



SABAH MANGROVE ACTION PLAN

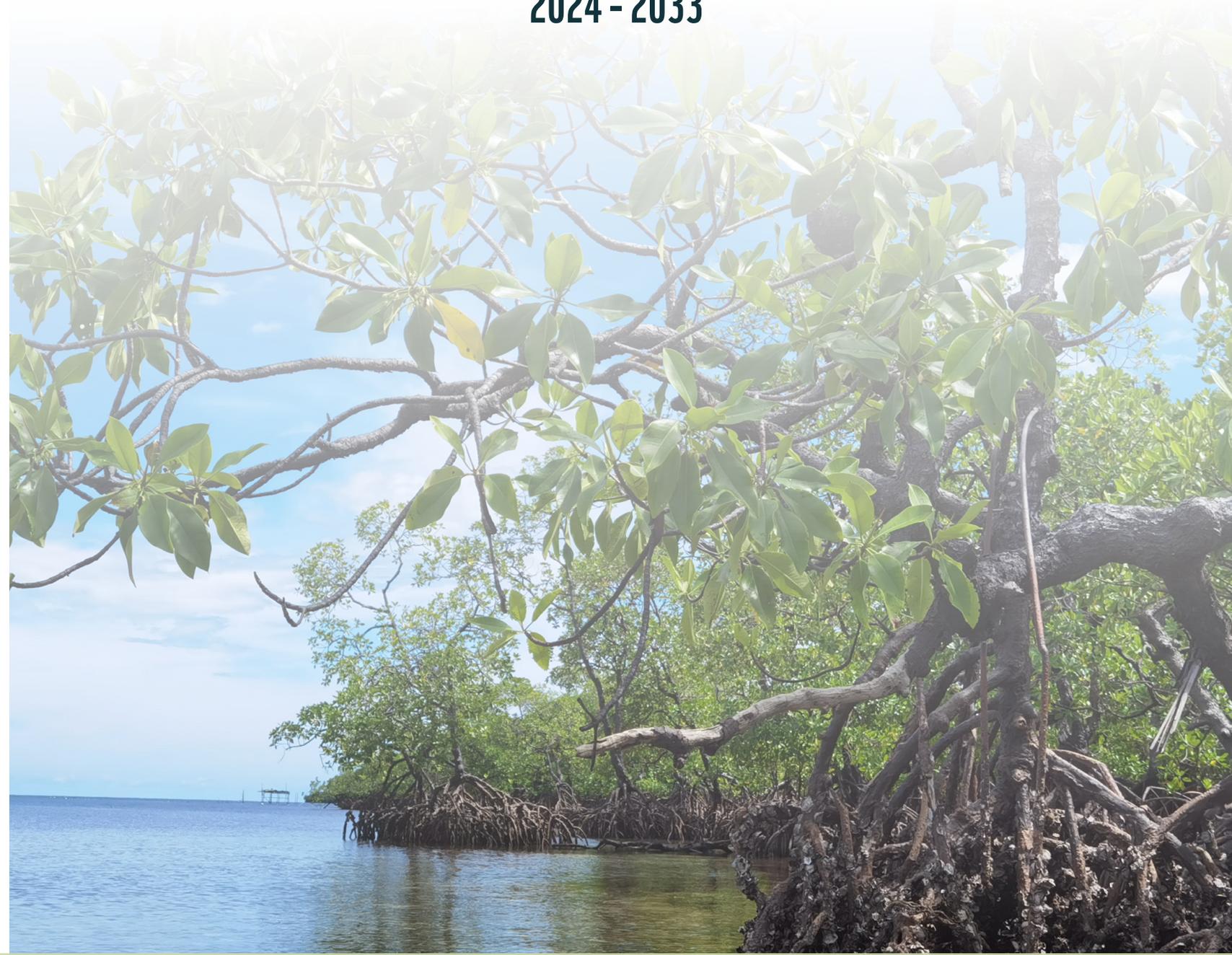
2024 - 2033

SABAH FORESTRY DEPARTMENT



SABAH MANGROVE ACTION PLAN

2024 - 2033



2024

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FOREWORD BY THE CHIEF MINISTER OF SABAH



This Sabah Mangrove Action Plan (SMAP) development proposal is in line with Core No.2 of the Sabah Forest Policy 2018 – which is Biodiversity Protection and Ecosystem Services. The objective under this Core outlines the need for the State Government to ensure that all types of forests, ecosystems and biodiversity are adequately represented and protected. This is also to ensure that all degraded forest areas are restored to improve the ecological functions of the forest.

The concept of Sustainable Forest Management (SFM) has evolved with emphasis on the sustainable use and development of resources. Sabah hosts the largest mangrove ecosystems in Malaysia, covering about 390,526 ha (60%) of the country's total mangrove of which 90% is still intact. Therefore, the management of mangrove forests also needs to be planned in line with the SFM concept. This is to ensure non-exploitation with negative impacts on mangrove forests occur in Sabah, thus affecting this important ecosystem, especially for vulnerable mangrove forest areas.

There is no doubt that mangrove forests are forest resources that can generate income for the Sabah Government such as water resources, carbon, nature-based tourism and development as well as potential biological diversity. Therefore, the development of this Action Plan is also in line with Blue Carbon Initiative, a coordinated global program to focus on the conservation and restoration of coastal ecosystems for climate, biodiversity and human well-being.

In addition, it also coincides with the Sabah's development agenda under the Hala Tuju Sabah Maju Jaya Development Plan (SMJ), to make the Blue Economy a new focus, where blue carbon is one of the areas that can be explored in-depth.

The implementation of SMAP will not involve additional financial implications for the Sabah Government since its implementation will be using existing provisions of the Department / Agency responsible for the implementation of the outlined Action Plan. Through the launch of this SMAP, the Sabah Government has the opportunity to receive funding sources for its implementation through financial instruments created at the national and international levels.

The launch of the Sabah Mangrove Action Plan (SMAP) 2024-2033 will be held to introduce to the public the direction of transformation towards the planning and management of Mangrove Forests (Mangroves) in Sabah. The development of this SMAP is also in line with the Sabah Government's policy and direction, namely the Sabah Forest Policy 2018 and the Hala Tuju Sabah Maju Jaya Development Plan (SMJ).

Datuk Seri Panglima Haji Hajiji Haji Noor
Chief Minister of Sabah

FOREWORD BY THE CHIEF CONSERVATOR OF FORESTS



Sabah hosts the largest mangrove ecosystems in Malaysia, covering about 390,526 ha (60%) of the country's total mangrove of which 90% are still intact. Mangrove forests in Sabah are regarded as natural protection, carbon sink and they conserve biodiversity. Although harvesting of mangrove trees for piling poles and charcoal production still continue on a smaller and limited scale for domestic use, it does not jeopardize the natural regeneration rate of mangrove vegetation. The catastrophe of Indian Ocean Tsunami in 2004 had prompted a significant call for mangrove conservation worldwide.

In 2020, the Sabah Forestry Department (SFD) and WWF-Malaysia drafted a Proposal combining (3) objectives encompassing ecosystem restorations at two (2) project sites involving mangrove areas and degraded forest, and a policy approach to create a larger impact beyond restoration sites for a 5-year period. In 2021, the Proposal was revised with seed funding from WWF-UK amounting to £1 Million for a 2-year duration. The Sabah Mangrove Action Plan is the policy approach chosen to enhance the conservation and protection of mangrove areas in Sabah. The Sabah Mangrove Action Plan (SMAP) 2024–2033, developed in consultation with key stakeholders, is a shared vision and integrated policy that takes into consideration legislation and a management framework for mangroves and its services.

The MOU between SFD and WWF-Malaysia was inked and an Inception Workshop kick-started the restoration and policy project in August 2022. The aim is to ensure that by 2025, the enabling policy conditions to support the implementation of the Action Plan is founded on nature-based solutions for mangrove forest protection and restoration; and government policy commitments are established.

In 2023, several Focus Group Discussions (FGDs) were conducted involving discussions among NGOs, academicians, private sector players, and selected communities that depend on mangrove areas, with the relevant government agencies. A Socialization Workshop was held on the 1st of November 2023 to present the first draft of the SMAP and to get feedbacks from the FGDs participants.

I take great pride in announcing that this initiative to develop a 10-year plan for Sabah's mangrove, the Sabah Mangrove Action Plan, is now successfully completed. We hope that the SMAP 2024–2033 will provide practical support and guidelines for all relevant stakeholders in our joint effort towards achieving the goals of sustainable utilisation and management of mangroves, and their protection for future generations.

We always encourage and support the exchange of knowledge through seminars, publications and other means, as well as win-win collaboration and cooperation with interested organizations.

With that, I would like to acknowledge the contributions of our partners—government agencies, the private sector, and NGOs and WWF-Malaysia—along the journey to complete this Action Plan; and to also congratulate all the working groups for making this Sabah Mangrove Action Plan 2024–2033 possible.

Thank you.

Datuk Frederick Kugan
Chief Conservator of Forests
Sabah Forestry Department



Executive Summary

The Sabah Mangrove Action Plan 2024–2033 (hereafter referred to as “the Action Plan” or SMAP) will support the protection, restoration, sustainable development planning and management for better conservation of mangroves in Sabah; an untapped resource for Sabah and its people. Mangroves management requires a holistic approach and prudent collaborative management to sustain their existence for generations.

The Action Plan, developed through extensive consultation with stakeholders, is a shared vision, and an integrated policy that considers legislation and a management framework for mangroves using nature-based solutions (NbS).

Sabah has been at the forefront of mangrove conservation; maintaining 60 per cent of the country’s mangrove forest and designating the first and largest Ramsar site in Malaysia; i.e. the Lower Kinabatangan-Segama Wetlands (78,803 ha) in 2008, and the second Ramsar site, Kota Kinabalu Wetlands (24 ha) designated in 2017. Mangroves are an important part of Sabah’s natural and cultural heritage, intrinsically linked to its identity and the well-being of local communities.

However, Sabah’s mangroves have been threatened by conversion to oil palm plantations and aquaculture, infrastructure developments such as the Pan Borneo Highway, and illegal Tengar extraction. The fragmentation and destruction of mangrove forests also impact the species that live and rely on mangroves in an interlinked ecosystem. The degradation of mangroves and loss of one species can have devastating effects on another since they are closely associated.

The actions proposed will ensure policy coherence for mangrove management to address threats, enhance synergies, and achieve shared sustainable outcomes. This requires institutional mechanisms; policy settings and processes; and priorities for balancing economic, social, and environmental objectives. A greater scientific understanding of mangroves as a natural resource, fish nurseries, water filters and carbon sinks, with future innovation, biotechnology, and bioprospecting, will increase the value of mangroves as a natural resource and a provider of ecosystem services.

Objective 1: To ensure an integrated management of mangroves, strengthen the environmental sustainability of coastal development, promote sound investments in coastal ecosystem management and achieve sustainable development.

Objective 2: To recommend areas for higher protection and restoration of mangrove forests in Sabah.

Objective 3: To engage with all stakeholders and to collaboratively plan and manage mangrove protection and utilisation with a clearly defined resources (where new funding should be explored), roles and responsibilities of the various multi-stakeholder groups.

Objective 4: To strengthen the participation of local communities in the implementation of mangrove forest management activities through a co-developed Community-based Forest Management Plans.



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***‘Kita cuma meminjam sumber yang ada ini dari generasi yang akan datang, dan kita harus mengembalikannya kepada mereka bila tiba waktunya, dalam keadaan yang baik ...
Perjalanan sejauh beribu batu harus dimulakan dengan langkah satu ...’***

**‘We only borrow our current resources from the next generation, and we should return these to them when the time comes, in good condition...
The journey of thousands of miles start with one step ...’**

(Mastupang Somoi, Sungai Eloi, Pitas, 2014)

Table of Contents

Executive Summary

List of Maps

List of Tables & Figures

Abbreviations

Chapter 1: Introduction

1.1 Policy, Institutional Framework and Protection

1.2 Key Stakeholders

1.3 Challenges, Threats and Gaps

Chapter 2: Status of Mangroves in Sabah

2.1 Distribution and Site Descriptions

2.2 Biodiversity in Mangroves

2.3 Baseline Map for Mangrove Vulnerability Criteria

Chapter 3: Strategies & Actions

3.1 Strategy 1: By 2033, all protected mangrove areas will be maintained, and identified vulnerable mangroves will be protected under various existing legislations.

3.2 Strategy 2: By 2033, state mangrove governance is strengthened.

3.3 Strategy 3: By 2033, all mangrove areas in Sabah are effectively and collaboratively managed.

3.4 Strategy 4: By 2033, vulnerable mangrove areas are protected and climate-resilient.

3.5 Strategy 5: By 2033, all degraded mangroves within vulnerable areas are restored.

3.6 Strategy 6: By 2033, support the environmentally sustainable livelihood of communities' dependent on mangroves ecosystem

3.7 Strategy 7: By 2033, the importance of mangroves is shared and applied by all levels of society.

Chapter 4: Implementation and Monitoring

4.1 Monitoring Plan

4.2 Action Plan Timeline

4.3 Potential Financing Source

References

List of Maps

Map 1.1: Sabah land cover shows mangrove extent primarily along the coastline, 2017

Map 2.1: Mangrove distribution in Sabah

Map 2.2: Mangrove Area in Sabah Map

Map 2.3: Biodiversity Map

Map 2.4 Land-use Map

Map 2.5: Human Activities Map

Map 2.6: Infrastructure Map

Map 2.7: Tsunami and Earthquake

Map 2.8: Annual Rainfall

List of Tables & Figures

Table 1.1: Major Threats to Sabah Mangrove Forest

Table 2.1: Total area of mangrove in Sabah

Table 2.2: Classifications of mangroves forest

Table 2.3: Endangered Species Associated with Mangroves, Sabah

Table 2.4: Avifauna in Mangroves, Malaysia

Table 2.5: Distribution of different vegetation types and land-uses within forest reserves (SFD, 2010)

Table 2.6: Intensity of Ground Shaking (Earthquake)

Figure 3.1: Strategies and Targets for Sabah Mangrove Action Plan 2024–2033

Figure 4.1: Monitoring plan timeline

Abbreviations

asl	Above sea level
CO ₂	Carbon Dioxide
CSR	Corporate Social Responsibility
DID	Department of Irrigation and Drainage
DOE	Department of Environment
DOFS	Department of Fisheries Sabah
DoSM	Department of Statistics, Malaysia
EPD	Environment Protection Department
ESG	Environmental, social and corporate governance
FGD	Focus Group Discussion
FR	Forest reserve
FRC	Forest Research Centre, Sepilok, Sandakan
GHG	Greenhouse gas
GIS	Geographical Information System
GMA	Global Mangrove Alliance
IRDA	Iskandar Regional Development Authority, Johor
ISME	International Society for Mangrove Ecosystems
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
MAFFI	Ministry of Agriculture, Fisheries and Food Security, Malaysia
MOU	Memorandum of Understanding
MyGAP	Malaysia Good Aquaculture Practices
NbS	Nature-based Solutions
NGO	Non-Governmental Organization
RDC	Rainforest Discovery Centre, Sepilok, Sandakan
RSPO	Roundtable on Sustainable Palm Oil
SDGs	Sustainable Development Goals

CHAPTER 1: INTRODUCTION

The Sabah Mangrove Action Plan 2024–2033 will guide the protection, restoration and sustainable development planning and management for better conservation of mangroves in Sabah, an untapped resource for the state and its people. Mangroves management requires a holistic approach and prudent collaborative management to sustain their existence for generations to come.

Objectives

The Sabah Mangrove Action Plan (SMAP) developed in consultation with key stakeholders is a shared vision and integrated policy that takes into consideration legislation and a management framework for mangroves and its ecosystem services.

The aim is to ensure that by 2050, the enabling conditions to support mangrove forest protection and restoration based on nature-based solutions and through government policy are established. The main objectives of the Action Plan are:

1. To ensure an **integrated management** of mangroves, strengthen environmental sustainability of coastal development, promote sound investments in coastal ecosystem management and achieve sustainable development.
2. To recommend **areas for higher protection and restoration** of mangrove forests in Sabah.
3. To **engage all stakeholders to collaboratively plan for and manage** mangrove protection and utilisation with clearly defined resources (where new funding should be explored), **roles and responsibilities** of multi-stakeholder groups.
4. To strengthen the **participation of local communities** in the implementation of mangrove forest management activities.

Mangroves in Sabah

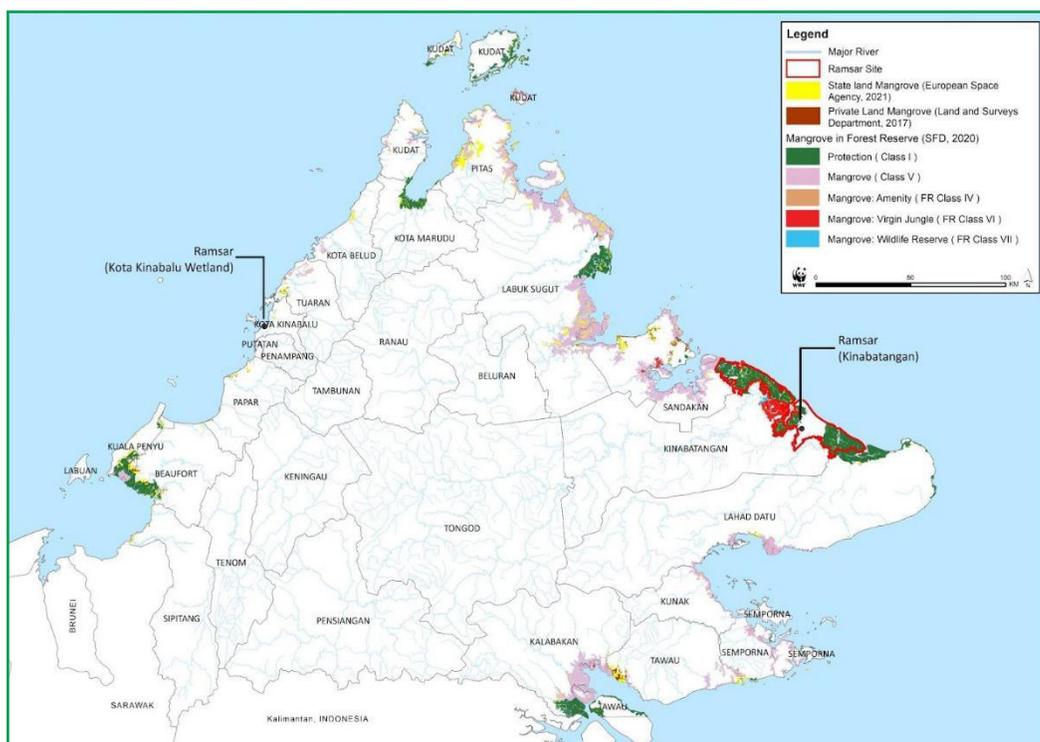
The tropical coastline of Sabah is endowed with large stretches of highly productive mangrove forests, which grow along sheltered coastal shores and estuaries with muddy to sandy substrates, that are alternately covered and uncovered by tidal fluxes. In the tropics, the development, structure and dynamics of mangrove ecosystems are influenced by marine and fresh or brackish waters. The flora consists of shrub-like vegetation to dense forest of even heights in the range of 6–24 metres (m) with unbroken and homogeneous canopies.

Sabah's mangroves, biogeographically classified as Indo-Malayan mangroves, are considered the oldest and most diverse mangrove habitats in existence which account for over 6.13 million hectares (ha) or over 40 per cent of global mangroves in 2010. On the basis of common ecological and environmental settings, mangroves are broadly classified into six distinct mangrove ecosystems; i.e. Indus River Delta, Godavari-Krishna, Sundarban, Burmese Coast, Indochina and Sunda Shelf mangroves.



Malaysia has 4.7% of the world’s mangroves, ranking sixth in country area after Indonesia (20.9%), Brazil (8.5%), Australia (6.5%), Mexico (5.0%) and Nigeria (4.8%) (Spalding et al., 2010). Malaysia comprises three regions; i.e. Peninsular Malaysia, Sabah and Sarawak which is separated by the South China Sea. Malaysia’s population in 2020 is estimated at 32.7 million (DoSM, 2020) and this has more than doubled in the last 35 years. Malaysia’s mangroves account for 2% (629,038 ha) of the total land area of Malaysia (329,847 km²) with 110,953 ha (18%) in Peninsular Malaysia, 139,890 ha (22%) in Sarawak, and the largest area of 390,526 ha (60%) in Sabah (Tangah et al., 2022). Sarawak lost the largest area of mangroves (8,046 ha); whereas Sabah still has 90% of mangroves intact (Tangah et al., 2020). Map 1.1 shows the distribution of mangroves area in Sabah based on forest classification.

Map 1.1: Sabah land cover shows mangrove extent primarily along the coastline, 2017



Source: SFD, 2017.

1.1 POLICY, INSTITUTIONAL FRAMEWORK AND PROTECTION

Mangroves don't just straddle the land-sea interface. They also straddle the worlds of people and nature, of science and action, of loss and gain, and even perhaps of despair and hope. And in resolving the challenges they face; it is critical that we also recognize that mangroves straddle the needs of both local and global communities. Indeed, mangroves are essential to the world. (Global Mangrove Alliance, 2021).

Pressures, constraints and opportunities for advancing mangrove ecosystem restoration and integration of government department policies and plans is central to delivering of a coherent action plan for the sustainable development of mangrove ecosystems. Mangrove management in Sabah falls under the Sabah Forestry Department since land is a State matter. Policy coherence for mangrove management will enhance synergies between interacting policy domains to achieve shared sustainable outcomes. Greater scientific understanding and emerging research on mangroves as natural infrastructure, fish nurseries, water filters, carbon sinks and future innovation, biotechnology and bioprospecting will increase the value of mangroves as a natural resource and a provider of ecosystem services. This requires institutional mechanisms, policy settings and processes as well as priorities for coherent actions that balance economic, social and environmental objectives.

1.1.1 Malaysian Policies on Mangrove Biodiversity Management

1. National Forestry Policy 1978 (Revised 1993)
2. National Policy on Biological Diversity 1998
3. National Policy on the Environment
4. 3rd National Agricultural Policy
5. National Wetlands Policy 2004

1.1.2 Malaysian Laws on Mangrove Biodiversity Management and Their Administration

The law with respect to the management of mangrove forests in Malaysia is basically under the jurisdiction of the states as provided under Schedule IX of the Federal Constitution. According to Article 74 of the Federal Constitution, matters relating to land, rivers, forest, local government, and town and country planning, as listed in the State List under Schedule IX, are within the jurisdiction of the State Authorities. The respective State Legislative Assemblies have powers to make their own laws on these matters.

1. National Forestry Act 1984
2. Environmental Quality Act 1974 (Amended 1985)
3. Fisheries Act 1985
4. Establishment of Marine Parks & Marine Reserves Order 1994

National Forestry Act 1984 And Environmental Quality Act 1974 (Amended 1985)

The National Forestry Act 1984 provides for the administration, management and conservation of forests and forest developments within the states in Peninsular Malaysia; whilst Sabah and Sarawak have their own state laws on forestry. Section 7 (1) of the National Forestry Act 1960 provided the states to gazette any land as a Permanent Reserve Forest (PRF). To enhance the effectiveness in forestry enforcement, the National Forestry Act 1984 was amended in 1993; and the Environment Quality (Prescribed Activities) Environmental Impact Assessment (EIA) Order 1987 is used with the National Forestry Act to protect the forest, environment and biodiversity, in particular, the logging of natural forests. Guidelines for environmental impact assessment (EIA) have also been drawn up to assist the proponents of major development projects to meet environmental standards. Activities which are subjected to the Environment Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987 are agriculture; infrastructure development, e.g. airport, housing, railways transportation, resort, ports, golf courses; drainage and irrigation; land reclamation; fisheries; forestry; industry; mining; petroleum; power generation and transmission; quarries; recreational development; waste treatment and disposal; water supply; and development of hill-slopes, etc.

Fisheries Act 1985

The Fisheries Act 1985 is the most recent Act implemented to manage, develop, conserve and control marine fishing and marine fisheries resources in the Malaysian waters. The objective of this Act is to provide for better conservation, management and development of fisheries in Malaysia. Briefly, the Act covers:

- Administration of fisheries in Malaysia;
- Licensing and management of local/estuarine fishing operations;
- Control of fishing by foreign fishing vessels in Malaysian fisheries waters;
- Offences, prohibitions and control of certain methods of fishing;
- Establishment of marine parks and marine reserves;
- Offences and legal procedures relating to the implementation of the Act.

Establishment of Marine Parks & Marine Reserves Order 1994

The waters around 42 islands in the Malaysian waters that have been gazetted as Marine Parks. Fishing, collection of fishes and other aquatic animals in these gazetted areas are prohibited.



1.1.3 Sabah Laws and Policies on Mangrove Biodiversity Management

Sabah State Laws on Mangrove:

- Forest Enactment 1968 comprising Class I (Protection Forest), Class IV (Amenity Forest), Class V (mangrove forest reserve), Class VI (Virgin Jungle Forest) and Class VII (wildlife reserve)
- Sabah Land Ordinance 1930
- Sabah Inland Fisheries and Aquaculture Enactment 2003
- Drainage and Irrigation Ordinance 1956
- Water Resource Enactment, 1998
- Wildlife Conservation Enactment 1997 – Schedule I, II, III
- (Sabah) Parks Enactment 1984
- Sabah Biodiversity Enactment 2000
- Environmental Protection Enactment 2002
- Town and Country Planning Ordinance 1950
- Port and Harbour Enactment 2002

Sabah State Policies on Mangrove:

- Sabah Biodiversity Strategy 2012–2022
- Sabah Structural Plan 2033
- Sabah Shoreline Management Plan (SMP)
- Sabah Forest Policy 2018
- Sabah Agriculture Blueprint
- Sabah Agriculture Policy
- Sabah Environmental Policy
- Sabah Maju Jaya
- Environmental Action Plan
- Proboscis Monkey Action Plan 2019–2028
- Sabah State Policy on Environment 2017
- Integrated Shoreline Management Plan (ISMP)
- Integrated TMP Management Plan

Sabah Biodiversity Strategy 2012–2022

The Sabah Biodiversity Strategy 2012–2022, a ten-year Strategy, charts Sabah's efforts to uphold Malaysia's commitment to implement the Convention on Biological Diversity (CBD), signed during the Rio Summit in 1992. It focuses on conserving biodiversity, ensuring sustainable use, and equitable sharing of genetic resource benefits. The primary goal of this strategy is to safeguard Sabah's rich biological diversity while promoting its sustainable utilization for the Sabah's socioeconomic development. Building upon the Sabah Conservation Strategy 1992, it aims to enhance residents' quality of life. The Strategy's five pillars emphasize engaging Sabah's residents, integrating biodiversity into economics, fortifying ecosystems, enhancing knowledge, and bolstering stakeholders' capacity. It delineates a structured framework for effectively managing biodiversity through execution, coordination and information exchange. The Sabah Biodiversity Strategy 2024-2034 is currently final stage of development.

Sabah Structure Plan 2033

The Sabah Structure Plan 2033 (SSP2033) is a comprehensive spatial planning blueprint governed by the Town and Country Planning Ordinance (Sabah Cap.141), aims to guide Sabah's development until 2033. Encompassing Sabah and its waters, its goal is to enhance residents' quality of life, ensure a sustainable environment, foster a robust economy and establish efficient connectivity through transportation and technology. Central to this vision is cultivating a liveable environment while preserving and enriching the natural surroundings. SSP2033's strategies focus on sustainable population growth, growth centres, Special Economic Zones, utility access, integrated transportation networks, expanding Protected Areas (PAs) and safeguarding Environmentally Sensitive Areas (ESA). It also emphasizes safeguarding sensitive coastal and marine ecosystems which include the protection of all coastal mangrove forests to mitigate tsunamis' impact and support fisheries sustenance.

Sabah Shoreline Management Plan (2005)

The Sabah Shoreline Management Plan (SMP) merges the East and West Coast plans into a unified strategy, designed in accordance with the Town and Country Planning Ordinance of 1950 (revised in 2002). It was conducted by DHI Water & Environment (Malaysia) Sdn. Bhd. under a contract with the Environment Protection Department (EPD) under the Ministry of Tourism, Culture, and Environment. It primarily focuses on existing land and nearshore areas, with little mention of the sea areas. Generally, the SMP serves as a comprehensive framework for guiding sustainable shoreline management in Sabah. The SMP document divides the coastline into Management Units (MUs) and establishes management strategies based on specific management objectives. It is committed to upholding sustainable development policies that consider the integrated management of coastal resources, optimization of development opportunities, and promotion of the socio-economic welfare of both the current and future populations. It also prioritise environmental conservation and preservation.

Sabah Forest Policy 2018

The Sabah Forest Policy 2018 is a document that replaces the 1954 Forest Policy, and was approved by the State Cabinet on 1 August 2018. It delineates the Sabah's dedication to the sustainable management and conservation of its forests. It acknowledges the significance of forests in biodiversity conservation; climate change mitigation and adaptation; and the sustenance of local communities. The Policy stated that Sabah is firmly committed to Sustainable Forest Management (SFM), ensuring that 50% of Sabah's landmass under forest cover and managed under sustainable forest use and tree cover, serving environmental protection, biodiversity conservation, and socio-economic well-being. It also aims to elevate the percentage of Sabah's land area within Totally Protected Areas (TPAs) to 30% by 2025, while progressively certifying all Forest Reserves.

Sabah Agriculture Blueprint (2021–2030)

The Sabah Agriculture Blueprint 2021–2030 functions as the principal guide for the comprehensive advancement of the agricultural sector. It encompasses strategies and goals for each agricultural sub-sector: livestock and fisheries. These are accompanied by proposed plans and projects designed to fulfil the objectives established by the Sabah government. This blueprint aligns with the objectives of the 3rd Sabah State Agriculture Policy (2017–2026), which aims to enhance food security, bolster production growth; and ensure the sustainability of both economic resources and the environment. Its aim is to work towards a sustainable agricultural transformation that results in significant

growth to the agricultural sector. This includes the participation of young entrepreneurs, expanding household income for targeted groups, enhancing food security, and increasing agricultural export.

Third Sabah Agricultural Policy (2015–2024)

The Third Sabah Agricultural Policy (SAP3), spanning from 2015 to 2024, lays out strategic pathways for Sabah’s agricultural development. It focuses on sustainable food production and increasing farmers’ income, building upon SAP1 (1992–2010) and SAP2 (1999–2010). Derived from SAP2’s challenges, SAP3 aims for accelerated and sustainable agricultural growth. It identifies sectoral issues, establishes strategic goals, and fosters collaboration among key stakeholders. Aligned with Vision 2020, it outlines goals, including ‘Increasing Food Security and Income,’ ‘Ensuring Sustainability,’ and ‘Strengthening Productivity Growth and Competitiveness.’

Sabah State Policy on the Environment (2018–2033)

The Sabah State Policy on the Environment, initiated in 2017, involves diverse stakeholders to collectively address environmental concerns. It emphasizes fundamental principles guiding governance across land, air, water, biodiversity, and societal aspects. With 83 strategies outlined, the policy underscores the significance of maintaining a healthy environment that includes clean air, healthy rivers and forests, productive land, bountiful seas, and cohesive communities; as these factors greatly contribute to the prosperity of Sabah and its people. It sets objectives to inspire Sabah’s population, providing a vision for environmental conditions and regulatory frameworks. This Policy aims to integrate global concepts such as the green economy promotion, sustainable production, cultural and environmental heritage preservation, biodiversity conservation, carbon emission off-setting, and good governance; ensuring it remains relevant by embracing contemporary values for Sabah’s sustainable development.

Sabah Environmental Education Policy (2009)

The Sabah Environmental Education Policy (SEEP) received official approval as a state policy from the State Cabinet on April 8, 2009. This Policy outlines guidance intended to aid various sectors, including government bodies, NGOs, private entities, educational institutions, the media, and the general public; in engaging and executing environmental education programs across Sabah. With the goal of fostering environmental stewardship and promoting sustainable lifestyles among the people of Sabah, this Policy has formulated strategies and interventions to ensure the effective implementation of these programs. Its objective is to instil environmental stewardship and sustainable lifestyle among the people of Sabah.

Sabah Maju Jaya Development Plan 1.0 (2021–2025)

The Sabah Maju Jaya Development Plan for 2021–2025 has outlined three main thrusts: “S” for agriculture, industry, and tourism; “M” for human capital and well-being; and “J” for green infrastructure. These aim to drive Sabah’s progress, benefiting society at large. The Plan identifies five (5) enablers consisting of fiscal sustainability, financial facilities, efficient delivery, integrity, and digital governance to support these thrusts. It delineates five (5) objectives: a united, peaceful, and prosperous state and society; optimizing state resources and revenue; stimulating economic recovery; enhancing the people’s economy; and elevating human capital.

Aligned with the Shared Prosperity Vision 2030, it employs multiple initiatives to meet its goals. It also emphasizes a green economy and environmental sustainability. In essence, the Plan lays out a new strategic direction for Sabah's economic development over the next five years.

Sabah Environmental Action Plan (2018–2033)

In an effort to ensure the successful implementation of the Sabah State Policy on the Environment, the Sabah Government commissioned a study to formulate specific action plans. Consequently, a comprehensive Action Plan was devised, encompassing around a hundred and ninety-five (195) Action Plans. Spanning 15 years from 2018 to 2033, these plans emphasize resource sharing and periodic reviews every five (5) years. Strategies include gazettement of forest habitats, maintaining protected areas, safeguarding mangroves, and planning shorelines against climate change impacts. Zoning for development aims to mitigate the environmental risks. The execution of these Plans underscores Sabah's commitment to robust environmental protection and resource management; essential due to the region's ecological sensitivity, demanding strategic planning and adaptive management.

Proboscis Monkey Action Plan 2019–2028

The Proboscis Monkey Action Plan (PMAP) for Sabah 2019–2028 is a comprehensive strategy aimed at conserving and securing the long-term survival of this unique species. The vision is to ensure the survival of viable proboscis monkey populations in Sabah. As per estimates from 2005, approximately 6,000 proboscis monkeys inhabited seven (7) major centres along the coast of Sabah. Concurrently, several smaller populations exist in the interior, necessitating attention. It is noteworthy that the presence of proboscis monkeys in Sabah offers new prospects such as eco-tourism, capable of contributing to the economic advancement of local communities and augmenting government revenues. Over the next 10 years, the Plan aims to identify, develop, and implement strategies and actions that will address the threats to the species in all seven priority populations in Sabah, while providing guidance to key players involved in these efforts.

Integrated Shoreline Management Plan (ISMP)

The Integrated Shoreline Management Plan (ISMP) is a strategic framework by the Malaysian Government, executed by the Department of Irrigation and Drainage (DID), aiming to promote sustainable coastal development in alignment with global agendas such as Agenda 21 of the Rio Declaration 1992. Tailored to each state, ISMP operates under Integrated Coastal Zone Management Plan (ICZM), addressing shoreline concerns. It aims to guide sustainable coastal development, minimizing risks through considering physical, environmental, and socioeconomic aspects, with stakeholder consultations. Decision Support Systems aided in the data gathering and offered strategic advice to stakeholders for consistent development. In Malaysia, each state carried out the ISMPs individually, overseen and managed by both Federal and State resources. The main focus of these Plans is the 4 km coastal area, stretching 1 km inland and 3 km offshore. However, the coastal, marine, and the environmental conditions beyond the Project boundaries were also considered. The goal is to create detailed technical reports guiding sustainable coastal management, addressing erosion, flooding, land use planning, tourism, and environmental conservation to aid informed decision-making for state authorities.

Tun Mustapha Park Integrated Management Plan (2017–2026)

The Tun Mustapha Park (TMP) Integrated Management Plan functions as a guiding document for the management authorities, enabling them to execute their tasks and responsibilities within a multi-stakeholder environment. It delineates the goals, objectives, strategies, and actions to be pursued over the upcoming decade (2017–2026). Developed through collaboration with Park stakeholders, the TMP aims to ensure integrated management, sustainable development, and healthy ecosystems. The vision set up by the Park is to preserve the integrity of the globally significant marine biodiversity in the TMP and guarantee the continued existence of abundant marine resources that support the community, all while maintaining their sustainability.



1.2 KEY STAKEHOLDERS

An in-depth stakeholder analysis was conducted by Sabah Forestry Department (SFD) and WWF-Malaysia based on stakeholder consultations from December 2022 to July 2023. A template was provided to capture the interest, power, mandate and impact of each stakeholder on mangroves (Table 5.1. See Appendix 1 for details) based on the four (4) focus group discussions (FGDs) were established to garner technical inputs through consultations, and to allow stakeholders' participation in the development of the Sabah Mangrove Action Plan:

- Government Agencies and District Officers
- Private Sector and GLSs
- NGOs/Academia/Researchers
- Local Communities

A total of 52 stakeholders were identified from the stakeholder identification process based on the SMAP's four (4) objectives and the analysis of seven (7) priority mangrove areas and sub-areas.

1.2.1 List of identified stakeholders

Government

Department:

- Sabah Climate Action Council (SCAC)
- Department of Fisheries, Sabah (DOFS)
- Department of Irrigation and Drainage (DID)
- Environment Protection Department (EPD)
- Land and Survey Department (JTU)
- Ministry of Agriculture (MOA)
- Ministry of Tourism, Culture & Environment (MTCE)
- Ministry of Works (MOW)
- National Water Research Institute of Malaysia (NAHRIM)
- Sabah Biodiversity Council (SaBC)
- Sabah Forestry Department (SFD)
- Sabah Parks (SP)
- Sabah Wildlife Department (SWD)
- Town and Regional Planning Department (TRPD)

District Offices:

- Beluran (Sugut)
- Kalabakan
- Kinabatangan
- Kota Belud
- Kota Marudu
- Kuala Penyu
- Kudat
- Lahad Datu
- Pitas
- Sandakan
- Sipitang
- Tawau
- Tuaran
- Beaufort
- Kunak
- Semporna

Private Sector and GLSs

- Acacia Forest Industries
- Asia Aquaculture, Tawau
- Enrich Wise Sdn Bhd
- North Cube Shrimp Aquaculture, Tawau
- Persatuan Pemilik Kapal Nelayan Kudat
- QL Aquamarine, Kudat
- Sankina Aquaculture, Tawau
- SAFODA
- Warisan Hikmat Sdn Bhd
- Yayasan Sabah
- Borneo Sulaman Cove Sdn Bhd (manages Sulaman Wetland Sanctuary)

NGOs/Academia/Researchers

- Danau Girang Field Centre
- Forever Sabah
- International Society for Mangrove Ecosystems (ISME)
- Malaysian Mangrove Research Alliance and Network (MyMangrove)
- PACOS
- Reef Check
- Sabah Environmental Protection Association (SEPA)
- Seagrass Guardians, KK
- Sabah Wetlands Conservation Society (SWCS)
- Universiti Malaysia Sabah Faculty of Science and Natural Resources (UMS-FSSA)
- WWF-Malaysia

Local Communities

- Kelab Belia Anak Taritipan (ANBATAR)
- Jawatankuasa Bertindak G6 Pitas
- Green Semporna
- Kinabatangan-Segama Wetlands 8 kampung





1.3 CHALLENGES, THREATS AND GAPS

The prospect of mangrove conservation and ecotourism in Sabah is promising. However, there are a number of issues and challenges in sustainable mangrove management in Sabah. Any effort to develop and promote the utilization of the untapped resources of mangrove ecosystem requires a holistic approach and prudent management for the conservation of mangrove ecosystem and sustaining its existence in perpetuity. (Tangah et al., 2018).

Major exploitation of mangroves for wood chips since the 1970s ceased in mid-1980s due to the declining income to Sabah and compounded by the growing awareness of the impacts of mangrove loss (Tangah et al., 2015). Although extractions are still allowed nowadays, it is regulated and only limited to small-scale for domestic consumption. Current major threats identified are listed in Table 1.1 and further elaborated in the next section:

Table 1.1: Major Threats to Sabah Mangrove Forest

NO	Threats	Description
1	Conversion to plantations (oil palm & timber)	Mangrove are cleared and reclaimed; or drained with embankments for commercial crops particularly oil palm.
2	Infrastructure development	Mangroves clearance for mega-structure such as industries, jetties or ports; and replaced or altered for roads.
3	Tengar extraction	Illegal activities of extracting mangrove trees bark which eventually kill the trees.
4	Aquaculture	Mangrove clearance for aquaculture.
5	Human settlements	Mangrove clearance for housing/settlements, including access roads and altered to allow crop cultivation.
6	Climate Change	Rises in sea levels and increases in oceanic acidification are the greatest threats to mangroves.

Note: Mangrove threats ranking from Inception Workshop Group Activity Report, 2022.

Oil Palm Plantation

Oil palms can be planted almost anywhere provided there is soil, manpower and fertilizer. Due to the high-water table, mangrove areas are not an ideal land for oil palm. However, this does not stop businesses from expanding into mangroves. Lucrative income from Sabah's 'Golden Crop' made it worth investing in mangrove land reclamation where mangroves were cleared; and then filled or drained prior to planting of oil palm seedlings. This can be done successfully, although in many cases, water seeps back into the modified area, making it impossible to be permanently converted, and possibly abandoned.

In many parts of Sabah i.e., from Kota Marudu to Kudat and Pitas (north), to Beluran (northeast), and along the east coasts towards Sandakan, Lahad Datu, Kunak, Semporna and Tawau – oil palm plantations had been established up to the fringes of the Mangrove Forest Reserves. Patches of plantations have encroached the mangroves, either under titled land or disputed boundaries.

Tengar Extraction Prevalence

“Tengar” or “Tangar” means the bark of a mangrove species (Tengar is a medium-sized mangrove tree which usually grows up to 25m tall with greyish brown, smooth bark and with flanged stem base (*Ceriops tagal*) that is harvested because of its tannin content. It is used for making alcoholic beverages, food colouring and fabric dye. The tree is either felled first; or the standing tree will eventually die post-extraction of its bark.

Mangrove forests prone to such activities are mainly located along the east coast, within boat reach from the neighbouring Philippines (Tangah et al., 2019):

- i. Tabin Wildlife Forest Reserve (Tabin)
- ii. Kuala Maruap Forest Reserve (Kinabatangan)
- iii. Trusan Kinabatangan Forest Reserve (Kinabatangan)
- iv. Sg. Sugut, Paitan, Pulau Jambongan Forest Reserve (Beluran)
- v. Bengkoka Peninsula Forest Reserve (Pitas)

Aquaculture in Mangrove extent

Mangrove area is a natural habitat and breeding ground for commercially valuable fishes and shrimps. However, to produce these in a more profitable scale, mangroves are cleared to build brackish water shrimp farms. Conventional shrimp lasts between two to five years. Over time, the farm soil will become too acidic and the water quality deteriorates, lowering prawn yields (The Fish Site, 2007). This suggests that farms without investment on pond lining or antibiotics will eventually be abandoned or relocated to fresh sites, placing mangroves at continuous risk. Shrimp ponds can be found mainly near mangroves in Kota Marudu, Pitas, Semporna, Lahad Datu, Kunak and Tawau.

In October 2018, the new Sabah Government announced that mangrove lands will no more be approved for shrimp farming in Sabah. This was partly due to the failure of a mega shrimp project in Pitas, called Pitas Shrimp Park, that was launched in 2014 (FMT, 2018). It involved a total investment of RM1.23 billion. The Project was envisaged to be the biggest shrimp farm in Malaysia comprising 1,500 ponds on a 1,335 ha of mostly mangrove forests. It was planned to be fully completed and operational in 2018 with an annual turnover of RM300 million and to provide 3,000 jobs for the locals. A total of 930 ha had been cleared and partially developed and operational as of 2018; whilst development for the remaining 400 ha was cancelled. By then, the damage was already done.

Pitas locals who were reliant on fish, *lokans* and crabs from the mangroves for their livelihood were severely affected by the clearings. To make matters worse, the promises of jobs and clean water supply system were never materialized. The community's plight and mangrove destruction received widespread media coverage leading up to the decision to stop the Project expansion. To date, the announcement made by the then newly-appointed State government for no mangrove lands for shrimp farms still remains as a directive and yet to be adopted as an official policy by the current State government.

Major Planned Development

Coastal development poses a severe threat to mangrove ecosystems. Coastal development includes the formation of resorts, desalination plants, power plants, nuclear plants, harbour facilities, docks, dams, and aquaculture ponds (Humayun, 2022). Coastal development is inevitably accompanied by grave issues such as soil erosion (Vousdoukas et al., 2020), pollution (Liu et al., 2022), and altered hydrology (Arévalo-Mejía et al., 2020), which hinder the rehabilitation of any adjacent mangrove forests. Coastal development also often causes the blockage or divergence of rivers that previously passed through mangroves before entering the sea, leading to changes in alluviation (Balkin, 2020), infiltration (Pour et al., 2020), salinity (Lázár et al., 2020), and temperature (Thakur et al., 2021). These changes adversely affect not only the mangrove plant population but also aquatic life, including fishes, shrimps/prawns, and other edible seafood species (Veettil et al., 2023).

Two (2) of the major projects that have been seen to affect areas of mangroves are the Palm Oil Industrial Cluster (POIC) in Lahad Datu and the Pan-Borneo Highways stretching from west coast to the east coast of Sabah.

Human Settlements

One of the hardest challenges in Sabah's mangrove management is human-occupied mangrove areas; where there is difficulty to enforce protection when humanitarian issues are involved. A large portion of the population in Sabah are located within the coastal area and this include also mangrove areas. This issue is further worsen by the presence of illegal settlement that are increasingly becoming a problem due to the population growth.

Climate Change

Climate change is causing a rise in sea level, increased temperature, increased CO₂ concentration, oceanic acidification, and changes in precipitation/storm patterns, all of which have negative effects on mangroves and lead to the extinction of mangrove species (Alongi, 2022). Among all the effects of climate change, rises in sea levels and increases in oceanic acidification are the greatest threats to mangroves (Castillo et al., 2022).

An increase in oceanic acidity caused by the absorption of atmospheric CO₂ decreases the bio-availability of plant nutrients, such as phosphorus and molybdenum; and increases the absorption of toxic metals, such as aluminium (Alongi, 2021), which are detrimental to mangrove species. Over the last four decades, the pH level of ocean surface water has declined at a rate of 0.02 pH units per decade (Rogers et al., 2020). Continuous CO₂ uptake by seawater will further intensify oceanic acidification in the future, impacting ocean bio-geochemical cycling (Terhaar et al., 2020) and potentially having lethal consequences for mangroves and marine life (Canadell et al., 2021).

CHAPTER 2: STATUS OF MANGROVES IN SABAH

Realising the importance of mangroves in maintaining Sabah's healthy coastal and estuarine environment, the Sabah Forestry Department is aware that any unwanted and poorly planned coastal development will cause degradation and eventually destroy the mangrove ecosystem (SFD, 2022).

1.3 CHALLENGES, THREATS AND GAPS

Mangroves in Sabah account for 60% (Tangah et al., 2020) of Malaysia's mangroves, and out of the seven designated Wetlands of International Importance (Ramsar Sites) in Malaysia, with an area of 139,890 ha, two (2) are located in Sabah i.e., Kota Kinabalu Wetlands, 24 ha designated in 2017 and the Lower Kinabatangan-Segama Wetlands, 78,803 ha designated in 2008 (Ramsar, 2022).

In 1984, an estimated 58.5% of total mangrove forests in Sabah were gazetted as Mangroves Forest Reserves (Class V) under the Forest Enactment 1968, for the management of the supply of mangrove timber and other produce. The districts of Lahad Datu, Pitas, Semporna, Sandakan, Kudat, Beluran, Kota Marudu, Kunak, and Tawau had about 70% of their mangrove forests gazetted; whereas Kota Kinabatangan and Kota Belud had only 40% gazetted, while Kota Kinabalu and Beaufort gazetted only 10%. The Sabah Mangrove Masterplan 2010–2016 estimated the total gazetted mangrove forest at approximately 326,487.12 ha in 2010 (Faisal Mohd Noor, 2010). The distribution of mangrove forest reserve is shown in Table 2.1.

Sabah's extensive mangroves occur mainly along the coastlines and river systems, of which 322,990 ha are within permanent forest reserves, with the remaining 67,536 ha are on state land or alienated/privately owned land as listed in Table 2.1. Table 2.2 shows the classification of mangroves based on Permanent Forest Reserves (PFRs) in Sabah.

Table 2.1: Total area of mangrove in Sabah.

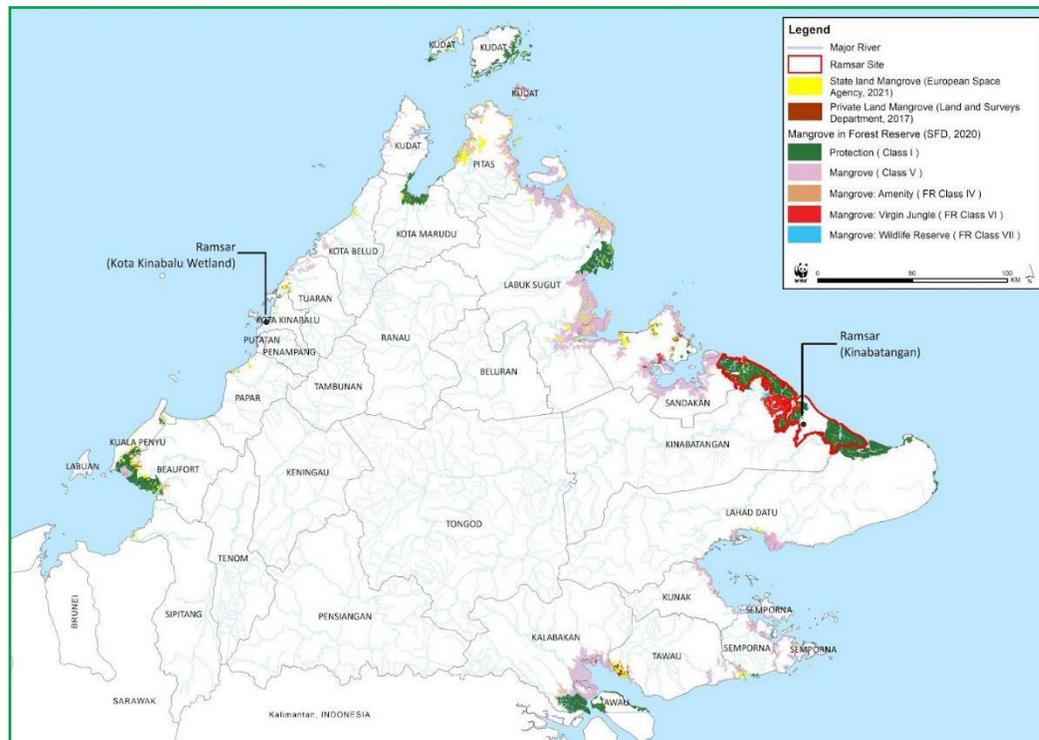
Forest Classification	Area (ha)
Class I (Protection)	100,990.10
Class V (Mangrove)	208,600.65
Class IV (Amenity Forests)	1,344.51
Class VI (Virgin Jungle Reserve)	9,289.74
Class VII (Wildlife Reserve)	2,416.05
State Land and Private Land Mangrove	67,536.00
Total	390,526.00

(Tangah et al., 2022)

Table 2.2: Classifications of mangroves forest

Status	Forest Classification	Description
Permanent Forest Reserves (PFRs)	Protection Forest Reserves - Class I	Forests conserved for the protection of watersheds and maintenance of stability of soil, water conservation, and other environmental factors. Logging is not permitted in these areas.
	Domestic Forest Reserves – Class III	The produce from these forests, including small amounts of timber, is for the consumption of local communities only and commercial use is discouraged.
	Amenity Forest – Class IV	Forests for providing amenity and recreation to the local inhabitants. Recreational facilities may be provided in attractive sites, notably often along roadsides, within these reserves. Exotic tree species are sometimes planted to enhance the amenity value of these areas.
	Mangrove Forest Reserves (MFRs) – Class V	Forests for supplying of mangrove timber and other forest produce to meet general trade demands and multi-uses.
	Virgin Jungle Reserves (VJR) – Class VI	Forests conserved strictly for forestry research purposes including biodiversity and genetic conservation. Logging is strictly prohibited.
State Land mangroves	Wildlife Reserves – Class VII	Forests conserved primarily for the protection and conservation of wildlife. Logging is prohibited.
	Native land/ commercial land	Largely, not protected for conservation and land is available for development. Non-gazetted land is also conserved for shoreline protection.
Gazetted conservation areas	National Parks/ Sanctuaries	Totally protected mangrove areas, gazetted as State Park, Bird Sanctuary, Nature Reserve or City/Town Park under various State laws.

Map 2.1: Mangrove distribution in Sabah.



The SMAP will take into consideration mangroves within and outside of protected areas; and will engage government, non-government, academia, public, private sectors and local communities. In addition, it will also look into the threats and challenges in the protection and management of mangrove within and outside of protected areas. This will also be captured in the mangroves vulnerability maps that will be developed in the course of this study.

Mangroves in Sabah can be classified into various forest types, dominated by one or two tree species. They are found in the seaward zone (*Rhizophora* forests), back mangrove zone (*Bruguiera* forests) and riparian fringes (*Nypa* or Nipah forests). The *Avicennia-Sonneratia* forests comprise mainly of *Avicennia alba* and *Sonneratia alba*. Characterized by their extensive rooting systems of pneumatophores, these tree species represent the early colonisers of the accreting seaward zone of mangroves.

The locally known *Bangkita* or *Bakau Minyak* (*Rhizophora apiculata*) is one of the most common mangrove trees found in Sabah. Occurring in the main mangrove zone, this species is characterized by its prominent prop or stilt roots, floral buds in pairs and fine black spots at the under-surface of leaves. Occurring at the landward zone, the *Bruguiera* forest represent the back mangroves with *Bruguiera parviflora* being the dominant species. In the open areas, thickets of *Acrostichum aureum* ferns are common undergrowth. The Nipah (*Nypa*) forests occur along the upstream banks of rivers system where there is greater freshwater influence. *Nypa fruticans*, the mangrove palm, grows gregariously, interspersed with the mud lobster mounds.

The dominant species based on zones are:

1. Seaward zone: Avicennia-Sonneratia forest, Rhizophora forest
2. Back mangrove zone: Bruguiera forest
3. Riparian fringes: Nypa forest – further inland, mangrove forest gradually change into Nypa forest which is less tolerant to salt and usually occurs along the transition zone between saltwater and freshwater.

2.2 BIODIVERSITY IN MANGROVES: FAUNA AND FLORA

Mangroves support rich biodiversity. The fauna includes invertebrates (crustaceans, chelicerates and insects) and vertebrates (fish, amphibians, reptiles, mammals and bird). The intertidal zone flourishes with seagrass, bivalves like oysters, edible snails, as well as fiddler crabs and air-breathing fishes such as mudskippers. Shy and nocturnal mud lobsters make their home in mangroves by building mud mounds which also serve as microhabitats for other life forms such as the moss-like liverwort and intertidal ants. In addition, migrating birds like the Pacific Golden Plover (*Pluvialis fulva*) and vulnerable Chinese Egret (*Egretta eulophotes*) use Sabah's mangroves to rest and recover during their journey. Found in mangrove habitats are larger Orangutans, crocodiles, Proboscis Monkeys, birds, water snakes, and a variety of other marine organisms. Flora consists of ferns, herbs, palms, woody climbers, trees and shrubs.

In Sabah, there are sixteen (16) fauna species associated with mangroves and one (1) mangrove flora species i.e., ranging from critically endangered to vulnerable on the IUCN Red List of Endangered Species based on the current species population, population trend and threats faced by the species (IUCN, various years) as shown in Table 2.3. These species live and rely on mangroves in an inter-linked ecosystem and are closely associated with each other. Degradation of mangroves and loss of one species can have devastating effects on another (Carson, 2013).

Table 2.3: Endangered Species Associated with Mangroves, Sabah

NO	Species	Local Name	IUCN	Sabah Wildlife Conservation Enactment 1997 -Schedule
1	Bornean Orangutan, <i>Pongo pymaeus</i>	Kogiu (Kadazan-Dusun) Kahui (Murut)	Critically Endangered	1
2	Hawksbill Turtle, <i>Eretmochelys imbricata</i>	Penyu karah Penyu sisik	Critically Endangered	1
3	Proboscis Monkey, <i>Nasalis larvatus</i>	Bangkatan Monyet Belanda	Endangered	1
4	Long-tailed Macaque, <i>Macaca fascicularis</i>	Kera Kra	Endangered	2
5	Southern Pig-tailed Macaque, <i>Macaca nemestrina</i>	Gobuk (Kadazan-Dusun) Keluang	Endangered	Not Listed

NO	Species	Local Name	IUCN	Sabah Wildlife Conservation Enactment 1997 -Schedule
6	Large Flying-fox, <i>Pteropus vampyrus</i>	Burung Botak Leher Hitam Burung Botak Hutan	Endangered	3
7	Storm's Stork, <i>Ciconia stormi</i>		Endangered	2
8	Rough-nose Stingray or Roughnose Cowtail Ray <i>Pastinachus solocirostris</i>		Endangered	Not Listed
9	Sunda Clouded Leopard, <i>Neofelis diardi</i>	Tananansad (Dusun) Duarong (Orang Sungai) Harimau Dahan (Bahasa Malaysia)	Vulnerable	1
10	Marbled Cat, <i>Pardofelis marmorata</i>		Vulnerable	2
11	Smooth-coated Otter, <i>Lutrogale perspicillata</i>		Vulnerable	2
12	Asian Small-clawed Otter, <i>Aonyx cinereus</i>		Vulnerable	2
13	Bearded Pig, <i>Sus barbatus</i>	Babi Hutan Babi Janggut	Vulnerable	3
14	Sambar Deer, <i>Rusa unicolor</i>	Rusa Payau	Vulnerable	3
15	King Cobra, <i>Ophiophagus hannah</i>	Ular Upeh	Vulnerable	Not Listed
16	Dugong, <i>Dugong dugon</i>	Dugong Babi Duyung	Vulnerable	Not Listed

Sources: (IUCN, various years) and Sabah Wildlife Conservation Enactment, 1997
status: Totally protected (Schedule 1), Protected - Limited hunting and collection under
licence (Schedule 2) and Protected - Hunting licence is required (Schedule 3)

Table 2.4: Avifauna in Mangroves, Malaysia

NO	Species (Common name)	IUCN Status	Description
1	<i>Pelargopsis amauroptera</i> (Brown-winged Kingfisher) *	NT	Depends exclusively on mangroves
2	<i>Halcyon coromanda</i> (Ruddy Kingfisher)	LC	
3	<i>Chrysocolaptes lucidus</i> (Greater Flameback)	LC	
4	<i>Pitta megarhyncha</i> (Mangrove Pitta) *	NT	
5	<i>Oriolus xanthornus</i> (Black-hooded Oriole)	LC	
6	<i>Parus major</i> (Great Tit) *	LC	
7	<i>Phylloscopus fuscatus</i> (Dusky Warbler)	LC	
8	<i>Cyornis rufigastra</i> (Mangrove blue flycatcher) *	LC	
9	<i>Leptocoma calcostetha</i> (Copper-throated Sunbird)	LC	Depends exclusively on mangroves for nesting
	<i>Pachycephala grissola</i> (Mangrove Whistler)	NT	
10	<i>Ardea sumatrana</i> (Great-billed Heron)	LC	Migrants which depend on mangroves for roosting
11	<i>Ardea alba</i> (Great Egret)	LC	
12	<i>Mycteria cinerea</i> (Milky Stork)	EN	
13	<i>Egretta garzetta</i> (Little Egret)	LC	
14	<i>Egretta eulophotes</i> (Chinese Egret)	VU	
15	<i>Ardea intermedia</i> (Intermediate Egret)	LC	
16	<i>Charadrius mongolus</i> (Lesser Sandplover)	LC	
17	<i>Numenius phaeopus</i> (Whimbrel)	LC	
18	<i>Limosa limosa</i> (Black-tailed Godwit)	NT	
19	<i>Tringa tetanus</i> (Common Redshank)	LC	
20	<i>Tringa terek</i> (Terek Sandpiper)	LC	

Source: Hamdan et al., 2020

Flora in Mangroves

Mangrove forest reserve inventories were conducted by SFD. In early 2000s, SFD conducted four (4) vegetation surveys for Kuala Bongaya and Kuala Labuk; Trusan Kinabatangan and Kuala Segama/ Maruap; Kudat and Marudu Bay; and Sibyte Mangrove Forest Reserves. The surveys found that only a fraction of the reserved areas are mangrove forests as significant areas had been lost due to encroachment e.g. Kota Marudu lost 2,288 ha to various anthropogenic activities; and Trusan Kinabatangan lost 1,248 ha mainly to oil palm fields (Faisal Mohd Noor, 2010). Table 2.5 shows the distribution of different vegetation types and land-uses within forest reserves in selected forestry district in Sabah based on state-wide mangrove inventory in 2008.

Table 2.5: Distribution of different vegetation types and land-uses within forest reserves (SFD, 2010)

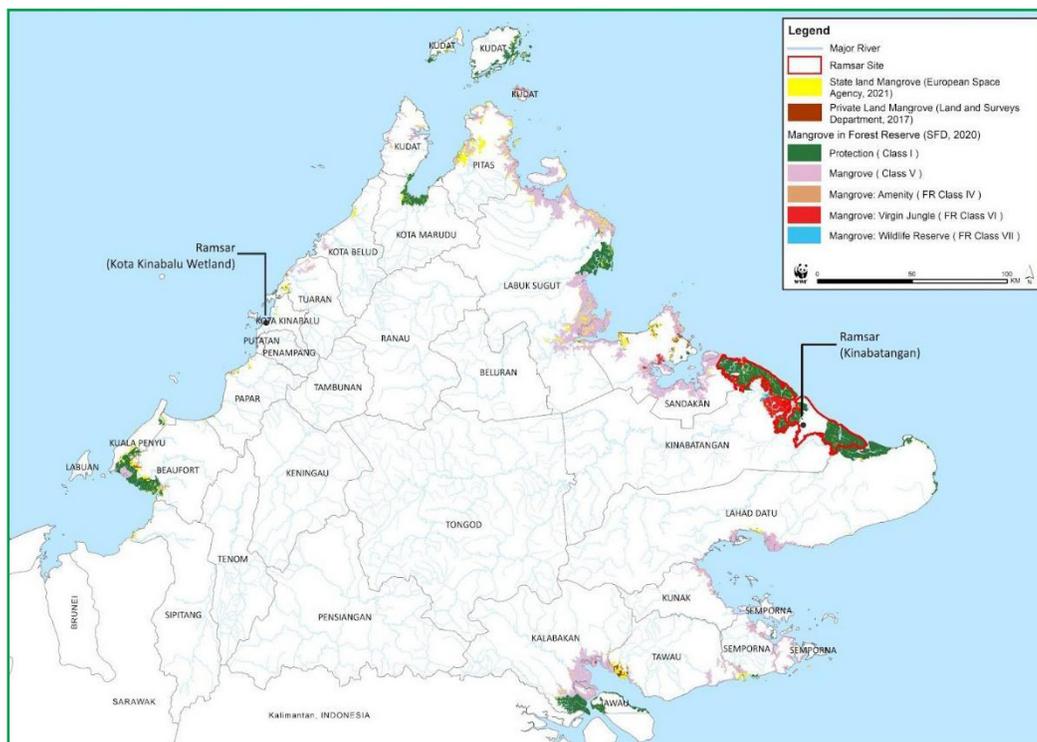
Mangrove FR	Mangrove Forests									
	Bakau Bangkita	Beus	Buta-buta	Mixed M	Other Mixed spp	Nipah	Nipah Mixed	Perepat & Api-api	Tengar	Non- com spp
Sibyte	420		83		1846					
Kuala Bonggaya & Kuala Labuk	3420	240	274	14777		8642	19567	1946	869	1123
Kota Marudu	5486				2431	1034	288			543
Trusan Kinabatangan	9401	708	833		1884	23857	14108	1091	1123	1061
Other Forest Types										
	Grassland	Logged-over	Transitional Forest	Beach Forest	Scrub	Swamp	Fresh Water Swamp Forest/ Small Crown	Fresh Water Swamp Forest/ Mixed Crown	Lowland Forest	
Sibyte	314	329								
Kuala Bonggaya & Kuala Labuk		103	560	69	42	52				
Kota Marudu			3556	501	440	2807	9004	3164	3255	
Trusan Kinabatangan										
Non-Forest										
	Waterbodies	Paddy	Oil Palm	Rubber	Fish Pond	Encroachment	Develop	Villages	Cultivated	Sand
Sibyte	1628						122			
Kuala Bonggaya & Kuala Labuk										
Kota Marudu		40	622	115	53	131	16	138	1025	148
Trusan Kinabatangan			1210		38					

2.3 BASELINE MAPS FOR MANGROVE VULNERABILITY CRITERIA

These baseline maps are compilation of major sensitive areas which include habitat and biodiversity; and also, current threats that can impact mangrove areas such as infrastructure development, land-use, human activities and also effects of climate change. Six (6) baseline maps have been produced as listed:

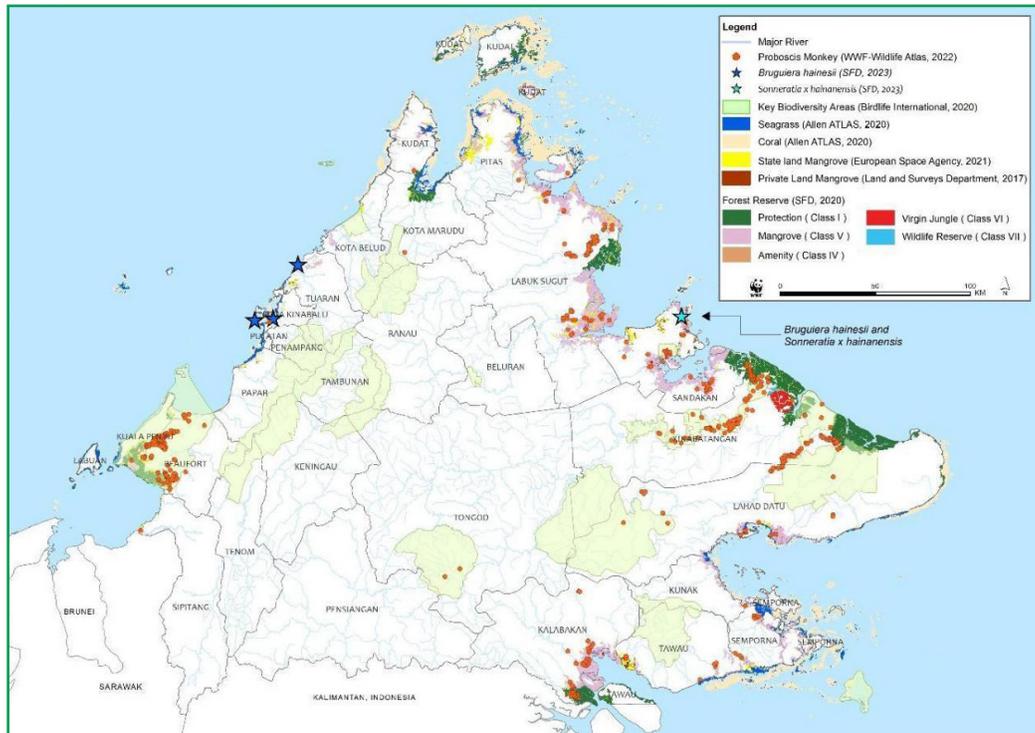
1. Mangrove Areas Map
2. Biodiversity Map
3. Land-Use Map
4. Human Activities Map
5. Infrastructure Map
6. Climate Change Map

Map 2.2: Mangrove Areas in Sabah Map.



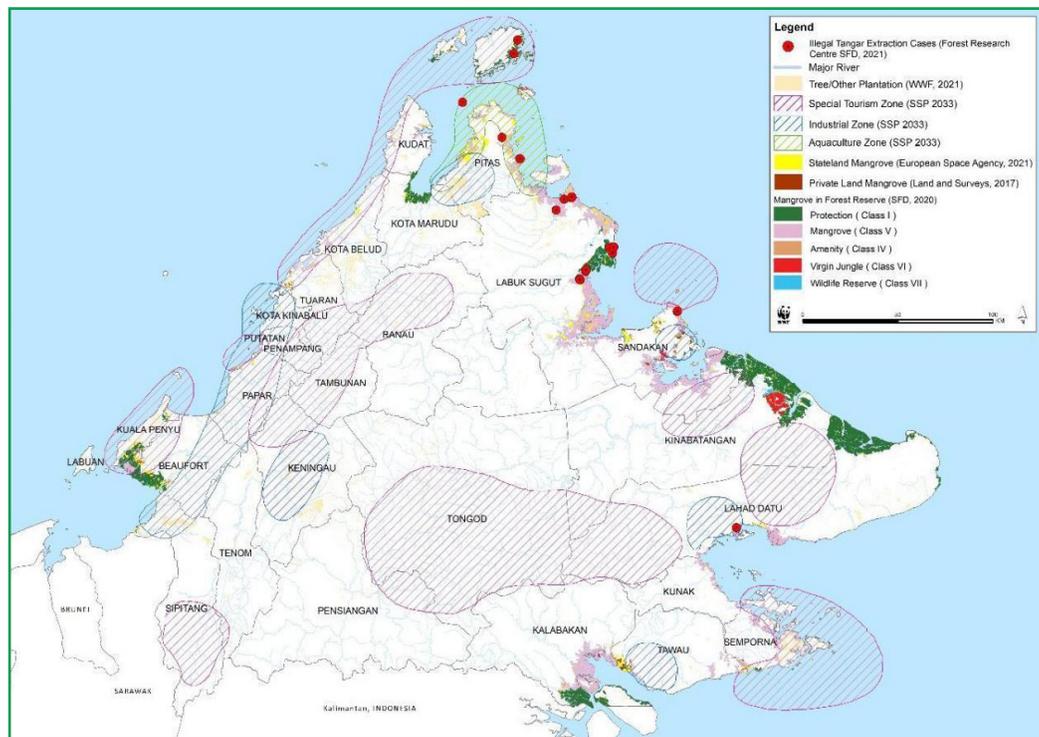
The Mangrove areas in Map 2.2 shows the entire existing mangroves in Sabah, including mangroves forest reserves managed by Sabah Forestry Department; and mangroves outside of forest reserves, which are state land and private land. The total area of mangroves in Sabah including state land/others, private land, and forest reserves is 378,195 hectares. Private land with mangrove areas were identified through basic data analysis and interpolation in ArcMap version 10.8.2 (ESRI Inc.), which involved cross-referencing the information of registered and privately owned land obtained from the Land and Surveys Department in 2017 with the Mangrove data by the European Space Agency in 2021.

Map 2.3: Biodiversity Map



The biodiversity map (Map 2.3) includes the distribution of proboscis monkey, important bird area, seagrass, and coral, *Bruguiera hainesii* and *Sonneratia x hainanensis*. There were 480 points of Proboscis monkeys found in pre-1970 until 2022 as reported in WWF-Wildlife Atlas of Sabah 2022. Most of the Proboscis Monkeys were found in river lines and mangroves, which are their preferred habitats. A total of 16 areas have been confirmed as Key Biodiversity Area or as important bird area by Birdlife International in 2022.

Map 2.4 Land-use Map.



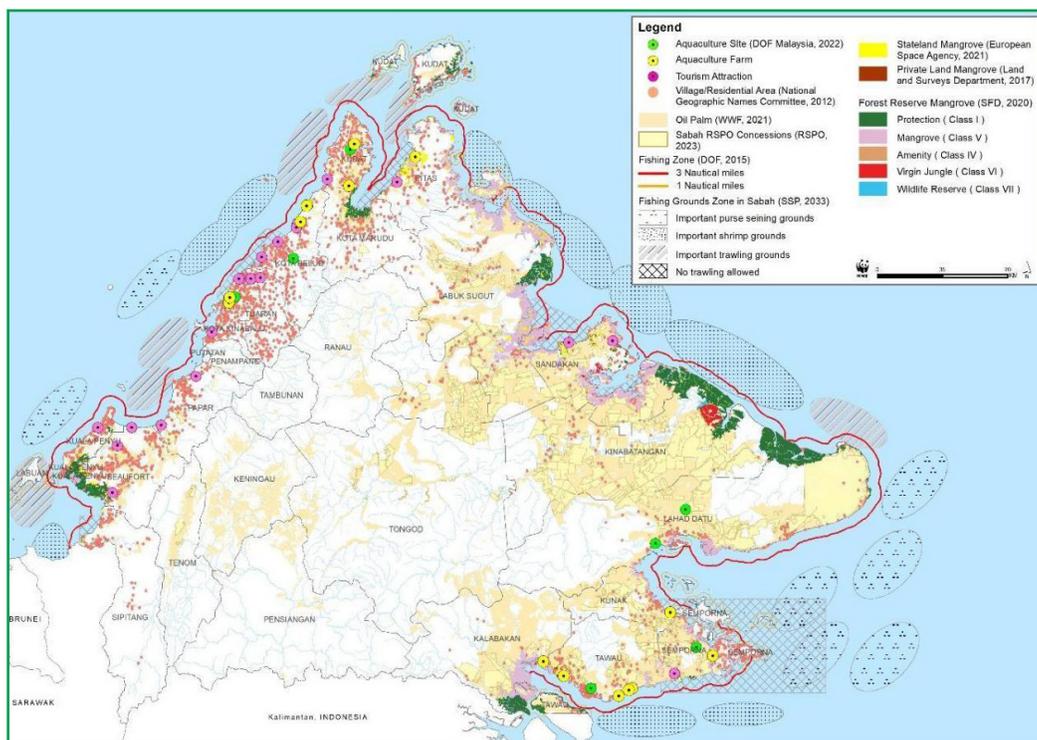
The Land use map (Map 2.4) criteria shows tree plantation, location of illegal Tengar extraction cases, special economic zone (Tourism zone), special manufacturing zone (Industrial zone), and aquaculture zone. Special Tourism Zone intends to do the seven (7) specialties as in Sabah Structure Plan 2033; namely, west coast tourism zone, highlands of Ranau-Tambunan tourism zone, Semporna marine tourism zone, wildlife tourism zone at Kinabatangan, Tabin conservation tourism zone in the heart of Sabah, coastal areas of Kuala Penyu tourism zone, and coastal areas of south of Kota Kinabalu to Papar tourism zone (Town and Regional Planning Department Sabah, 2016). Special Manufacturing Zones include general industrial zone between Kimanis and Beaufort, heavy industrial zone in Sipitang, livestock industrial zone in Keningau, and marine industrial zone in Tawau. As for the Special Agricultural Zone which is the aquaculture zone (Map 2.4) has the potential to be expanded and developed based on the Sabah Strategic Plan (SSP) 2033 report.

The Special Economic Zone include special tourism zone, special manufacturing zone, and special agricultural zone (Map 2.4). Special Tourism Zone intends to do seven (7) specialties as in Sabah Structure Plan 2033, namely west coast tourism zone, highlands of Ranau-Tambunan tourism zone, Semporna marine tourism zone, wildlife tourism zone at Kinabatangan and Tabin conservation tourism zone in the heart of Sabah, coastal areas of Kuala Penyu tourism zone, and coastal areas of south of Kota Kinabalu to Papar tourism zone (Town and Regional Planning Department Sabah, 2016).

Special Manufacturing Zones include general industrial zone between Kimanis and Beaufort, heavy industrial zone in Sipitang, livestock industrial zone in Keningau, and marine industrial zone in Tawau. In Special Agricultural Zone which is the aquaculture zone (Map 2.4) has the potential to be expanded and developed as in Sabah Strategic Plan (SSP) 2033 report.

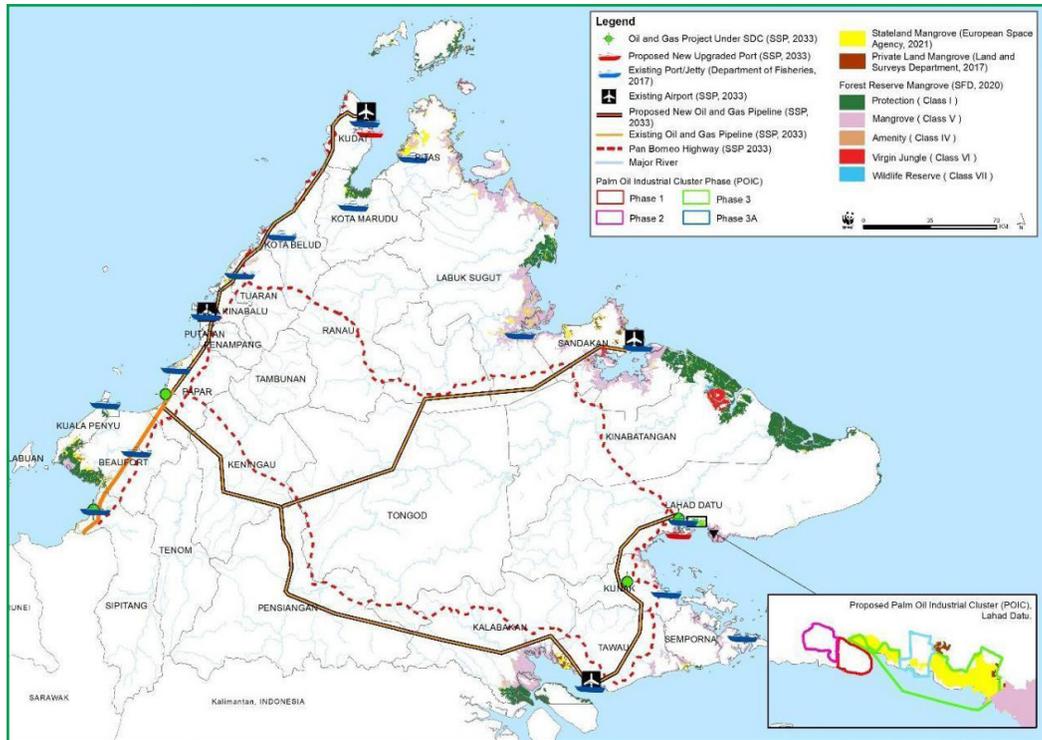


Map 2.5: Human Activities Map.



In human activities map (Map 2.5), the human activities criteria identified in Sabah include aquaculture site by lead agency, aquaculture farm, mangrove tourism attractions, fishing zones for commercial use, villages or residential areas, fishing grounds zone, oil palm, and Sabah RSPO concessions. The primary aquaculture sites located in Semporna, Lahad Datu, Kudat, Kota Belud, Pitas, Tanjung Batu Tuaran, and Kg Silam will be revised based on Sabah Government approval. This revision aims to determine potential development areas for new projects or the expansion of existing projects as part of the Aquaculture Strategic Plan 2021-2030.

Map 2.6: Infrastructure Map.

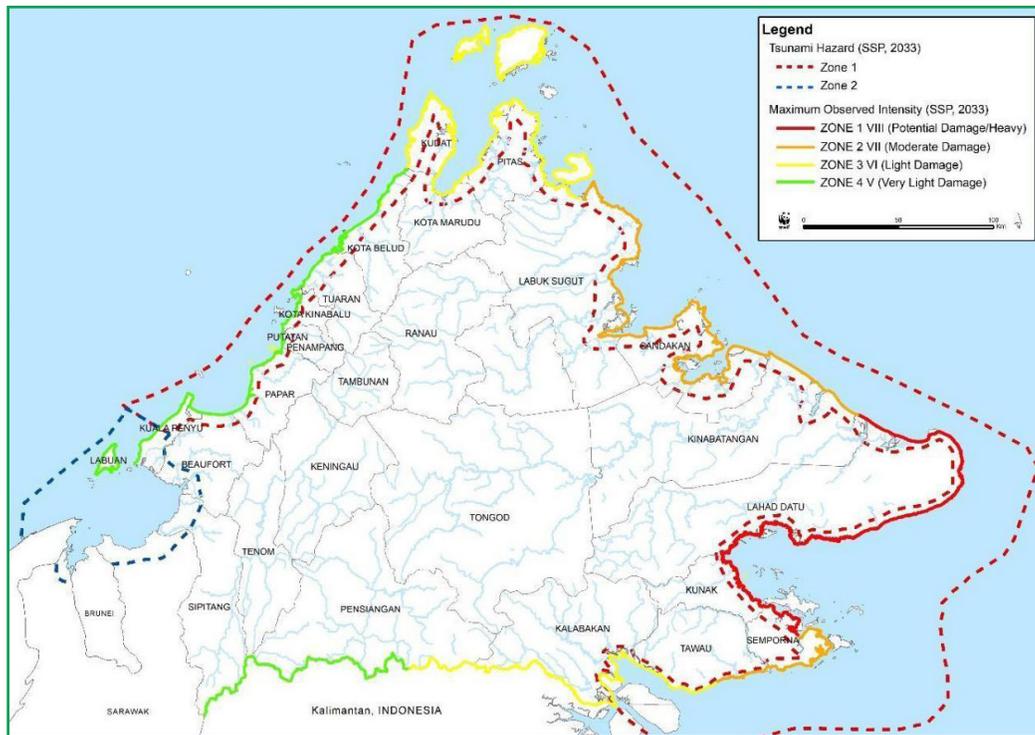


The criteria outlined in Map 2.6 encompass various aspects, including the positioning of oil and gas projects location under the Sabah Development Corridor, proposed new oil and gas pipeline, existing oil and gas pipeline, identification of jetty locations using Google Earth has not been verified on-site, proposed new upgraded port, site locations of Sabah fisheries landing marine fish, existing airport (Airport Fire Rescue Service - AFRC), International Airport, and Domestic Airport, and palm oil industrial cluster by phase in Lahad Datu Sabah. Next criteria are Pan Borneo Highway being implemented in phases according to the Sabah Structure Plan (2033); and as of 2023, construction progress is ongoing specifically on the road segment from Sipitang to Tuaran. Another criterion involves the phased development of the palm oil industrial cluster in Lahad Datu, Sabah.



Climate Change Map

Map 2.7: Tsunami and Earthquake



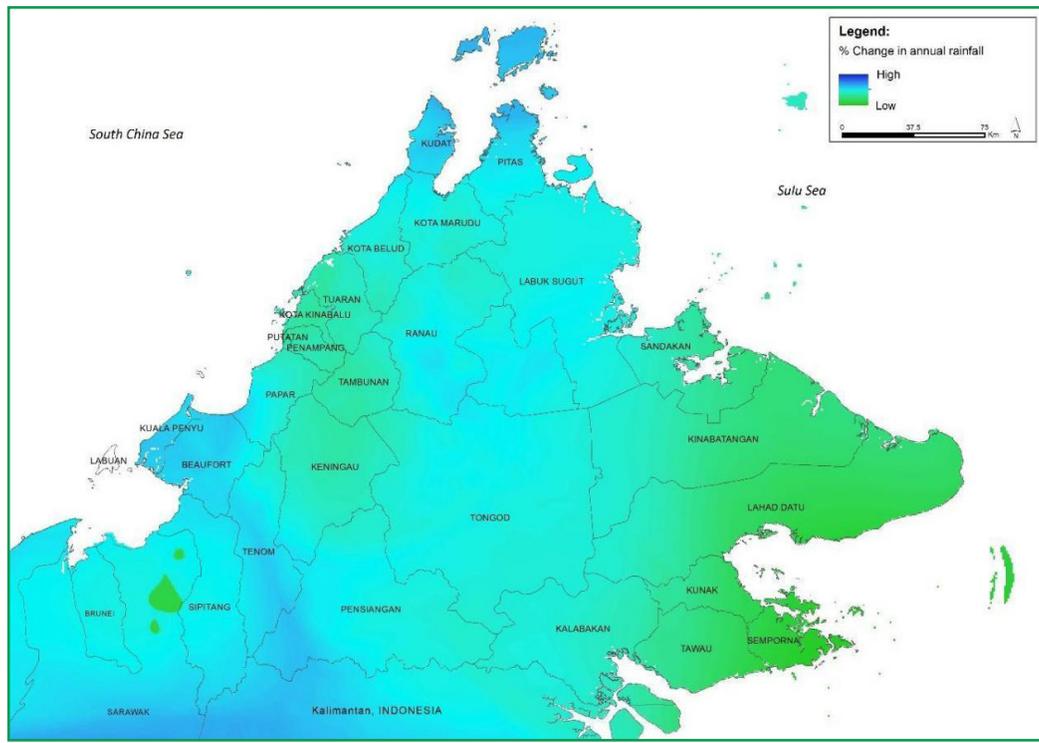
Map 2.7 shows that practically the whole coastal areas in Sabah will be affected by tsunami (Tsunami Hazard Zone 1) and expected to experience earthquakes especially in coastline areas in Sandakan to Kunak. Table 2.6 shows the intensity of Ground Shaking (Earthquake) by zones.

Table 2.6 Intensity of Ground Shaking (Earthquake)

Zones	Maximum Observed Intensity (Intensities of ground shaking)
Zone 1	Severe (Potential Damage, heavy)
Zone 2	Very strong (Moderate damage)
Zone 3	Strong (Light Damage)
Zone 4	Moderate (Very light)

Predicted Changes in Rainfall

Map 2.8: Annual Rainfall



Referring to Map 2.8, basic calculations were performed in QGIS by combining raster layers for various SSPs (Shared Socioeconomic Pathways) and GCMs (Global Climate Models) to assess and predict changes in rainfall patterns for the period 2071-2100, in which data are sourced from the CHELSA website.

CHAPTER 3: STRATEGIES AND ACTIONS

‘Let’s take action and work together. Our ambitious goals can only be achieved with the support of all stakeholders, including government authorities, academic institutions, nature conservation bodies, schools, communities and the private sector. ... We have to do much more to address the ongoing environmental crises that have worsened over the years and decades ... we will develop dynamic concerted actions to generate holistic cooperation for large-scale positive change – ... action is needed and we need to work together’. – Dr Shamila Nair-Bedouelle, UNESCO Natural Sciences, 2020

The SMAP represents a phase-shift in conservation opportunities for mangroves. With a shared Sabah centric vision, it is a catalyst for accelerating change and building opportunities for coastal peoples and biodiversity around the world.

The seven key strategies and targets defined and agreed by stakeholders to be achieved between 2024–2033 are focused on 1. Protection; 2. Governance; 3. Effectiveness; 4. Climate; 5. Restoration; 6. Community; and 7. Awareness (Figure 3.1).

Figure 3.1: Strategies and Targets for Sabah Mangrove Action Plan 2024–2033



Focus Group Discussions (FGDs) were held with stakeholders to gather ideas and feedback for developing the Action Plan for mangroves that can be implemented in Sabah. All findings from the FGDs will be included in the Sabah Mangrove Action Plan. The four (4) groups identified are:

- Government Agencies and District Offices in Sabah
- Private Sector and Government Linked Companies (GLCs)
- Academia/NGOs/Researchers
- Communities

Based on these FGDs, we have established 7 main strategies and 43 actions under these strategies to achieve the objectives of this SMAP.

 **Strategy 1: By 2033, all protected mangrove areas will be maintained, and identified vulnerable mangroves will be protected under various existing legislations.**

Mangrove areas within the Forest Reserve are protected. However, there are vulnerable mangrove areas identified outside of forest reserves that need to be protected and restored.

 **Strategy 2: By 2033, Sabah State mangrove governance is strengthened.**

Mangrove management falls under various state agencies' jurisdictions, as mangroves straddle between terrestrial and marine legislation. In addition, the priorities of mangroves as a forest, fisheries and community resource need to be agreed on and aligned between agencies and communities and between the different levels of state and national governance for forest, wildlife, tourism and fisheries management. This strategy aims to integrate and improve all the different legislations, policies, and guidelines to strengthen mangrove governance.

 **Strategy 3: By 2033, all mangrove areas in Sabah are effectively and collaboratively managed.**

An integrated database is needed for better informed development planning. This will feed into an integrated management plan which is inclusive of all stakeholders.

 **Strategy 4: By 2033, vulnerable mangrove areas are protected and climate-resilient.**

The mangrove ecosystem functions, such as mitigating climate change, natural barriers, nursery for fish, carbon sink, stabilization of coastal areas, etc., need to be improved through a state adaptation and mitigation plan. This will also help communities' dependent on mangroves to become climate resilient.

 **Strategy 5: By 2033, all degraded mangroves within vulnerable areas are rehabilitated and restored.**

Increasing the hectares of mangrove areas is important to compensate for lost areas. Degraded mangrove areas, specifically vulnerable ones, need to be restored. This will require research on the best restoration method for badly degraded areas.

 **Strategy 6: By 2033, support the environmentally sustainable livelihood of communities' dependent on mangroves ecosystem.**

Diversifying local community livelihood sources is important to avoid over-dependence on extractive activities. Sustainable mangrove ecotourism is a viable alternative livelihood for communities living near or adjacent to mangroves.

 **Strategy 7: By 2033, the importance of mangroves is shared and applied by all levels of society.**

Mangrove education and awareness is still lacking in Sabah. Vigorous efforts are needed to mainstream mangrove protection within all levels of society. Mangrove education programmes and modules need to be developed and adopted by learning institutes.



3.1 – Strategy 1: By 2033, All Protected Mangrove Areas Will Be Maintained, And Identified Vulnerable Mangroves Will Be Protected Under Various Existing Legislations

Strategy 1: Protection

By 2033, all protected mangrove areas will be maintained, and identified vulnerable mangroves will be protected under various existing legislation.

Overall Objective

Ensure that mangrove areas within the Forest Reserve are protected and vulnerable mangrove areas outside of forest reserves that need to be protected and restored are identified.

ACTION PLAN

Action 1.1	Identify vulnerable mangrove area using mangrove vulnerability criteria
Action 1.2	Encourage other type of legislation for mangrove protection
Action 1.3	Compile and populate mangrove datasets supported by Global Navigation Satellite System (GNSS) technology.
Action 1.4	Enable public access to mangrove data
Action 1.5	Demarcate all mangrove forest reserve boundaries (inland boundary)

Action 1.1: Establish mangrove vulnerability criteria

1.1 Identify vulnerable mangrove area using mangrove vulnerability criteria

Key Objective:

- To establish mangrove vulnerability criteria that include aspect of sensitivity, biodiversity, development trends, population growth and climate change.
- To identify vulnerable mangrove areas in Sabah

Description:

- The mangrove vulnerability criteria developed must be accepted by the state and all relevant stakeholders.
- This criterion will guide the SMAP to identify vulnerable mangrove area so that further action can be taken to protect or restore the area.

Stakeholders

Lead Entity:

- Sabah Forestry Department (SFD)

Relevant Stakeholder:

- Sabah Lands and Surveys Department (L&SD)
- Sabah Wildlife Department (SWD)
- Sabah Parks (SP)
- Department of Fisheries Sabah (DoF)
- Drainage and Irrigation Department (DID)
- District Offices (DOs)
- Local Communities (LCs)
- CSOs & NGOs

Implementation Timeline

2 years

Strategy Type

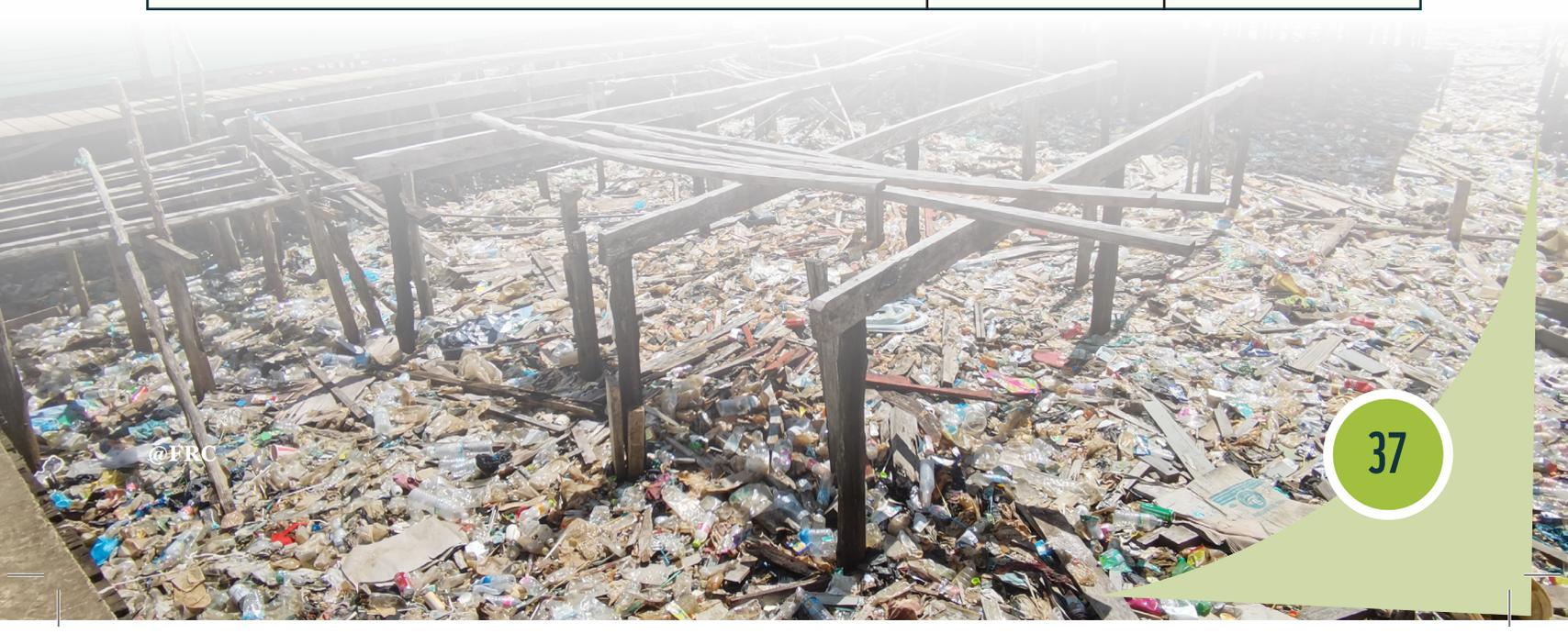
Short Term

Action 1.2: Encourage other type of legislation for mangrove protection

1.2 Encourage other type of legislation for mangrove protection				
<p>Key Objective:</p> <ul style="list-style-type: none"> To leverage on other legislation under different department with power to gazette and protect mangrove area that are not forest reserve. <p>Description:</p> <ul style="list-style-type: none"> Majority (> 90%) of the mangrove areas in Sabah is within the jurisdiction of Sabah Forestry Department under the Forest Enactment 1968. Looking at current legislative powers under the various department, there are opportunity to put the identified vulnerable mangrove area under different jurisdiction and not just relying on forest reserve protection. 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> Ministry of Tourism, Culture and Environment Sabah (KePKAS) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Lands and Surveys Department (L&SD) Sabah Wildlife Department (SWD) Sabah Parks (SP) Department of Fisheries Sabah (DoF) Drainage and Irrigation Department (DID) District Offices (DOs) 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>5 years</td> <td>Medium Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	5 years
Implementation Timeline	Strategy Type			
5 years	Medium Term			

Action 1.3: Compile and populate mangrove datasets supported by Global Navigation Satellite System (GNSS) technology

1.3 Compile and populate mangrove datasets supported by Global Navigation Satellite System (GNSS) technology				
<p>Key Objective:</p> <ul style="list-style-type: none"> To collect and archive mangrove data especially the forest reserve boundary data with GNSS technology. <p>Description:</p> <ul style="list-style-type: none"> Record all the location boundaries, rare species, and endangered species using Global Navigation Satellite System (GNSS). Establish a database for mangrove forest reserves. 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Biodiversity Centre (SaBC) Sabah Land and Survey Department (JTU) District Forestry Offices (DFOs) University Malaysia Sabah (UMS) NGOs 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>5 years</td> <td>Medium Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	5 years
Implementation Timeline	Strategy Type			
5 years	Medium Term			





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Action 1.4: Enable public access to mangrove data

1.4 Enable public access to mangrove data				
<p>Key Objective:</p> <ul style="list-style-type: none"> To allow for easier access of data on mangrove. Enhance public awareness on mangrove. <p>Description:</p> <ul style="list-style-type: none"> To share responsibly location database collected from GNSS with the public. Data needs to have control and limits and to have a certain level of privacy. The 5-year timeline would be to develop the platform needed for the access but data sharing agreements should be continuous. 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Biodiversity Centre (SaBC) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Sabah Wildlife Department (SWD) Department of Fisheries Sabah (DoF) Sabah Lands and Surveys Department (L&SD) Academic Institute NGOs 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>5 years</td> <td>Medium Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	5 years
Implementation Timeline	Strategy Type			
5 years	Medium Term			

Action 1.5: Demarcate all mangrove forest reserve boundaries

1.5 Demarcate all mangrove forest reserve boundaries				
<p>Key Objective:</p> <ul style="list-style-type: none"> To ensure all gazetted mangrove forest reserve have a properly demarcated boundary. To reduce problems of overlapping boundaries and also establish clear lines on where communities or other party can and cannot enter. <p>Description:</p> <ul style="list-style-type: none"> Physical demarcation activities for all mangrove forest reserve in Sabah. These will need to be properly maintained to account for the dynamic changes in mangrove areas. To prioritize demarcation on high-risk conflict areas i.e., state land, kampung, plantation, etc. Mangroves are sensitive areas and proper signboards need to be erected to indicate the area as a protected area. To harmonize the forest reserve boundaries and the local community settlement. 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Lands and Surveys Department (L&SD) Jawatankuasa Hutan Simpan Negeri Sabah District Forest Offices (DFOs) District Offices (DOs) 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>2 years</td> <td>Short Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	2 years
Implementation Timeline	Strategy Type			
2 years	Short Term			



3.2 – Strategy 2: Governance: By 2033, State Mangrove Governance Is Strengthened

<p>Strategy 2: Governance By 2033, state mangrove governance is strengthened.</p>	
<p>Overall Objective Mangrove management falls under various state agencies’ jurisdiction, which can create confusion. This strategy aims to integrate and improve all the existing legislation, policies, and guidelines to strengthen mangrove governance.</p>	
<p>ACTION PLAN</p>	
<p>Action 2.1</p>	<p>Harmonizing all existing state agencies’ legislation or policies to allow for an integrated management of mangrove areas.</p>
<p>Action 2.2</p>	<p>Improve land use planning process on development activities within mangrove areas.</p>
<p>Action 2.3</p>	<p>Review the existing mangrove buffer provision in the State legislation.</p>
<p>Action 2.4</p>	<p>Prevent human settlement in mangrove areas.</p>
<p>Action 2.5</p>	<p>Enhance the enforcement and monitoring of river and coastal pollutions.</p>
<p>Action 2.6</p>	<p>Improve standard for industry effluent discharge.</p>
<p>Action 2.7</p>	<p>Establish a mechanism under the Forest Enactment 1968 for mangrove ecotourism.</p>
<p>Action 2.8</p>	<p>Enhance decision-making at the district level to ensure sustainable mangrove management.</p>
<p>Action 2.9</p>	<p>Manage waste pollution in mangrove areas.</p>
<p>Action 2.10</p>	<p>Joint task force on encroachment and illegal extraction of Tengar.</p>

Action 2.1: Harmonizing all existing State agencies' legislation or policies to allow for integrated management of mangrove areas

2.1 Demarcate all mangrove forest reserve boundaries					
<p>Key Objective:</p> <ul style="list-style-type: none"> To ensure that all existing State agencies' legislation or policies on mangrove are consistent and include the recommendations from SMAP. <p>Description:</p> <ul style="list-style-type: none"> Review and harmonize legislation and policy under DOFS, DID, JTU, TRPD, EPD and DOE Sabah. State Attorney General (AG) would be the legal adviser for these reviews. 	Stakeholders				
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Natural Resources Office (NRO) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Sabah Lands and Surveys Department (L&SD) Department of Fisheries Sabah (DOF) Drainage and Irrigation Department (DID) Town and Regional Planning Department (TRPD) Environment Protection Department (EPD) Department of Environment Sabah (DOE Sabah) 				
	<table border="1"> <tr> <td align="center">Implementation Timeline</td> <td align="center">Strategy Type</td> </tr> <tr> <td align="center">5 years</td> <td align="center">Medium Term</td> </tr> </table>	Implementation Timeline	Strategy Type	5 years	Medium Term
	Implementation Timeline	Strategy Type			
5 years	Medium Term				

Action 2.2: Improve land use planning process on development activities within mangrove areas

2.2 Improve land use planning process on development activities within mangrove areas					
<p>Key Objective:</p> <ul style="list-style-type: none"> To ensure that sensitive and vulnerable mangrove areas are properly assessed during the planning process on any development activities. <p>Description:</p> <ul style="list-style-type: none"> This action plans to increase the awareness of decision makers on mangroves so that proper steps can be taken during planning stages. Mangroves area should be properly categorised in the District Plan. Land Utilisation Committee (LUC) is a platform that should be engaged as they are the decision maker on approvals of landuse. There should be added human resource to the District Offices to cater for environmental protection needs. 	Stakeholders				
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Pihak Berkuasa Perancang Tempatan District Offices (DOs) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Sabah Lands and Surveys Department (L&SD) Department of Fisheries Sabah (DoF) Drainage and Irrigation Department (DID) Environment Protection Department (EPD) Department of Environment Sabah (DoE Sabah) 				
	<table border="1"> <tr> <td align="center">Implementation Timeline</td> <td align="center">Strategy Type</td> </tr> <tr> <td align="center">10 years</td> <td align="center">Long Term</td> </tr> </table>	Implementation Timeline	Strategy Type	10 years	Long Term
	Implementation Timeline	Strategy Type			
10 years	Long Term				





Action 2.3: Review the existing mangrove buffer provision in state legislation

2.3 Review the existing mangrove buffer provision in state legislation		
<p>Key Objective:</p> <ul style="list-style-type: none"> To establish a uniform buffer for mangrove areas. Easier enforcement and increase protection of mangrove areas. <p>Description:</p> <ul style="list-style-type: none"> Review on buffer provision in state legislation. A study to assess the best buffer needed for good protection of mangrove areas. Model to identify mangrove buffer for land use intervention. 	Stakeholders	
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Lands and Surveys Department (L&SD) Department of Fisheries Sabah (DoF) Drainage and Irrigation Department (DID) Environment Protection Department (EPD) Department of Environment Sabah (DoE Sabah) Town and Regional Planning Department (TRPD) District Offices (DOs) 	
	Implementation Timeline	Strategy Type
	2 years	Short Term

Action 2.4: Prevent human settlement in mangrove areas

2.4 Prevent human settlement in mangrove areas		
<p>Key Objective:</p> <ul style="list-style-type: none"> To reduce the problem of settlement, build in mangrove areas. Provide a good alternative for community expansion that does not affect mangrove areas. <p>Description:</p> <ul style="list-style-type: none"> To highlight human settlement issues to the Ministry of Local Government and Housing. Review the Squatter Policy to ensure settlement in mangroves areas can be avoided. Support the implementation of the policy through the development of a new regulation. Empower the local community to tackle any issues/risks related to mangroves in their area. 	Stakeholders	
	<p>Lead Entity:</p> <ul style="list-style-type: none"> District Offices (DOs) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Lands and Surveys Department (L&SD) Kementerian Kerajaan Tempatan dan Perumahan (KKTP) Jawatankuasa Kemajuan Kampung 	
	Implementation Timeline	Strategy Type
	3 years	Short Term

Action 2.5: Enhance the enforcement and monitoring of river and coastal pollution

2.5 Enhance the enforcement and monitoring of river and coastal pollution

Key Objective:

- To improve the monitoring of water pollution in rivers and coastal areas.
- To improve enforcement on water pollution.

Description:

- Establish an integrated platform between DOE, DID, and EPD on the effluent discharge enforcement.
- Improve Infrastructure (Internet tower) for better connectivity for enforcement.
- Develop partnerships based on monitoring communities. Added responsibilities to competence residence.

Stakeholders

Lead Entity:

- Environment Protection Department (EPD)
- Department of Environment Sabah (DoE Sabah)

Relevant Stakeholder:

- Drainage and Irrigation Department (DID)
- Department of Fisheries Sabah (DoF)

Implementation Timeline

5 years

Strategy Type

Medium Term

Action 2.6: Improve standard for industry effluent discharge

2.6 Improve standard for industry effluent discharge

Key Objective:

- To have higher standard for effluent discharge.

Description:

- To review existing industry standards on effluent discharge.
- To establish best practices recommendations or standards for industries to adhered.

Stakeholders

Lead Entity:

- Environment Protection Department (EPD)
- Department of Environment Sabah (DoE Sabah)

Relevant Stakeholder:

- Drainage and Irrigation Department (DID)
- Department of Fisheries Sabah (DoF)
- Sabah Forestry Department (SFD)

Implementation Timeline

5 years

Strategy Type

Medium Term

Action 2.7: Establish a mechanism under the Forest Enactment 1968 for mangrove ecotourism

2.7 Establish a mechanism under the Forest Enactment 1968 for mangrove ecotourism				
<p>Key Objective:</p> <ul style="list-style-type: none"> To support mangrove ecotourism within allowed area of forest reserve. Provide a framework for protection through ecotourism for mangrove areas. <p>Description:</p> <ul style="list-style-type: none"> To review existing mechanism under the Forest Enactment 1968. To develop a sustainable framework for mangrove ecotourism within specific forest reserve class. 	Stakeholders			
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Tourism Board (STB) Ministry of Tourism, Culture and Environment Sabah (KePKAS) 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>5 years</td> <td>Medium Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	5 years
Implementation Timeline	Strategy Type			
5 years	Medium Term			

Action 2.8: Enhance decision-making at the district level to ensure sustainable mangrove management

2.8 Enhance decision-making at the district level to ensure sustainable mangrove management				
<p>Key Objective:</p> <ul style="list-style-type: none"> To introduce best practices on mangrove managements in district office. <p>Description:</p> <ul style="list-style-type: none"> Develop the directive (Pekeliling / ordinance Kementerian Pembangunan Luar Bandar) for all districts with mangroves to apply best practices, such as the Semporna Mangrove Committee. Involve communities and improve the level of participation. 	Stakeholders			
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Ministry of Rural Development <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> District Offices Pihak Berkuasa Tempatan (PBT) 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>2 years</td> <td>Short Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	2 years
Implementation Timeline	Strategy Type			
2 years	Short Term			

Action 2.9: Manage waste pollution in mangrove areas

2.9 Manage waste pollution in mangrove areas				
<p>Key Objective:</p> <ul style="list-style-type: none"> To reduce pollution in mangrove areas. <p>Description:</p> <ul style="list-style-type: none"> Encourage policy implementation on waste management and support integrated waste management. To strengthen enforcement of waste management. To encourage research on waste pollution in mangrove area Conduct awareness programme for local community on waste management. 	Stakeholders			
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Ministry of Rural Development <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> District Offices Ministry of Local Government & Housing (KTPK) 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>5 years</td> <td>Medium Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	5 years
Implementation Timeline	Strategy Type			
5 years	Medium Term			

Action 2.10: Joint task force on encroachment and illegal extraction

2.10

Joint task force on encroachment and illegal extraction

Key Objective:

- To reduce the threat of encroachment and illegal extraction of mangroves in forest reserve.

Description:

- Conduct mangrove threat profiling.
- Develop hotspots of mangrove encroachment and conduct joint patrolling. (currently practice under OBK).
- Utilized the existing task forces in district, state and regional platforms to leverage this.
- Reference guide from strategy 2 socialized to all LEA for enforcement.
- To understand the demand of mangrove bark and collaborate with neighbouring countries for intelligence to combat this crime through the SIG platform.

Stakeholders

Lead Entity:

- Sabah Forestry Department (SFD)

Relevant Stakeholder:

- District Offices (DOs)
- Ministry of Local Government & Housing (KTPK)
- ESSCOM

Implementation Timeline

10 years

Strategy Type

Long Term





3.3 – Strategy 3: By 2033, All Mangrove Areas In Sabah Are Effectively And Collaboratively Managed

Strategy 3: Effectiveness

By 2033, all mangrove areas in Sabah are effectively and collaboratively managed.

Overall Objective

An integrated database is needed for better-informed development planning. This will feed into an integrated management plan which is inclusive of all stakeholders.

ACTION PLAN

Action 3.1	Strengthen EIA process for any project that affects mangrove areas
Action 3.2	Empower communities to self-manage their mangrove areas
Action 3.3	Enhance decision-making process to use database for SMAP
Action 3.4	Publish Mangrove Atlas of Sabah based on an integrated database
Action 3.5	Streamline boundaries of mangrove forest reserves within various state agencies
Action 3.6	Empower local communities to monitor mangrove areas
Action 3.7	Promote mangrove encroachment reporting through i-ADU
Action 3.8	Develop an integrated management plan for all Mangrove Forest Reserve
Action 3.9	Promote sustainable development for any plan within or adjacent to mangrove areas

Action 3.1: Strengthen EIA process for any project that affects mangrove areas

3.1 Strengthen EIA process for any project that affects mangrove areas				
<p>Key Objective:</p> <ul style="list-style-type: none"> To enhance protection of mangrove areas affected by major development. <p>Description:</p> <ul style="list-style-type: none"> Review existing Prescribe Activities under the Environment Protection Enactment 2002 and existing guidelines to better protect mangrove areas. 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> Environment Protection Department (EPD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Ministry of Tourism, Culture and Environment (KeP-KAS) 			
	<table border="1"> <tr> <td>Implementation Timeline</td> <td>Strategy Type</td> </tr> <tr> <td>5 years</td> <td>Medium Term</td> </tr> </table>	Implementation Timeline	Strategy Type	5 years
Implementation Timeline	Strategy Type			
5 years	Medium Term			

Action 3.2: Empower communities to self-manage their mangrove areas

3.2 Empower communities to self-manage their mangrove areas				
<p>Key Objective:</p> <ul style="list-style-type: none"> To support communities that want to manage their mangrove areas and to build their capacity for sustainable management. <p>Description:</p> <ul style="list-style-type: none"> Assisting communities in developing and incorporating their Community Protocol for mangroves outside forest reserves. This would be supported by SFD until the community's protocol is approved by the District Native Court. Communities are included in the planning and management of mangrove. Establishment / gazettement of "Tagal Bakau" area. Integrate land use planning and construct community mapping. This will identify and specify which communities to focused on. Identify funding for the communities to manage their areas. 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> District Offices District Native Court Local Community 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>5 years</td> <td>Medium Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	5 years
Implementation Timeline	Strategy Type			
5 years	Medium Term			

Action 3.3: Enhance decision-making process to use database for SMAP

3.3 Enhance decision-making process to use database for SMAP				
<p>Key Objective:</p> <ul style="list-style-type: none"> To develop an integrated database that would better assist planners and developers in decision making. <p>Description:</p> <ul style="list-style-type: none"> Collaboration with UPEN to develop or establish an integrated database to inform on better development decision-making. This database should incorporate protection of mangrove areas and be accessible to planners and developers looking to do projects in Sabah. Include District Plans and Local Plans as part of the database. 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Economic Planning Unit (UPEN) Town & Regional Planning Department (TRPD) District Offices 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>10 years</td> <td>Long Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	10 years
Implementation Timeline	Strategy Type			
10 years	Long Term			



Action 3.4: Publish a Mangrove Atlas of Sabah based on an integrated database

3.4 Publish Mangrove Atlas of Sabah based on an integrated database		
<p>Key Objective:</p> <ul style="list-style-type: none"> To create one main source or one-stop-centre of mangrove data that all stakeholders can use. <p>Description:</p> <ul style="list-style-type: none"> Promote data sharing between agencies. This will involve collaboration with educational institutions/academia. Explore the opportunity to incorporate and use SABIS which has been developed by SaBC. 	Stakeholders	
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Biodiversity Centre (SaBC) Academic Institute NGOs 	
	Implementation Timeline	Strategy Type
	3 years	Short Term

Action 3.5: Streamline boundaries of mangrove forest reserves within various state agencies

3.5 Streamline boundaries of mangrove forest reserves within various state agencies		
<p>Key Objective:</p> <ul style="list-style-type: none"> To synchronize the databases on mangrove forest reserve boundaries by SFD and JTU. <p>Description:</p> <ul style="list-style-type: none"> SFD will work together with JTU to review existing mangrove forest reserve boundaries and sync them to make sure there are no overlapping boundaries. To exercise due diligence when it involves mangrove areas. 	Stakeholders	
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Land and Survey Department (JTU) 	
	Implementation Timeline	Strategy Type
	5 years	Medium Term

Action 3.6: Empower local communities to monitor mangrove areas

3.6 Empower local communities to monitor mangrove areas		
<p>Key Objective:</p> <ul style="list-style-type: none"> To provide opportunities and channels to communities to monitor their own mangrove areas. <p>Description:</p> <ul style="list-style-type: none"> Increase appointment of Honorary Forest Rangers related to mangroves from local communities. Mobilize community citizen science, introduce new technology, capacity building on enforcement, and on the usage of social media. 	Stakeholders	
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> District Forestry Offices District Offices Local Communities 	
	Implementation Timeline	Strategy Type
	2 years	Short Term



Action 3.7: Promote mangrove encroachment reporting through i-ADU

<p>3.7 Promote mangrove encroachment reporting through i-ADU</p>				
<p>Key Objective:</p> <ul style="list-style-type: none"> To improve the reporting tool and channels that can be used by the communities. <p>Description:</p> <ul style="list-style-type: none"> Explore i-Adu to improve the reporting tool, and to educate communities about the importance of protecting mangrove. Advertise and demonstrate the use of i-Adu during awareness programmes on mangroves; and collecting feedback from the stakeholders to improve the reporting tool. 	<p>Stakeholders</p> <ul style="list-style-type: none"> Lead Entity: <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Relevant Stakeholder: <ul style="list-style-type: none"> Bahagian Integriti dan Governance Negeri Sabah (BIGONS) District Forestry Offices District Offices Local Community 			
	<table border="1"> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> <tr> <td>2 years</td> <td>Short Term</td> </tr> </table>	Implementation Timeline	Strategy Type	2 years
Implementation Timeline	Strategy Type			
2 years	Short Term			

Action 3.8: Develop an integrated management plan for all Mangrove Forest Reserve

<p>3.8 Develop an integrated management plan for all Mangrove Forest Reserve</p>				
<p>Key Objective:</p> <ul style="list-style-type: none"> To have Forest Management Plan (FMP) for all mangrove forest reserves in Sabah. <p>Description:</p> <ul style="list-style-type: none"> Established multi-stakeholder management committees within mangrove areas Conduct research and development that will contribute to the development of an Integrated Management Plan for mangrove areas in Sabah Develop an integrated and sustainable Forest Management Plans for mangroves forest reserves. 	<p>Stakeholders</p> <ul style="list-style-type: none"> Lead Entity: <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Relevant Stakeholder: <ul style="list-style-type: none"> District Forestry Offices District Offices Local Communities 			
	<table border="1"> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> <tr> <td>7 years</td> <td>Medium Term</td> </tr> </table>	Implementation Timeline	Strategy Type	7 years
Implementation Timeline	Strategy Type			
7 years	Medium Term			

Action 3.9: Promote sustainable development for any plan within or adjacent to mangrove areas

3.9 Promote sustainable development for any plan within or adjacent to mangrove areas

Key Objective:

- To reduce the impact of infrastructure development within or adjacent to mangrove areas.

Description:

- Explore new technology for sustainable and environmentally friendly infrastructures for mangrove areas.
- Finding a balance between infrastructure development; and at the same time, making sure mangrove areas are protected and conserved (a win-win approach).

Stakeholders

Lead Entity:

- Public Works Department (JKR)

Relevant Stakeholder:

- Sabah Forestry Department (SFD)

**Implementation
Timeline**

10 years

Strategy Type

Long Term





3.4 – Strategy 4: By 2033, Vulnerable Mangrove Areas Are Protected and Climate-Resilient

Strategy 4: Climate Change

By 2033, vulnerable mangrove areas are protected and climate-resilient.

Overall Objective

The mangrove ecosystem functions, such as mitigating climate change, natural barriers, nursery for fish, carbon sink, stabilization of coastal areas, etc., need to be improved through a state adaptation and mitigation plan. This will also help communities dependent on mangroves to become climate resilient.

ACTION PLAN

Action 4.1

Develop plans to enhance resilience of vulnerable mangrove areas to climate change impacts

Action 4.2

Conduct researches to address on how to enhance the resilience of the communities dependent on mangrove areas

Action 4.1: Develop plans to enhance resilience of vulnerable mangrove areas to climate change impacts

4.1

Develop plans to enhance resilience of vulnerable mangrove areas to climate change impacts

Key Objective:

- Enhance the resilience of vulnerable mangrove areas to climate change impacts.

Description:

- Develop the coastal areas climate change mitigation and adaptation plan.
- Include no development areas such as Beach Area and “Foreshore Reserves” (example: in Tanjung Aru).
- Education or awareness to increase expertise in climate related agenda.

Stakeholders

Lead Entity:

- Sabah Climate Action Council (SCAC)

Relevant Stakeholder:

- Sabah Forestry Department (SFD)

Implementation Timeline

5 years

Strategy Type

Medium Term

Action 4.2: Conduct researches to address on how to enhance the resilience of the communities’ dependent on mangrove areas

4.2

Conduct researches to address on how to enhance the resilience of the communities dependent on mangrove areas

Key Objective:

- Enhance the resilience of communities’ dependent on mangrove areas.

Description:

- To conduct research to enhance the resilience of the communities’ dependent on mangrove areas.
- Set up District level Committee to ensure local communities in mangrove areas have their own mitigation and adaptation plan.

Stakeholders

Lead Entity:

- District Offices (DOs)

Relevant Stakeholder:

- Borneo Marine Research Institute (BMRI), UMS

Implementation Timeline

5 years

Strategy Type

Medium Term



3.5 – Strategy 5: By 2033, All Degraded Mangroves Within Vulnerable Areas Are Restored

Strategy 5: Restoration

By 2033, all degraded mangroves within vulnerable areas are rehabilitated and restored.

Overall Objective

Increasing the hectare of mangrove areas is important in order to compensate for lost areas. Degraded mangrove areas, specifically vulnerable ones, need to be rehabilitated and restored. This will require research on the best restoration method for badly degraded areas.

ACTION PLAN

Action 5.1	Develop a business model based on the ecosystem functions of mangroves
Action 5.2	Prevent the extinction of endangered mangrove species
Action 5.3	Conduct a systematic assessment to identify and delineate degraded mangrove areas in vulnerable regions, followed by the implementation of targeted restoration initiatives

Action 5.1: Develop a business model based on the ecosystem functions of mangroves

5.1 Develop a business model based on the ecosystem functions of mangroves	
Key Objective: <ul style="list-style-type: none"> Enhance the resilience of communities' dependent on mangrove areas. Description: <ul style="list-style-type: none"> To develop a portfolio for each mangrove area by emphasizing the functions of mangroves specifically for that area and benefits to the people and ecosystem The portfolio should include inputs from the community as well (community database) and should start with pilot sites. There is also a need to conduct a study on the monetary value (e.g., fisheries, biodiversity credits, blue carbon etc). 	Stakeholders Lead Entity: <ul style="list-style-type: none"> State Economic Planning Unit (UPEN) Relevant Stakeholder: <ul style="list-style-type: none"> Sabah Forestry Department (SFD)
	Implementation Timeline 2 years

Action 5.2: Prevent the extinction of endangered mangrove species

5.2 Prevent the extinction of endangered mangrove species		
<p>Key Objective:</p> <ul style="list-style-type: none"> To ensure critical and endangered mangrove species is not loss in Sabah. <p>Description:</p> <ul style="list-style-type: none"> Identify endangered mangrove species and establish a species' distribution mapping for Sabah. Restoration and rehabilitation strategy for endangered mangrove species. Explore financing mechanisms that can provide sustainable financing for restoration and rehabilitation of mangrove. 	Stakeholders	
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Biodiversity Centre (SaBC) 	
	Implementation Timeline	Strategy Type
	2 years	Short Term

Action 5.3: Conduct a systematic assessment to identify and delineate degraded mangrove areas in vulnerable regions, followed by the implementation of targeted restoration initiatives

5.3 Conduct a systematic assessment to identify and delineate degraded mangrove areas in vulnerable regions, followed by the implementation of targeted restoration initiatives		
<p>Key Objective:</p> <ul style="list-style-type: none"> To restore degraded mangroves areas in Sabah. <p>Description:</p> <ul style="list-style-type: none"> Conduct mapping, identification, and research efforts to assess the restoration needs of severely degraded mangrove areas. Publish the research findings and detailed methodology used for identifying and restoring/rehabilitate degraded mangroves. Demonstrate the restoration/rehabilitation process for severely degraded mangrove areas as a pilot project; showcasing the practical application of the developed methodology. 	Stakeholders	
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Academic Institute NGOs 	
	Implementation Timeline	Strategy Type
	3 years	Short Term





3.6 – Strategy 6: By 2033, Support The Environmentally Sustainable Livelihood Of Communities’ Dependent On Mangroves Ecosystem

Strategy 6: Sustainable Livelihood

By 2033, support the environmentally sustainable livelihood of communities dependent on the mangrove ecosystem.

Overall Objective

Diversifying local communities livelihood sources is important to avoid over-dependence on extractive activities. Sustainable mangrove ecotourism is a viable alternative livelihood for communities living near or adjacent to mangroves.

ACTION PLAN

Action 6.1	Develop guidelines on sustainable mangrove ecotourism
Action 6.2	Promote sustainable Mangrove Ecotourism throughout Sabah
Action 6.3	Enhance community participation in ecotourism
Action 6.4	Encourage behaviour change on waste management

Action 6.1: Develop guidelines on sustainable mangrove ecotourism

6.1		Develop guidelines on sustainable mangrove ecotourism	
Key Objective: <ul style="list-style-type: none"> To ensure that ecotourism in mangroves area is done sustainably and does not negatively impact the mangrove areas. Description: <ul style="list-style-type: none"> The guidelines should include best practices and also cover community participation. Increase community involvement in the development of the mangroves ecotourism guideline. 	Stakeholders		
	Lead Entity: <ul style="list-style-type: none"> Sabah Tourism Board (STB) District Tourism Association (under District Office) Relevant Stakeholder: <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Academic Institute NGOs 		
	Implementation Timeline	Strategy Type	
2 years	Short Term		



Action 6.2: Promote sustainable Mangrove Ecotourism throughout Sabah

6.2 Promote sustainable Mangrove Ecotourism throughout Sabah				
<p>Key Objective:</p> <ul style="list-style-type: none"> To increase visibility and adoption of Mangrove Ecotourism. <p>Description:</p> <ul style="list-style-type: none"> Develop a sustainable mangrove ecotourism package for suitable mangroves areas that can be applied by operators and local communities. Include sustainable mangrove ecotourism in major tourism related marketing for Sabah. 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Tourism Board (STB) District Tourism Association (under District Office) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Academic Institute NGOs 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>1 year</td> <td>Short Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	1 year
Implementation Timeline	Strategy Type			
1 year	Short Term			

Action 6.3: Enhance community participation in ecotourism

6.3 Enhance community participation in ecotourism				
<ul style="list-style-type: none"> Key Objective: To increase communities' involvement in mangroves ecotourism. <ul style="list-style-type: none"> Description: Duplicate business model at other sites such as co-operatives: Community-Based Tourism (KOPEL - Received UNWTO Best Tourism Village 2021) Kg. Mumiang, Tanjung Aru and Kg. Pitas Laut Identify areas that are suitable to be developed as an ecotourism area for pilot sites for Community-Based Tourism (CBT) which will also serve as study sites. 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Tourism Board (STB) District Tourism Association (under District Office) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>5 years</td> <td>Medium Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	5 years
Implementation Timeline	Strategy Type			
5 years	Medium Term			

Action 6.4: Encourage behaviour change on waste management

6.4 Encourage behaviour change on waste management				
<p>Key Objective:</p> <ul style="list-style-type: none"> To increase community awareness on waste management and its impact to mangroves areas. <p>Description:</p> <ul style="list-style-type: none"> Establish baseline for general communities' awareness. This should be more structured according to community age-level, location (rural, urban). Launching of public awareness campaigns to the communities on the detrimental impacts of waste pollution. Review waste management system and encouraging environmental-friendly approach to manage waste (eg. use biodegradable materials, not using single-use plastic materials, 3R: reduce, reuse, recycle, etc., Zero Waste initiatives, etc.) Strengthen enforcement by Local Authorities (PBT) 	<p>Stakeholders</p> <p>Lead Entity:</p> <ul style="list-style-type: none"> NGOs Ministry of Local Government & Housing (KTPK) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Forestry Department District Offices 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>2 years</td> <td>Short Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	2 years
Implementation Timeline	Strategy Type			
2 years	Short Term			





3.7 – Strategy 7: By 2033, The Importance Of Mangroves Is Shared And Applied By All Levels Of Society

Strategy 7: Education Awareness

By 2033, the importance of mangroves is shared and applied by all levels of society.

Overall Objective

Mangrove education and awareness are still lacking in Sabah. Vigorous efforts are needed to mainstream mangrove protection within all levels of society. Mangrove education programs and modules need to be developed and adopted by learning institutions.

ACTION PLAN

Action 7.1	Establish a Mangrove Research and Information Centre in Sabah
Action 7.2	Design and implement an education program on mangroves to be used by various stakeholders
Action 7.3	Encourage knowledge sharing on mangrove management and protection among communities
Action 7.4	Ensure all aquaculture and agriculture activities within or adjacent to mangrove areas are sustainable
Action 7.5	Enable public access to mangrove restoration knowledge and skills
Action 7.6	Promote mangrove education and increase its relevance in universities, colleges, and vocational schools
Action 7.7	Mainstreaming mangrove protection
Action 7.8	Host Mangrove International Forum in Sabah in 2027
Action 7.9	Increase local resource persons and experts on mangroves in Sabah

Action 7.1: Establish a Mangrove Research and Information Centre in Sabah

7.1		Establish a Mangrove Research and Information Centre in Sabah	
Key Objective: <ul style="list-style-type: none"> To create a main hub for research and information on mangroves in Sabah. 		Stakeholders	
Description: <ul style="list-style-type: none"> Empower people who are working on wetlands to form a platform for all relevant stakeholders to work together on mangroves. Establishing a Sabah Mangrove Alliance. 		Lead Entity: <ul style="list-style-type: none"> Sabah Biodiversity Centre (SaBC) 	
		Relevant Stakeholder: <ul style="list-style-type: none"> Academic Institute NGOs Sabah Forestry Department (SFD) 	
		Implementation Timeline	Strategy Type
		5 years	Medium Term

Action 7.2: Design and implement an education program on mangroves to be used by various stakeholders

7.2 Design and implement an education program on mangroves to be used by various stakeholders				
<p>Key Objective:</p> <ul style="list-style-type: none"> To enhance mangrove education and awareness in Sabah. <p>Description:</p> <ul style="list-style-type: none"> To design and implement an education program on mangroves through the SERASI program under EPD Enhance Environmental Education Race conducted by EPD to include a mangrove education and awareness Leverage on Sabah Environmental Education Network (SEEN) as a platform for knowledge sharing and planning. Stakeholders 	Stakeholders			
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Environment Protection Department (EPD) 			
	<p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Academic Institute NGOs 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>3 years</td> <td>Short Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	3 years
Implementation Timeline	Strategy Type			
3 years	Short Term			

Action 7.3: Encourage knowledge sharing on mangrove management and protection among communities

7.3 Encourage knowledge sharing on mangrove management and protection among communities				
<p>Key Objective:</p> <ul style="list-style-type: none"> To assist in knowledge exchanges between communities on their traditional knowledge of mangrove managements. <p>Description:</p> <ul style="list-style-type: none"> Document traditional knowledge Disseminate traditional knowledge documented by communities to other communities (knowledge sharing) Published book on community knowledge of mangrove use. 	Stakeholders			
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Environment Protection Department (EPD) 			
	<p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Academic Institute NGOs 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>10 years</td> <td>Long Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	10 years
Implementation Timeline	Strategy Type			
10 years	Long Term			





Action 7.4: Ensure all aquaculture and agriculture activities in and /or adjacent to mangrove areas are sustainable

7.4 Ensure all aquaculture and agriculture activities in and/or adjacent to mangrove areas are sustainable		
<p>Key Objective:</p> <ul style="list-style-type: none"> To promote sustainable certification for aquaculture and agriculture activities in and/or adjacent to mangrove areas. <p>Description:</p> <ul style="list-style-type: none"> To encourage the private sector to obtain sustainable certification (MyGap, RSPO, MSPO etc.). Currently, the application of MyGAP certification is optional and not compulsory. Only those involved with exports are required/ certified because of the cost of certification application. Monitoring & enforcement of land use change. 	Stakeholders	
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Ministry of Agriculture, Fisheries and Food Industry (MAFFI) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Department of Fisheries Sabah (DoF) Malaysian Palm Oil Board (MPOB) 	
	Implementation Timeline	Strategy Type
	3 years	Short Term

Action 7.5: Enable public access to mangrove restoration knowledge and skills

7.5 Enable public access to mangrove restoration knowledge and skills		
<p>Key Objective:</p> <ul style="list-style-type: none"> To promote good restoration practices and increase success rate of restoration program conducted by community. <p>Description:</p> <ul style="list-style-type: none"> Sabah Forestry Department should develop a toolkit for mangrove restoration that can be used by any stakeholder and community for their own restoration program. To publish and disseminate the toolkit for easier accessibility. 	Stakeholders	
	<p>Lead Entity:</p> <ul style="list-style-type: none"> Sabah Forestry Department (SFD) <p>Relevant Stakeholder:</p> <ul style="list-style-type: none"> Academic Institute NGOs 	
	Implementation Timeline	Strategy Type
	3 years	Short Term

Action 7.6: Promote mangrove education and increase its relevance in universities, colleges, and vocational schools

7.6 Promote mangrove education and increase its relevance in universities, colleges, and vocational schools				
<p>Key Objective:</p> <ul style="list-style-type: none"> To include mangrove education in major courses and educational syllabus. <p>Description:</p> <ul style="list-style-type: none"> Sabah Forestry Institute to add mangroves into their syllabus/special course on mangroves Encourage UMS to have a special course on mangroves Encourage more mangrove Master and PhD students in Sabah State government to create or establish scholarships for mangrove research. 	<p>Stakeholders</p> <ul style="list-style-type: none"> Lead Entity: <ul style="list-style-type: none"> University Malaysia Sabah (UMS) Relevant Stakeholder: <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Academic Institute NGOs 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>3 years</td> <td>Short Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	3 years
Implementation Timeline	Strategy Type			
3 years	Short Term			

Action 7.7: Mainstreaming mangrove protection

7.7 Mainstreaming mangrove protection				
<p>Key Objective:</p> <ul style="list-style-type: none"> To increase promotion of mangrove protection in mainstream media. Increase public awareness on mangrove issues in Sabah. <p>Description:</p> <ul style="list-style-type: none"> Identify guidelines related to mangroves from all government agencies and to highlight and promote the guidelines. Empower SaBC to do more activities on mangroves. Find a mangrove champion among decision-makers. Target media (radio station / local TV) to have regular programmes on mangroves. Wildlife Management Plan (human-wildlife conflict). 	<p>Stakeholders</p> <ul style="list-style-type: none"> Lead Entity: <ul style="list-style-type: none"> NGO Relevant Stakeholder: <ul style="list-style-type: none"> Sabah Forestry Department (SFD) Sabah Biodiversity Centre (SaBC) Academic Institute 			
	<table border="1"> <thead> <tr> <th>Implementation Timeline</th> <th>Strategy Type</th> </tr> </thead> <tbody> <tr> <td>3 years</td> <td>Short Term</td> </tr> </tbody> </table>	Implementation Timeline	Strategy Type	3 years
Implementation Timeline	Strategy Type			
3 years	Short Term			



Action 7.8: Host Mangrove International Forum in Sabah in 2027

7.8		Host Mangrove International Forum in Sabah in 2027	
Key Objective: <ul style="list-style-type: none"> • Increase visibility of Sabah’s mangrove at the international stage. • Increase opportunity for conservation funding. Description: <ul style="list-style-type: none"> • To call for publications and research on mangroves in Sabah. • Promote new innovative nature-based solutions that revolve around mangrove areas. 	Stakeholders		
	Lead Entity:		
	Relevant Stakeholder:		
	Implementation Timeline		Strategy Type
	4 years		Medium Term

Action 7.9: Increase local resource persons and experts on mangroves in Sabah

7.9		Increase local resource persons and experts on mangroves in Sabah	
Key Objective: <ul style="list-style-type: none"> • Increase availability of local experts in mangroves in Sabah. Description: <ul style="list-style-type: none"> • Develop a program to nurture new local experts in mangrove conservation. • Mangrove subjects included in higher education curriculum. • Local climate change related expert is lacking at the moment. • Publish Field Guide on Wildlife & Marine Aquatic. 	Stakeholders		
	Lead Entity:		
	Relevant Stakeholder:		
	Implementation Timeline		Strategy Type
	10 years		Long Term

CHAPTER 4: IMPLEMENTATION AND MONITORING

This SMAP is covering a period of 10 years (2024–2033). The ultimate goal is to enhance the conservation, protection, and restoration of mangroves in Sabah. This will be achieved through 7 pillars of strategy encompassing:

1. Protection
2. Governance
3. Effectiveness
4. Climate
5. Restoration
6. Community
7. Awareness & Education

All the recommendations described in this SMAP should be evaluated by the Sabah Forestry Department and endorsed by the Sabah State Cabinet.

The implementation of SMAP is a collective effort by all lead departments that have shared the benefit and responsibility of management and protection of mangrove. Sabah Forestry Department (SFD) will remain the secretariat of the document to oversee its implementation, considering that most of the mangrove areas are under its jurisdiction.

4.1 MONITORING PLAN

A committee under SFD shall produce a yearly overview and analysis progress of the SMAP and disseminate the results to all stakeholders. A mid-term review will also be produced after five years by SFD with the assistance of major stakeholders.

Figure 4.1: Monitoring plan timeline

Monitoring/ Year	1	2	3	4	5	6	7	8	9	10
Progress Report										
Mid-Term Review										

4.2 ACTION PLAN TIMELINE

Year		1	2	3	4	5	6	7	8	9	10
Strategy 1: By 2033, all protected mangrove areas will be maintained, and identified vulnerable mangroves will be protected under various existing legislations.	Action 1.1: Establish mangrove vulnerability criteria										
	Action 1.2: Encourage other type of legislation for mangrove areas protection										
	Action 1.3: Compile and populate mangrove datasets supported by Global Navigation Satellite System (GNSS) technology										
	Action 1.4: Enable public access to mangrove data										
	Action 1.5: Demarcate all mangrove forest reserve boundaries										
Strategy 2: By 2033, state mangrove governance is strengthened.	Action 2.1: Harmonizing all existing state agencies' legislation or policies to allow for integrated management of mangrove areas										
	Action 2.2: Improve land use planning process on development activities within mangrove areas										
	Action 2.3: Review the existing mangrove buffer provision in State legislation										
	Action 2.4: Prevent human settlement in mangrove areas										
	Action 2.5: Enhance the enforcement and monitoring of rivers and coastal areas pollution										

Year	1	2	3	4	5	6	7	8	9	10
Action 2.6: Improve standard for industry effluent discharge										
Action 2.7: Establish a mechanism under the Forest Enactment 1968 for mangrove ecotourism										
Action 2.8: Enhance decision-making at the district level to ensure sustainable mangrove management										
Action 2.9: Manage waste pollution in mangrove areas										
Action 2.10: Joint task force on encroachment and illegal extraction of Tengar etc										
Action 3.1: Strengthen EIA process for any project that affects mangrove areas										
Action 3.2: Empower communities to manage sustainably their mangrove areas										
Action 3.3: Enhance decision-making process to use database for SMAP										
Action 3.4: Publish Mangrove Atlas of Sabah based on an integrated database										
Action 3.5: Streamline boundaries of mangrove forest reserves within various state agencies										
Action 3.6: Empower local communities to monitor mangrove areas										

Strategy 3:
By 2033, all mangrove areas in Sabah are effectively and collaboratively managed.

Year	1	2	3	4	5	6	7	8	9	10
	Action 3.7: Promote mangrove encroachment reporting through i-ADU									
	Action 3.8: Develop an integrated management plan for all Mangrove Forest Reserve									
	Action 3.9: Promote sustainable development for any plan within or adjacent to mangrove area									
Strategy 4: By 2033, vulnerable mangrove areas are protected and climate-resilient.	Action 4.1: Develop plans to enhance resilience of vulnerable mangrove areas to climate change impacts									
	Action 4.2: Conduct researches to address on how to enhance the resilience of the communities dependent on mangrove areas									
Strategy 5: By 2033, all degraded mangroves within vulnerable areas are restored.	Action 5.1: Develop a business model based on the ecosystem functions of mangroves									
	Action 5.2: Prevent the extinction of endangered mangrove species									
	Action 5.3: Conduct a systematic assessment to identify and delineate degraded mangrove areas in vulnerable regions, followed by the implementation of targeted restoration initiatives									
Strategy 6: By 2033, support the environmentally sustainable livelihood of	Action 6.1: Develop guidelines on sustainable mangrove ecotourism									
	Action 6.2: Promote sustainable mangrove ecotourism throughout Sabah									

Year	1	2	3	4	5	6	7	8	9	10
communities' dependent on mangroves ecosystem										
										
Strategy 7: By 2033, the importance of mangroves is shared and applied by all levels of society.										
										
										
										
										
										
										
										
										

The action plan timeline is divided into three implementation timeframes:

Long-Term: 2024–2033

Long-term Project refers to project requiring a longer period of completion and planned to commence at a later period in 2024 and complete within the ten-year (10) timeframe by 2033.

Medium-Term: 2024–2028

Medium-term Project refers to project that will commence in 2026 and complete within the five-year (5) timeframe by 2028.

Short-Term: 2024–2026

Short-term Projects refer to projects that are currently in progress and will be completed by 2026; as well as projects that will commence in 2024 and will be completed by 2026.

4.3 POTENTIAL FINANCING SOURCE

Ecological Fiscal Transfer (EFT)

The Government of Malaysia introduced the EFT in years 2019 and 2021 with a combined budget allocation of more than USD31 million representing a transfer to the States for protecting and expanding their nature forest reserves and protected areas.

EFT is essentially an intergovernmental fiscal transfer to distribute public revenue from the Federal to State governments according to agreed principles and priorities towards environment conservation. In other words, a formalized environmental grant making system corresponding to a number of ecological criteria – adding a new sub set dimension to fiscal transfers from Federal to State. This has the potential to overcome funding gaps for conservation, incentivize the States, meet national objectives, targeted conservation financing, etc.

REDD Plus Finance Framework (RFF)

The REDD Plus Framework supports the role of Malaysian forests in climate change mitigation, contributing to the reduction of greenhouse gas (GHG) emissions. By implementing eligible REDD Plus activities in Malaysia, the conservation and protection of forests can provide prolonged ecological services, which support environmental integrity that can provide adaptation benefits for society.

Currently the two certificates under the RFF are:

Forest Carbon Offset (FCO)

The FCO is a market-based approach, meaning that participating corporations will receive forest emissions reductions units (carbon credits) that they can use to offset their own emissions or sell on the carbon credit market. The FCO is open to both domestic and international investors.

The FCO is a mechanism that allows the transfer of emissions reduction from forests to the buyers, in the form of carbon offsets. Robust accounting will be applied to generate the carbon offsets, taking into consideration robust methodologies for GHG estimation, calculation, environmental integrity as well as transparent, complete and accurate reporting. The FCO will only be issued for domestic use, creating a domestic carbon offset scheme

Forest Conservation Certificate (FCC)

The Forest Conservation Certificate (FCC) is a non-market based mechanism focusing on non-carbon benefits while ensuring environmental integrity of the emissions reduction. It will act as an incentive for environmental and social contributions focusing on conservation of ecosystem services. The FCC is generated following the REDD Plus requirements agreed under the UNFCCC. The FCC is open to domestic and international investors.

Carbon Financing

Bursa Carbon Exchange (BCX), Malaysia's voluntary carbon market (VCM) exchange, is part of the nation's commitment towards achieving net zero greenhouse gas (GHG) emissions as early as 2050. BCX is a global multi-asset environmental exchange that facilitates the trading of high-quality carbon credits via standardised carbon contracts. Corporates may purchase these credits to offset their carbon footprint; while in return, the sale of carbon credits will help to finance and drive the development of domestic GHG emission reduction and removal solutions and projects.

Private Funding

Corporate Social Responsibility (CSR) is a self-regulating business model that helps a company be socially accountable to itself, its stakeholders, and the public. By practising corporate social responsibility, also called corporate citizenship, companies can be conscious of the kind of impact they are having on all aspects of society, including economic, social, and environmental.

All listed companies in Malaysia must comply with CSR programs. This is following the orders of the Ministry of International Trade and Industry Secretary-General Datuk Isham Ishak, Bursa Malaysia.

Common examples of corporate social responsibility:

- Making social and environmental conscious investments.
- Decreasing carbon footprints and climate change
- Adjusting corporate policies for environmental benefits
- Engaging in charity and volunteer activities within your community
- Improving labour policies and embrace fair trade

National Conservation Trust Fund (NCTF)

The National Conservation Trust Fund for Natural Resources (NCTF) was established to carry out activities related to conservation efforts such as communication, education and public awareness, research and development, management, protection and climate change mitigation and adaptation.

NCTF's objectives are:

- To carry out long term conservation plan to support natural resource management;
- Support Sustainable Forest Management (SFM);
- Conduct research and development activities in the fields of natural resources management and conservation;
- Support capacity building for the implementation of obligations and commitments under Multilateral Environmental Agreements (MEA) of which Malaysia is a party of; and
- Provide a transparent mechanism for receiving and channelling funds to support natural resource management and biodiversity conservation.

International Funding Source

Funding for nature conservation may be found at three (3) different departments or ministries of foreign governments i.e., nature conservation; international cooperation (previously called development collaboration or aid, and research and education.

Research Funding

The ministry for research is the odd-one out here, but should not be overlooked for projects that involve research. Usually, ministries for research exclusively finance public research in their own country. However, they may finance scholarships for foreign researchers to visit or for domestic researchers to go abroad. Applying for such scholarships is open to all researchers, but an affiliation with a public or private research institution may be required, and contacts with the destination beneficial.

Environment and International Cooperation

Nature conservation in the global South sits at the cross roads of the ministries for the environment and for foreign affairs/international collaboration. This means that funding possibilities may be found at both locations, and sometimes even at both locations within the same government i.e., the ministry for environment may support projects abroad, whereas the ministry for international cooperation may provide funding for environmental projects. For example, the Japan International Cooperation Agency (JICA) mentions environment under its list of grants types. At the same time, the Japanese Environmental Restoration and Conservation Agency operates the Japan Fund for Global Environment.

International NGOs or other contacts

A government (from country X) may not provide grants directly to applicants from abroad (country Y). Instead, they require applicants to collaborate with an NGO from country X. This internationally operating NGO, or INGO, may be the actual applicant or at least a co-applicant. A similar construct may apply for research grants where the applicant from country Y needs to collaborate with a researcher or research institute of country X.

Supra-national funding, United Nations Global Environmental Facility

Perhaps the biggest funder of nature conservation projects is the UN's Global Environmental Facility or the GEF. Established in 1992, as a result of the Rio Earth Summit, it grants on average about 0.8 billion US dollars per year on environmental projects in developing countries. The GEF also funds projects under other UN conventions, such as the conventions on biological diversity, climate change, sustainable forest management, food security and sustainable cities.

The majority of the GEF-funded projects are supporting governments who have to apply in collaboration with one of GEF's agencies. The majority of these agencies are the World development banks; but they also include the WWF and the IUCN. Although, the procedures are lengthy but projects' cost are in the million-dollar range.



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ANNEX

A1. List of Stakeholder and Their Mandate

NO	Government	Mandate
1	Sabah Climate Action Council (SCAC)	Focal point for Sabah on climate change policies, green economy, carbon market and finance.
2	Department of Fisheries, Sabah (DOFS)	Manage fisheries resources and stocks, nursery grounds and aquaculture.
3	Department of Irrigation and Drainage (DID)	Shoreline management plan and river system management
4	Environment Protection Department (EPD)	Environmental planning, implementation and control of development activities and exploitation of natural resources.
5	Land and Survey Department (JTU)	Land alienation, valuation, development, mapping, and management including mangroves in state land.
6	Ministry of Agriculture (MOA)	Policies and plans to the development of agriculture industry including aquaculture.
7	Ministry of Tourism, Culture & Environment (MTCE)	Protection and conservation of the environment, natural and cultural heritage, and related eco-tourism activity.
8	Ministry of Works (MOW)	Planning and develop infrastructure. - Pan Borneo Highway, Kudat Port and Kudat-KK railway.
9	National Water Research Institute of Malaysia (NAHRIM)	Hydraulic research for water and environment management.
10	Sabah Biodiversity Council (SaBC)	Biodiversity and biological resources of Sabah
11	Sabah Forestry Department (SFD)	Sustainable forest management (SFM), conserve natural forest with financial resources, technology, and logistical support.
12	Sabah Parks (SP)	Sustainable parks and marine park, conservation, gazettement and enforcement.
13	Sabah Wildlife Department (SWD)	Wildlife management, protection, and enforcement. - Proboscis Monkey
14	Town and Regional Planning Department (TRPD)	Develop Districts' Plans and Local Plans.
NO	District Offices	District Land Use Management. Notes of specific interest
1	Beluran (Sugut)	Crab area of interest is high.
2	Kalabakan	Border town with Kalimantan Indonesia.
3	Kinabatangan	Proboscis Monkeys.
4	Kota Belud	Small-scale fisheries.
5	Kota Marudu	Small-scale fisheries.
6	Kuala Penyu	Crabs.
7	Kudat	Fisheries.

NO	District Offices	District Land Use Management. Notes of specific interest
8	Lahad Datu	Mangroves.
9	Pitas	Fisheries (Bagang for anchovies).
10	Sandakan	Fisheries.
11	Sipitang	There are mangroves along the coast but not a FR, industrial, titled lands, etc.
12	Tawau	Fisheries.
13	Tuaran	Prawn and crabs.
14	Beaufort	Proboscis Monkeys and fireflies.
NO	Private Sector and GLCs	Interest
1	Acacia Forest Industries	Commercial forestry, sustainable tropical tree plantation and community.
2	Asia Aquaculture, Tawau	Shrimp farming and business. MyGAP certified.
3	Enrich Wise Sdn Bhd	They own their land. Aquaculture and business. No MyGAP certification, likely to be
4	North Cube Shrimp Aquaculture, Tawau	converting mangroves. Hence need active engagement with them and manage closely. Aquaculture, business, CSR, socioeconomic vocational education. MyGAP certified
5	Persatuan Pemilik Kapal Nelayan Kudat	Fisheries.
6	QL Aquamarine, Kudat	Prawn aquaculture, export (China, Taiwan, Korea, Australia and Singapore) and import. MyGAP & FQC certified.
7	Sankina Aquaculture, Tawau	They own the land. Aquaculture, manufacturer and seafood exporter. MyGAP and ASC certified. Need to engage and monitor them.
8	SAFODA	Sustainable forest products and activities, and tree planting. Research, conservation and capacity building.
9	Warisan Hikmat Sdn Bhd	Prawn breeding, trading and investment. MyGAP and FQC certified.
10	Yayasan Sabah	Concession on mangroves in Silam, Darvel Bay for industry.
11	Borneo Sulaman Cove Sdn Bhd (manages Sulaman Wetland Sanctuary)	Sustainable Forest Management License Agreement (SFMLA), a licensee under Sabah Forestry Department; activities limited to Conservation, Education, Eco-tourism, research and forest protection.
NO	Academia, NGOs & Researchers	Interest
1	Danau Girang Field Centre	Wildlife Research including proboscis monkey
2	Forever Sabah	Mangrove conservation and community livelihood.
3	International Society for Mangrove Ecosystems (ISME)	Mangrove ecosystems, research, sustainable management and rehabilitation of mangroves.
4	Malaysian Mangrove Research Alliance and Network (MyMangrove)	Mangrove research, technical expertise on Ecologically or Biologically Significant Marine Area (EBSA).
5	PACOS	Empowerment of local communities particularly in Pitas.
6	Reef Check	Coral reef monitoring.

NO	Academia, NGOs & Researchers	Interest
7	Sabah Environmental Protection Association (SEPA)	Community and environmental rights and high-level advocacy. Do not specifically work on mangroves and no mandate over mangroves. SEPA normally works on environment and community issues.
8	Seagrass Guardians, KK	Mangrove, coral and seagrass areas
9	Sabah Wetlands Conservation Society (SWCS)	Protection and wise use of RAMSAR (Kota Kinabalu) area through education, research, and advocacy.
10	Universiti Malaysia Sabah Faculty of Science and Natural Resources (UMS-FSSA)	Research on habitat, forest and riparian areas.
11	WWF-Malaysia	Mangroves, restoration in three landscapes – Tawau, Tabin and Sugut (MOU with SFD), TMP and Darvel Bay gazettements, communities, Kalimantan border town study
NO	Communities	Interest
1	Kelab Belia Anak Taritipan (ANBATAR)	Community mangrove conservation and management
2	Jawatankuasa Bertindak G6 Pitas	Community management of mangroves for livelihood
3	Green Semporna	Community-youth volunteers for environmental conservation
4	Kinabatangan-Segama Wetlands 8 kampungs	Community mangrove conservation and management



