultural
- Permanent Food Produce Park
- Aquaculture Industrial Zone

Others

- State Capital
- State Boundary

Source:
- Department of Agrilculture, 2018

ACTION SR 2.5D

Using the latest technology to increase the productivity of agricultural products

The adoption of smart farming, which has been introduced in the country since a decade ago, should be expanded to cover more agricultural areas in the country as an effort to increase agricultural yield. Smart farming supports crop suitability analysis, facilitates accurate agriculture mapping and data gathering, enables real-time monitoring of crops, and various other benefits towards increasing crop yield. Smart farming also helps to increase sowing and fertilizing efficiency, aids early identification of diseases and pests, and thereby ensures cost-efficient agricultural practices.

Measures to encourage the use of the latest technology to increase agricultural yield are:

1. Strengthen the adoption of new technology and approaches in paddy granary areas to maximise paddy production and minimise costs. This includes the selection of new seed varieties. Hybrid rice, for instance, can increase yield to over 10 metric tonnes/hectares, saves fertiliser use and is disease resistant.

2. Promote vertical farming as cultivation method for enclosed space and integrated with internet of things (IoT) technology to monitor and control the ambience condition for optimum crop growth and yield. This method can be implemented in the livestock, vegetable and fruit industries organically.

3. Encourage the use of big data analytics, internet of things (IoT) and robotic technology to improve the efficiency of farm and agricultural site management as well as to help monitor the food supply chain.

4. Support research on seed diversity to improve the quality and productivity of agricultural commodities.

5. Establish smart collaborations between farmers, young entrepreneurs, public and private agencies to enable the sharing of knowledge, expertise and skills, and to provide efficient funding for such purposes.

6. Implement continuous R&D to improve quality or genetic modification through biotechnology and nanotechnology research in line with the National Technology and Innovation Sandbox (NTIS) initiative.

7. Facilitate the marketing of agricultural product through the use of the latest technology and online applications.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Ministry of Agriculture and Food Industry (MAFI) • Ministry of Science, Technology and Innovation (MOSTI) • Department of Agriculture • Malaysian Institute of Agricultural Development and Research (MARDI)	• State Authority • Farmers' Organisation Authority

STRATEGY
SR 2.6

STRENGTHEN THE PRESERVATION, CONSERVATION AND PROTECTION OF NATIONAL CULTURAL AND NATURAL HERITAGE SITE

RELATED SDGs
- SDG11
- SDG15

A heritage site refers to a location deemed and designated as important to the **cultural heritage** or **natural heritage** of a community or of an area**.** Cultural heritage sites include archaeological heritage sites, buildings, and monuments/sites that have cultural heritage significance. Meanwhile, natural heritage sites include sites with outstanding universal value from the point of view of nature, science, history conservation or natural beauty including the flora and fauna.

The management of national heritage assets requires improvement to create uniformity in terms of the application of legal provisions in the relevant Acts. The formulation of specific definition of heritage sites from legal point of view is also important important. Coordinated mitigation methods are also required to regulate and manage heritage conservation to ensure that national heritage assets are not susceptible or exposed to threats. Heritage sites are divided into three (3) main categories :

1. UNESCO World Heritage Site (WHS)

   The UNESCO World Heritage Sites (WHS) are cultural or natural sites of Outstanding Universal Value (OUV). These values transcend national boundaries and are of common interest to current and future generations. OUV is determined based on three (3) components:

   i. The site meets at least one (1) of the 10 WHS eligibility criteria;
   ii. Integrity and authenticity of the site; and
   iii. The legislative provisions and management framework that protect the site from threats.

BRIEF FACTS

The definition of heritage in the National Heritage Act 2005 (Act 645)

The National Heritage Act 2005 (Act 645) prescribes two (2) important forms of heritage value:

i. Cultural heritage; and
ii. Natural heritage

Cultural heritage significance means "cultural heritage having aesthetic, archaeological, architectural, cultural, historical, scientific, social, spiritual, linguistic or technological value" (Section 2, Act 645).

An important natural heritage value is "any natural site of outstanding value from the point of view of nature, science, history conservation or natural beauty including flora and fauna of Malaysia" (Section 2, Act 645).

Source: National Heritage Act 2005 (Act 645)

The inscription of heritage sites as WHS is merely an acknowledgment and does not provide protection to the sites. Therefore, to prevent deterioration of the sites and to keep them listed as WHS, the UNESCO emphasises the requirement that WHS be protected under the laws of their respective countries.

2. National Heritage

National Heritage includes heritage sites listed in the National Heritage Register under the National Heritage Act 2005 (Act 645), as well as 'Protected Zones' for underwater cultural heritage. The protection of these sites falls under the duty of the Heritage Commissioner (refer **Box 5-25**).

Box 5-25: Protected Zones: Underwater Cultural Heritage

Underwater cultural heritage is the traces of human existence having a cultural, historical or archaeological character which have been partially or totally under water, periodically or continuously, for at least a hundred years. Underwater cultural heritage of significant heritage value but less than a hundred years old may also be declared as cultural heritage site or object by the Minister. Currently, there are five (5) areas in the Peninsular Malaysia and F.T. Labuan waters gazetted as protected zones to protect underwater cultural heritage under the provisions of sections 63 & 64, Act 645. Any site or object declared as an underwater cultural heritage is also listed in the National Heritage Register. The following are the five (5) gazetted underwater cultural heritage protected zones:

1. **Tanjung Tuan Zone**
   This zone covers the area between Teluk Kemang and Pasir Panjang, Port Dickson, Negeri Sembilan, with an area of 141.4 sq km.

2. **Pulau Upeh - Pulau Besar Zone Water Gazette Zone**
   This zone covers the waters between Tanjung Kling and Merlimau, Melaka, covering an area of 364.47 sq km.

3. **Tioman – Mersing Zone**
   This zone is the largest Protected Zone with an area of 7,047.6 sq km. This zone is located between Kuala Rompin and Tanjung Sedili, and covers the islands of Tioman and Mersing between Pulau Tioman and Pulau Aur.

4. **Pulau Bidong Zone**
   This zone is only 4 sq km and is located in the western waters of Pulau Bidong Laut.

5. **Federal Territory of Labuan Zone**
   This zone covers the eastern waters from Tanjung Kubong to the south and on the west to Sungai Pagar with a total size of 526.24 sq km.

Source: Malaysian Maritime Enforcement Agency

Pulau Bidong, Terengganu

3. State and Local Heritage

State and Local Heritage sites are listed under the State Heritage Enactment and/or in the State Structure Plan (SP) and Local Plan (LP) gazetted under the Town and Country Planning Act 1976 (Act 172).

The supervision and monitoring of these sites fall under the responsibility of the State Authority and the Local Authority. Since they are not listed in the National Heritage Register, it is thus imperative that State and Local heritage Sites are listed in the State Heritage Register to ensure that they are protected and conserved.

The following are the categories of heritage sites listing in the National Heritage Register, which are subject to Act 645:

i. Heritage Sites (Section 24) – designated by the Heritage Commissioner; and

ii. National Heritage (Section 67) – declared by the Ministry of Tourism, Arts and Culture by order published in the Gazette.

There are also other heritages that are valued by certain local groups or communities only. Although such heritages are not designated as State and Local Heritage, but their value and importance to the local groups and communities still need to be respected.

FRIM Selangor Forest Park has been gazetted as a National Heritage

ACTION SR 2.6A

Protect cultural heritage sites and natural heritage sites through legal mechanisms

The country's heritage assets are protected through legal instruments under the following Acts;

i. Town and Country Planning Act 1976 (Act 172) through the Structure Plan and Local Plan system;
ii. Federal Territory (Planning) Act 1982 (Act 267) for Kuala Lumpur; and
iii. National Heritage Act 2005 (Act 645) through listing in the National Heritage Register.

The listing of heritage assets in the National Heritage Register under Act 645 provides additional protection and enable these sites to be governed as national heritage. For example, sites of natural heritage importance, such as geological heritage sites, have been identified and documented in detail by the Department of Minerals and Geosciences Malaysia.

These geological heritage sites include 157 geo-sites and geofeature locations that need to be protected from development threats (refer to **Plan 5-20**). Meanwhile, sites identified as having a very high heritage value will be proposed to the Ministry of Tourism, Arts and Culture to be gazetted as National Heritage.

Internationally, being recognised by UNESCO as a World Heritage Site (WHS) makes the site as one of the most important cultural and natural heritage sites in the world. All UNESCO WHS in the country must be gazetted as National Heritage to remain on the UNESCO list including heritage sites in the Tentative List. This is a general condition of eligibility set out in the latest UNESCO Operational Guidelines for the Implementation of the World Heritage Convention.

Measures to protect all potential heritage sites through legal mechanisms are:

1. List all heritage sites in the SP and LP to update the State Heritage Register and the National Heritage Register

   State Heritage Register must be established to create integrated heritage site list consisting of heritage sites identified in the SP and LP. This is as an alternative measure for heritage site management by the State Authority and the Local Planning Authority. For this purpose, State Heritage Enactment will need to be enacted by states in Peninsular Malaysia

2. Identify heritage sites with Outstanding Universal Value (OUV) in the National Heritage Register for nomination as National Heritage.

3. Gazette existing UNESCO WHS and heritage sites in the Tentative List as National Heritage.

   Table 5-12 shows the gazette status of existing UNESCO WHS and heritage sites on the Tentative List. Thus far, only Royal Belum State Park, Perak and FRIM Selangor Forest Park have been fully gazetted as National Heritage. It is therefore important that the process to fully gazette the WHS and other heritage sites on the Tentative List as National Heritage is undertaken immediately to ensure the WHS can remain as UNESCO WHS and the sites on the Tentative List can be nominated for WHS.

Table 5-12: UNESCO WHS and heritage sites in the Tentative List gazette status as National Heritage.

NO.	SITE	STATE	UNESCO STATUS	SITE CATEGORY	CURRENT GAZETTE STATUS UNDER ACT 645
1.	Melaka World Heritage City and George Town	Melaka & Pulau Pinang	Recognised in 2008	Cultural Heritage	Several buildings and sites have been gazetted as National Heritage
2.	Lenggong Valley Archaeological Heritage	Perak	Recognised in 2012	Cultural Heritage (Archaeological Site)	Several major archeological sites have been declared as National Heritage
3.	National Park	Pahang, Terengganu dan Kelantan	Listed under Tentative List	Natural Heritage	Has been gazetted under the National Parks Enactment; In the process of being gazetted as a National Heritage
4.	National Leprosy Control Center (PKKN)	Selangor	Listed under Tentative List	Cultural Heritage	In the process of being gazetted as a National Heritage
5.	Royal Belum State Park	Perak	Listed under Tentative List	Natural Heritage	Has been gazetted as a National Heritage
6.	FRIM Selangor Forest Park	Selangor	Listed under Tentative List	Cultural Heritage	Has been gazetted as a National Heritage

Source: Malaysian Maritime Enforcement Agency

The National Park is an important habitat for ~~the~~ flora (Rafflesia Flower, Monkey Pot) and fauna (Rajah Brooke Butterfly, Rhinoceros Hornbill, Leopard Tiger, Red Eagle, White Hand Hornet) which are parts of the attractions in this area.

4. Prepare and implement for heritage sites

A Conservation Management Plan (CMP) must be prepared for each heritage site listed in the National Heritage Register and sites listed in the SP and LP. The CMP should be used as a guide for the conservation, development control and management of heritage sites and their surrounding areas.

The CMP must be submitted by the Commissioner of Heritage to the State Authority and the Local Planning Authority for implementation (refer **Box 5-26**). Its preparation should be subject to relevant legal provisions such as Section 46 (1) of Act 645, Act 267, Act 172 or the State Heritage Enactment.

For heritage sites that are parts of ongoing preparation of Special Area Plans (SAP), the SAP must be prepared based on requirements equivalent to the CMP.

Box 5-26: Conservation Management Plan (CMP) in Section 46, National Heritage Act 2005 (Act 645)

The Heritage Commissioner shall prepare Conservation Management Plan (CMP) for heritage site that has been designated as such under Act 645 and to advise and co-ordinate with the State Authority and the Local Planning Authority for the implementation of the conservation management plan and its guidelines for the purpose of:

i. Promoting the conservation, preservation, rehabilitation, restoration, or reconstruction of a heritage site.
ii. Ensuring the proper management of a heritage site including the use and development of all buildings and land within the heritage site and the preservation of the environment including measures to improve the physical living environment, communications, socio-economic well-being, traffic management and the promotion of economic growth.
iii. Encourage schemes for the education of, or for practical and financial assistance to, owners and occupiers, and for community involvement in decision-making.

Dilapidated shelters that used to be the residence of leprosy patients at the National Leprosy Control Centre, Sungai Buloh, Selangor

AGENCIES INVOLVED

Main Agencies

- Ministry of Tourism, Arts and Culture Malaysia (MOTAC)
- Malaysian Maritime Enforcement Agency
- State Authority
- Local Authority

Supporting Agencies

- PLANMalaysia@Negeri
- State Forestry Department
- Department of Wildlife and National Parks (PERHILITAN) Peninsular Malaysia
- Department of Survey and Mapping Malaysia
- Department of Minerals and Geosciences Malaysia
- District and Land Office

Current Gazette Status under Act 645

1. **Malacca and Georgetown UNESCO World Heritage Cities -** Few buildings and site have been gazette as National Heritage.
2. **Lenggong Valley Archeological Heritage -** Few main archeological sites have been declared as National Heritage.
3. **Taman Negara** - Have been gazetted under Taman Negara National Park Enactment; in the process of gazettement as National Heritage .
4. **National Leprosy Control Centre (NLCC)** - in process of National Heritage gazettement.
5. **Royal Belum National Park –** have been gazetted as National Heritage.
6. **Selangor FRIM Forest Park -** have been gazetted as National Heritage.

MAP 5-20: HERITAGE SITES IN PENINSULAR MALAYSIA AND F.T OF LABUAN

Cultural Heritage Resources

- Archeological Heritage Site
- Building/ Monument/ Site Heritage Site
- Proposed Archeological Heritage Site
- Proposed Building/ Monument/ Site Heritage Site

Natural Heritage Resources

- UNESCO World Heritage Site (WHS)
- Nominated UNESCO World Heritage Site (WHS)
- Proposed Natural Geology Heritage Site

Others

- State Capital
- State Boundary

Source:
- National Heritage Department, 2019
- State Structure Plan
- National Physical Plan 4, 2020

STRATEGY
SR 2.7

ENSURE THE PRESERVATION AND PROTECTION OF CULTURAL HERITAGE IN THE PHYSICAL PLANNING AND DEVELOPMENT CONTROL PROCESS

RELATED SDGs
- SDG11
- SDG15

The art and cultural heritage of the local people symbolises the community of a place, settlement, region or country and thus need to be preserved to retain the integrity and sustainability of the heritage. The importance and the value of heritage preservation also lie in its ability to regenerate economy of the area but at the same time retain the community lifestyle and prevent them from being displaced as a result of modernisation and development. The physical planning process has a role to play in the preservation of art and cultural heritage. The conservation of a heritage site can revitalise the area, increase its liveability, encourage adaptive re-use, retain traditional trade and practices, and retain existing communities and improve their well-being.

Tourism activities in heritage areas also requires monitoring and control to avoid undesirable effects such as damage to heritage sites or objects, or disruption to the daily affairs of the residents of the areas. Heritage areas redevelopment must also avoid gentrification. **Figure 5-32** shows the strong relationship between cultural values and the formation of settlement in an area. This justifies the importance of the need to preserve and protect existing heritage areas. Funds and incentives should be made available for heritage sites and buildings rehabilitation. The participation of investors in heritage conservation efforts also need to be encouraged. Although the Heritage Fund has been established under Act 645, there are limitations in terms of financial allocation at the Federal Government level. Heritage Funds need to be created at the state and local levels state and local authorities can generate and allocate financial resources, as well as acquire federal funds allocation to undertake conservation projects and manage heritage conservation areas. The Local Government Act 1976 (Act 171) empowers local authorities to maintain or contribute to the maintenance of historical buildings or sites and to acquire any land related to the maintenance of historical buildings or sites (Section 101). The Act also permits the local authorities to provide for the establishment, regulation and management of any historical buildings or sites. The conservation of local art and cultural heritage through physical planning process can enhanced by incorporating elements of local culture and arts in new developments to create unique and distinctive local identity and values.

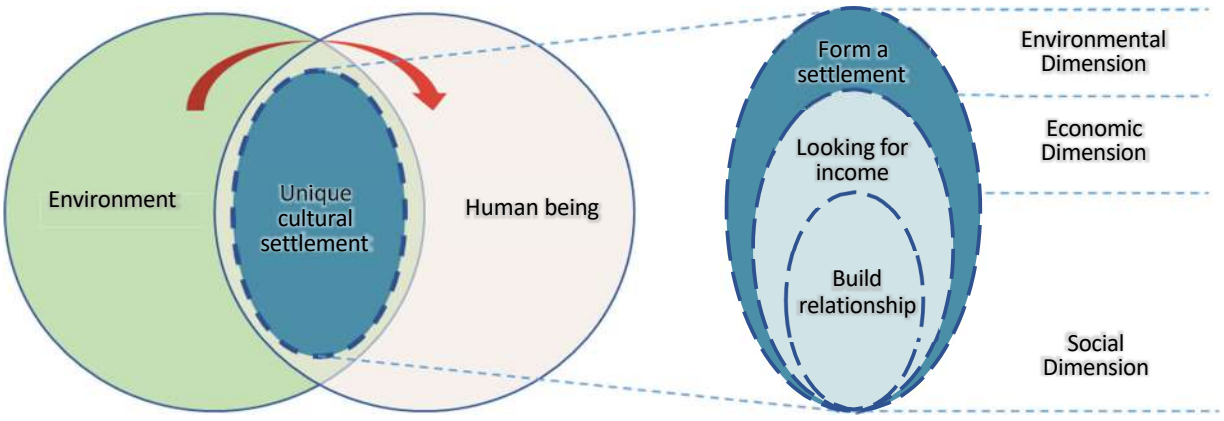


Figure 5-32: Dimensions of cultural values in the formation of settlements
Source: *Cultural mapping: A guide to understanding community*, Pillai, J, 2020.

ACTION SR 2.7A

Undertake cultural mapping to preserve the integrity, authenticity and value of local heritage

The uniqueness of the local arts, image and identity, whether of urban or rural communities, should be highlighted as cultural heritage that needs to be preserved. Efforts to preserve and conserve cultural and artistic heritage shape the value of community heritage. The preservation and promotion of local culture and heritage needs must be strengthened to create a strong identity so that they can used as attractions to generate the economy of the local community.

The measures that need to be implemented are:

1. Ensure that elements of local culture and heritage are embedded in the urban design and in the design of new buildings to form a local identity.

2. Implement development control to ensure that the heritage value, the originality and the integrity of heritage sites are preserved through the planning process.

3. Identify possible threats and adverse effects from proposed interventions or changes to an area on important heritage values.

4. Provide planning guidelines for the conservation of heritage areas and buildings taking into account existing and new development.

5. Undertake cultural mapping and by adapting the 'Area Character Statement' technique to identify local heritage and cultural characteristics.

6. Ensure that the OUV and cultural heritage significance of the local area are preserved.

Kampung Kling Mosque ~~in~~ on Jalan Tukang Emas, Melaka, or also known as 'Harmony Street' due to the location of the mosque which is near to the Sri Poyatha Moorthi Temple and the Cheng Hoon Teng Temple.

AGENCIES INVOLVED

Main Agencies

- National Department for Culture and Arts
- Malaysian Maritime Enforcement Agency
- Local Authority

Supporting Agencies

- Ministry of Tourism, Arts and Culture Malaysia (MOTAC)
- PLANMalaysia
- State Authority

ACTION SR 2.7B

Enhance the preservation of culture and arts for future generations

The provision of public spaces that are unique and with cultural values is important to preserve the arts and culture of the local community. Ongoing programmes and activities in public spaces that are easily accessible can promote and educate the community about local arts and culture, and can become a tourist attraction of the area. It is also important in enhancing the community's understanding of the importance, and the need for preservation, of heritage values that forms the basis of the community's identity.

Measures to promote education, learning and understanding of arts and culture include:

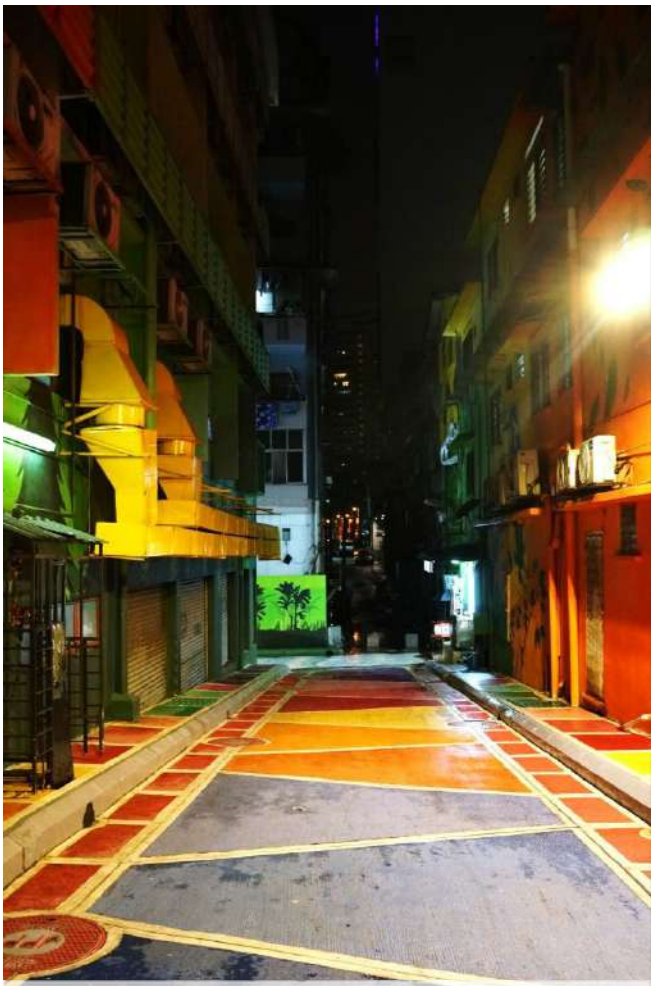
1. Identify public spaces that are unique and with cultural values and are suitable for holding cultural activities in urban and rural areas.

2. Provide opportunities to organise arts and cultural performances, exhibitions and training in cultural complexes or sites, plazas, arenas and squares in major cities as part of 'placemaking'.

3. Intensify arts and cultural activities among the youth.

4. Diversify activities and provide skills training programmes to increase awareness and promotion of the conservation and preservation of art and cultural heritage to support the country's creative industry.

5. Provide state and local heritage funds as well as other incentives for the purpose of local art and cultural heritage conservation.



Jalan Alor in Bukit Bintang, Kuala Lumpur showcases street art which becomes an attraction in the area.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Ministry of Tourism, Arts and Culture Malaysia (MOTAC) • National Department for Culture and Arts • Local Authority	• State Authority • PLANMalaysia

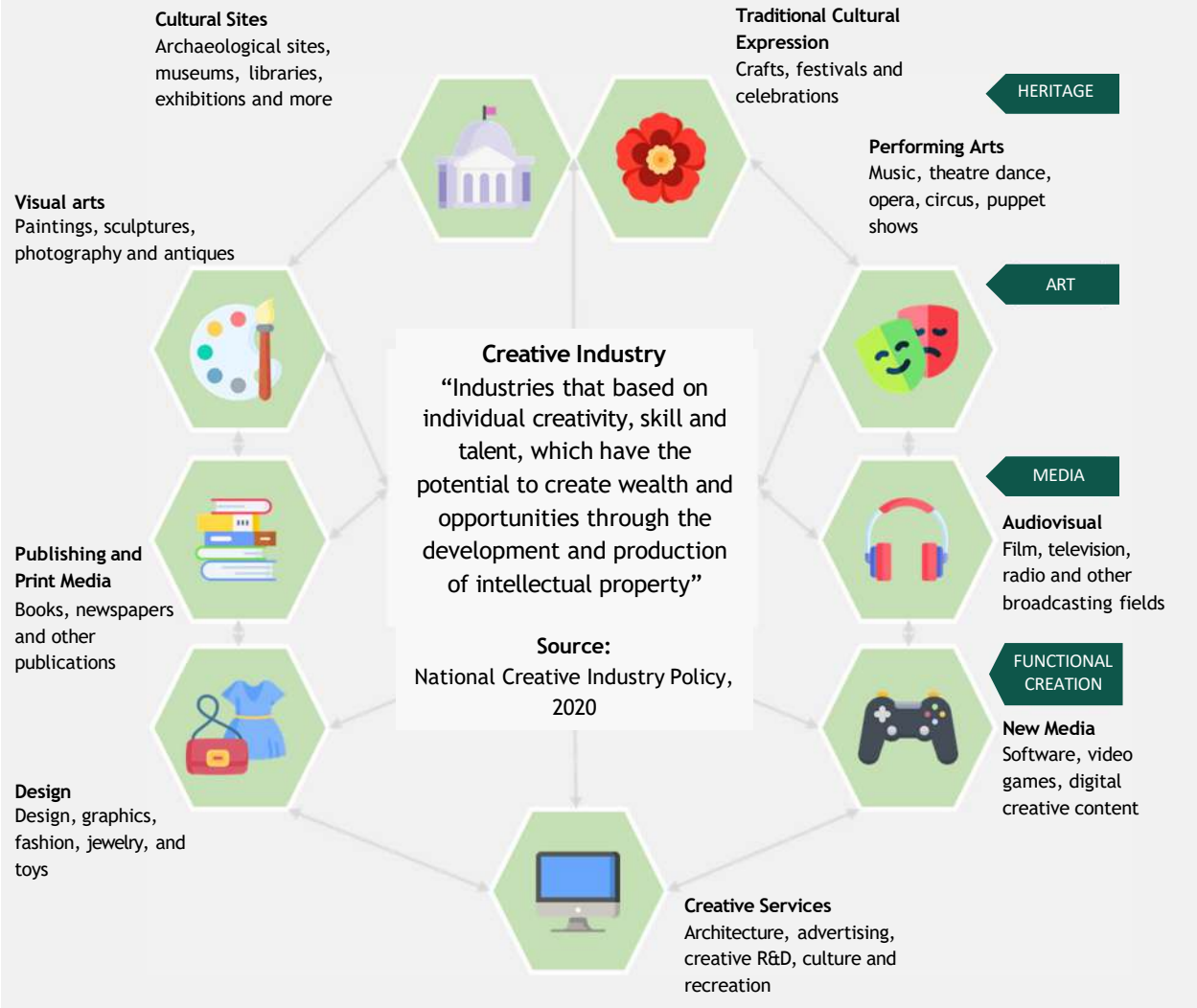


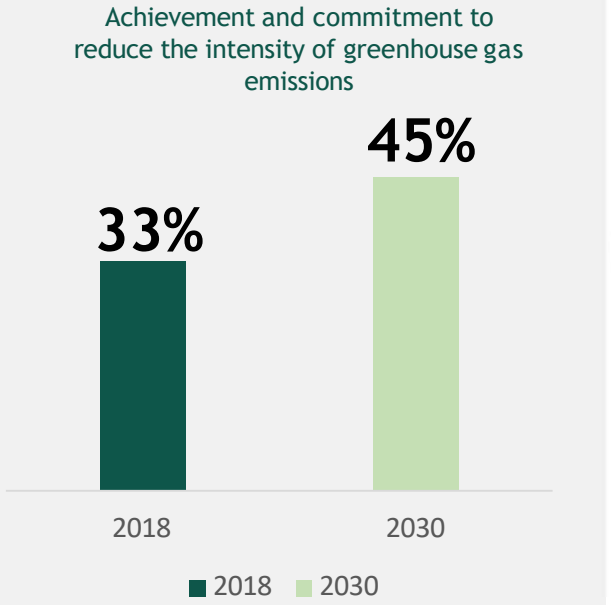
Figure 5-33: Scopes of the creative industry in Malaysia
Source: NPP3, 2015 and National Creative Industry Policy, 2020

The existence of the creative industry opens up avenues and opportunities for the talented groups especially the younger generation, to produce creative works involving multimedia, arts or culture which have been well received at home and abroad. The Government's encouragement of creative industry spanning multiple scopes (refer to **Figure 5-33**) through the use of latest technology to build interest among the community has helped to enhance the preservation of arts and culture. This has created a long-term impact and has transformed the creative industry into a high value industry. The creative industry also helps in supplying quality and unique works of art as well as creating a sense of appreciation for arts culture among the community.

SR 3
DEVELOPMENT TOWARDS A CARBON NEUTRAL NATION

Malaysia has signed the 2015 Paris Agreement which aims at limiting global temperature rise this century to well below 2 degrees Celsius above the pre-industrial levels, and pursuing continuous efforts to limit the rise further to 1.5 degrees Celsius. Under this agreement, Malaysia has set a target of reducing the intensity of GHG emissions by 45% against Gross Domestic Product by 2030. Spatial and land use planning is an important dimension that is critical in efforts to minimise GHG emissions, especially in urban areas, so that temperature increase can be curbed to below 1.5 degrees Celsius.

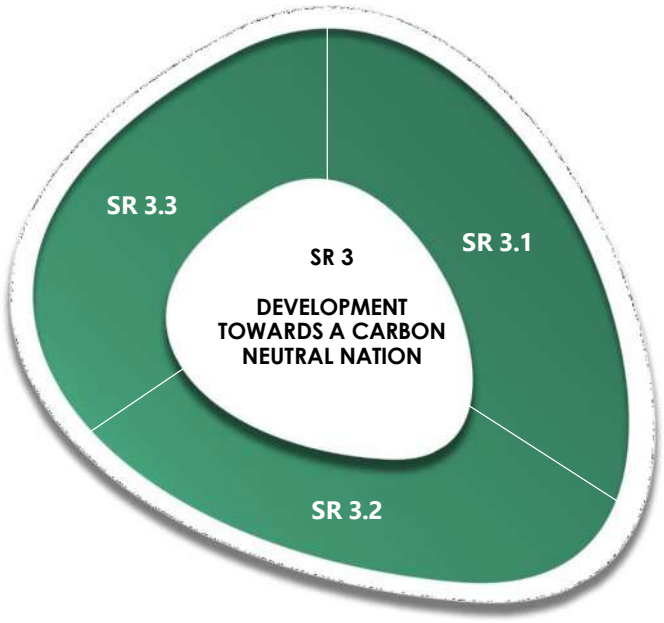
In developing and managing the growth of the country, NPP4 emphasises on the strategies to reduce the country's carbon emissions to a carbon neutral level. Various initiatives implemented at the municipal level can be expanded and supported at the state level. At the same time, national level initiatives such as low-carbon development and the use of sustainable energy sources need to be expanded so that they can significantly contribute towards a carbon neutral nation.



By 2018, Malaysia has recorded a 33% reduction in the intensity of greenhouse gas (GHG) emissions against Gross Domestic Product (GDP). Under the ratification of the Paris Agreement at the Climate Conference Paris 2015 (COP21), Malaysia had pledged to reduce GHG emissions by 45% against GDP by 2030.

Source: Third National Communication Report to the United Nations Framework Convention on Climate Change (UNFCC), 2018

This Strategic Direction focuses on low-carbon development towards a carbon neutral nation by expanding the implementation of low-carbon city framework and the provision of sustainable infrastructure minimize impact of physical development on the environment. The carbon neutral development component, which includes the use of Renewable Energy (RE) and efficient waste management, is also emphasised through the proposed strategies and actions towards reducing GHG emissions and becoming a carbon neutral nation.



Strategic Direction SER3

DEVELOPMENT TOWARDS A CARBON NEUTRAL NATION

SR 3.1	Expand the Implementation of the low-carbon Cities Framework
SR 3.2	Improve the Management of Sustainable Alternative Energy Sources
SR 3.3	Strengthen Efficient and Sustainable Waste Management

STRATEGY
SR 3.1

EXPAND THE IMPLEMENTATION OF THE LOW-CARBON CITIES FRAMEWORK

RELATED SDGs
SDG9 SDG13
SDG11 SDG16

Malaysia has always been seen as a leading and committed nation to sustainable development among developing countries. The NPP4 provides a platform for Malaysia to plan for targets beyond 2030 by focusing on the country's readiness to shoulder a higher commitment, namely towards a carbon neutral country. Malaysia has an advantage in terms of vast forest cover, which is at 55.1% of the country's land area. Forests are important carbon sinks that can offset carbon emissions from key economic sectors, namely the energy sector and the industrial sector (refer to **Figure 5-34**).

Malaysia is also becoming more advanced in terms of technology and efficiency in the use of energy to reduce carbon emissions. The country's economic transition to low-carbon or zero carbon technology such as the use of Renewable Energy (RE) sources can generate external investment, create opportunities and employment in new economic sectors, as well as reduce costs for healthcare and environmental mitigation. These cost savings can be used for other purposes for national development.

At the municipal level, low-carbon cities are the results of overall economy emitting GHG at a lower level than usual or business as usual (BaU) level. Cities can also set higher targets, namely zero carbon emissions, which can be achieved through domestic mitigation measures, including increase in forest area, utilisation of green technology, reduction or cessation of fossil fuel use, and implementation of sustainable solid waste management.

In comparison to zero emission, the concept of carbon neutral allows carbon reduction to be achieved through not only mitigation measures within the country, but also beyond national borders. For example, through carbon offset measures between countries.

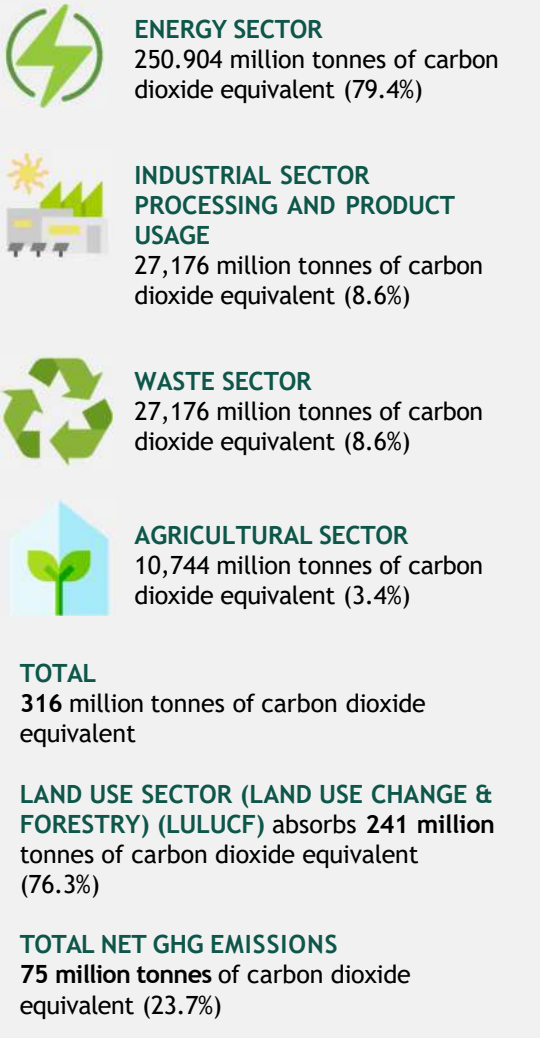


Figure 5-34: Greenhouse gas emissions by sector in 2016
Source: Third Biennial Update Report, Ministry of Environment and Water, 2020

At the state level, carbon reduction policies and achievements also need to be encouraged. The implementation of low-carbon state initiatives will contribute towards the country achieving the carbon neutral state aspiration in the future (refer to **Figure 5-35**).

Therefore, to support the aspiration of the country, this NPP4 strategy emphasises various initiatives involving the implementation of low-carbon action plans, the use of green and low-carbon building practices and features, as well as the recognition of the importance of the transport sector in supporting GHG reduction aspirations. These can also accelerate the transformation of cities towards low-carbon cities. This strategy also focuses on the development of a roadmap towards a carbon neutral nation that involves the expansion of the low-carbon city framework to the national level. The following are among the benefits of expanding the low-carbon city framework through the proposed actions (refer to **Table 5-13**).

BRIEF FACTS

The concept of a carbon neutral state

Carbon offset occurs when country X sponsors forest conservation work in country Y. The carbon uptake by the forest will replace or offset the carbon emissions from country X to enable country X to achieve carbon neutral status.

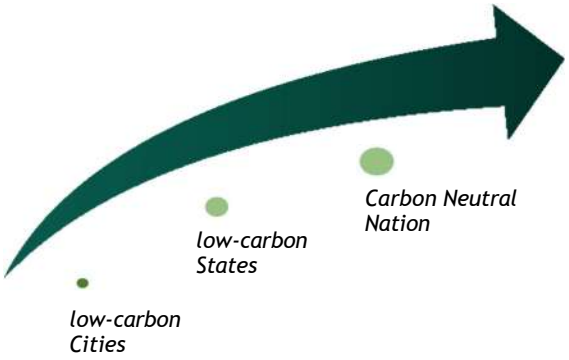


Figure 5-35: Hierarchy of low-carbon and carbon-neutral development aspirations

Table 5-13: The benefits of actions to expand the implementation of low-carbon city framework

Actions	Benefits
SR 3.1A: Ensuring that each state prepares a low-carbon action plan	• To mutually agree and planning of resources and development at state level. • Facilitates monitoring of action plan implementation by local authorities at the state level.
SR 3.1B: Expanding the implementation of low-carbon city action plans in all local authorities	• Helps reduce carbon emissions by economic sector. • Contributes to efforts to limit temperature rise in urban areas.
SR 3.1C: Developing low-carbon mobility	• Reduces the carbon footprint of the transportation sector by shifting to low-carbon mobility. • Encourages the use of cleaner fuels for transportation.
SR 3.1D: Ensuring the application of green building and low-carbon city features in development	• Helps reduce construction waste while reducing carbon generation. • Promotes energy efficiency and economical living.
SR 3.1E: Formulating a roadmap towards a carbon neutral state	• Emphasises efforts towards reducing pollution and improving the quality of public health. • Preserves the country's ecological assets and biodiversity values.

ACTION SR 3.1A

Ensure each state prepares an action plan for low -carbon urban development

The state government plays an important role in mainstreaming low-carbon development in existing state development policies and strategies. The state government should prioritise commitment, support and financial allocation to local authorities with carbon reduction initiatives to become a city that is resilient to climate change. The National low-carbon Cities Master Plan will provide guidance to state government in establishing low-carbon cities. The benefits of preparing a low-carbon action plan in an effort to reduce carbon emissions in cities are as follows:

i. To mutually agree and planning of resources and development at state level especially in the way forward of the economy and the sustainable use of natural resources such as land and water.

ii. State-level monitoring of low-carbon action plan implementation by local authorities to ensure that all local authorities receive the necessary support.

iii. State-level collaboration among the local authorities enables collective solutions to cross-district issues such as electricity generation and supply, conservation of large forest areas, inter-city transportation and water supply resource management.

iv. Promotes sharing of expertise in terms of low-carbon strategy planning, evaluation, reporting and verification of carbon emission reduction.

The measures towards the preparation of low-carbon action plan at the state level are:

1. Improve state development policies and strategies towards promoting the development and investment of low-carbon technology.

2. Strengthen collaboration between state governments, the private sector and local communities in developing a green economy and creating employment opportunities.

3. Introduce the concept of performance-based financial incentives from the central government for states that have successfully reduced carbon emissions (refer to **Action SR 3.1E**)

The use of public transport contributes towards carbon reduction

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Ministry of Environment and Water (KASA) • State Authority	• Ministry of Energy and Natural Resources (KeTSA) • PLANMalaysia@Negeri • Malaysia Green Technology Corporation

ACTION SR 3.1B

Expand the implementation of low-carbon city action plans in all local planning authorities

Low-carbon urban development is part of sustainable urban initiatives designed to assist in reducing carbon emissions and in generating the economy especially related to high-tech industry and green technology. Several cities in Malaysia have drawn up their low-carbon action plans and have also prepared their greenhouse gas inventories that can be used in monitoring the effectiveness of the action plans.

F.T. Kuala Lumpur, Iskandar Malaysia, Seberang Perai, Penang and Melaka are now registered under global city associations such as the C40 Cities and the International Council for Local Environmental Initiatives (ICLEI). In 2018, data by Malaysia Green Technology Corporation shows that a total of 52 local authorities in Malaysia have registered under the low-carbon Cities Framework (LCCF) initiative.

BRIEF FACTS

National low-carbon Cities Master Plan

A document being prepared by the Green Technology Application for the Development of low-carbon Cities (GTALCC) with the primary objective of driving low-carbon development and initiatives in Malaysia. GTALCC is a project implemented by the government in collaboration with the United Nations Development Program (UNDP) - Global Environment Facility (GEF). This master plan will set out a general definition of a low-carbon city and detail key actions and targets for each city.

However, there are still cities without low-carbon action plans. **Plan 5-21** shows the implementation of the LCCF in Malaysia where the initiative was adapted by 56 parties comprising local authorities, educational institutions and the Corridor Authority. GHG reduction can also be achieved through sector-related efforts (refer to **Figure 5-36**).

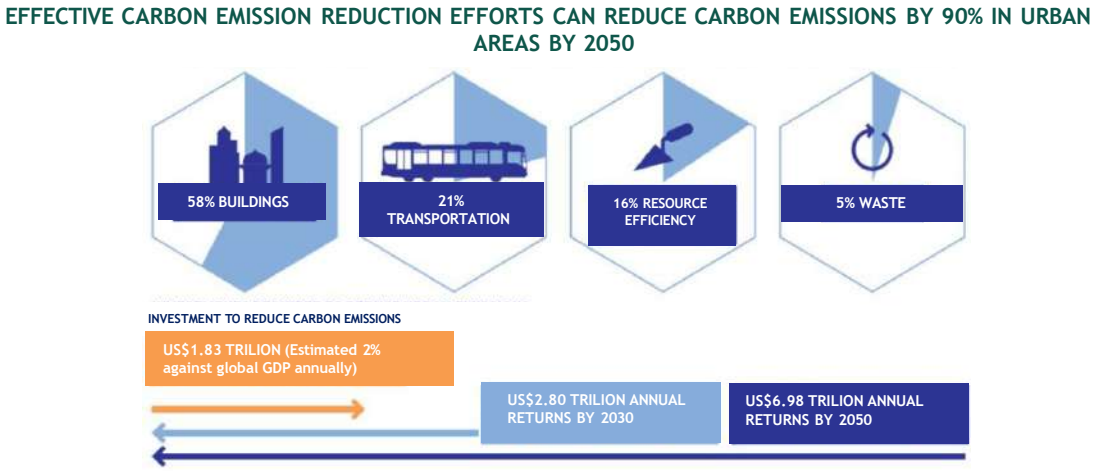
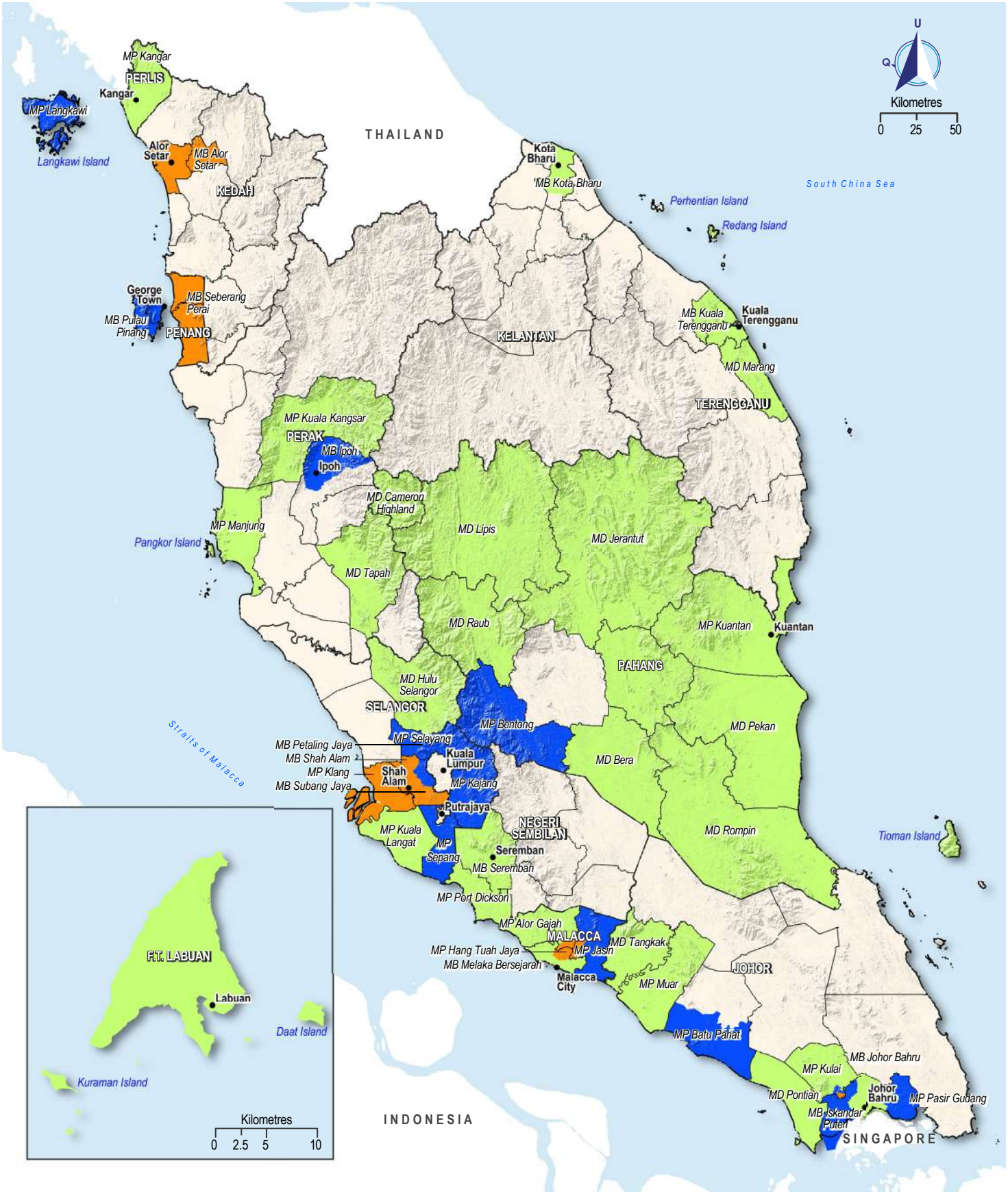


Figure 5-36: Estimated investments and returns from low-carbon technology and practices

Note:
Coalition for Urban Transitions is a global sustainable urban development initiative involving a collaboration between 35 research institutes, government organisations, investors and NGOs

Source: Climate Emergency Urban Opportunities, Coalition for Urban Transition (The Global Commission on the Economy and Climate), 2019



MAP 5-21 : IMPLEMENTATION OF LOW CARBON CITIES FRAMEWORK (LCCF) AT LOCAL AUTHORITY LEVELS IN PENINSULAR MALAYSIA AND F.T OF LABUAN

Implementation phase

- Phase 1: LCCF Awareness and Advanced Training
- Phase 2: Low Carbon Baseline and Action Plan Development
- Phase 3: Achieved Carbon and Continuous Improvement

Others

- State Capital
- Mukim Boundary

Source:
- Malaysia Green Technology Corporation, 2019

Based on **Figure 5-36**, efforts to achieve GHG reduction by 2050 accounted for an estimated 58% from commercial and residential development (through energy efficient practices), 21% from the transportation sector (through biofuel use, mode of transport change, reduction of motor vehicle travel, and others) 16% of manufacturing and 5% of solid waste management (recycling practices, collection and use of methane gas, and waste reduction).

This represents a reduction from 17.3 billion tCO2e to 1.8 billion tCO_2e by 2050. The use of existing low-carbon technology and practices can reduce global carbon emissions by 90%. These efforts require an investment of USD1.8 trillion (RM7.50 trillion) a year, which is about 2% of total world GDP, but could generate a return of USD2.8 trillion by 2030 and USD6.98 trillion by 2050.

The measures that need to be taken in implementing this action are:

1. Local authorities need to prepare their own low-carbon city action plans that include policies to facilitate them to set and benchmark targets to achieve low-carbon city status. The action plans will also help local authorities to plan and control development with the application of low-carbon urban design in line with the low-carbon Cities Framework (LCCF), as well as to inculcate a low-carbon culture among urban communities. **Table 5-14** lists examples of existing low-carbon city action plans in Malaysia.

Table 5-14: Examples of low-carbon city action plan in Malaysia

Action Plans	Main Objectives
Putrajaya Green City 2025	• Reduce 60% of greenhouse gas emissions from the transportation sector. • Reduce 50% of greenhouse gas emissions from the solid waste sector. • Lowering the temperature in Putrajaya by 2°C.
low-carbon Society Blueprint for Iskandar Malaysia 2025	• Reduce greenhouse gas emission intensity by 58%. • Reduce greenhouse gas emissions by 40% based on Business as Usual (BaU).
Kuala Lumpur low-carbon Society Blueprint 2030	• Reduce greenhouse gas emission intensity by 70%.

Source: Putrajaya Corporation, Iskandar Malaysia & Kuala Lumpur City Hall

2. Encourage the involvement of the private sector in the implementation of green economic practices to reduce carbon emissions, especially in urban areas. By encouraging their engagement will help make the private sector become more committed ~~in~~ with their responsibilities to the community and the environment.

3. Monitor the performance of low-carbon action plans and carbon emission reduction. Monitoring of low-carbon action plans should also be conducted periodically for reporting at the national level. The reduction of carbon emissions needs to be monitored using monitoring system that is adopted at the national and global levels.

4. Ensure that the greenhouse gas inventory is undertaken under the low-carbon city action plan to monitor the level of GHG reduction towards the achievement of low-carbon planning in the future as has been practiced by several ~~some~~ local authorities (refer to **Table 5-15**).

BRIEF FACTS

Since 2006, every company listed on Bursa Malaysia has been required to prepare an annual sustainability report.

Source: Bursa Malaysia, 2006

Table 5-15: Local authorities low-carbon action plan achievements

Local Authority	Achievement
Seberang Perai City Council, Penang	• CO_2 reduction from 2015 to 2017 by 77.30 tCO_2. • 1,807 tonnes of waste is recycled. • Generate 6,130KWh of energy per month from solar panels (Solar PV). • Energy consumption decreased by 1.8% (36,006KWh). • 4km bike path (Taman Pauh - Bandar Perda - MPSP Tower).
Shah Alam City Council, Selangor	• Reduction in energy consumption of 2,225,038KWh leading to a reduction of 1,684.5 tCO_2 (3.3%). • 817 tonnes of solid waste was segregated at source leading to a reduction of 270.3 tCO_2 (25.9%). • 1,681 tonnes of waste is recycled. • Reduction in water consumption of 37,775m^3 leading to a reduction of 15.8 tCO_2 (9.6%). • Reduction of 12,173 vehicles leading to a reduction of 1,497.4 tCO_2 (38.8%).
Klang Municipal Council, Selangor	• Reduction in energy consumption of 66,939KWh leading to a reduction of 50.0 tCO_2 (4.6%) in 2017 compared to 2015. • 1,872.4 tonnes of solid waste was segregated at source (not sent to landfill) leading to a reduction of 670.5 tCO_2 (23.5%). • 18,743.0 tonnes of waste is recycled. • 137 trees were planted leading to carbon sequestration of 4.1 tCO_2 (103.8%).

Source : Malaysia Green Technology Corporation, 2019

5. Provide Low-Carbon Urban Planning Guidelines to guide the Federal, State and Local Governments in low-carbon urban planning. The guidelines should also provide guidance, mitigation measures and adaptation strategies for climate change in the context of spatial planning. Additionally, the guidelines should include guidance to formulating a comprehensive GHG inventory and the setting of district-level carbon reduction targets in the preparation of Local Plans (LPs). Also to be included in the guidelines will be the methods, techniques and approaches for climate risk and vulnerability analysis to reduce the impact of climate change.

6. Encourage local authorities to actively implement low-carbon urban initiatives to gain recognition at the Ministry level (refer to Box 5-27).

BRIEF FACTS

Low-carbon Society Blueprint for Iskandar Malaysia 2025

Iskandar Malaysia has adopted the low-carbon Society Blueprint for Iskandar Malaysia 2025 since 2012. Based on carbon monitoring through the Iskandar Malaysia Greenhouse Gas Inventory 2017 which adopts the Global Protocol for Community Scale Greenhouse Gas Emission Inventories (GPC), Iskandar Region has managed to reduce carbon intensity by 13 % in 2017, which was equivalent to 0.2164 ($ktCO_2e$/Million RM) compared to (0.2484 ktCO2e/Million RM) in 2010.

Source: Iskandar Regional Development Authority, IRDA

Box 5-27: low-carbon City Awards Ceremony organised by Malaysian Green Technology and Climate Change Center (MGTC) and Ministry of Environment and Water (KASA)

The low-carbon City (LCC) Awards Ceremony is organised to appreciate local authorities who have intensified their efforts in reducing carbon emissions at the municipal level. LCC is the second phase of LCCF implementation. The goal of the LCC is to reduce the intensity of carbon emissions, in line with the country's global commitment to reduce GHG emissions by 45% by 2030.

Source: Malaysian Green Technology and Climate Change Centre, 2021

The 'Shah Alam Car Free Day' as one of the initiatives set by Shah Alam City Council

AGENCIES INVOLVED

Main Agencies

- Local Authority
- PLANMalaysia

Supporting Agencies

- Ministry of Housing and Local Government (KPKT)
- Ministry of Environment and Water (KASA)
- Ministry of Energy and Natural Resources (KeTSA)
- State Authority

ACTION SR 3.1C

Explore low-carbon mobility

Efforts towards low-carbon urban development need to be supported by the low-carbon transportation sector. This is in line with the strategy in the National Transport Policy 2019-2030, which is to accelerate the implementation of low-carbon mobility initiatives. Low-carbon mobility also helps in ensuring a clean and healthy environment for all groups of the society. The use of public transport and energy efficient vehicles is a key step in promoting low-carbon mobility.

The measures to develop low-carbon mobility are:

1. Encourage development planning that minimises the use of motor vehicles

   This measure seeks to create a conducive low-carbon mobility ecosystem. The designation and development of no vehicle zone at certain areas must be planned and encouraged. For these areas, vehicle access is only allowed for emergency purposes and for delivery of goods at permitted times only.

2. Encourage the use of low-carbon technology vehicles

   Electric vehicles are the future of the world automotive industry. From the context of low-carbon mobility, the use of electric vehicles (private or public), can reduce carbon emissions. Measures to encourage the use of electric vehicles are also in line with the NTP. Appropriate infrastructure must also be provided such as the provision of charging stations at existing petrol stations. The provision of vehicle charging stations can be made as one of the conditions for the development of new petrol stations in the future.

3. Encourage green technology innovation in transportation network systems.

   Future highway development should take into account the use of green technology such as solar panels for street lighting. Innovation and the use of new environmentally friendly technology should also be encouraged. In Turkey, the ENLIL project, which is supported by the Istanbul Metropolitan Municipality, involves technology that generates renewable energy from wind turbines installed on the road. Such innovations should be encouraged in low-carbon transport networks.

BRIEF FACTS

National Transport Policy 2019-2030 (DPN)

The NTP has outlined a Strategy to Accelerate the Implementation of the low-carbon Mobility Initiative with the following key action plans:

- Review Act 333 to promote industrial growth and the use of EEV/EV in Malaysia.
- Encourage the use of various EV models.
- Formulate and implement fuel economy policies.
- Develop green indices and green friendly incentives.

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Ministry of Transport Malaysia (MOT) • Ministry of Environment and Water (KASA) • Ministry of Energy and Natural Resources (KeTSA) • Local Authority	• Ministry of Housing and Local Government (KPKT) • PLANMalaysia • State Authority

ACTION SR 3.1D

Ensure the application of green building and low-carbon city features in development

A building can be categorised as a green building if its design, construction or operation helps in shaping a positive impact on the climate and the environment. The construction, operation and maintenance of green buildings should emphasise on the efficient use of resources, innovativations, low-carbon technology and environmentally friendly design towards creating a sustainable living environment and community.

Measures to ensure the adoption and use of green and low-carbon building practices and features in development are as follows:

1. To require the use of green building practices as a requirement to obtain construction support or approval of the Certificate of Completion and Compliance (CCC). This proposed measure is in line with the requirements of existing guidelines including the Code of Practice on Energy Efficiency and Use of Renewable Energy for Non-Residential Buildings (MS1525) by Standard Malaysia.

2. To diversify green building rating incentives for building designs that emphasise the characteristics of such green practices. Examples of incentives that can be provided include appropriate tax reductions or exemptions and subsidies for training programmes related to green practices in the construction sector.

3. Strengthen cooperation between professional bodies and government agencies to raise awareness on the use of green building practices. The International Greentech & Eco Products Exhibition & Conference Malaysia (IGEM) programme has encouraged the use of green technology, especially for construction and energy efficiency in buildings. This programme is a collaboration between professional bodies and government agencies for the implementation of green practices as explained in **Box 5-28**.

BRIEF FACTS

There are several green development rating systems that are recognised in Malaysia, namely:

i. Green Building Index (GBI) Malaysia
ii. Green Rating (pH JKR) by Public Works Department Malaysia (JKR)
iii. Malaysian Carbon Reduction and Environmental Sustainability Tool (MyCREST) by CIDB and JKR
iv. CIS 20-GreenPASS by the Construction Industry Development Board of Malaysia (CIDB)
v. Melaka Green Seal by Melaka Green Technology Corporation (MGTC)
vi. Comprehensive Assessment of Built Environment Efficiency (CASBEE Iskandar) as a result of a collaboration between IRDA, Universiti Teknologi Malaysia (UTM) and the Institute for Building Environment and Energy Conservation (IBEC)
vii. BCA Green Mark by Building and Construction Authority, Singapore
viii. Leadership in Energy and Environmental Design (LEED) by the US Green Building Council, USA

Source: Sustainable Energy Development Authority (SEDA)

Box 5-28: International Greentech & Eco Products Exhibition & Conference Malaysia (IGEM) 2019

The International Greentech & Eco Products Exhibition & Conference Malaysia is an annual event organised by KeTSA as a platform to promote the use of green technology, especially in building construction and energy efficiency. The event also showcases the latest innovations as an exposure to various parties including policy makers and government organisations to attract investment.

Hologram technology showcased by Hitachi company during IGEM.

The modern exhibition space design attracts visitors to get more information related to products that support green technology.

Screens are provided for interactive experience for visitors.

Source: www.igem.my & www.hitachi.com.my

AGENCIES INVOLVED

Main Agencies

- Local Authority
- State Authority

Supporting Agencies

- Ministry of Environment and Water (KASA)
- Ministry of Energy and Natural Resources (KeTSA) Ministry of Housing and Local Government (KPKT)
- PLANMalaysia@Negeri
- Malaysian Investment Development Authority
- Malaysian Construction Industry Development Board (CIDB)

ACTION SR 3.1E

Formulate a roadmap towards a carbon neutral state

Malaysia has set targets for reducing carbon emissions at the national level in line with the agreement at the United Nations Framework Conference on Climate Change (UNFCCC). India and China have also taken similar approach to reducing carbon emissions and achieving carbon neutral in their countries (refer **Box 5-29**). However, national commitment to reduction of carbon emissions is unlikely to be achieved without state-level contributions and involvement. Therefore, the states must work together and shoulder the responsibility in realising the country's commitment at the international level. This action, therefore, aims at mainstreaming low-carbon development in physical and land use planning at the state level towards carbon neutral state.

Box 5-29: Case Study: Efforts towards achieving a carbon neutral state in China

China is the second highest country in terms of carbon contributors at 28% of total global carbon emissions. The use of abundant energy resources due to its rapid development and economic boom has resulted in high carbon emissions. Yet China is committed to reducing carbon emissions by 65% by 2030 against the 2005 level and to becoming a carbon neutral country by 2060.

The steps that are being taken by to achieve these targets include :

i. Increasing forest cover by 6 billion m^3;
ii. Generating 1.2 billion kW of power using wind and solar;
iii. Ensuring 25% of its energy come from non-fossil energy sources;
iv. Investing USD15 trillion in green technology; and
v. Lending USD1.7 trillion for green loans.

Financial mechanisms considered by the Chinese government and banks to support the country's targets include:

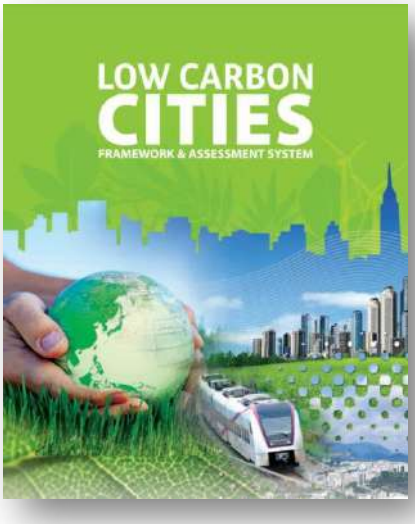
i. Providing green bonds and loans to support the use of low-carbon energy especially in the manufacturing and infrastructure sectors;
ii. Increasing investment in solar and wind technology;
iii. Mandating state financial institutions to promote green economic activities; and
iv. Making green investment criteria as compulsory in the assessment of the banking sector.

These reform measures have been initiated in nine major cities. The cost involved to achieve the carbon neutral national target is expected to reach USD5 trillion. This does not include the cost of economic and social change resulting from the reduction in the use of fossil fuels. For example, many of Chinese population have lost their sources of income due to the closure of coal mines.

Source: www.unfccc.int

A feasibility study and action plan (roadmap) towards a carbon neutral country should be implemented taking into account the following measures:

1. Improve the LCCF framework (refer to **Action SR 3.1A**), or alternative framework supported by appropriate institutions, to be cascaded to the state level to achieve low-carbon development aspirations.



2. Increase carbon sequestration through measures such as the retention and management of forest areas as carbon sinks (refer to **Strategy SR 2.1**)
3. carbon emission reduction targets for key sectors in each state that contribute to national targets.
4. Mainstream relevant national plans and policies, including the Five Year Malaysia Plan or climate change-related policies to support the achievement of a low-carbon state by 2040 and towards a carbon neutral state.
5. Study successful mechanism of central government incentives to states that achieve the set low-carbon targets (performance-based) (refer to **Action SR 2.1C**).

The conservation and effective management of forest areas will contribute significantly towards realising the nation's carbon neutral aspiration. Location: Mulu National Park, Sarawak

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Ministry of Environment and Water (KASA) • PLANMalaysia	• Ministry of Energy and Natural Resources (KeTSA) • Malaysia Green Technology Corporation • Local Authority

STRATEGY
SR 3.2

IMPROVE THE MANAGEMENT OF SUSTAINABLE ALTERNATIVE ENERGY SOURCES

RELATED SDGs
- SDG7
- SDG9

The strategy to realise the sustainable management of alternative energy sources is aimed at reducing GHG emissions as well as emphasising clean energy generation. This can be achieved by reducing dependence on fossil fuels and expanding the use of renewable energy (RE). In line with the country's commitment to reduce carbon intensity by 45% by 2030, the government is also targeting renewable energy to form 20% of the country's energy generation mix by 2025 (Peninsular Malaysia Electricity Supply Outlook, 2019).

As of December 2017, the total electricity generation in Malaysia was 160,723.82 GWh. The highest electricity generation was from power stations that use fossil fuels such as coal and natural gas (refer to **Table 5-16**). Meanwhile, electricity generation from renewable energy sources was still low, amounting to only 0.77% of total electricity generation in Malaysia.

Table 5-16: Electricity generation by energy source in Malaysia in 2017

Energy Source	Total (GWh)	Percentage (%)
Non-Renewable Energy (NRE)		
Coal	68,870.156	42.85
Natural Gas	62,135.83	38.66
MFO/Distillate/ Diesel	1,687.60	1.05
Hydro	26,712.30	16.62
*Others	96.43	0.06
Total	159,502.32	99.24
Renewable Energy (RE)	1,221.50	0.77
Overall Total	160,723.82	100.000

Note:
- *Other non-renewable energy sources refer to non-crude energy forms which include imported light diesel oil, slop reprocess, crude residue and Middle East Residue as Refinery Intake.
- Total renewable energy include solar energy, biogas, biomass, mini hydro and micro hydro
- GWh - Gigawatts per hour

Source: Electricity Supply Industry Performance Information and Statistics Report, Energy Commission, 2017

Among the challenges in increasing the use of RE in Malaysia is the high financial outlay such as the high allocation of RE research grants, thus increasing the price of energy generated from RE. This affects the efforts to increase RE in the energy mix. Similarly, the capital outlay for installation of RE equipment is also high compared to conventional energy sources.

Additionally, technical constraints also prevent some RE generations from being competitive in the energy market as compared to conventional energy sources, hence unable to sustain their operation. For example, the uncertainty of long-term resource availability for biomass energy generation. At the same time, limited information and awareness sharing by the relevant agencies on the benefits of RE also hinders efforts to increase RE utilisation in the energy market.

ACTION SR 3.2A

Enhance solar energy generation

Solar energy is a source of renewable energy (RE) produced through the heat of the sun. Malaysia's proximity to the Equator, which experiences hot and humid weather throughout the year, makes solar energy generation a huge renewable energy potential. Solar energy generation and technology need to be developed to help increase renewable energy generation in the country.

There are several existing initiatives to promote solar energy generation such as Net Energy Metering (NEM) and large scale solar energy generation (LSS). LSS is one of the initiatives to increase the use of solar energy as renewable energy in the country's electricity supply. The total capacity allocated for this initiative is 2,500 MW until 2020. The following measures need to be implemented to strengthen solar energy generation:

1. Develop solar farms to reduce dependence on fossil fuel energy as well as increase renewable energy generation. Development of solar farms should refer to the Solar Farm Planning Guidelines by PLANMalaysia. Several areas in Perlis, Kedah, Penang, Kelantan, Terengganu and the border between Negeri Sembilan and Melaka have great potential to be developed with solar farms (refer to **Plan 5-22**).

2. Provide appropriate incentives to encourage the use of solar panels in all developments.

3. Encourage the production of affordable and easy-to-maintain solar panel to increase its widespread use in the future to reduce conventional energy generation.

BRIEF FACTS

Net Energy Metering

The Malaysian Government through the Sustainable Energy Development Authority (SEDA) has provided incentives under the Net Energy Metering (NEM) scheme to encourage the use of solar panels on the roof of houses, office buildings and factories. Through the NEM programme or scheme, consumers who install solar panels in their own buildings can channel the excess energy generated to the national grid. The surplus energy will be purchased by Tenaga Nasional Berhad (TNB) according to the incentive tariff or feed-in tariff that has been set.

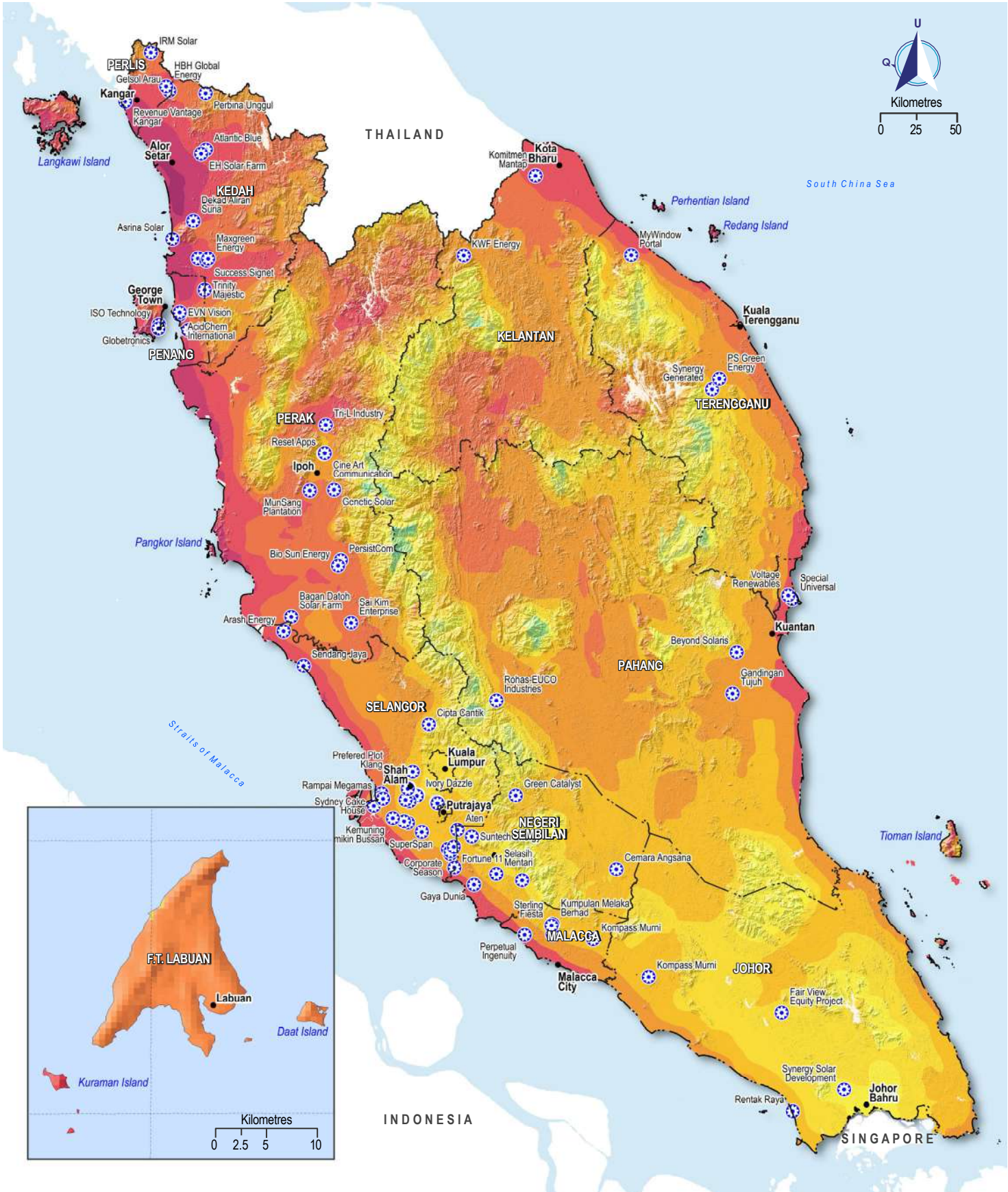
The NEM initiative is open to domestic, commercial (including government buildings), industrial and agricultural consumers. Among the types of installation allowed under this NEM scheme is the installation of photovoltaic modules on the roof of a building, a garage or a car park.

From 2012 to 2018, the total solar energy generation from the feed-in-tariff programme was 1,727.15 GWh leading to a reduction in carbon emissions of 1,178,617.69 tCO2.

Source: Sustainable Energy Development Authority (SEDA) 2018 Annual Report

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Ministry of Energy and Natural Resources (KeTSA) • Sustainable Energy Development Authority • Local Authority	• Energy Commission • Malaysia Green Technology Corporation • Tenaga Nasional Berhad



MAP 5-22 : DISTRIBUTION OF SOLAR FARMS AND AVERAGE PHOTOVOTAIC POWER POTENTIAL (PVOUT) IN PENINSULAR MALAYSIA AND F.T OF LABUAN

Solar Farm Location

Solar Farm

Others

State Capital

State Boundary

Long term average of PVOUT, period from 1999 (2007 in the East) to 2018

Daily Totals:	3.2	3.4	3.6	3.8	4.0	4.2	kWh/kWp
Yearly Totals:	1168	1241	1314	1387	1461	1534	

Source:
- Tenaga Nasional Berhad, 2018
- Global Solar Atlas, 2019

ACTION SR 3.2B

Enhance the development of Renewable Energy (RE) for biogas and biomass energy

The use and generation of biogas and biomass energy sources from solid waste and agricultural waste will continue to be encouraged to support the transition to renewable energy. In 2017, the amount of energy generated from biogas and biomass was still low and only contributed 0.48% to the total energy generation of the country. Biogas resources in Malaysia today are mostly sourced from ~~oil~~ palm oil mill effluents and are estimated at 68 million metrics (SEDA, 2018). This source is also seen as the most potential biogas source for energy generation (refer to **Table 5-17**).

Table 5-17: The potential of biogas as a source of energy generation in Malaysia

Region	Potential generation from gas emissions from cattle breeding activities (GWh)	Potential generation from palm oil mill effluent (GWh)	Potential generation from solid waste disposal areas (GWh)	Total (GWh)
South	646	887,602	994	889,242
North	413	545,441	1,081	546,523
East	474	822,830	669	823,973
Central	118	119,610	1,517	121,299
Total	**1,651**	**2,375,483**	**4,261**	**2,381,037**

Source : *Progress of Biogas Industry in Malaysia: Cattle Manure as Potential Substrate for Biogas Production and Issues and Challenges, 2018*

Overall, biogas sources are generated from the following wastes:

i. Solid waste consisting of domestic, commercial, institutional and industrial wastes;
ii. Sewage; and
iii. Methane gas emissions from cattle farming activities.

Biogas is generated from sewage through the Anaerobic Digester system. For example, IWK currently operates six (6) sewerage treatment plants that are capable of producing 10,000 cubic metres of biogas resources and have the potential to generate energy of 0.02GWh per day (IWK, 2021)

BRIEF FACTS

National Biomass Strategy 2020

This strategy was launched in 2011 to lay out actions and measures to benefit from waste from the oil palm industry. The Malaysian Innovation Agency (AIM) has updated the strategy to include study on biomass waste from farming and forestry.

Source: Sustainable Energy Development Authority (SEDA) 2018 Annual Report

Meanwhile, there are various sources of biomass from agricultural and municipal waste, which have the potential as a source of energy generation. Malaysia produces at least 168 million tonnes annually of biomass resources, including wood, oil palm waste, rice husk, coconut fibre, municipal waste and sugarcane waste (Biomass and bioenergy: An overview of the development potential in Turkey and Malaysia, Ozturk, M, 2017).

Currently, oil palm industry provides the highest potential for biomass energy generation due to its large volume of waste, such as the empty fruit bunch, the fruit fibre, the fruit shell and the mill effluent, that can be used as resources for biomass energy generation. Other plantation wastes such as wood chips, rice husk and plant fibre (bagasse) can also be used for biomass energy generation (refer **Table 5-18**). Biomass energy generation produces much lower GHG emissions than fossil fuels because it uses plantation waste as a source of renewable energy. This makes plantation waste a value-added product and reduces environmental pollution.

Table 5-18: The potential of biomass as a source of energy generation in Malaysia

Types of Biomass	Amount (tonnes/year)	Annual power generation potential (GWh)
Empty fruit bunch (EFB)	16,700	28,000
Palm fruit fibre	12,200	
Palm husk	4,900	
Palm oil mill effluent	38,900	2,800
Wood chip	2,200	600
Paddy husk	400	300
Bagasse	300	200
Total	**58,500**	**31,900**

Note:
The calculation of the energy generation potential from biomass is based on the total turnover of the type of biomass that can be processed in the year and based on data from the Energy Commission and MPOB, 2007.

Source: Development of renewable energy in Malaysia strategic initiatives for carbon reduction in the power generation sector, Shamsuddin, 2012

The process of biogas energy generation involves the decomposition of organic matter both in solid or liquid forms. The decomposition process releases methane and other gaseous by products, which can then be purified and used for energy generation. Methane is also a GHG, and therefore its emission into the atmosphere must be controlled. Different type of waste used for biogas generation may require different biogas processing technology. (ml.organicsmalaysia.com, 2019).

Figure 5-37 shows that the basic processes of biogas and biomass energy generation are closely linked, and therefore both can become contributors to country's energy mix.

Oil palm is an important source for biogas and biomass energy generation in Malaysia

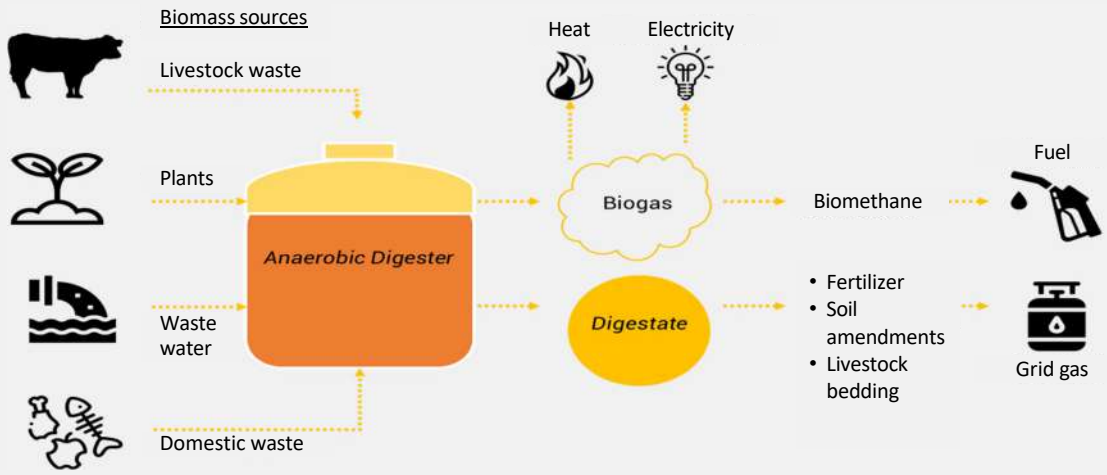


Figure 5-37: The process of generating biogas and biomass
Source: Environmental and Energy Study Institute, 2017

The measures to increase biogas and biomass energy production are:

1. Conduct detail feasibility study on biogas and biomass energy generation by area, resources and national grid connectivity.

2. Identify potential areas for biogas and biomass energy generation such as plantation areas, cattle breeding areas and landfill areas. These areas also need to be close to the national grid and have adequate resources for energy generation purposes.

3. Develop plans for connecting biogas and biomass energy generation potential areas to nearby consumers through a mini grid system or the national grid system.

BRIEF FACTS

A mini grid system is a set of grid systems that provide electricity from small-scale power generators (10kW to 10MW) to a specific population or consumers that are not connected to the national grid system. The system can also generate electricity from one or more sources, for example from biomass sources in plantation areas. There are three stages in energy supply process, which are :

- Stage 1: Production of energy from one or more sources;
- Stage 2: Distribution of energy from the energy generation site to consumers; and
- Stage 3: Consumers receives electricity supply.

Source: Africa-EU Renewable Energy Cooperation Programme, 2014 & usaid.gov, 2018

AGENCIES INVOLVED

Main Agencies

- Ministry of Energy and Natural Resources (KeTSA)
- Kementerian Perusahaan Perladangan dan Komoditi (KPPK)
- Sustainable Energy Development Authority
- Energy Commission

Supporting Agencies

- Department of Environment
- Malaysian Palm Oil Board
- Malaysia Green Technology Corporation

ACTION SR 3.2C

Develope small hydropower generators for rural areas

Malaysia has many river basins and abundant water resources that have high potential as sources for hydropower energy generation. Hydro or hydroelectric energy refers to the exchange of energy from the flow of water to electricity energy.

The measures outlined under this action give special focus on the development of small hydropower generators not exceeding 30MW of renewable electrical energy.

Although energy generation from small hydropower generators, whether mini or micro, is low, their use has great potential in generating electricity supply especially in rural areas that have limited access or are not connected to the national grid system.

Small hydropower generators do not require large storage reservoirs and offer more support for the development of electricity resources in rural areas besides contributing to energy supply through the national grid.

The measures to develop small hydropower generators are:

1. Identify and map potential areas for the development of small hydropower plants in rural areas.

2. Develop a strategic and integrated plan to maximise the benefits of small hydropower energy generation. This is because small hydropower can become a major source of energy in an area and, thus, requires a comprehensive long-term planning.

3. Conduct detail studies on rivers with hydropower potential. The rivers must have sufficient water flow and volume to operate small hydropower plants. The plants are usually self-maintained or outsourced to local contractors or infrastructure providers of the area.

Box 5-30: Case Study: Perting Hydro Power Plant, Bentong, Pahang

One example of a small hydropower project in Malaysia is the Perting Hydro Power Plant in Bentong, Pahang. The project, which began operation in 2004 with initial capacity of 4MW, has since been upgraded and able to generate 6MW of electricity in 2015.

Source : Abdullah et. al, Hydro Review, 2016

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• Sustainable Energy Development Authority • Energy Commission • Local Authority • Department of Orang Asli Development	• Ministry of Energy and Natural Resources (KeTSA) • Kementerian Pembangunan Luar Bandar (KPLB) • Department of Irrigation and Drainage • Tenaga Nasional Berhad

STRATEGY
SR 3.3

STRENGTHEN EFFICIENT AND SUSTAINABLE WASTE MANAGEMENT

RELATED SDGs
SDG6 SDG11 SDG9

The Solid Waste and Public Cleansing Management Act 2007 (Act 672) was enacted to ensure uniformity of law in the control and regulation of matters relating to solid waste and public cleansing management throughout Peninsular Malaysia and the Federal Territories of Putrajaya and Labuan.

Currently, eight (8) states have adopted Act 672 in their management of solid waste. Therefore, for states who have yet to adopt Act 672 and manage solid waste through Local Authorities such as Kelantan, Terengganu, Selangor, Perak and Penang, it is recommended that the states ensure their waste management are comprehensive and in line with new initiatives such as smart waste management and the implementation of the concept of circular economy.

Cluster 3 of the National Cleanliness Policy introduces the concept of circular economy. The implementation of circular economy is part of the government's drive towards 'zero waste' aspiration. The shift from linear to circular economy (**Figure 5-38**) reduces resource and material consumption, as well as reduces waste generation. In implementing circular economy, the Policy identifies four (4) strategies as follows:

Strategy 3.1: Promote Practices of 3R (Reduce, Reuse, Recycle) and Waste Separation
Strategy 3.2: Generate Income from Waste (Waste to Wealth)
Strategy 3.3: Encourage Industry Players to Adopt Circular Economy
Strategy 3.4: Implement Extended Producer Responsibility (ERP) to Promote Recycling.

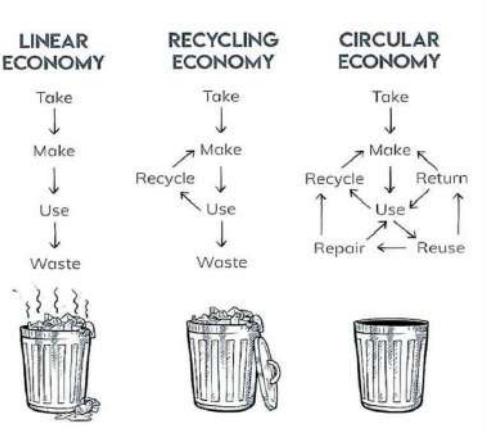


Figure 5-38: Transformation from a linear economy to a recycling economy
Source: www.goingzerowaste.com

BRIEF FACTS

The use of technology in the solid waste management process is as follows:

Stage 1: Solid waste generation
- Waste segregation at source
- Waste treatment at source
- *Value Food No Waste*

Stage 2: Waste storage
- Automatic trash can
- Spiral waste bin (SWB) system
- Portable waste compactor Deep collection system (utilises underground space to store waste)

Rank 3: Waste collection
- Curbside recycling collection methods
- Radio Frequency Identification (RFID) technology

Stage 4: Waste recovery
- Waste value recovery facility

Stage 5: Waste treatment
- Compost
- Anaerobic digester
- *Waste to Energy*

Stage 6: Waste disposal
- Final disposal at landfill for non-recyclable waste and bottom ash from waste treatment process.

Source: SWCorp, 2017

Malaysians are estimated to generate 1.17 kg of waste per capita per day where the majority of the waste is eventually disposed of in landfills (JPSPN, 2018). The lifespan of a landfill depends on the size of the site and the quantity of solid waste generation. Landfills that have reached their lifespan need to cease their operations safely to reduce the impact of pollution on the environment. Besides landfill (sanitary and non-sanitary), there are several other types of solid waste management facilities such as transfer station, inert waste disposal site, and integrated/treatment sites.

A sanitary landfill is a landfill equipped with methane gas and leachate water collection systems, leachate water treatment plant, and bottom and surface liners. It is a more environmentally friendly method of waste disposal as compared to a non-sanitary landfill. **Table 5-19** and **Plan 5-23** show the number and location of solid waste management sites operating in Peninsular Malaysia and F.T. Labuan. At present, there are still 53 non-sanitary landfills in active operation.

Table 5-19: Active solid waste management facilities in Peninsular Malaysia and F.T. Labuan

State	Sanitary landfill (Nos.)	Non-sanitary landfill (Nos.)	Transfer station (Nos.)	Inert waste landfill (Nos.)	Integrated / treatment site (Nos.)
Johor	1	8	1	None	None
Melaka	1	None	None	None	None
Negeri Sembilan	1	2	None	None	None
F.T. Kuala Lumpur	None	None	1	None	None
Kedah	3	1	None	None	1
Perlis	1	None	None	None	None
Pahang	3	7	None	None	2
Selangor	3	2	1	3	None
Pulau Pinang	1	None	2	1	None
Perak	1	15	None	None	1
Kelantan	None	10	None	None	None
Terengganu	1	8	None	None	None
F.T. Labuan	1	-	None	None	None
Total	17	53	5	4	4

Note:

i. Sanitary landfills – landfills with technology to treat wastewater and dispose of solid waste.
ii. Non-sanitary solid waste landfills - landfills without technology to treat wastewater and dispose of solid waste
iii. Inert waste landfill – Landfills for disposal of solid waste that does not physically or chemically react or decompose.

Sumber : National Solid Waste Management Department, 2020

MAP 5-23 : LOCATION OF EXISTING SOLID WASTE TREATMENT FACILITIES IN PENINSULAR MALAYSIA AND F.T OF LABUAN

Type of Facility

- Sanitary Disposal Site
- Non-sanitary Disposal Site
- Incinerator
- Inert Waste Disposal Site

Others

- State Capital
- State Boundary

Source:
- Solid Waste Management and Public Sanitation Corporation, 2019

Based on the NPP4 population projection for 2040, solid waste generation is estimated to increase to 16.25 million tonnes by 2030 and 17.72 million tonnes by 2040 (refer to **Table 5-20**). This creates the need for an efficient solid waste management, the provision of adequate and efficient solid waste facilities supported by good practices in waste management at various levels.

BRIEF FACTS

Solid Waste Generation Calculation Formula

A = Total population
B = Solid waste generation rate per capita
C = 365 days

Annual solid waste generation = (A X B) X 365

Table 5-20: Solid waste generation projections for 2030 and 2040

Year	Population (million)	Solid waste generation (tonnes/day)	Solid waste generation (million tonnes / year)
2030	38.06	44,530.2	16.25
2040	41.5	48,555.0	17.72

Note:
The projection is based on a per capita generation rate of 1.17 kg/capita/day (JPSPN, 2018)

BRIEF FACTS

Definition of Scheduled Waste

Any waste that falls under the waste category listed in the First Schedule of the Environmental Quality (Scheduled Waste) Regulations 2005.

The First Schedule has listed 77 categories of scheduled waste.

Source: Hazardous Materials Section, Department of Environment, 2011

For Scheduled Waste, its management is differentiated from the management of municipal solid waste to prevent pollution to the environment, preserve human health, protect the food chain and maintain the aesthetic value of the environment. Scheduled waste needs to be managed at designated facilities licensed by the Department of Environment. Scheduled waste generation is projected to increase from 4.01 million tonnes in 2020 to 4.47 million tonnes by 2040 (refer to **Table 5-21**). The increase in scheduled waste generation increases the importance of sustainable and systematic waste management to ensure the best quality of the environment, especially in built-up areas. The provision of additional specialised facilities for scheduled waste treatment is also required.

Table 5-21: Projected scheduled waste generation for 2020, 2030 and 2040

Year	77 Categories of Scheduled Waste ~~Code~~ (million tonnes)	Electronic Waste (tonnes)
2020	4.01	89,956.34
2030	4.24	85,548.40
2040	4.47	81,140.47

Note:
The 77 categories of scheduled waste are based on the First Schedule of the Environmental Quality (Scheduled Waste) Regulations 2005

Source: Department of Environment, 2020

ACTION SR 3.3A

Explore solid waste management facilities that are in line with social needs and low-carbon requirements

Sustainable solid waste management requires the provision of comprehensive and efficient facilities. This is important to support good practices in waste management such as separation at source and recycling. The provision of efficiently planned facilities will increase public participation in ensuring the effectiveness of solid waste management. The solid waste management facilities provided also need to adapt to smart waste management methods in their operation such as the implementation of smart waste collection fleet management). The benefits of these methods are:

i. Reduce the cost of solid waste management;
ii. Increase recycling rates;
iii. Reduce the source of pollution; and
iv. Improve supervision and enforcement.

BRIEF FACTS

Smart waste management initiatives in Selangor

To achieve the target of becoming a Premier Smart State by 2025, the State Government through appointed company; KDEB Waste Management Sdn Bhd (KDEBWM) implements smart waste management initiatives through the exploration of new methods, administrative improvements to administrative aspects including data systems, workflow, and technology, and the use of artificial intelligence (AI).

KDEBWM's latest achievements include the recycling business, and the exploration in the manufacturing of biodegradable plastic rubbish bags.The company is also exploring plastic-based biodiesel technology and new waste disposal initiatives such as Waste-to-Energy facility.

Source: www.selangor.gov.my, 2019

The measures to ensure efficient and sustainable solid waste management include:

1. Build new sanitary landfills, transfer stations and integrated treatment facilities to accommodate the increase in solid waste generation in the future. **Table 5-22** shows the proposed new facilities for States who have adopted Act 672.

Table 5-22: Proposed solid waste management facilities (for States under Act 672), 2020-2025)

State	Sanitary Landfill (nos.)	Transfer Station (nos.)	Integrated Treatment Facility (nos.)
Johor	3	6	3
Melaka	none	none	1
Negeri Sembilan	none	2	1
F.T. Kuala Lumpur	none	none	1
Kedah	1	2	1
Pahang	2	7	1
F.T. Putrajaya	none	none	none
Perlis	none	none	none

Source: National Solid Waste Management Department, 2020

2. Identify suitable areas for the provision of recycling centres and recycling material processing in the Local Plan.

   The provision of areas for recycling centres and recycling material processing should be identified and mapped in the LP, and equipped with relevant information to facilitate the management of such recycled materials. The formation of green communities at the local level to realise the implementation of recycling practices more effectively should also be encouraged. Successful recycling contributes to the reduction of GHG emission in settlement areas and creates a healthier living environment.

3. Allocate sites for recycling centres in new urban development at appropriate locations based on waste types and processing methods.

   Sites for recycling centres should be allocated in every residential, commercial, industrial and institutional areas to facilitate the residents and the community to use the facilities. The provision of recycling centres must be within the threshold of 20,000 households as recommended by JPSPN. The implementation of this measure is expected to help in increasing the recycling rate at the national level which has now reached 24% in 2018, higher than the 22% target set for 2020 (JPSPN, 2019). In promoting recycling, a Deposit Refund System (DRP) can be introduced (refer to **Figure 5-39**). Under this system, a buyer pays a surcharge when making a purchase involving products in glass bottles, polyethylene terephthalate (PET) containers or aluminium cans. The buyer will be given a rebate when he/she returns the bottles, containers and cans for reuse or recycling. DRS is currently being used successfully in 23 countries.

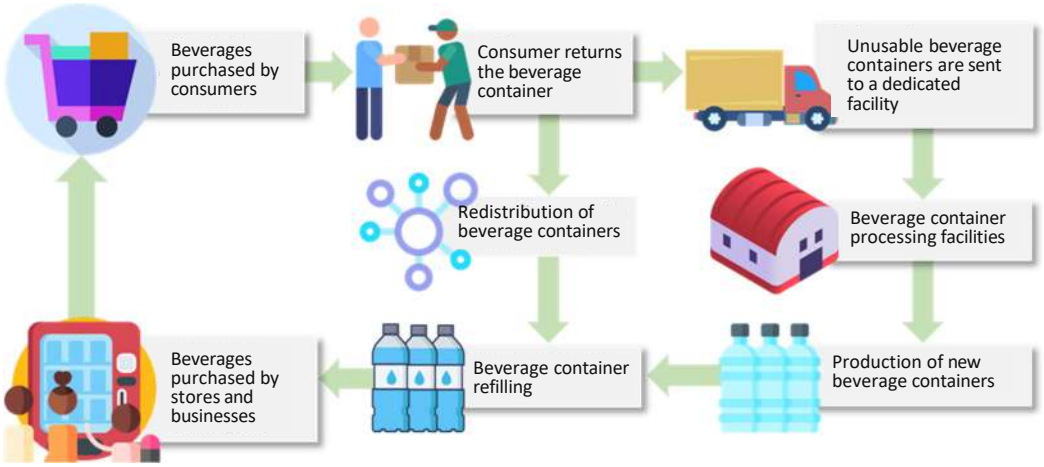


Figure 5-39: Beverage Deposit System Flow Chart
Source: *Reverse Vending 101*, TOMRA, 2017

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• National Solid Waste Management Department • Solid Waste Management and Public Cleansing Corporation (SWCorp) • Local Authority	• Ministry of Housing and Local Government (KPKT) • PLANMalaysia@Negeri

ACTION SR 3.3B

Recycle and upcycle solid waste and scheduled waste for environmental sustainability

Waste value recovery contributes to the economy while having a positive impact on the environment. If expanded and made profitable, waste value recovery will provide the opportunity for new industry to establish and grow. At the same time, it will also lead to reduction in the amount of waste sent to landfills, and consequently reducing the load on existing waste management infrastructure.

The measures to be implemented to develop waste value recovery are as follows:

1. Practice food waste segregation for the purpose of energy generation, composting and livestock feed.

   Data from SWCorp (2015) indicates that food waste makes up a large percentage of landfill waste disposal, which was between 11.8% to 46.4%. If food waste is segregated at source, it can be used for other purposes such as for energy generation, composting and processed livestock feed. It is estimated that food waste has the potential to generate 4,262 GWh of electricity.

   To be successful, initiative on food waste segregation need to be implemented widely in Peninsular Malaysia and F.T. Labuan.

2. Develop Waste-to-Energy (WtE) plants and facilities for the purpose of generating energy from municipal solid waste.

   The Waste-to-Energy (WtE) is part of solid waste and public cleansing management that involve treatment of waste to produce energy such as electricity, heat and vehicle fuel. WtE initiative not only contributes to the economy, but also reduces the amount of waste sent to landfills.

   The Ladang Tanah Merah WtE plant in Negeri Sembilan, which is currently under construction, will be the first large-scale WtE plant in Malaysia with an electricity generation capacity of 25MW. Each state is targeted to have at least one WtE plant.

BRIEF FACTS

All medals for the 2020 Tokyo Olympics were made from precious metal recovered from discarded electronic devices. A total of 78,985 tonnes of electronic waste was collected from all over Japan and 6.21 million used NTTDocomo mobile phones were donated for the project by the people of Japan. The amount of gold, silver and bronze recovered was as follows:

- Gold: 32 kg
- Silver: 3,500 kg
- Bronze: 2,200 kg

3. Provide electronic waste (e-waste) recycling centre for public users.

   E-waste contains components that can be recycled or processed for reuse. However, currently only e-waste from the industry is sent to facilities licensed by the Department of Environment. At present, there is no e-waste recycling centre for public use.

   Therefore, the recycling centre as proposed in **Action SR 3.3A** needs to be established so that the collection of consumer e-waste for recycling and recovery can be made The types of consumer e-waste are expected to include: electronic waste or e-waste targeted by consumers are:

   i. Television
   ii. Washer/ dryer
   iii. Refrigerator
   iv. Cell phone
   v. Computer~~s~~ / Laptop~~s~~
   vi. Air conditioner

4. Encourage textile waste value recovery.

   Textile waste also contributes to the country's solid waste generation. It is estimated that Malaysians generated 2,000 tonnes of textile waste to landfills per day (Kloth Cares Malaysia, 2019). Initiatives to encourage textile reuse and trade-in voucher or discount for old clothes should be expanded to the whole country. At the same time, textile waste collection facilities also need to be provided especially in community focus areas and ~~or~~ residential areas.

5. Emphasise scheduled waste reduction in line with the cradle-to-cradle principle

   This measure increases the recovery value of scheduled waste. Thus, it will make recycling and upcycling of scheduled waste more profitable and attractive especially to related parties such as the producers of the scheduled waste. This move is also in line with the Post-2015 Scheduled Waste Management Strategic Plan by the Department of Environment which needs to be supported by the use of new technology and expertise in scheduled waste management.

   The cradle-to-cradle (C2C) principle which is being implemented by the Department of Environment is an example of effort to reduce the amount of scheduled waste sent to landfill for disposal. The implementation of this principle also involves reusing scheduled waste as alternative raw material for other processes through technology such as ‘co-processing’ (refer to **Box 5-31**).

6. Establish one scheduled waste treatment facility in each region.

   Scheduled waste treatment facilities need to be provided in each region as compared to now where there is only one existing facility in Peninsular Malaysia, namely the Kualiti Alam Waste Management Center (WMC) in Negeri Sembilan. The provision of scheduled waste treatment facility in each region will reduce the cost of transporting the waste to centralise facility, and minimise spill and contamination risk over long journey to the facility.

Box 5-31: Cradle-to-Cradle (C2C) Principle

Under the C2C principle, scheduled waste (SW) generated from waste producer (Cradle 1) is recommended to be subjected to 3Rs, namely:

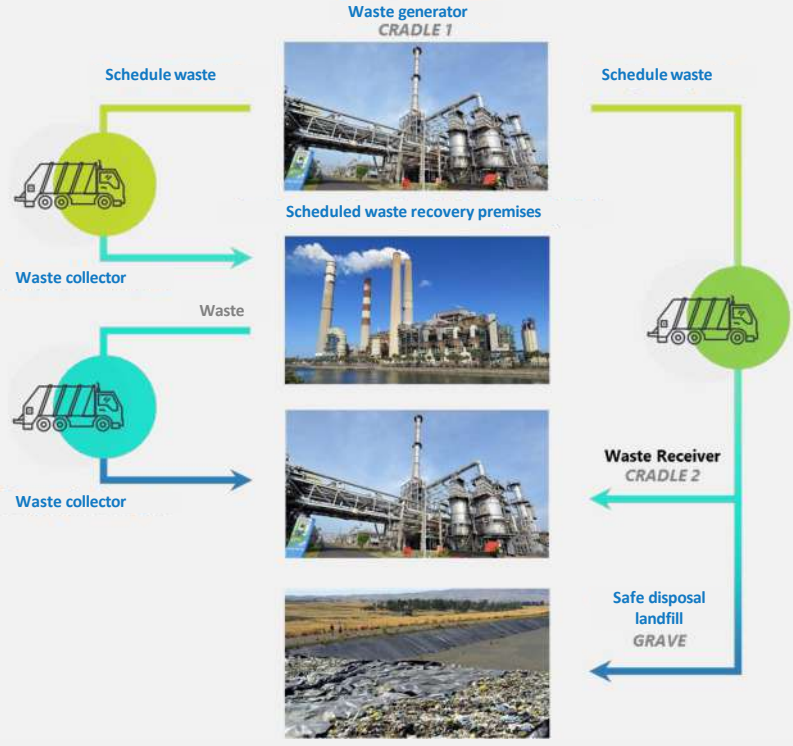
- Reduce;
- Reuse as a raw material or alternative fuel; or
- Recycle

Cradle-to-Cradle

A licensed scheduled waste operator will transport the waste to recovery facilities for further treatment and processing according to the type of waste, before the processed waste being sent to the waste receiver (Cradle 2) for reuse. Scheduled waste from Cradle 1 which requires no further treatment or processing before being reused will be transported directly to waste receiver (Cradle 2) for reuse.

Cradle-to-Grave

Scheduled waste from Cradle 1 and Cradle 2 that no longer has reuse, recycle or recovery value will be treated before being sent for a safe disposal at a safe disposal site licensed by the Department of Environment.



Source: Post-2015 Scheduled Waste Management Strategic Plan, DOE, 2015

AGENCIES INVOLVED

Main Agencies	Supporting Agencies
• National Solid Waste Management Department • Solid Waste Management and Public Cleansing Corporation (SWCorp) • Department of Environment	• Ministry of Housing and Local Government (KPKT) • Ministry of Environment and Water (KASA) • Local Authority

THRUST 2 RELATIONS WITH SDGs

RELATED SDGs	THRUST 2 STRATEGIES DAN ACTIONS	INDICATORS
SR 1 : Holistic Land Use Planning		
SDG11 SDG12	**SR 1.1** Optimal Land Development Planning	1. Major land use change rates (by country, state) 2. Total TOD development in major cities 3. Number of *waqf* land that have been developed 4. Number of Malay Reserves that have been developed
	ACTION SR 1.1A Prioritise mixed-use development and multi-use development activities in built-up areas	
	ACTION SR1.1B Prioritise Transit-Oriented Development (TOD) in Conurbations, Global Cities and Regional Cities	
	ACTION SR 1.1C Utilise airspace and basement for appropriate development	
	ACTION SR 1.1D Leverage on *waqf* land in development planning at the State and Local Authority levels	
	ACTION SR 1.1E Encourage development on Malay Reserve Land (MRL)	
SDG3 SDG16 SDG17	**SR 1.2** Prioritise Urban Renewal In Existing Built-up Areas	1. Preparation of urban renewal planning guidelines 2. Number of brownfield areas that have been developed by state/ local authority
	ACTION SR 1.2A Encourage urban renewal in appropriate areas	
	ACTION SR 1.2B Review current legislation to enable en-bloc consent for urban redevelopment	
SDG11 SDG12	**SR 1.3** Ensure Development Focus Areas Are Developed In A Sustainable Manner	1. Population density of saturated areas (for country, state) 2. Economic density of development area (for country, state) 3. Number of local authorities with sustainable city status (based on MURNINets) 4. Preparation of saturation studies and determination of urban development intensity
	ACTION SR 1.3A Ensure growth areas within the Conurbation and Promoted Development Zone (PDZ) are developed sustainably	
	ACTION SR 1.3B Identify the needs for development index to assess urban area saturation level of urban areas	

RELATED SDGs	THRUST 2 STRATEGIES DAN ACTIONS	INDICATORS
SR 1 : Holistic Land Use Planning		
SDG9 SDG11 SDG12	**SR 1.4** Implement The Establishment of Malaysia Urban Observatory (MUO) As An Urban Big-Data Centre And A National Smart City Platform	1. Development of MUO as an urban public data centre and national smart city platform 2. Number of specialist development programmes in related fields 3. Number of MOU/ Cooperation Note/ Letter of Intent 4. Number of MUO distribution and publicity programmes
	ACTION SR 1.4A Develop the MUO system into an urban big-data centre and the country's smart city platform	
	ACTION SR 1.4B Establish an MUO Operations Centre at PLANMalaysia to manage and develop MUO as a data control and management centre at the National level	
	ACTION SR 1.4C Institute strategic partnerships between government agencies, the private sector, professional bodies, HEIs and community-based organisations	
SDG11 SDG13	**SR 1.5** Implement Mitigation Efforts To Reduce The Risk Of Natural Disasters And Climate Change	1. Country's ranking in disaster risk management at the global level 2. Establishment of disaster risk management training centres 3. Preparation of mapping of disaster risk areas 4. Assessment of risk and coastal vulnerability to sea level rise
	ACTION SR 1.5A Improve resilience and readiness for natural disasters and the threat of climate change	
	ACTION SR 1.5B Minimise the impact of flood disasters on settlement and municipalities located in flood basin	
	ACTION SR 1.5C Implement comprehensive coastal land use planning and development plan	
	ACTION SR 1.5D Ensure sustainable management of water resources to reduce the impact of drought	
	ACTION SR 1.5E Regulate development activities in landslide risk areas	
	ACTION SR 1.5F Avoid forest and peat fire risks through land use planning solutions	
	ACTION SR 1.5G Implement integrated planning and management of earthquake risk areas by involving community and stakeholders	

RELATED SDGs	THRUST 2 STRATEGIES DAN ACTIONS	INDICATORS
SR 2: Sustainable Management of Natural, Food and Heritage Resources		
SDG13 SDG14 SDG15	**SR 2.1** Preserve And Conserving National Ecological Assets	1. Acreage & percentage of forest cover area 2. Conservation of endangered CFS Corridor areas 3. Gazetted HSK area 4. Reduction in the intensity of GHG emissions 5. Size of gazetted marine protected area 6. Number of Indigenous and Local Community Conserved Areas (ILCA) Programmes with local communities and government agencies
	ACTION SR 2.1A Increase forest cover to reach the target of up to 50% in Peninsular Malaysia	
	ACTION SR 2.1B Maintain the connectivity of forest landscape through the preservation of ecological networks	
	ACTION SR 2.1C Intensify the implementation of the National REDD Plus strategy	
	ACTION SR 2.1D Create a network of sustainably managed and integrated managed marine protected areas	
	ACTION SR 2.1E Encourage the management of natural resources with the local community	
SDG13 SDG14 SDG15	**SR 2.2** Manage and Regulate Development in Environmentally Sensitive Areas (ESAs)	1. Number of Structure Plans (SP) with ESAs identified 2. The amount of ESA in the development plan 3. Number of ESAs gazetted in SP and LP 4. Number of coastal land reclamation project proposal brought to MPFN
	ACTION SR 2.2A Strengthen the ESA framework as the basis for regulating development	
	ACTION SR 2.2B Establish the requirement for buffer zone outside ESA Level 1 boundaries	
	ACTION SR 2.2C Introduce the concept of "no net loss of biodiversity" to ensure biodiversity loss through development projects are replaced	
	ACTION KD2.2D Regulate land reclamation and activities in coastal areas	

RELATED SDGs	THRUST 2 STRATEGIES DAN ACTIONS	INDICATORS
SR 2: Sustainable Management of Natural, Food and Heritage Resources		
SDG6 SDG12 SDG15	**SR 2.3** Ensure Sustainability of Water Resources	1. Size & percentage of gazetted water catchment area 2. Number of river riparian areas gazetted 3. Number of integrated river basin management master plans (IRBMs) 4. Number of National River Trail programmes 5. River water quality & number of polluted rivers 6. Study the total maximum daily load (TMDL) to identify the pollution load 7. Groundwater quality monitored 8. Percentage of non-revenue water loss (NRW) 9. Identify groundwater protection zones
	ACTION SR 2.3A Implement the Integrated River Basin Management approach for river basins planning and development	
	ACTION SR 2.3B Control pollution loads and restoring river water quality	
	ACTION SR 2.3C Apply the concept of 'Sponge City' in municipal water management	
	ACTION SR 2.3D Explore sustainable groundwater resources	
	ACTION SR 2.3E Strengthen water resources management	
	ACTION SR 2.3F Implement water recycling	
	ACTION SR 2.3G Improve the wastewater treatment system	
	ACTION SR 2.3H Minimise the use of treated water	
SDG12 SDG15	**SR 2.4** Manage Geological Resources and Diversity	1. Percentage of coverage area having mineral resources map 2. Percentage of mineral, mining and rare earth storage frameworks 3. Number of redevelopment projects of former mining areas with low impact development 4. Recognition of heritage sites and geoparks at the national and international levels (Global UNESCO Geopark) 5. Establishment of a body that regulates the development of the country's mineral resources
	ACTION SR 2.4A Identify, recognise and manage sites of geological interest	
	ACTION SR 2.4B Develop mineral mining and quarrying industry in a sustainable manner	

RELATED SDGs	THRUST 2 STRATEGIES DAN ACTIONS	INDICATORS
SR 2: Sustainable Management of Natural, Food and Heritage Resources		
SDG1 SDG2 SDG3 SDG11 SDG12	**SR 2.5** Ensuring National Food Security	1. Size of protected paddy granary areas 2. Size and total/ programme area of new and existing Permanent Food Production Park (TKPM) 3. Size and number/ program of new and existing Aquaculture Industrial Zone (ZIA) 4. Targets for self-sufficiency level (SSL) for rice and other crops 5. Malaysia's performance in the Global Food Security Index (GFSI) 6. Number of intelligent agricultural technology developed.
	ACTION SR 2.5A Preserve country's food resource area	
	ACTION SR 2.5B Increase the level of self sufficiency (paddy)	
	ACTION SR 2.5C Improve food self-sufficiency level (other than paddy)	
	ACTION SR 2.5D Using the latest technology to increase the productivity of agricultural products	
SDG11 SDG15	**SR 2.6** Strengthen The Preservation, Conservation And Protection Of National Cultural And Natural Heritage Site	1. Number of National Heritage sites registered under Act 645 2. Number of heritage sites prescribed under Act 645 3. Number of endangered heritage & National Heritage sites 4. Number of heritage & National Heritage sites with CMP
	Action Sr 2.6a Protect Cultural Heritage Sites And Natural Heritage Sites Through Legal Mechanisms	
SDG11 SDG15	**Sr 2.7** Ensure The Preservation And Protection Of Cultural Heritage In Physical Planning And Development Control Process	1. Preparation of cultural/ heritage mapping Preparation of planning guidelines for the conservation of heritage areas and buildings 2. Number of area transformed towards heritage/ cultural/ placemaking identities
	ACTION SR 2.7A Undertake cultural mapping to preserve the integrity, authenticity and value of local heritage	
	ACTION SR 2.7B Enhance the preservation of culture and the arts for future generations	

RELATED SDGs	THRUST 2 STRATEGIES DAN ACTIONS	INDICATORS
SR 3: Development Towards A Carbon Neutral Nation		
SDG9 SDG11 SDG13 SDG16	**SR 3.1** Expand the Implementation of the low-carbon Cities Framework	1. Greenhouse Gas (GHG) per capita 2. Intensity of CO2 emissions from GDP in the current year against 2005 level 3. Number of local authorities adopting LCCF 4. Number of States and Local Authorities with low-carbon action plans. 5. Preparation of low-carbon urban planning guidelines 6. Number of LPs implementing elements of low-carbon urban planning and climate change 7. Number of cities recognized as low-carbon cities 8. Number of buildings and development awarded green building status 9. Preparation of a roadmap towards a carbon neutral state
	ACTION SR 3.1A Ensure each state prepares an action plan for low-carbon urban development	
	ACTION SR 3.1B Expand the implementation of low-carbon city action plans in all local planning authorities	
	ACTION SR 3.1C Explore low-carbon mobility	
	ACTION SR 3.1D Ensure the application of green building and low-carbon city features in development	
	ACTION SR 3.1E Formulate a roadmap towards a carbon neutral state	
SDG7 SDG9	**SR 3.2** Improve the Management of Sustainable Alternative Energy Sources	1. Total Renewable Energy generated (by source) 2. Renewable Energy Rate (by type of source) 3. Level of energy efficiency 4. Number of solar farm in the states 5. Number of potential areas for biogas and biomass energy generation 6. Number of small hydropower generators developed
	ACTION SR 3.2A Enhance solar energy generation	
	ACTION SR 3.2B Enhance the development of Renewable Energy (RE) for biogas and biomass energy	
	ACTION SR 3.2C Develop small hydropower generators for rural areas	

RELATED SDGs	THRUST 2 STRATEGIES DAN ACTIONS	INDICATORS
KD 3: Development Towards A Carbon Neutral Nation		
SDG6 SDG9 SDG11	**SR 3.3** Strengthen Efficient and Sustainable Waste Management	1. The amount and percentage of solid waste sent to a sanitary landfill 2. The amount & percentage of solid waste at the landfill is re-treated 3. Number of recycling centres for electronic waste and textile waste 4. Proposed solid waste management facilities (in the States under Act 672) for the year 2020 to 2025) that have been developed 5. Percentage rate of household waste recycling
	ACTION SR 3.3A Explore solid waste management facilities that are in line with social needs and low-carbon requirements	
	ACTION SR 3.3B Recycle and upcycle solid waste and scheduled waste for environmental sustainability	

> "And among His Signs is the creation of the heavens and the earth, and the variations in your languages and your colours: verily in that are Signs for those who know."

30:22 - Ar-Rum