

PETRONAS' Environmental Focus Areas

» Air Emissions

- Monitor, evaluate and address risks related to air emissions.
- Leverage on our online monitoring platform to provide early warning for increasing trends in emission load that will enable timely intervention.
- Measure Sulfur Oxides (SOx) and Nitrogen Oxides (NOx) emissions through continuous monitoring or periodic samplings.
- Ensure measurements are in accordance to host country requirements and internationally-accepted standards.

» Oil Spill Prevention

- Embed industry best practices on spill prevention into our facility design.
- Implement scheduled inspections and maintenance programmes.

» Decommissioning

- Adhere to Decommissioning Option Assessment (DOA) in disposing petroleum facilities.
- Conduct feasibility studies on transforming decommissioned oil and gas platforms into artificial reefs to maximise the lifecycle of decommissioned structures and protect marine biodiversity.

» Water Management

- Implement internal standards, policies and practices to optimise freshwater withdrawal.
- Focus on three pillars – conduct water accounting, understand water availability and increase water use efficiency.
- Carry out regular tracking of freshwater withdrawal in water stress areas.
- Monitor, evaluate and address risks from waste water discharge from our facilities.

2022 Environmental Quality Performance

1 Water

Freshwater Withdrawal	2021	2022
Malaysia (million cubic metres per year)	70.2	76.8
International (million cubic metres per year)	1.0	4.8
Total (million cubic metres per year)	71.2	81.6
Discharges to Water (tonnes of hydrocarbon)	452	487

In 2022, our total freshwater withdrawal was 81.6 million cubic metres as compared to 71.2 million cubic metres recorded in 2021. The increase in water withdrawal was attributed by two major new sources i.e. Pengerang Integrated Complex and new processing trains in Iraq operations.

2 Air Emissions

We continued to monitor air emissions from all our facilities.

	2021	2022
Total of Sulphur Oxides Emissions (tonnes)	47,954	60,116
Total of Nitrogen Oxides Emissions (tonnes)	133,962	62,790

In 2022, the Group's sulphur oxides emissions increased to 60,116 tonnes compared with 47,954 tonnes in 2021. The increase in emission load was attributable to higher gas production in Sarawak's Upstream asset and gas processing plant.

Total nitrogen oxides emissions for 2022 stood at 62,790 tonnes from 133,962 tonnes in 2021, mainly due to omission of emission load data from ships due to ongoing review of reporting method, and revision in calculation methodology for floating LNG and power plant.

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3 Environmental Health

Human Health Risk Assessments (HHRAs)

We are committed to safeguard the health of communities in areas where we operate.

We proactively conduct HHRA beyond facility fencelines to evaluate community exposure to chemicals in the ambient environment. Since 2018, we have been conducting baseline HHRAs at selected operations and continued our efforts in 2022 to establish the environmental health risk profile for our global operations. From the baseline HHRAs, we have identified areas of improvement to reduce chemical exposures in air emissions and groundwater, going beyond regulatory compliance.

4 Oil Spill Prevention

	2021	2022
Number of Hydrocarbon Spills into the Environment over One Barrel (Number of cases)*	2	2

* One barrel is equivalent to 159 litres

- In 2021 and 2022, there were two cases of oil spills, compared to five in 2020.
- Several Joint Offshore Oil Spill Response (OSR) Standard Operating Procedure development workshops were conducted involving 13 government agencies in collaboration with the Department of Environment (DOE). The purpose of these workshops was to brainstorm on the effective methodology to overcome challenges during the response to oil spill incidents. This includes managing transportation from OSR service providers' bases to incident locations, chartering spotter aircrafts, mobilisation of equipment and experts from outside Malaysia.
- Document Guideline to request government assistance for oil spill response operations was approved during the National Oil Spill Operation Committee (NOSC) sitting.
- Conducted an Oil Spill Response Capability Assessment (OSRCA) for various PETRONAS OPU's
- Enhancement of OSR personnel capability via OSRL Masterclass IMO Level 3 and webinars.
- Organised 3 regional forums on Malaysia Oiled Wildlife Response (MOWReP) and developed new PETRONAS Technical Guideline (PTG) 18.41.02 Oiled Wildlife Response for Malaysia's government agencies and industry players.

5 Decommissioning

In 2022, we achieved the following on the decommissioning front:

- Complete the plug and abandonment of 13 wells.
- Successfully secured a preliminary agreement for the 10-year Sabah Master Reefing Plan with the Department of Fisheries (DOF), Sabah.
- Organised a Decommissioning Enhancement Workshop with Production Arrangement Contractors (PACs) and decommissioning service providers from 13 to 14 December 2022. A total of 12 papers were presented to further improve future execution of decommissioning projects. Other benefits from the workshop included clarity in future decommissioning outlook and better resource planning.
- In collaboration with DOF, the Kapal rig-to-reef site monitoring indicated a growth of fish species by ~30 per cent with an annual average fisheries' economic growth by ~5 per cent.
- Continuous active regional and international industry collaborations:
 - International Association of Oil and Gas Producers (IOGP)'s Decommissioning Committee's Expert Groups on Asset Retirement Obligations (ARO), Habitat Retention on Reefing Guidance, and Co-Chairing the IOGP Asia Pacific (APAC) Decommissioning Sub-Committee.
 - Finalised the ASEAN Council on Petroleum (ASCOPE) Decommissioning Guideline (ADG) revision draft based on inputs from the Exploration and Production Task Force (EPTF).



Biodiversity

Why Is It Important?

Biodiversity is the total sum of life on Earth comprising flora, fauna, microorganisms, ecosystems and habitats as well as the interdependent relationships between all of them. We depend on this web of life, both terrestrial and marine, to gain access to fresh water, food, medicine and a stable climate – all of which help sustain livelihoods, human health and economies.

Our inability to conserve and protect biodiversity will adversely affect the benefits it provides. For example, forests and wetlands are essential in our efforts to combat climate change by sequestering carbon while providing a habitat for various species, protecting coastlines and supporting surrounding communities as sources of livelihood. Where PETRONAS is concerned, our relationship with biodiversity is one of the impacts and dependencies where our activities could potentially impact the biodiversity around us.

At the same time, PETRONAS also depends on biodiversity and ecosystem services such as water, land and marine resources for the continuity of our operations.

As such, we are responsible for protecting and, where necessary, reversing biodiversity loss to avoid irreversible damage, which may impact our ability to deliver on our business goals and Net Zero Carbon Emissions by 2050 Pathway. Within this context, protecting Malaysia’s biodiversity is important to PETRONAS, given our large operational footprint in the country and its large potential for forest-based carbon offsets and the fact that Malaysia is one of the 17 mega diverse countries in the world, despite its small land mass.

What Is Our Approach?

In 2022, PETRONAS established our Position on Nature and Biodiversity (the Position) to improve oversight on our nature and biodiversity footprint at enterprise level and strengthen our attainment of NZCE 2050 aspiration. In establishing the Position, PETRONAS was guided by various international agreements and national policies such as the Convention on Biological Diversity (CBD) and Malaysia’s National Policy on Biological Diversity 2016-2025, as well as industry best practices from organisations such as Ipieca (i.e., the global oil and gas association for advancing environmental and social performance across the energy transition), the International Association of Oil and Gas Producers (IOGP) and the World Business Council for Sustainable Development (WBCSD). The Position consists of five areas of action that demonstrate visible leadership in nature and biodiversity conservation, harnessing the right expertise and resources to positively impact the nation and the ASEAN region.

Biodiversity and Ecosystem Services (BES) management tools applied in PETRONAS

- PETRONAS Technical Guideline (PTG) on BES Management
- Integrated Biodiversity Assessment Tool (IBAT)
- BES Risk Assessments (BESRA) and Biodiversity Action Plan (BAP)
- Environmental Impact Assessments (EIA)

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PETRONAS' Position on Nature and Biodiversity

The introduction of our nature and biodiversity position enables us to accelerate our momentum in establishing plans and ensuring internal alignment on nature and biodiversity matters. We will shape the necessary work processes, systems and establish a centralised database to ensure the smooth implementation of this positioning, which will be enforced in 2024. To operationalise the Position during 2023, PETRONAS will also strengthen our capacity and capability on nature and biodiversity, including setting up a dedicated Centre of Excellence (CoE). Moving forward, we will continue to focus our efforts in making progress in the below key focus areas:

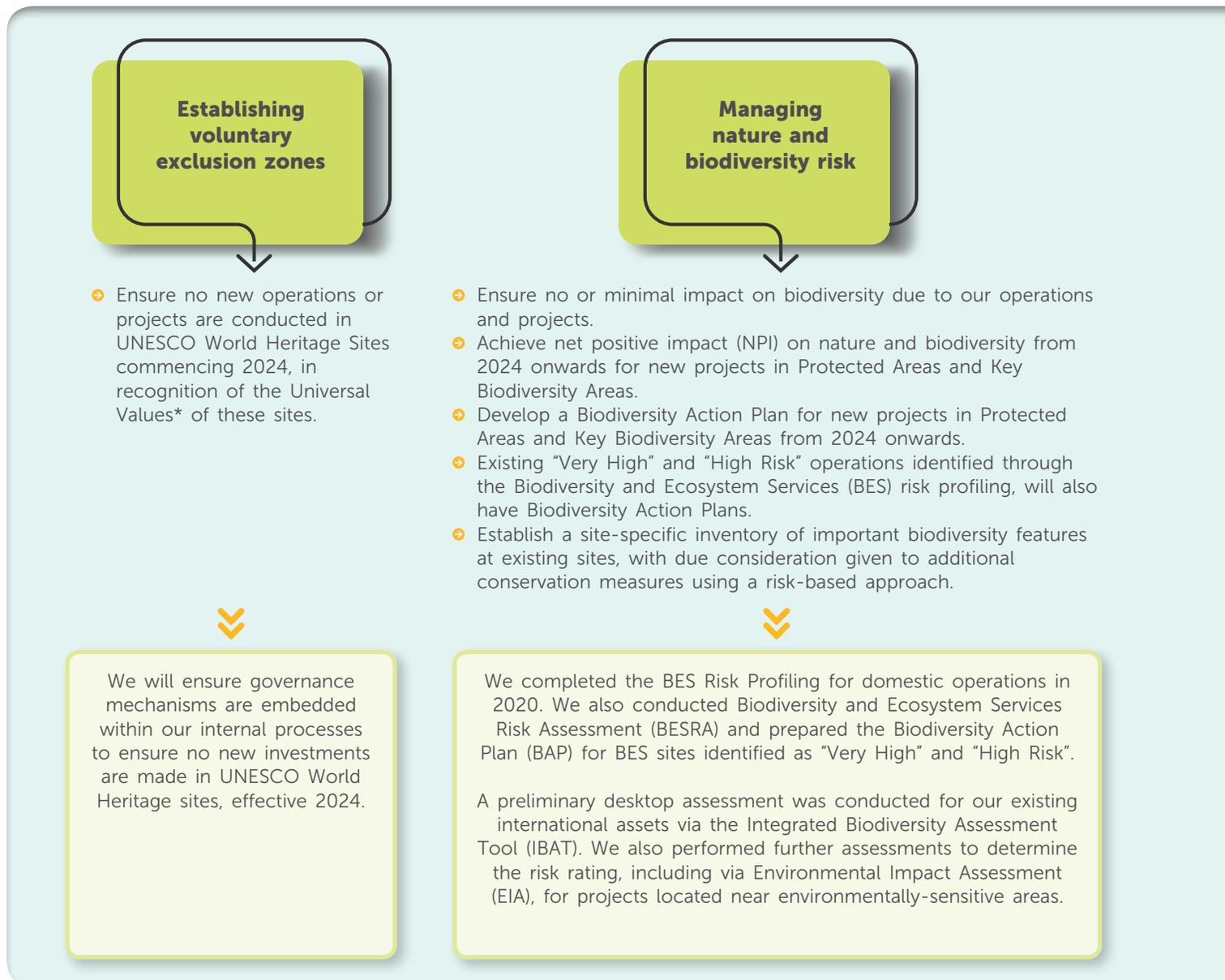


Figure 1: The Position on Nature and Biodiversity, with the work conducted on respective areas of action and/or our plan moving forward.

* Outstanding Universal Value means cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole. The Committee defines the criteria for the inscription of properties on the World Heritage List.

Promoting nature and biodiversity through partnerships and collaborations

- Support and participate in local nature and biodiversity conservation, restoration and enhancements to safeguard and protect ecosystems, habitats and endangered species in Malaysia and the countries where we operate.
- Partner with credible international organisations to leverage global best practices, international frameworks and standards.



Ongoing efforts to support biodiversity conservation were carried out via Yayasan PETRONAS' Sentuhan Alam pillar in Malaysia, and various business units of PETRONAS locally and internationally with various stakeholders from governments, non-governments, and communities through various collaborations to halt biodiversity loss. Business and operating units also implemented conservation activities in ecosystems, habitats and endangered species.

Supporting public policy that aims to protect nature and biodiversity

- To support the implementation of the Kunming-Montreal Global biodiversity Framework and Malaysia's National Policy on Biological Diversity
- Recognise policies and ambitions on nature and biodiversity in the countries where we operate.



We are members of several international biodiversity industry-level working groups such as the Ipieca Biodiversity and Ecosystem Services (BES) Working Group, the National Biodiversity Roundtable and the Malaysia Platform for Business and Biodiversity.

Promoting high-quality nature-based climate solutions

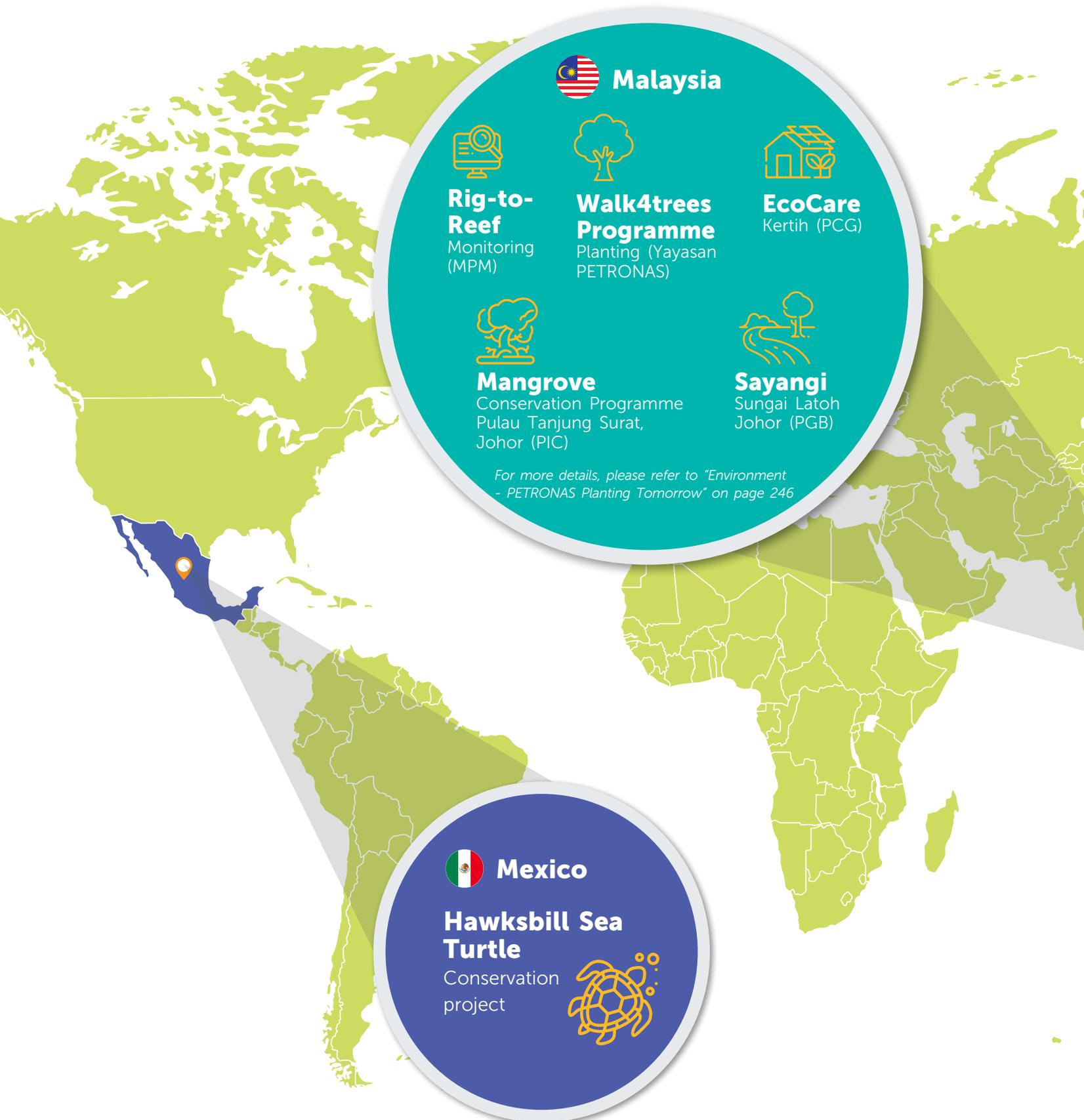
- Support nature-based carbon offsets to realise NZCE 2050.
- Actively explore and invest in opportunities in high-quality nature-based climate solutions, anchoring on credible, internationally recognised certification standards.



We believe that nature-based climate solutions form an important lever to offset residual and hard-to-abate emissions. Going forward we will identify investments that will generate high-quality carbon credits which will benefit the community and conserve the nature and biodiversity of the area.

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PETRONAS' Biodiversity Conservation Efforts Through Social Impact Around The World



Malaysia

Rig-to-Reef
Monitoring (MPM)

Walk4trees Programme
Planting (Yayasan PETRONAS)

EcoCare
Kertih (PCG)

Mangrove
Conservation Programme
Pulau Tanjung Surat,
Johor (PIC)

Sayangi
Sungai Latoh
Johor (PGB)

For more details, please refer to "Environment - PETRONAS Planting Tomorrow" on page 246

Mexico

Hawksbill Sea Turtle
Conservation project



Figure 2: Map to showcase PETRONAS’ biodiversity conservation efforts through Social Impact around the world*

For 2022, we included reporting of PETRONAS Malaysia’s operation site in Protected Areas and Key Biodiversity Areas. The activity was conducted utilising data from Integrated Biodiversity Assessment Tool (IBAT). The summary of results is shown as per Table 1 below:

Type of protected area	Within the boundary	Near (1-10km) (up to 10km outside of boundary of protected area/key biodiversity area)
World Heritage Site	0	0
Ramsar Site	0	0
IUCN Protected Area Category I-VI*	5	29
Key Biodiversity Area	1	2

Table 1: PETRONAS Malaysia’s Operations within/near Protected Areas and Key Biodiversity Areas.

* International Union for Conservation of Nature (IUCN) Protected Area categories are as below:

- Ia Strict nature reserve
- Ib Wilderness area
- II National park
- III Natural monument or feature
- IV Habitat/species management area
- V Protected landscape or seascape
- VI Protected areas with sustainable use of natural resources

IUCN management categories are voluntary for countries to apply to their protected areas and are not being used by all countries. However, for the purpose of standardisation of reporting for PETRONAS operations globally, these categories will be used.