Biodiversity and Ecosystem Services Risk Assessment & Progress Report

Commitment

PTTEP realizes the importance of compliance with relevant laws and regulations as well as responsibility for the community, society, and the environment in all operating area to reduce both direct and indirect impacts on biodiversity. PTTEP is committed to Biodiversity and No Deforestation, by setting **targets** to

- Achieve Net Positive Impact of Ocean Biodiversity and Ecosystem Services (Ocean BES) value in all offshore operations by 2030.
- Achieve No-Net Loss of biodiversity in protected areas as defined by the International Union for Conservation of Nature (IUCN) Category I-IV protected areas by 2044.
- Avoid operating in World Heritage sites as defined by UNESCO.
- Achieve No Gross Deforestation* for E&P from 2021 onwards.

**The Food and Agriculture Organization (FAO) defines a forest as natural forests and forest plantations that have tree canopy covers more than 10 percent and areas of more than 0.5 hectare. The trees should be a minimum height of 5 meters. Forests are determined both by the presence of trees and the absence of other predominant land uses.*

The commitments stated above cover all PTTEP activities and work boundaries including:

- All of PTTEP's own operations and adjacent areas, including existing and future operations globally.
- All contractors, suppliers within PTTEP value chain (direct and indirect) for both PTTEP upstream and downstream activities.

Scope

The scope of this biodiversity and ecosystem services risk assessment and progress report covers PTTEP's own operations and adjacent areas, upstream and downstream activities (PTT, Thailand). This report also presents details on risk assessment approach, outputs, and risk management actions.

Approach

PTTEP manages biodiversity and ecosystem service risks by integrating them into a **company-wide risk management process.** PTTEP developed the Biodiversity and Ecosystem Services (BES) Management

Guideline in line with IPIECA's "A Guide to Developing Biodiversity Action Plans for the Oil and Gas Sector" and International Finance Corporation (IFC)'s Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

The Biodiversity and Ecosystem Services Risk Assessment, implemented since 2017, showed that no project possessed high biodiversity risks. The assessment was based on **location-specific approach with project activities**, e.g. operation located in close proximity to the critical biodiversity.

In addition, PTTEP conducts **dependency and impacted-related risks assessments** for the operations located in close proximity to the critical biodiversity using **WWF's Water and Biodiversity Risk Filter**.

Assessment Output

The results from the biodiversity risk assessments are summarized below.

1. Own Operations and Adjacent Areas of Own Operations

PTTEP has conducted biodiversity and ecosystem service risk assessments on all its own operations and adjacent areas globally as follow.

	Number of sites	Areas (Hectares)
Total number of sites and areas used for operational activities	11	2,923,295
Total number of sites and areas conducted for biodiversity impact assessments	11	2,923,295
Total number of sites and areas in close proximity to critical biodiversity	2	23,374
Total number of sites and areas in close proximity to critical biodiversity that have a biodiversity management plan	2	23,374
Total number of sites and areas in close proximity to critical biodiversity that the progress of biodiversity management plans are monitored	2	23,374

For more details on the assessment results, please refer to the Environmental Performance Data.

From the assessment, PTTEP has identified two operations that are in close proximity to critical biodiversity. The first is Sinphuhorm Project, an onshore natural gas field located in Udon Thani and Khon Kaen provinces in Thailand. The second, Zawtika Onshore Gas Transportation Project, located in Dawei, Myanmar. PTTEP conducted further assessment on these two operations including ecosystem service assessment, natural habitat and modified habitat assessment, critical habitat assessment and no-net loss/net gain assessment. Outputs from the assessment were used for development of biodiversity offset management plan for these two operations.

Based on the **WWF Water Risk Filter and Biodiversity Risk Filter results**, Sinphuhorm is at risk of water scarcity, however this does not mean it has high dependency on water due to PTTEP's business operations. Both sites are vulnerable to natural hazards such as extreme heat, tropical cyclones, and drought, while Sinphuhorm is also at risk of floods. Both sites have high pressure on biodiversity, specifically on pollution and deforestation, while Sinphuhorm also is at risk of land and freshwater use change.

2. Upstream and Downstream Activities

PTTEP's upstream and downstream activities in Thailand have been assessed for biodiversity risks by focusing on PTT, which is one of the key suppliers and key customer of PTTEP. From PTT location-specific assessment to identify risk and impact of its operation to the key biodiversity, PTT one high risk area has been identified from its five total operating sites in Thailand: Khanom Natural Gas Separation Plant, in Nakhon Sri Thammarat province.

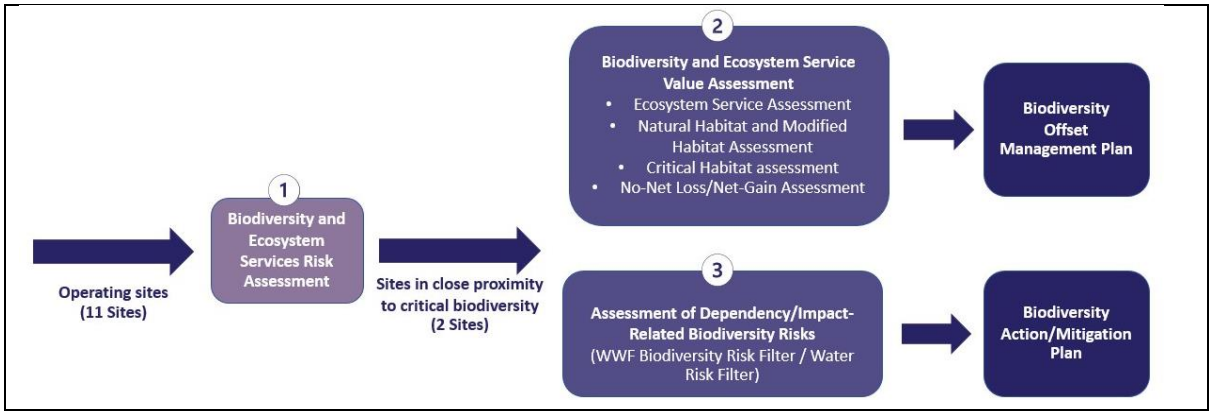
Summary of PTT biodiversity and ecosystem services risk assessment is shown below:

	Number of sites	Areas (Hectares)
Total number of sites and areas used for operational activities	5	208.16
Total number of sites and areas conducted for biodiversity impact assessments for sites used for operational activities	5	208.16
Total number of sites and areas in close proximity to critical biodiversity	1	7.52

	Number of sites	Areas (Hectares)
Total number of sites and areas that have a biodiversity management plan	1	7.52
Total number of sites and areas that have impact to IUCN Red List species and/or species on the national conservation list	1	7.52

Biodiversity and Ecosystem Services Risk Assessment

1. Own Operations and Adjacent Areas of Own Operations



PTTEP screens all of its existing operations and adjacent areas globally through the *Biodiversity and Ecosystem Services Risk Assessment,* which also incorporate the results from Integrated Biodiversity Assessment Tool (IBAT), to determine operations sites in close proximity to critical biodiversity. The assessment was conducted in 2017 and reviewed in 2021. The assessment process is location-specific and integrated into a company-wide risk management process.

From the assessment, PTTEP has identified two operations that are in close proximity to critical biodiversity from a total of eleven sites used for operational activities globally. The first is Sinphuhorm Project, an onshore natural gas field located in Udon Thani and Khon Kaen provinces in Thailand. The second, Zawtika Onshore Gas Transportation Project, located in Dawei, Myanmar. PTTEP conducts further assessment on the two operations. The assessment includes ecosystem service assessment, natural habitat and modified habitat assessment, critical habitat assessment and no-net loss/net gain assessment. The assessment outcomes are used for determination of "Biodiversity Offset Management Plan" to achieve no-net-loss/net-gain of natural habitats in the operating area and significantly improve conservation outcomes for numerous native species, including those with special conservation status.

PTTEP uses standard methodologies, specifically the **WWF Water Risk Filter and Biodiversity Risk Filter** to assess dependency and impact of the two operations with biodiversity identified risk. The assessment cover sensitivity analysis (e.g. water scarcity). The results show Sinphuhorm is at risk of water scarcity, however this does not mean it has high dependency on water due to PTTEP's business operations. Both sites are vulnerable to natural hazards such as extreme heat, tropical cyclones, and drought, while Sinphuhorm is also at risk of floods. Both sites have high pressure on biodiversity, specifically on pollution and deforestation, while Sinphuhorm also is at risk of land and freshwater use change. Details of biodiversity and ecosystem services risk assessment results are summarised in table below.

Scape Physical Risk	Risk Types	Sinphuhorm	Zawtika
1. Provisioning Services	1.1 Water Scarcity	3.85	2.8
	1.2 Limited Timber Availability	3	2.5
	1.3 Limited Wild Flora & Fauna Availability	No dependency or impact	No dependency or impact
	1.4 Limited Marine Fish Availability	NA	NA
2. Regulating & Supporting Services - Enabling	2.1 Soil Condition	No dependency or impact	No dependency or impact
	2.2 Water Condition	2.5	2
	2.3 Air Condition	3.5	3
	2.4 Ecosystem Condition	No dependency or impact	No dependency or impact
	2.5 Pollination	No dependency or impact	No dependency or impact
3. Regulating Services - Mitigating	3.1 Landslides	3	4
	3.2 Fire Hazard	3.5	3
	3.3 Plant/Forest/Aquatic Pests and Diseases	No dependency or impact	No dependency or impact
	3.4 Herbicide Resistance	No dependency or impact	No dependency or impact
	3.5 Extreme Heat	4	3.5
	3.6 Tropical Cyclones	4	3.5
4. Cultural Services	4.1 Tourism Attractiveness	No dependency or impact	No dependency or impact
5. Pressures on Biodiversity	5.1 Land, Freshwater and Sea Use Change	4.25	3
	5.2 Deforestation	4	5
	5.3 Invasives	2.5	2
	5.4 Pollution	4	3.75
6. Environmental Factors	6.1 Protected/Conserved Areas	3.5	5
	6.2 Key Biodiversity Areas	3.5	4
	6.3 Other Important Delineated Areas	3.5	3.5
	6.4 Ecosystem Condition	3.12	4.12
	6.5 Range Rarity	3	4
7. Socioeconomic Factors	7.1 Indigenous Peoples (IPs); Local Communities (LCs) Lands and Territories	NA	NA

Scape Physical Risk	Risk Types	Sinphuhorm	Zawtika
	7.2 Resource Scarcity: Food - Water - Air	2.85	2.5
	7.3 Labor/Human Rights	4	4.25
	7.4 Financial Inequality	2	1.5
8. Additional Reputational Factors	8.1 Media Scrutiny	4	3.5
	8.2 Political Situation	3.38	3.62
	8.3 Sites of International Interest	2	2
	8.4 Risk Preparation	2.5	3

2. Upstream and Downstream Activities

The Khanom Natural Gas Separation Plant in Nakhon Sri Thammarat province, Thailand, is identified as a high-risk area based on the biodiversity risk assessment of upstream and downstream activities. PTT (Public Company Limited) is implementing mitigation measures and taking appropriate actions to address the impact on biodiversity and ecosystem services.

Risk Management

To manage biodiversity and ecosystem services risks, PTTEP has taken the following actions in corporate wide in accordance with the biodiversity mitigation hierarchy.

Avoidance: The first and most important step is to avoid activities or projects that could cause significant harm to biodiversity. PTTEP focuses on avoiding operations in critical biodiversity areas including World Heritage sites as defined by UNESCO. The company also has had no activity in the forestry and ensured 100% implementation and compliance with the group-wide commitment, forest regulations, and mandatory standards since 2021. The evaluation of the compliance level has been introduced via internal and external monitoring and compliance audits.

Minimization: The step of biodiversity impact minimization using best practices, innovative design, and technology. The goal is to reduce the scale and intensity of the impacts to the lowest possible level. PTTEP reduces biodiversity risks by integrating them into the Environmental Impact Assessment of all E&P projects as well as impose mitigating plan at projects with a biodiversity risks. PTTEP has completed the voluntary Biodiversity Action Plan or Biodiversity Management Plan for all operational assets that possess medium-level risks. The Company also organized workshops to enhance knowledge and understanding on biodiversity for personnel working in areas of moderate risk level.

Moreover, PTTEP updates the Vendor Sustainable Code of Conduct to ensure the effective protection and preservation of the biodiversity and ecosystem services and compliance with all commitments. The Code of

Conduct will be integrated as part of the pre-qualification system for vendor acknowledgment. To monitor the compliance of vendors and suppliers, they will be tracked via the acknowledgment on the electronic system. This will enhance vendors' and suppliers' awareness, management, and mitigation of biodiversity and ecosystem services risks.

Restoration & Regeneration: The next step is to restore or rehabilitate any biodiversity that may have been affected. This involves activities such as habitat restoration, reforestation, or the creation of artificial habitats to ensure the biodiversity and ecological functions are restored closely to a level comparable to the pre-development condition. Furthermore, PTTEP has embarked on a reforestation program, involving the planting of native tree species in areas where habitats for diverse flora and fauna have been destroyed. These programs play a crucial role in fostering biodiversity and ecosystem development, promoting sustainability. Notably, the outcomes of these efforts have been verified and certified by reputable carbon standards, such as T-VER or Verra.

Offset: The residual impacts remain after implementing avoidance, minimization, and restoration measures, the offset in the final step is to provide compensation or offset measures. This involves implementing conservation actions elsewhere to compensate for the remaining impacts.

The two operations of Zawtika and Sinphuhorm were identified from biodiversity risk assessment that are in close proximity to critical biodiversity, PTTEP developed Biodiversity Offset Management Plan (BOMP) for operation locating in sensitive areas (ZTK & SPH) and BOMP implementation tracking tool in order to monitor the completeness of actions state in BOMP.

In addition, PTTEP implements the BES offsetting through Ocean for Life projects such as Rig to Reef, Mangrove Forestation, Conservation Area & Fish Home, and H.T.M.S. submerged programs. The Rig to Reef project explores suitable approaches to place artificial reefs. The Mangrove Forestation project aims to create coastal nurseries by expanding mangrove forests to cover 45,000 rais of land, the project serves as a natural carbon sink, increases benthos species, and establishes a forest and environment conservation network. Moreover, PTTEP has implemented a sea turtle conversation program as well as established an aquatic animal hatchery learning center to conserve and promote economic aquatic animal aquaculture. Lastly, PTTEP implemented the H.T.M.S submerged program, a man-made dive site, built to be a new home for corals and marine animals as well as to reduce impacts on the natural coral reefs that are recovering from coral bleaching.

Furthermore, PTTEP is actively transforming its forestation projects through collaboration with Varuna through the use of “Smart Forest Solution”. This involves the use of survey drones, satellites, and proprietary artificial intelligence (AI) models to analyze forestation area. The solution enables the monitoring and management of large green areas for carbon credit calculation and risks identification of possible wildfires.

Engagement with Stakeholders: PTTEP monitors ocean health and biodiversity in collaboration with stakeholders and external parties such as the governments, leading universities, and sustainability-related independent organizations by developing PTTEP ocean data platform. This Platform links with the national database to monitor underwater biodiversity and marine endangered species like turtles and whale sharks. The platform also includes the results of various ecosystem and coastal activity surveys conducted through drone and advanced technology to be used as the key inputs for researchers and related authorities to support ocean sustainability.

Performance

In 2022, PTTEP reached the following achievements, demonstrating our strong commitment to conserve biodiversity and prevent deforestation.

- No gross deforestation in E&P in 2022.
- 44.7% net positive impact on ocean biodiversity and ecosystem services (BES) values in all offshore operations.
- 3,563 of conservation networks.
- 1,000-rai mangrove plantation and obtained approval of mangrove areas of 4,000 rais.
- More than 100,000 participants attending sustainability conferences and sessions jointly supported by PTTEP and various collaboration networks.
- Completed a feasibility study for plantation of seagrass as a mean of offset carbon.
- More than 600 views of PTTEP's Ocean Data Platform that includes meteorological and oceanographic data and PTTEP's project implementation.
- Biodiversity Offset Management Plan (BOMP) for operation locating in sensitive areas (ZTK & SPH)
- BOMP implementation tracking tool for ZTK and SPH in order to monitor the completeness of BOMP

Please find more details on PTTEP's 2022 Sustainability Report.

(Information as of May 2023)