

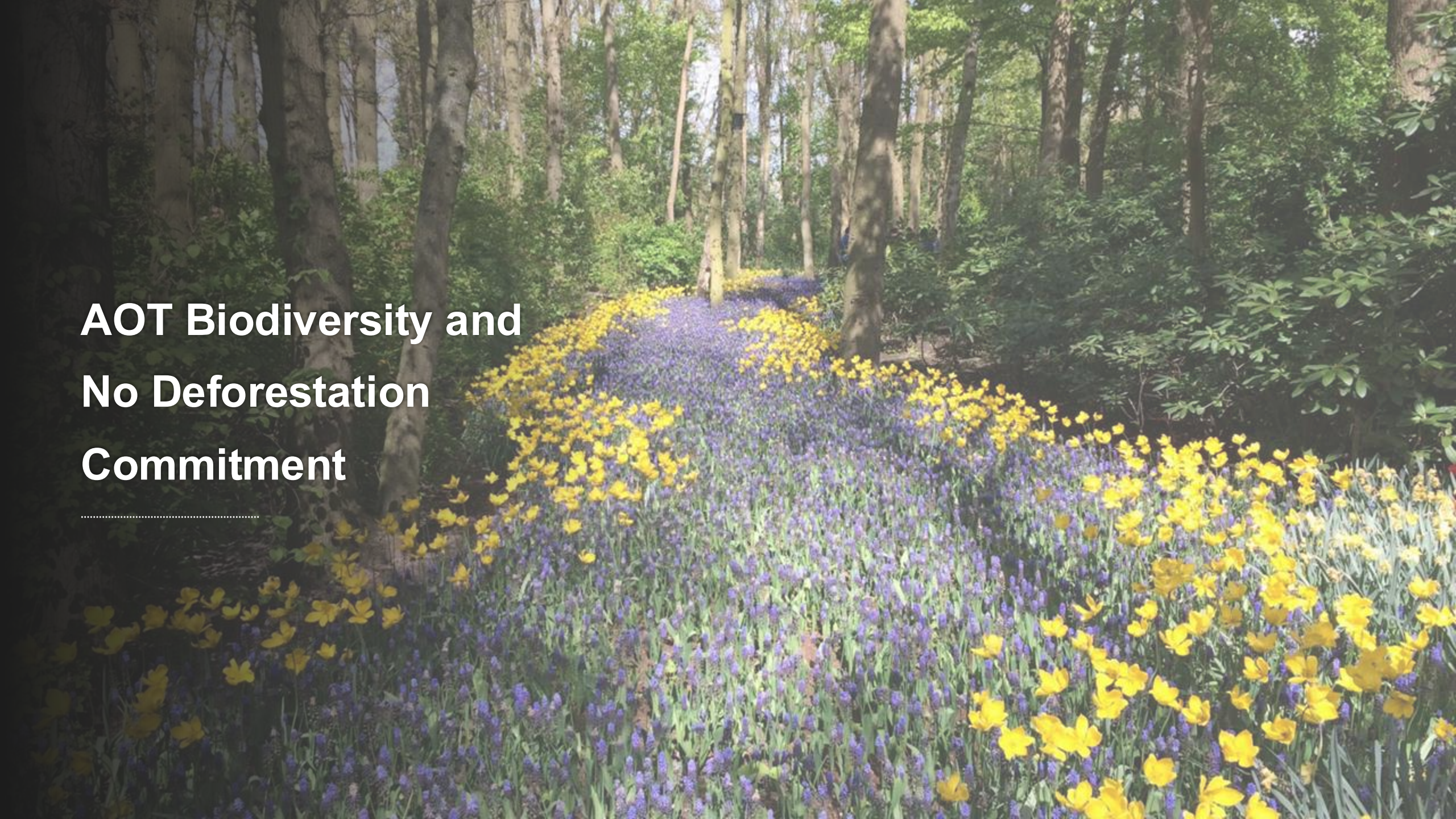
An aerial photograph taken from the perspective of someone looking out of an airplane window. The right side of the frame is dominated by the white wing and engine nacelles of the aircraft. Below the wing, a vast, rugged mountain range stretches across the landscape, covered in dense green forests. The mountains are characterized by sharp peaks and deep, shadowed valleys. The sky above is a mix of bright blue and large, fluffy white clouds. The overall scene conveys a sense of high altitude and natural beauty.

Biodiversity Report

Outline

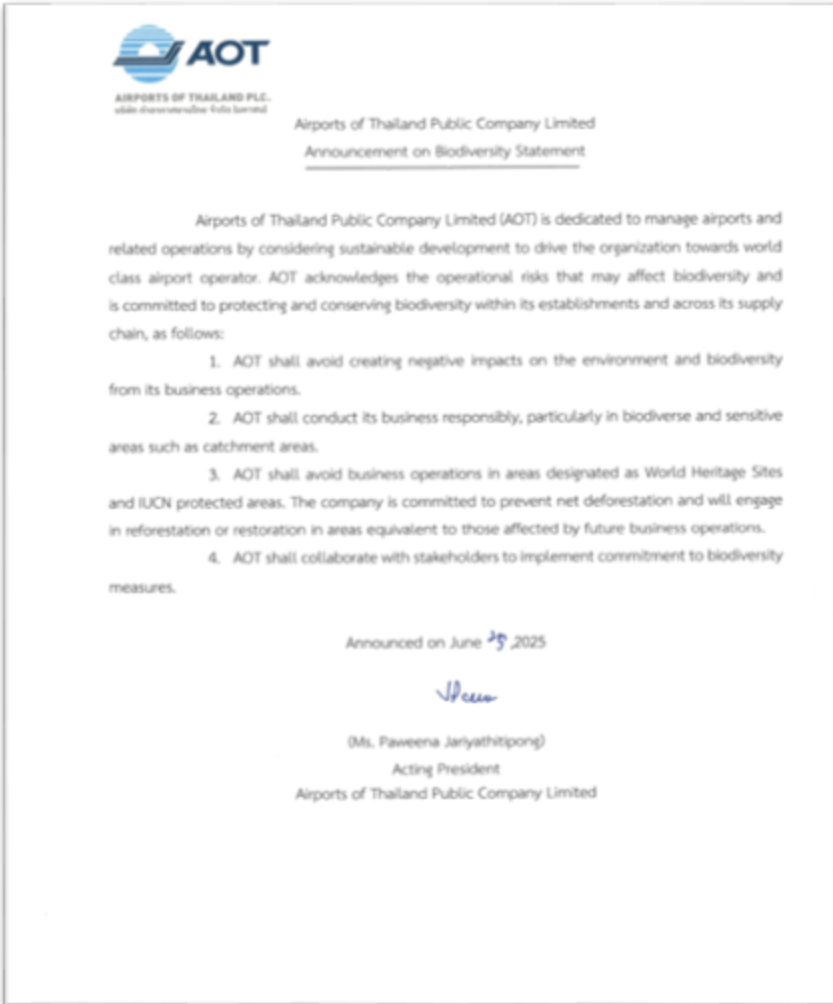


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A photograph of a forest floor covered in a dense carpet of yellow and purple flowers. The flowers are in full bloom, creating a vibrant, colorful ground cover. Tall, slender trees with green foliage stand in the background, their trunks visible against the bright sky. The scene is bathed in natural light, highlighting the textures of the flowers and the bark of the trees.

AOT Biodiversity and No Deforestation Commitment

AOT Biodiversity Commitment



Airports of Thailand Public Company Limited (AOT) is committed to management and operate airports by adhering to the best practices on airport environmental management and to become international airports that are sustainable and friendly to the environment and the community. AOT recognizes the importance of biodiversity and seeks to **promote biodiversity awareness and actions across the value chain, including suppliers and customers**. Besides, this has been included an **avoidance of operation activities near sites containing globally or nationally important biodiversity of value chain**. While regarding no deforestation as an integral part in biodiversity conservation, **AOT intends to compensate and reserve the protected area through the reforestation program towards no net loss annually** and aims to limit the impact on biodiversity and deforestation in compliance with our Airport Environmental Management Policy and applicable regulations. This includes but not limited to the following activities;

- Conducting biodiversity impact assessment, mitigation and monitoring measures according to Environmental Impact Assessment (EIA) and Environmental Impact and Health Impact Assessment (EHIA) Reports.
- Monitoring environment quality, both terrestrial and aquatic ecosystem, and developing a system for data collection, reporting and verification to enhance transparency and disclosure of airport environmental system.
- Limiting biodiversity impact that may be caused by airport waste and wastewater by implementing circular economy principles, enhancing resource utilization efficiency, minimize waste and effluents that may cause negative impacts on ecosystem.
- Engaging with employees, value chain partners, and business partners to ensure operational activities avoid or minimize impacts on sites containing globally or nationally important biodiversity and sensitive ecosystems.
- Adopting the application of a mitigation hierarchy, i.e., avoid, minimize, restore, and offset, as an approach to initiate the biodiversity management.

<https://corporatestrategy.airportthai.co.th/wp-content/uploads/2025/08/%E0%B8%9B%E0%B8%A3%E0%B8%B0%E0%B8%81%E0%B8%B2%E0%B8%A8%E0%B8%84%E0%B8%A7%E0%B8%B2%E0%B8%A1%E0%B8%A1%E0%B8%B8%E0%B9%88%E0%B8%87%E0%B8%A1%E0%B8%B1%E0%B9%88%E0%B8%99%E0%B8%94%E0%B9%89%E0%B8%B2%E0%B8%99%E0%B8%84%E0%B8%A7%E0%B8%B2%E0%B8%A1%E0%B8%AB%E0%B8%A5%E0%B8%B2%E0%B8%81%E0%B8%AB%E0%B8%A5%E0%B8%B2%E0%B8%A2%E0%B8%97%E0%B8%B2%E0%B8%87%E0%B8%8A%E0%B8%B5%E0%B8%A7%E0%B8%A0%E0%B8%B2%E0%B8%9E%E0%B8%82%E0%B8%AD%E0%B8%87-%E0%B8%97%E0%B8%AD%E0%B8%97.pdf>

Targets on Biodiversity and Reafforestation AOT's Biodiversity



AOT's Biodiversity and Reafforestation Commitments and Targets

Restoring and expanding the mangrove forest area by planting 9,999 seedlings per year in collaboration with biodiversity partner organizations until 2025 at least, starting from 2014.

Strategic Partners

- Bangpu Nature Education Center
- Provincial Administrative Organization
- Local schools and communities



Airport Environmental policies related to biodiversity



Airport Environment Management Policy



Airports of Thailand public Company Limited

Announcement on Airport Environmental Management Policy

With our commitment to manage and operate airports by adhering to the best practices on airport environmental management and to become international airports that are sustainable and friendly to the environment and the community, Airports of Thailand Public Company Limited (AOT) has formulated environmental management policy as follows:

- AOT shall preserve the environment in compliance with environmental mitigation and monitoring measures, which are stated in Environmental Impact Assessment (EIA) and Environmental and Health Impact Assessment (EHIA) Reports, approved by the National Environment Board.
- AOT shall run airport business, related activities and services by considering environmental concerns beyond national and international regulations and standards.
- AOT shall monitor environment quality as well as develop a system for data collection, reporting and verification to enhance transparency and disclosure of airport environment system.
- AOT shall plan the development of airports and related facilities under AOT's responsibility through design, construction and operation processes to increase efficiency of energy consumption and resource utilization by adopting new green innovation or technology throughout airports' system.
- AOT aims to achieve low-carbon airports by adopting global carbon reduction target while integrating climate change adaptation measures into current airport operation and the design of new facilities.
- AOT shall use natural resources attentively to maximize the benefit while minimize environmental impacts by applying circular economy principle to enhance the efficiency of resources utilization in every operation in order to minimize waste disposal.
- AOT shall install wastewater management system that covers entire water cycle including water consumption and wastewater treatment by ensuring that water quality complies with related regulations. AOT shall monitor water quality continuously as well as

8. AOT shall engage and guide AOT staff and all stakeholders including subsidiaries, business partners, concessionaires, contractors, suppliers and other outsourcing partners to increase value of services while reducing environmental footprint throughout their operations and logistics.

9. AOT shall include environmental management cost as a part of due-diligence, mergers or acquisitions process if any.

Announced on August 11, 2020


(Mr. Nitinai Sinsamattarakul)
President
Airports of Thailand Public Company Limited

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Airport Environmental Policy



Airports of Thailand public Company Limited

Announcement on Environmental Policy

Airports of Thailand Public Company Limited (AOT) is dedicated to managing airports in accordance with best environmental practices, guided by the vision of becoming a leading international eco-airport that is environmentally friendly and sustainable to the community. "Moving toward international Leading Eco-Airport," AOT acknowledges the importance of utilizing resources and energy efficiently and reducing greenhouse gas emissions, aiming to achieve net-zero greenhouse gas emissions by the year 2045. Therefore, AOT has established the following environmental policy:

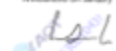
- AOT is committed to becoming a net-zero greenhouse gas emissions airport in line with the national and international targets. This includes integrating measures to reduce greenhouse gas emissions and address climate change, both for current operations and the design of new facilities. AOT will promote the use of renewable energy within airports and AOT's assets, ensuring it is appropriately and sufficiently aligned with the total electricity consumption. Additionally, AOT will encourage the use of electric vehicles and clean energy vehicles by both AOT and stakeholders.
- AOT provides, supports, and prepares facilities for airlines to use Sustainable Aviation Fuel (SAF).
- AOT shall establish an Airport Environmental Fund as a mechanism to address environmental issues and support the sustainable development of the communities surrounding the airport.
- AOT shall manage the airport environment in accordance with best practices to prevent and mitigate impacts, control, and reduce the effects of business operations on the community, ecosystem, and biodiversity as follows:
 - Management of airport noise impacts by ensuring compliance with applicable regulations and laws.
 - Comprehensive waste management, applying circular economy principles to minimize the amount of waste to be disposed of, aiming for zero waste disposal outside the airport.
 - Systematic water management for both use water and wastewater, increasing the recycling of treated water that meets quality standards for reuse to reduce water resource consumption, with the goal of achieving zero wastewater discharge outside the airport.

5. AOT shall monitor and track environmental quality, as well as develop data collection system, reporting and verification to ensure transparency and disclosure of airport environment system.

6. AOT shall promote the involvement of executives, employees, and stakeholders in the development of environmental policies, training, and raising awareness on reducing environmental impacts, managing greenhouse gases, and optimizing the use of resources and energy, while ensuring that the organization continues to business advancement in accordance with sustainable development.

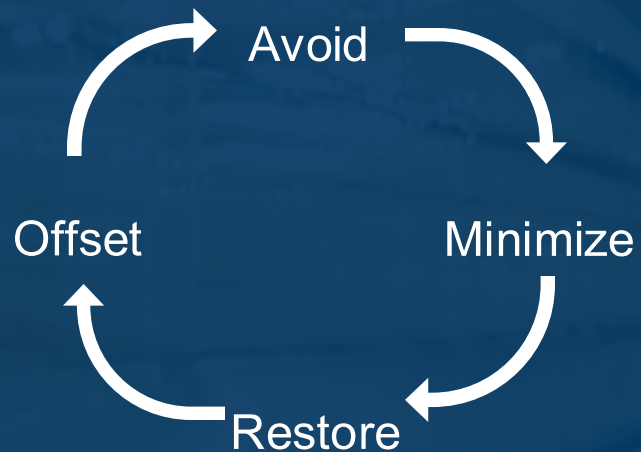
7. AOT shall consider environmental management costs throughout its entire supply chain, including all AOT operations, activities, and future business ventures in the event of mergers or acquisitions process.

Announced on January 16, 2025


(Mr. Nopon Jitprasert)
President
Airports of Thailand Public Company Limited

<https://corporatestrategy.airportthai.co.th/wp-content/uploads/2025/04/%E0%B8%99%E0%B9%82%E0%B8%A2%E0%B8%9A%E0%B8%B2%E0%B8%A2%E0%B8%94%E0%B9%89%E0%B8%B2%E0%B8%99%E0%B8%AA%E0%B8%B4%E0%B9%88%E0%B8%87%E0%B9%81%E0%B8%A7%E0%B8%94%E0%B8%A5%E0%B9%89%E0%B8%AD%E0%B8%A1%E0%B8%82%E0%B8%AD%E0%B8%87%E0%B8%97%E0%B8%AD%E0%B8%97.pdf>

AOT Biodiversity Commitment on Application of a mitigation hierarchy



Avoid: The measures taken to anticipate and prevent adverse impacts on biodiversity

Minimize: Measures taken to reduce the duration, intensity, significance and/or extent of impacts that cannot be completely avoided.

Restore: A measures taken to repair degradation or damage (features identified as targets for mitigation) to specific biodiversity and ecosystem services for the project impacts that cannot be completely avoided and/or minimized.

Offset: A compensation measures resulted from action that cannot be avoided minimized and/or rehabilitated/restored. This is to achieve no net loss or a net gain of biodiversity.

Preventive

Remediative



Biodiversity Risk Assessment

Biodiversity Risk Assessment: Introduction



AOT assessed the Biodiversity risk for all operation site with the **WWF biodiversity risk filter (WWF BRF)**. This tool is used in specifying the severity relevant to the particular risk of biodiversity, i.e., physical and transition risk. It is a tool for assessing the potential risks and impacts on biodiversity associated with a company's operations as a location-specific approach. The tool is designed to be used by companies as corporate-level screening and prioritization tools to identify risk hotspots and opportunities across direct operations and value chains. By using spatially- explicit global data sets and similar risk assessment frameworks, both tools provide location-specific and sector-specific assessments of different physical, regulatory and reputational risks, with the objective to help companies better prioritize where and on what to focus contextual responses as well as inform their stewardship strategy and target setting.



Biodiversity Risk Assessment: Methodology



Risk type	Risk category
Physical risk	INPUTS: Lack of natural inputs Production inputs extracted from nature (including feed, raw materials, and genetic material) become locally scarce or inaccessible
	ENABLERS: Lack of natural enablers of business productivity Lack of ecosystem services as enablers of production processes, including cultivation of crops or breeding of animals but also access to extraction sites
	DISTURBANCES: Acute disturbance of value chain or operations Natural hazards disrupting projects, operations, or entire value chains
	ATTRACTIVENESS: Decline in attractiveness of land-/basin-/seascapes or specific sites Landscapes or specific sites that companies depend on (e.g., for tourism or education) become increasingly unattractive
	VULNERABILITY: Increasing vulnerability of ecosystems to the effects of business activities Land, basin, and seascapes become increasingly unable to remediate adverse effects from business activities (e.g., effects on nutrient balances) and may potentially require further interference to stay productive
Regulatory risk	CURRENT LEGISLATION: Risk of project/operation-specific interventions Risk of current legislation leading to restriction of operations at certain sites of operation, requirements or delays to specific projects, litigation, and/or fines
	FUTURE LEGISLATION – SITES: Risk of new site-specific restrictions and requirements Risk of forthcoming regulation leading to stranded assets or restricted operations, e.g., due to additional areas being designated as protected or conserved
	FUTURE LEGISLATION – ACTIVITIES: Risk of new activity-specific restrictions and requirements Risk of forthcoming regulation leading to new mandatory standards (e.g., thresholds, taxation, prohibition) on resource extraction, cultivation, or production processes that cause non-compliant firms to face restrictions or miss out on subsidies
Reputational risk	ENVIRONMENTAL: Reputation damage due to environmental impact Negative publicity concerning company's environmental sustainability performance (impact on environmental assets), causing direct brand damage, loss of consumer demand and investor scrutiny
	SOCIAL: Reputation damage due to social impact Negative publicity concerning company's social sustainability performance impact on social assets, causing direct brand damage, loss of consumer demand, investor scrutiny and social unrest
	ECONOMIC: Reputation damage due to impact on local economic capabilities Negative publicity concerning company's impact on the economic capabilities and development of a region, causing direct brand damage, loss of consumer demand, investor scrutiny and social unrest
Market risk	INPUTS: Input price increases Risk of production cost increases due to restrictions on sourcing or use of certain resources, or decline of global abundance of a resource
	COMPETITION: Declining brand and value proposition (relative to competitors) Companies are perceived to perform worse on biodiversity than direct competitors and lose market share and investor goodwill

Biodiversity-related risks constitutes four risk types, i.e., physical risk, regulatory risk, reputational risk, and market risk, which are grouped into physical risk and reputational risk as a result for identified risk. The risk can also be the occasional term by the opportunities related biodiversity risk, including scape-based, operation-based, and market-based opportunities. These risk areas allow the implementation toward the opportunities that can return the value to business and operation.

Opportunity type	Response option category – what does nature need?	Potential benefits for businesses	Opportunity type	Response option category – what does nature need?	Potential benefits for businesses
Scape-based opportunities: Allowing firms to realize benefits by supporting the preservation or restoration of specific places	Conservation: Businesses can directly support the conservation of specific sites, land-/basin-/seascapes, or entire ecosystems through instruments like funding or technical assistance	• Permission to operate at local sites (e.g., mining concessions) • CSR stories and materials based on verified contributions • Marketable credits for certified projects (e.g., PES = Payment for Ecosystem Services) • New revenue streams from commercialization of nature-based products • Local use of own products and services	Market-based opportunities: Allowing firms to realize benefits by catering to market participants' needs or desires for biodiversity-friendly products and value chains	Efficient and circular production systems: Create and support sustainable, eco-efficient and circular value chains through significant improvements in natural resource use, emissions, and waste for existing products	• Reduced production costs • Enhanced brand image to consumers, investors and in recruiting
	Addressing pressures: Businesses can help combat specific pressures on biodiversity by • Eliminating sources of pressure (e.g., poaching) • Mitigation of impact (e.g., removing invasives)	• Permission to operate at local sites (e.g., mining concessions) • CSR stories and materials based on verified contributions • Local use of own products and services • New revenue streams from commercialization of nature-based products		New resource-efficient business models: Create and support eco-efficient and circular value chains through consumer end products and services that radically reduce biodiversity impact (e.g., Product-as-a-Service models)	• Enhanced brand image and specifically value proposition to consumers
	Restoration: Businesses can support the restoration of habitats and entire ecosystems	• Permission to operate at local sites (e.g., mining concessions) • CSR stories and materials based on verified contributions • Marketable credits for certified projects (PES = Payment for Ecosystem Services) • New revenue streams from commercialization of nature-based products • Local use of own products and services		Enablers of biodiversity-safe business: Develop product and service innovations that reduce the biodiversity impact of other sectors, especially in resource extraction and cultivation (e.g., precision farming tools)	• Opportunity to capture B2B demand for such products and services • Enhanced brand image to consumers, investors, and in recruiting
Operation-based opportunities: Allowing firms to realize benefits by changing practices in ways that benefit or prevent harm to biodiversity	Sustainable policies: Businesses can advocate for policy changes that facilitate business in harmony with nature	• Permission to operate at local sites (e.g., mining concessions) • Local use of own products and services		Biodiversity-positive products: Develop product and service innovations that benefit biodiversity (e.g., soil-replenishing seeds, targeted pest control)	• Opportunity to capture B2B/B2P/B2C demand for such solutions • Enhanced brand image to consumers, investors, and in recruiting
	Integrate improved production systems: Significant improvements in natural resource use, emissions, pollution, and waste for existing products	• Reduced production costs • Enhanced brand image • Enhanced value proposition to consumers			

Biodiversity Risk Assessment: Methodology

AOT uses the WWF biodiversity risk filter (WWF BRF) in assessing the biodiversity-related risk with three core functionalities regarding the step of The BRF tool, i.e., inform, explore, and assess.



- **Inform** Understand sector-level impacts and dependencies.
- **Explore** The spatial component is added, and high risk and opportunity areas are shown globally. Companies can identify and focus on high-risk locations and places to prioritize parts of the value chain that will be mapped at site level.
- **Assess** Risks and opportunities are assessed across value chains and key issues and locations identified. The tool provides a detailed assessment of risk and opportunity types across all provided company locations. This will allow companies to identify high-risk and opportunity locations, investigate their underlying causes, and prioritize areas for action.
- **Respond** Identify appropriate corporate-level response options from the offered portfolio of actions. Responses are fitted to specific issues and locations (e.g., changing resource extraction or cultivation practices on the ground; engaging with suppliers; meeting certification standards; contributing to conservation, restoration, and remediation; engaging with local communities, etc.).

Biodiversity Risk Assessment Process



Scoping the assessment

*Defining the specific industry for the indicators harmonized with the biodiversity risk assessment. This process can specify both “**dependency-related and impact-related biodiversity risk assessment**”.*

Selecting the location for assessment

Selecting the specific operational location to perform the biodiversity risk assessment.

Biodiversity-related risk assessment

The results based on the selected locations come up with the biodiversity-related risk of each BRF indicators in accordance with the industrial context.

Interpreting biodiversity risk to the company

The consequences associated with each indicator show the relevant implication of the physical and reputational risks to the company.



Biodiversity Risk Assessment: Scoping the assessment

The industry materiality, including dependencies and impacts. The specific context of AOT is the transportation Service. The specific BRF indicators consists of scape physical risk and scape reputation risk. Particularly, the indicators of these two scape risks harmonized with the transportation service are shown below:

Indicator #	BRF Indicators	Impact/Dependency
Physical Risk		
Provisioning Services		
1.1	Water Scarcity	Dependency
1.2	Forest Productivity and Distance to Markets	Dependency
1.3	Limited Wild Flora & Fauna Availability	Dependency
1.4	Limited Marine Fish Availability	Dependency
Regulating & Supporting Services - Enabling		
2.1	Soil Condition	Dependency
2.2	Water Condition	Dependency
2.3	Air Condition	Dependency
2.4	Ecosystem Condition	Dependency
2.5	Pollination	Dependency
Regulating Services - Mitigating		
3.1	Landslides	Dependency
3.2	Wildfire Hazard	Dependency
3.3	Plant/Forest/Aquatic Pests and Diseases	Dependency
3.4	Herbicide Resistance	Dependency
3.5	Extreme Heat	Dependency
3.6	Tropical Cyclones	Dependency
Cultural Services		
4.1	Tourism Attractiveness	Dependency
Pressures on Biodiversity		
5.1	Land, Freshwater and Sea Use Change	Impact
5.2	Tree Cover Loss	Impact
5.3	Invasives	Impact
5.4	Pollution	Impact
Environmental Factors		
6.1	Protected/Conserved Areas	Impact
6.2	Key Biodiversity Areas	Impact
6.3	Other Important Delineated Areas	Impact
6.4	Ecosystem Condition	Impact
6.5	Range Rarity	Impact
Socioeconomic Factors		
7.1	Indigenous Peoples (IPs); Local Communities (LCs) Lands and Territories	Impact
7.2	Resource Scarcity: Food - Water - Air	Impact
7.3	Labor/Human Rights	Impact
7.4	Financial Inequality	Impact
Additional Reputational Factors		
8.1	Media Scrutiny	Dependency
8.2	Political Situation	Dependency
8.3	Sites of International Interest	Dependency
8.4	Risk Preparation	Dependency

Scape physical risk:

- Provisioning service
 - Water Scarcity
 - Forest Productivity and Distance to Markets
- Regulating & Supporting Services – Enabling
 - Water Scarcity
 - Forest Productivity and Distance to Markets
- Regulating Services – Mitigating
 - Landslides
 - Fire Hazard
 - Extreme Heat
 - Tropical Cyclones
- Pressures on Biodiversity
 - Land, Freshwater and Sea Use Change
 - Tree Cover Loss
 - Invasives
 - Pollution

Scape reputational risk:

- Environmental Factors
 - Protected/Conserved Areas
 - Key Biodiversity Areas
 - Other Important Delineated Areas
 - Ecosystem Condition
 - Range Rarity
- Socioeconomic Factors
 - Resource Scarcity: Food - Water - Air
 - Labor/Human Rights
 - Financial Inequality
- Additional Reputational Factors
 - Media Scrutiny
 - Political Situation
 - Sites of International Interest
 - Risk Preparation

Biodiversity Risk Assessment: Scoping the assessment

The industry materiality, including dependencies and impacts. The specific context of AOT is the transportation Service. The specific BRF indicators consists of scape physical risk and scape reputation risk. Particularly, the indicators of these two scape risks harmonized with the transportation service are shown below:

Scape physical risk:

1. Provisioning service
 - Water Scarcity
 - Forest Productivity and Distance to Markets
2. Regulating & Supporting Services – Enabling
 - Water Scarcity
 - Forest Productivity and Distance to Markets
3. Regulating Services – Mitigating
 - Landslides
 - Fire Hazard
 - Extreme Heat
 - Tropical Cyclones
5. Pressures on Biodiversity
 - Land, Freshwater and Sea Use Change
 - Tree Cover Loss
 - Invasives
 - Pollution

Scape reputational risk:

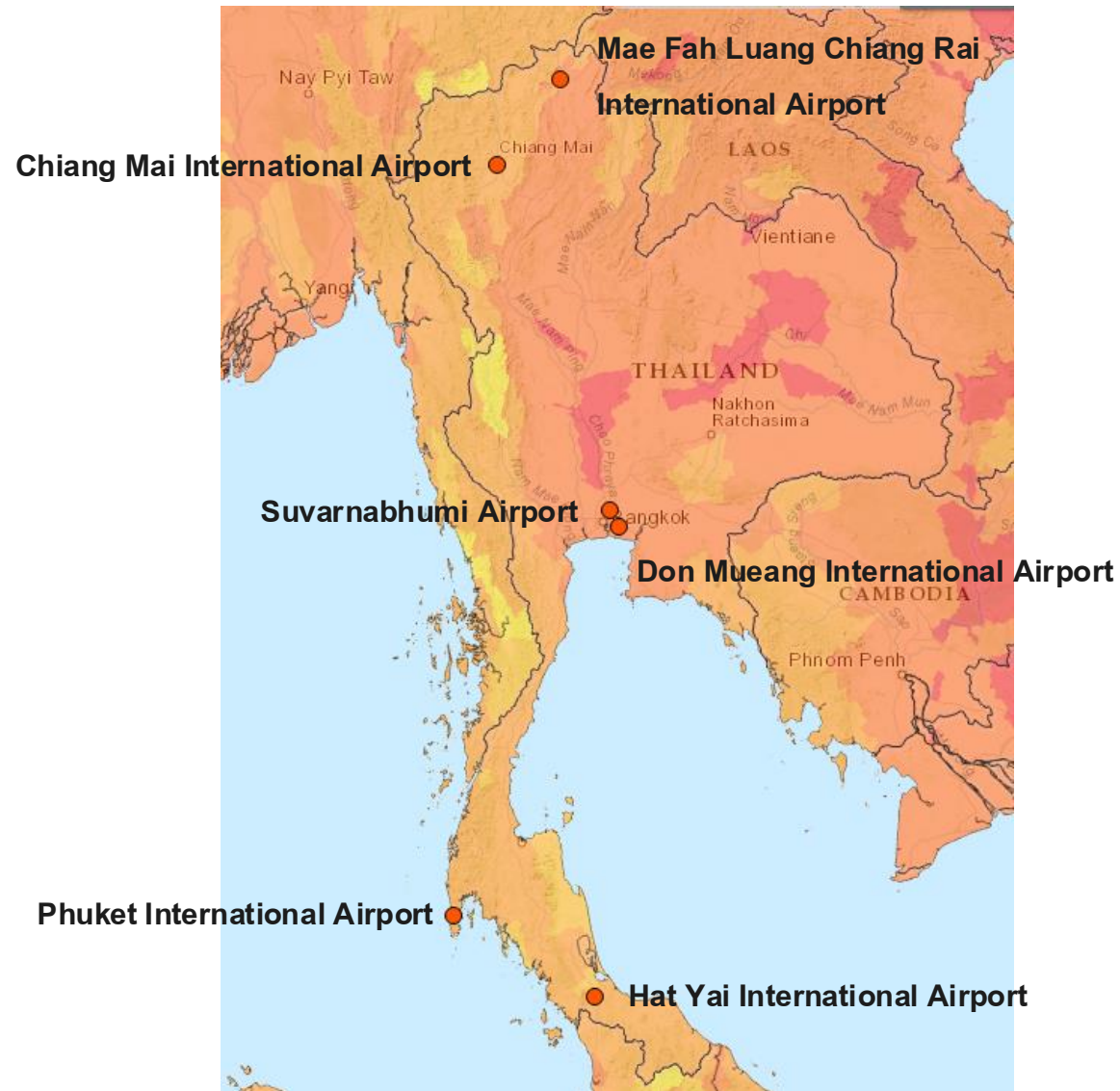
6. Environmental Factors
 - Protected/Conserved Areas
 - Key Biodiversity Areas
 - Other Important Delineated Areas
 - Ecosystem Condition
 - Range Rarity
7. Socioeconomic Factors
 - Resource Scarcity: Food - Water - Air
 - Labor/Human Rights
 - Financial Inequality
8. Additional Reputational Factors
 - Media Scrutiny
 - Political Situation
 - Sites of International Interest
 - Risk Preparation

Indicator #	BRF Indicators	Impact/Dependency
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7.2	Resource Scarcity: Food - Water - Air	Impact
7.3	Labor/Human Rights	Impact
7.4	Financial Inequality	Impact
Additional Reputational Factors		
8.1	Media Scrutiny	Dependency
8.2	Political Situation	Dependency
8.3	Sites of International Interest	Dependency
8.4	Risk Preparation	Dependency

	Impact
	Dependency



Biodiversity Risk Assessment: Selecting the location for assessment



Selecting the location for assessment is the second step out of four. The operational location of AOT is indicated to assess the biodiversity-related risk in term of significant indicators. The assessment requires the important level of the business of each location which can be interpreting the result between biodiversity severity and AOT. Hence, all airport locations is set to be high important level as for AOT holds 100% of shareholder. These operational sites of AOT have included the adjacent area in the biodiversity-related risk assessment (0-2 km)

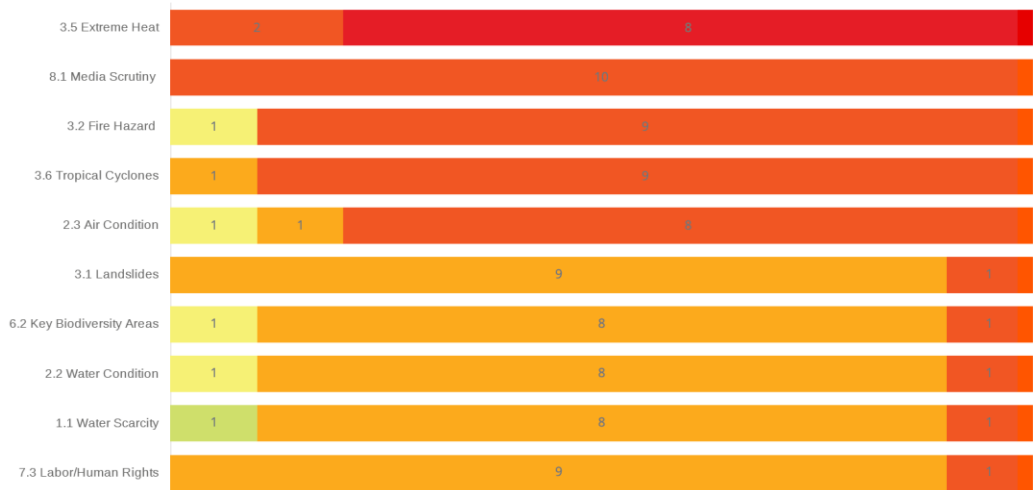
- Chiang Mai International Airport (High Importance)
- Don Mueang International Airport (High Importance)
- Hat Yai International Airport (High Importance)
- Mae Fah Luang Chiang Rai International Airport (High Importance)
- Phuket International Airport (High Importance)
- Suvarnabhumi Airport (High Importance)

Biodiversity Risk Assessment: The location for upstream and downstream assessment



These are the example location of the most significant suppliers of both upstream and downstream that are assessed to perform the result of biodiversity-related risk of AOT's suppliers, including:

- Unitech Associates Company Limited
- Gem Environmental Management Company Limited
- Turnkey Communication Services Public Company Limited
- SKY ICT Public Company Limited.
- M.I.T. Solution Company Limited
- G.G. Engineering Company Limited
- S.W.N. Intertrade Company Limited
- AOT Ground Aviation Services Company Limited
- T.T.S. Corporation Company Limited
- Advanced Information Technology Public Company Limited



Biodiversity Risk Assessment: Biodiversity-related risk assessment

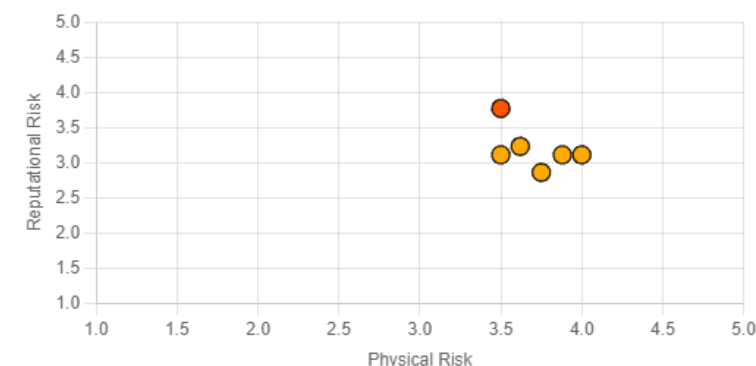


Biodiversity Risk Filter Scape Risk Results	Key	Chiang Mai International Airport	Don Mueang International Airport	Hat Yai International Airport	Mae Fah Luang Chiang Rai International Airport	Phuket International Airport	Suvarnabhumi Airport
Scape Physical Risk	SPH	3.88	3.75	3.50	3.62	3.50	4.00
1. Provisioning Services	SRC1	2.62	3.12	2.33	2.67	2.15	3.23
1.1 Water Scarcity	S1_1	3.75	3.75	3.15	3.35	2.80	3.95
1.2 Forest Productivity and Distance to Markets	S1_2	1.50	2.50	1.50	2.00	1.50	2.50
2. Regulating & Supporting Services - Enabling	SRC2	2.50	3.00	2.50	2.50	2.00	3.00
2.2 Water Condition	S2_2	2.50	3.00	2.50	2.50	2.50	3.00
2.3 Air Condition	S2_3	3.00	3.00	2.50	3.00	2.00	3.00
3. Regulating Services - Mitigating	SRC3	3.88	4.00	3.50	4.00	3.50	4.00
3.1 Landslides	S3_1	4.50	3.50	3.50	3.50	4.50	3.50
3.2 Fire Hazard	S3_2	3.50	4.00	3.50	4.00	3.00	4.00
3.5 Extreme Heat	S3_5	3.50	4.50	3.50	4.00	3.50	4.00
3.6 Tropical Cyclones	S3_6	4.00	4.00	3.50	4.00	3.50	4.00
5. Pressures on Biodiversity	SRC5	4.00	3.75	3.88	3.62	3.69	4.00
5.1 Land, Freshwater and Sea Use Change	S5_1	4.00	4.50	3.50	4.00	3.25	4.00
5.2 Tree Cover Loss	S5_2	4.00	3.00	5.00	3.00	5.00	4.00
5.3 Invasives	S5_3	3.00	3.00	3.00	3.00	3.00	3.00
5.4 Pollution	S5_4	3.50	3.50	3.25	3.50	3.00	3.50
Scape Reputational Risk	SRP	3.11	2.86	3.11	3.23	3.77	3.11
6. Environmental Factors	SRC6	3.50	3.00	3.50	3.75	4.00	3.50
6.1 Protected/Conserved Areas	S6_1	5.00	3.00	4.50	4.50	4.00	3.00
6.2 Key Biodiversity Areas	S6_2	3.50	4.50	3.50	2.50	4.00	4.00
6.3 Other Important Delineated Areas	S6_3	3.50	2.50	3.50	3.50	3.50	2.50
6.4 Ecosystem Condition	S6_4	3.38	2.62	3.50	3.75	3.75	3.50
6.5 Range Rarity	S6_5	3.50	2.50	3.50	3.50	3.00	2.50
7. Socioeconomic Factors	SRC7	2.62	2.62	2.50	2.50	2.50	2.73
7.2 Resource Scarcity: Food - Water - Air	S7_2	2.25	2.25	2.00	2.00	2.00	2.45
7.3 Labor/Human Rights	S7_3	3.00	3.00	3.00	3.00	3.00	3.00
7.4 Financial Inequality	S7_4	2.00	2.00	2.00	2.00	2.00	2.00
8. Additional Reputational Factors	SRC8	2.72	2.72	2.72	2.72	3.53	2.72
8.1 Media Scrutiny	S8_1	2.50	2.50	2.50	2.50	2.50	2.50
8.2 Political Situation	S8_2	3.38	3.38	3.38	3.38	3.38	3.38
8.3 Sites of International Interest	S8_3	2.00	2.00	2.00	2.00	4.00	2.00
8.4 Risk Preparation	S8_4	2.50	2.50	2.50	2.50	2.50	2.50

As a result, there is only Phuket international airport which is assessed to be the high risk to biodiversity.

- Chiang Mai International Airport (3.88, 3.11)
- Don Mueang International Airport (3.75, 2.86)
- Hat Yai International Airport (3.5, 3.11)
- Mae Fah Luang Chiang Rai International Airport (3.63, 3.23)
- Phuket International Airport (3.5, 3.77)
- Suvarnabhumi Airport (4, 3.11)

Physical Risk vs. Reputational Risk



- 1.0 ≤ x ≤ 1.8 Very low risk
- 1.8 < x ≤ 2.6 Low risk
- 2.6 < x ≤ 3.4 Medium risk
- 3.4 < x ≤ 4.2 High risk
- 4.2 < x ≤ 5.0 Very high risk



Biodiversity Risk Assessment: Biodiversity-related risk assessment



According to the top 10 biodiversity indicators based on the 6 airports, there are 7 out of 10 which is the highest scope physical risks and 3 scope reputational risks as below:

Physical risk

3.1 Landslides

- Areas of very high risk have a high landslide susceptibility according to rainfall patterns, terrain slope, geology, soil, land cover and (potentially) earthquakes that make localized landslides a frequent phenomenon.

5.2 Tree Cover Loss

- Areas of very high risk have experienced high rates of tree cover loss (>8%).

3.5 Extreme Heat

- Areas of very high risk experience a very high (32°C) daily maximum WBGT (wet bulb globe temperature) with a 5-year return period

5.1 Land, Freshwater and Sea Use Change

- Areas of very high risk experienced high percentages of cropland expansion (>12%) and a high fragmentation of rivers; or high pressure from shipping and direct human impact.

3.6 Tropical Cyclones

- Areas of very high risk are predicted to experience very high maximum wind speeds (>120mph) on a 50-year return period

3.2 Fire Hazard

- Areas of very high risk have a very high maximum predicted fire weather intensity (>120) for a 10-year return period

5.4 Pollution

- Areas of very high risk have high levels of nitrogen and pesticides per hectare of cropland (>77kg/ha; >5.9kg/ha, respectively); high total N concentrations in freshwater (>2.6mg/L); a very high nutrient & chemical pollution impact score in marine areas; experience more than 50 mg/m2 of PM 2.5

Reputational risk

6.1 Protected/Conserved Areas

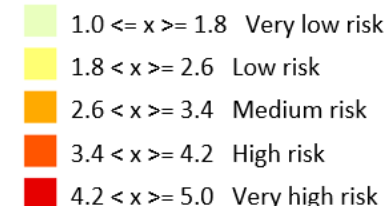
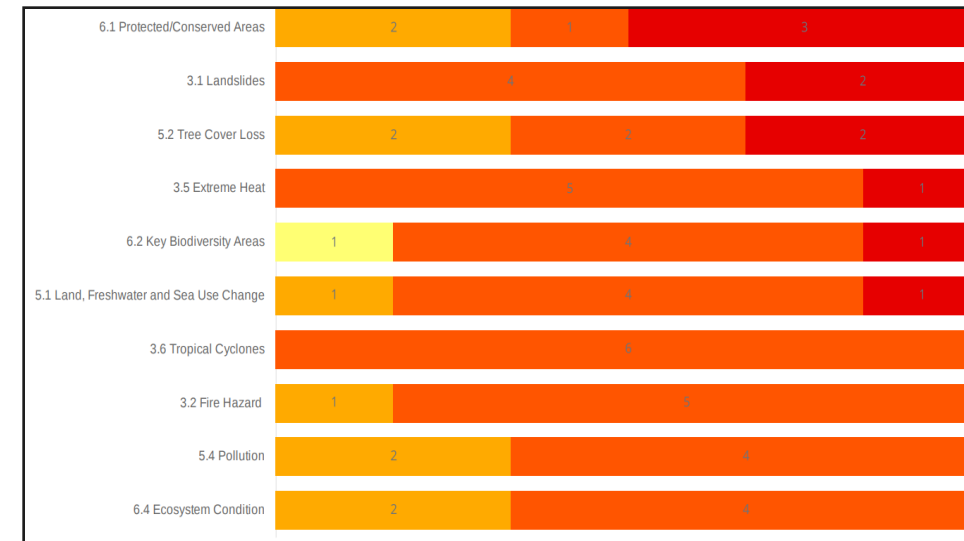
- Areas of very high risk is located in proximity to Protected Area (PA) with very high risk have >30% overlap with PA Categories I-IV + not categorized PA's. This is urgently needed to prepare corporate and financial safeguards for mitigating the potential impacts.

6.2 Key Biodiversity Areas

- Areas of very high risk is located in proximity to KBA and PA, >50% overlap with a KBA. This is urgently needed to prepare corporate and financial safeguards for mitigating the potential impacts.

6.4 Ecosystem Condition

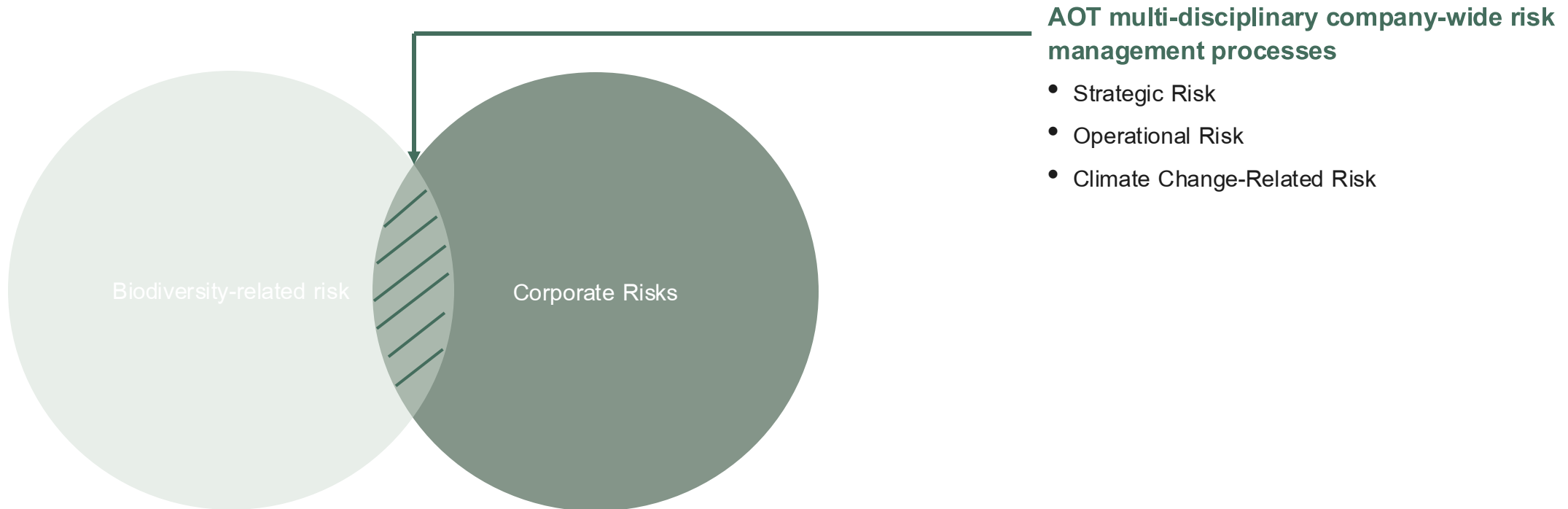
- Areas of very high risk are estimated to have high levels of ecosystem intactness (>97.5 and 100% for terrestrial and marine areas, respectively) and high levels of connectivity (low fragmentation of rivers and high mammal movement probability).



Biodiversity Risk Assessment: Integrating biodiversity risk to the company



As for biodiversity-related risk has been accounted to be the consequences from business operation, integrating biodiversity-related risk which derived from the identified risk process into the corporate risk is deemed to be “**multi-disciplinary company-wide risk management processes**” of AOT. The integration can potentially manage and control the risk toward effective mitigation plan accordingly. As a result, AOT can raise and promote its reputation across all airport locations in dealing with the potential biodiversity risk and alleviating the severe impacts.



Biodiversity Risk Assessment: Integrating biodiversity risk to the company



Risk type	Relevance to biodiversity
Climate Change-Related Risk	The threads and risks related to the operational business of AOT can be the restriction and barrier to the continuity operation and continuous improvement owing to an unforeseen incidents caused by climate change, particularly biodiversity-related risks. The identified biodiversity risk can be consequently occurred from the climate change and be deemed to be close interconnected. AOT addresses the biodiversity-related risk into climate change-related risk for long-term sustainability planning toward continuity operation.

Climate Change-related risk
AOT has realized the importance of protective and responsive preparations towards many natural disasters or any occurred incidents that may affect and interrupt AOT's business operations. Thus, the business continuity management system according to ISO 22301 : 2019 standard is implemented in terms of risk evaluation, arranging and exercising business continuity plan every year to ensure that significant services will recover to normal, and efficient protection of stakeholder's benefits, reputation and images.

Integrated into multi-disciplinary company-wide risk management processes





บริษัท อากาศไทย จำกัด (มหาชน)

Airport of Thailand Public Company Limited

ส่วนงาน ฝคส. (สคส.โทร.4983)

ที่ 42 / 65 วันที่ 4 ก.พ. 65

เรื่อง ขอความเห็นชอบการประเมินผลกระทบด้านสิ่งแวดล้อม "ประเด็นความเสี่ยงที่อาจเกิดขึ้นและส่งผลกระทบท่อการดำเนินงานของ ทอท. ปีงบประมาณ 2566 - 2570"

เรียน นายจิร พงษ์เกษม

1. ตามหลักเกณฑ์การประเมินผลกระทบด้านงานรัฐวิสาหกิจตามระบบประเมินผลรัฐวิสาหกิจ (State Enterprise Assessment Model: SE-AM) ด้านที่ 2 การวางแผนเชิงยุทธศาสตร์ (Strategic Planning: SP) ซึ่งกำหนดให้รัฐวิสาหกิจมีกระบวนการในการรวบรวมและวิเคราะห์สภาพแวดล้อม (Environmental Scanning) ทั้งภายใน และภายนอกองค์กร ที่แสดงให้เห็นถึงความทันกาล หรือมีการติดตามแนวโน้มการเปลี่ยนแปลงของข้อมูลอย่างต่อเนื่อง สัญญาณบ่งชี้ถึงการเปลี่ยนแปลงที่สำคัญ ด้านเทคโนโลยี ปัจจัยขับเคลื่อนความยั่งยืน ความเสี่ยง เป็นต้น เพื่อนำข้อมูลดังกล่าวมาใช้ในการจัดทำแผนวิสาหกิจ/แผนยุทธศาสตร์ นั้น

2. ในการประชุม คสส.ทอท.ครั้งที่ 1/2565 เมื่อวันที่ 27 ม.ค.65 วาระที่ 3 เรื่อง ติดตามผลปฏิบัติงานมติที่ประชุม คสส.ทอท.ครั้งที่ 12/2564 ที่ประชุมมีมติรับทราบผลการปฏิบัติงานตามมติที่ประชุม คสส.ทอท.ครั้งที่ 12/2564 ตามที่ฝ่ายเลขานุการเสนอและให้ คสส.ทอท.ให้การสนับสนุนข้อมูลประกอบการวิเคราะห์ความเสี่ยง เพื่อให้เป็นปัจจัยนำเข้าในการทบทวนแผนวิสาหกิจของ ทอท. (ปีงบประมาณ 2566 - 2570) ต่อไป

3. ในเบื้องต้น ฝคส.ได้วิเคราะห์ประเด็นความเสี่ยงที่อาจเกิดขึ้นและส่งผลกระทบท่อการดำเนินงานของ ทอท.ปีงบประมาณ 2566 - 2570 (เอกสารแนบ 1) และได้จัดทำแบบสอบถาม "ประเด็นความเสี่ยงที่อาจเกิดขึ้นและส่งผลกระทบท่อการดำเนินงานของ ทอท. ปีงบประมาณ 2566 - 2570" (เอกสารแนบ 2) เรียบร้อยแล้ว เพื่อให้การวิเคราะห์ประเด็นความเสี่ยง มีความสมบูรณ์ สอดคล้องกับหลักเกณฑ์การประเมินผล และมติที่ประชุม คสส.ทอท.ครั้งที่ 1/2565 ครอบคลุมมุมมองของผู้บริหาร (Top Down) ฝคส.จึงขอความเห็นชอบจาก คสส.ทอท.ทง.การจัดลำดับความสำคัญของประเด็นความเสี่ยง ประเมินความเสี่ยงโอกาสเกิด (Likelihood) และผลกระทบ (Impact) รวมทั้ง คาดการณ์ช่วงระยะเวลาที่อาจเกิดเหตุการณ์ ตามที่ระบุในแบบสอบถามฯ และขอได้จัดส่งแบบสอบถามฯ ที่ได้กรอกข้อมูลแล้วคืนกลับให้ ฝคส.ภายในวันพฤหัสบดีที่ 17 ก.พ.65 เพื่อให้ ฝคส.จะได้ประมวลผลและจัดส่งข้อมูลดังกล่าวให้ ผอ.ท. เพื่อเป็นปัจจัยนำเข้าในการทบทวนแผนวิสาหกิจของ ทอท. (ปีงบประมาณ 2566 - 2570) ต่อไป

อนึ่ง เพื่อเป็นการอำนวยความสะดวกในการดำเนินการ ฝคส.จึงได้มอบหมายให้ นางสาวศุภา สิงห์พันธุ์ จทท.บศ.7 สคส.ฝคส. หมายเลขโทรศัพท์ 0-2535-4983 เป็นผู้รับผิดชอบในการประสานงาน

จึงเรียนมาเพื่อกรุณาพิจารณาดำเนินการตามข้อ 3 ให้ต่อไปด้วย



ผู้ทำงานและเลขานุการ คสส.ทอท./ร.อ.คส.

AOT analyzes an uncertainty of potential risk that can be impacting to AOT's business. Environmental scanning to analyze and collect in both internal and external environmental contexts. Global climate change is the crucial agenda which has been indicated to be the potential risk to AOT. Adopting any transition approaches to AOT can prepare the readiness and lead to enhance its strength and business continuity that the cause has been derived from climate change. The integration of effective approach, i.e., Integrating Hybrid Electric Vehicle (HEV), Hydrogen fuel cell, Hydrogen turbine, and sustainable aviation fuels (SAF) can alleviate the impact to biodiversity in return in another perspective.

4. สิ่งแวดล้อม **Environmental Aspect**

4.1 การเปลี่ยนแปลงสภาพภูมิอากาศ (Global Climate Change)

การเปลี่ยนแปลงสภาพภูมิอากาศอย่างรวดเร็วและส่งผลให้เกิดภัยพิบัติที่สร้างความเสียหายให้แก่ชีวิตและทรัพย์สิน รวมถึงระบบเศรษฐกิจ ซึ่งเป็นประเด็นที่ทั่วโลกให้ความสำคัญ ภาคส่วนต่าง ๆ ร่วมมือกันในการส่งเสริมการใช้พลังงานเชื้อเพลิงเพื่อรักษาสีงแวดล้อมแบบยั่งยืน การผลิตพลังงานทดแทนสำหรับอุตสาหกรรมการบินเพื่อลดปริมาณการปล่อยก๊าซเรือนกระจกเป็นแนวโน้มการพัฒนาของพลังงานที่ทั่วโลกให้ความสนใจ ทั้งการวิจัยด้านการขับเคลื่อนด้วยพลังไฟฟ้าและระบบไฮบริด (Hybrid Electric Vehicle: HEV) เชื้อเพลิงไฮโดรเจน (Hydrogen fuel cell) กังหันก๊าซ (Hydrogen turbine) รวมถึงการใช้เชื้อเพลิงคาร์บอนต่ำ (Sustainable aviation fuels: SAF) ซึ่งการเปลี่ยนแปลงของรูปแบบพลังงานในอุตสาหกรรมการบินดังกล่าวส่งผลให้ท่าอากาศยานจำเป็นต้องปรับเปลี่ยนและเตรียมความพร้อมในด้านโครงสร้างพื้นฐานหรือสิ่งอำนวยความสะดวกสำหรับอากาศยานเพื่อพร้อมรับการเปลี่ยนแปลงที่อาจเกิดขึ้นในอนาคต

4.2 แนวนโยบายร่วมกันลดปริมาณการปล่อยก๊าซเรือนกระจก มีผลให้ภาคธุรกิจและภาครัฐประเทศต่างๆ แสวงหาเทคโนโลยี นวัตกรรมที่เป็นมิตรต่อสิ่งแวดล้อม สนับสนุนพลังงานสะอาดหรือมอกอนโยบายสนับสนุนวิธีการผลิตที่เป็นมิตรต่อสิ่งแวดล้อม เพื่อให้บรรลุเป้าหมายควบคุมอุณหภูมิโลกร่วมกัน แนวทางการดำเนินนโยบายระดับโลกที่เปลี่ยนไปเช่นนี้ หากธุรกิจและนโยบายประเทศใดปรับตัวล่าช้าหรือไม่ทัน อาจต้องเผชิญการสูญเสียโอกาสทางเศรษฐกิจการค้าการลงทุนได้ ดังนั้นองค์กรควรพิจารณา เตรียมความพร้อมในการเร่งปรับตัวผ่านการใช้เทคโนโลยี นวัตกรรมและพลังงานที่ไม่ทำลายสิ่งแวดล้อมจึงเป็นเรื่องสำคัญ

Integrating Hybrid Electric Vehicle (HEV), Hydrogen fuel cell, Hydrogen turbine, and sustainable aviation fuels (SAF)

Greenhouse gas emission reduction policy

Risk Department

Biodiversity Exposure & Assessment



Biodiversity Critical Areas for AOT's Operational Site



Biodiversity Area	Description	Reference
National Park	National Park constitutes the specific locations associated with the natural area that requires a protection. The national park has various natural resources of ecological importance.	Source
Alliance for Zero Extinction (AZE)	Alliance for Zero Extinction (AZE) sites contain the entire population of one or more species listed as Endangered or Critically Endangered on the IUCN Red List of Threatened Species. The Alliance itself is formed of 93 biodiversity conservation institutions from 37 countries, and its goal is to prevent the extinction of species. Following identification, the Alliance aims to act together to eliminate threats and restore habitat at these sites to allow species populations to rebound. The focus of AZEs is on species that face extinction either because their last remaining habitat is being degraded at a local level, or because their restricted global range makes them especially vulnerable to external threats.	Source
World Heritage UNESCO sites	A World Heritage Site is a landmark or area with legal protection by an international convention administered by the United Nations Educational, Scientific and Cultural Organization (UNESCO). World Heritage Sites are designated by UNESCO for having cultural, historical, scientific or other form of significance. The sites are judged to contain "cultural and natural heritage around the world considered to be of outstanding value to humanity". A World Heritage Site may signify a remarkable accomplishment of humanity, and serve as evidence of our intellectual history on the planet, or it might be a place of great natural beauty. As of June 2020, a total of 1,121 World Heritage Sites (869 cultural, 213 natural, and 39 mixed properties) exist across 167 countries. With 55 selected areas each, China and Italy are the countries with the most sites on the list	Source
Ramsar Wetlands	Ramsar Wetlands is the list of wetland related to the international importance. The lists are included the status of wetland that has been recognized by the international community as being crucial for humanity not only for the national and regional areas.	Source
UNESCO MAB	UNESCO MAB is the development program of natural and social sciences for conservative resource of the biosphere toward relationship improvement between environmental and people. This program allows an increase people's ability to efficiently manage natural resources for the well-being of both human populations and the environment. The program mainly focuses on the international site of the biosphere reserved network.	Source

AOT's Own Operational Site



The results showed that two operational sites of AOT are the biodiversity critical areas

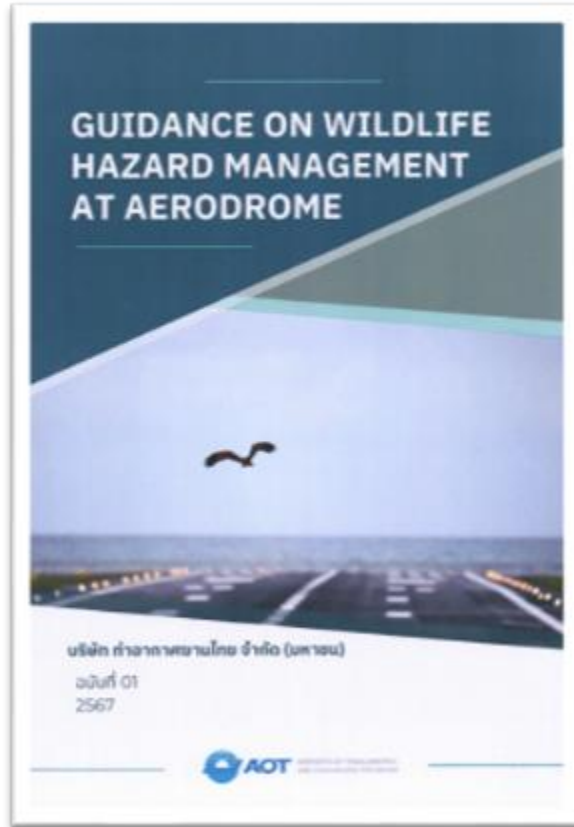
Airport	Location	Area** (ha)	Type	Biodiversity impact assessment	Biodiversity Management plans*	Exposure to Biodiversity Critical Areas				
						National Park	AZE	World Heritage Sites	Ramsar Wetlands	UNESCO MAB
Chiang Mai International Airport	Chiang Mai	257	Own Operation	Yes	Yes	Doi Suthep-Pui National Park	No	No	No	No
Don Mueang International Airport	Bangkok	614	Own Operation	Yes	Yes	-	No	No	No	No
Hat Yai International Airport	Songkhla	475	Own Operation	No	No	-	No	No	No	No
Chiang Rai International Airport	Chiang Rai	487	Own Operation	Yes	Yes	-	No	No	No	No
Phuket International Airport	Phuket	221	Own Operation	Yes	Yes	Sirinath National Park	No	No	No	No
Suvarnabhumi Airport	Bangkok	3,520	Own Operation	Yes	Yes	-	No	No	No	No

Remark: * AOT complies with Thai laws and regulations, with EIAs developed for the airports since the design phase. The EIA identifies environmental issues—including those related to biodiversity—and recommends appropriate solutions. These recommendations are aligned with the Biodiversity Management Plan, which provides detailed guidance for implementation and has been officially approved by the Thai government.

** Sites with exposure to critical biodiversity areas refers to sites in close proximity (0-2 km) to critical biodiversity areas

Biodiversity Exposure & Assessment

Guidance on Wildlife Hazard Management at Aerodrome



AOT's approach to biodiversity risk assessment is primarily focused on mitigating the risks that wildlife poses to aviation safety, a process known as **Wildlife Hazard Management (WHM)**. The assessment is a structured procedure to identify, analyze, and evaluate the risk of aircraft colliding with animals, particularly birds. These assessments are based on analytical data and risk evaluations, which are used to support consultation and management in alignment with national regulations and ICAO recommendations.

- **Chapter 1: Introduction** introduces Wildlife Hazard Management (WHM) and details the relevant laws, regulations, and standards. This includes standards from the International Civil Aviation Organization (ICAO), Thai laws related to aviation and animals, and conservation laws.
- **Chapter 2: Roles and Responsibilities** outlines the duties of various entities within AOT, including the airport, safety committees, airport directors, operational units, and the Airport Standards and Safety Department concerning wildlife hazard management.
- **Chapter 3: Aerodrome Wildlife Safety Risk Assessment** explains the process of assessing the risks posed by wildlife. It covers the methodology for evaluating the probability and severity of wildlife strikes and includes a risk assessment matrix.
- **Chapter 4: Habitat Management** focuses on managing the airport environment to make it less attractive to wildlife. It discusses the airport ecosystem, identifying and managing attractants both on and off the aerodrome, such as water sources, vegetation, and waste.
- **Chapter 5: Management of Hazardous Wildlife** details the active measures for controlling dangerous animals, including patrols, dispersal and harassment techniques, and guidelines for implementing new methods or equipment.
- **Chapter 6: Other Operational Practice** covers procedures for data collection, recording, reporting, and issuing warnings related to wildlife. It includes information on surveys, incident reporting, and aeronautical information services like ATIS and NOTAMs.
- **Chapter 7: Training** describes the training requirements for personnel involved in wildlife management. This includes the objectives of initial, recurrent, and refresher training programs, as well as record-keeping for all training activities.
- **Chapter 8: Wildlife Hazard Management Programme (WHMP) and Performance Evaluation** outlines the components of the WHMP and the process for evaluating its effectiveness. It details the elements of the program and provides guidelines for assessing its performance through various metrics and evaluation topics.

Biodiversity impact assessments

The objective is to enhance wildlife hazard management by providing comprehensive information, including:

- Bird species data
- Risk levels
- Habitats
- Food sources
- Behavior and nesting patterns
- Attraction points within airport areas
- Management plans

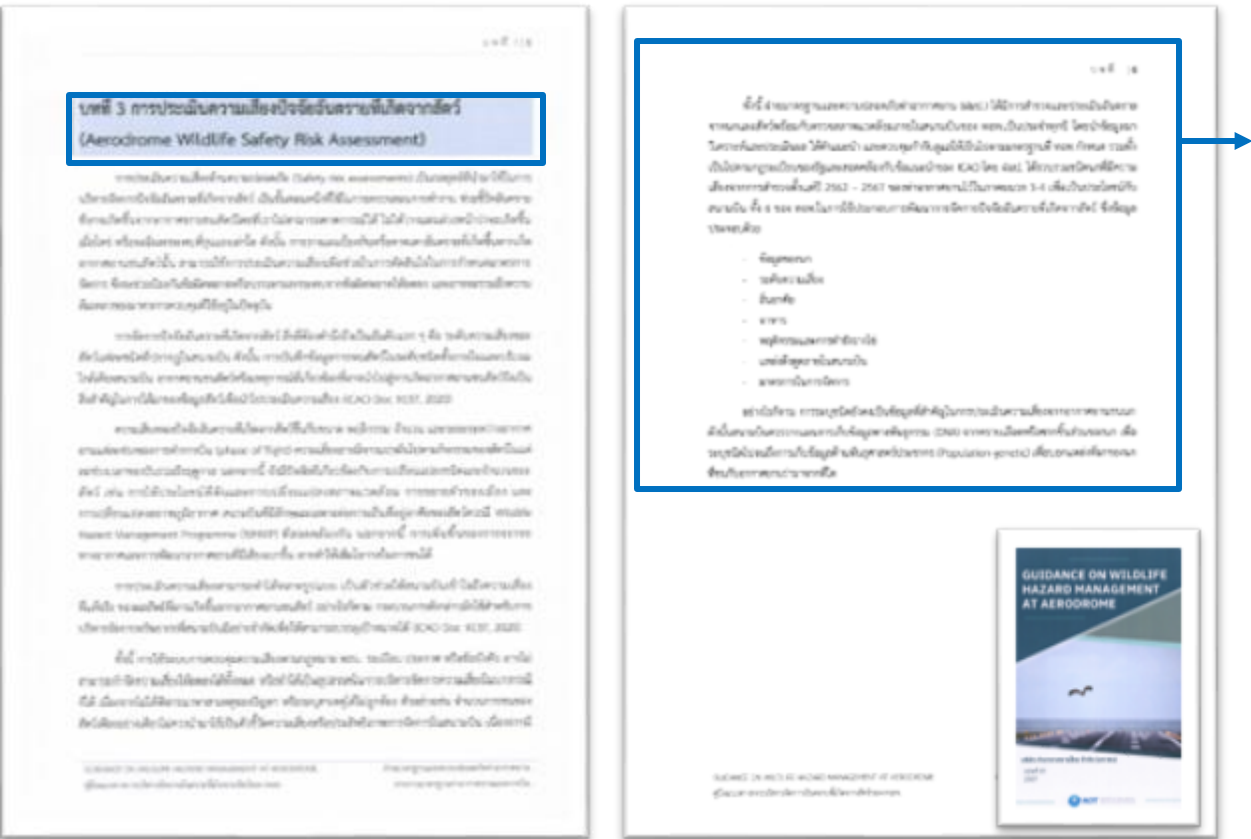
Since 2017, the department has compiled a list of bird species posing potential risks, covering the period through 2024. This research is detailed in Appendices 3–4 and applies to all six AOT-operated airports.

Assessed Operational Sites for Significant Biodiversity Impacts

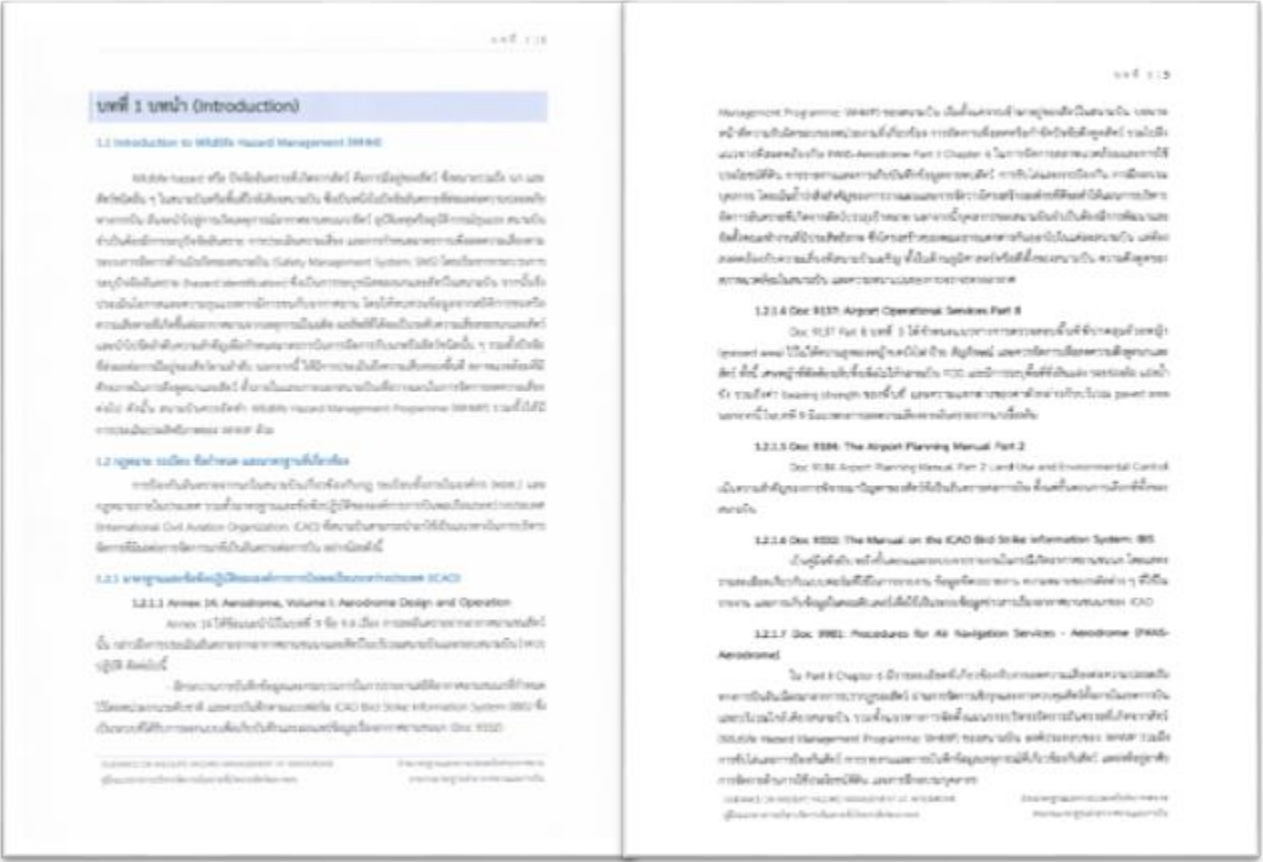
AOT assesses its operational sites to identify areas that have a significant impact on biodiversity, specifically by attracting wildlife that could pose a hazard to aircraft operations. The assessments cover areas both inside and outside the airport perimeter.

- **On-Aerodrome Assessment:** This involves identifying and monitoring areas within the airport that attract wildlife. Key attractants include:
 - Food sources: Insects, seeds, plants, and waste.
 - Water sources: Drainage canals, ponds, and temporary puddles.
 - Shelter and Nesting Sites: Trees, shrubs, buildings, and other man-made structures.
- **Off-Aerodrome Assessment:** AOT also evaluates the landscape within a 13-kilometer radius of the airport to identify external sites that attract hazardous wildlife. These areas can include:
 - Agricultural lands, such as rice paddies
 - Large water bodies, like lakes, rivers, and reservoirs
 - Aquaculture farms
 - Wastewater treatment plants and landfills

Surveys of these external areas are also conducted at least every four months to monitor changes in land use and wildlife populations.



Key Methodologies and Frameworks methodologies or frameworks used for assessment



- **ICAO Doc 9137, Airport Services Manual, Part 3 - Wildlife Hazard Management:** This is the core framework referenced throughout the document. It provides comprehensive guidance on developing a Wildlife Hazard Management Programme (WHMP) , assessing risks , and implementing control measures.
- **ICAO Doc 9332, The Manual on the ICAO Bird Strike Information System (IBIS):** This manual provides the standardized methodology for recording and reporting aircraft bird strikes. The IBIS system is the global standard for collecting and disseminating bird strike data.
- **ICAO Doc 9981, PANS-Aerodrome:** This document is cited for its detailed procedures related to the components of a WHMP, wildlife dispersal and control, data recording, and personnel training.
- **ICAO Annex 14, Volume I - Aerodrome Design and Operations:** This provides the foundational standards for aerodromes, including the requirement to assess and reduce wildlife hazards on and around the airport.
- **Airport Cooperative Research Program (ACRP) - Avian Survey Methods:** The report's methodology for conducting bird surveys is adapted from the methods recommended by the ACRP to ensure standardized and reliable data collection.
- **ICAO Asia Pacific Guidance for Evaluation of Aerodrome Wildlife Hazard Management Programme:** This document is specifically recommended for detailed procedures on how to evaluate the performance and effectiveness of the airport's management plan.

Biodiversity risk assessments



เอกสารที่ 3.4 คู่มือการประเมินความเสี่ยง (ปรับจาก ICAO Doc 9137, 2000)

		Probability				
		Very high	High	Moderate	Low	Very low
Severity	Very high	Intolerable	Intolerable	Intolerable	Intolerable	Intolerable
	High					
	Moderate	Tolerable	Tolerable	Tolerable	Tolerable	Tolerable
	Low					
	Very low					

จากตาราง การประเมินความเสี่ยงได้ 3 ระดับ และสามารถแบ่งออกได้ ดังนี้

ระดับ 1 คือความเสี่ยงที่ยอมรับได้ (Acceptable) ไม่จำเป็นต้องหาวิธีการเพิ่มเติมใด ๆ เว้นแต่ในกรณีที่พบการชนกันของอากาศยานกับสัตว์ป่า ซึ่งอาจเป็นอันตรายต่อการดำเนินงานของท่าอากาศยานได้

ระดับ 2 คือความเสี่ยงที่ยอมรับได้ (Tolerable) หากมีการดำเนินการตามมาตรการที่ดำเนินการอยู่ ให้พบการชนกันของอากาศยานกับสัตว์ป่าเป็นปกติ อาจจำเป็นต้องมีการดำเนินการเพิ่มเติมเพื่อลดผลกระทบจากการชนกันของอากาศยานกับสัตว์ป่า

ระดับ 3 คือความเสี่ยงที่ไม่ได้ (Intolerable) ให้มีการดำเนินการเพิ่มเติมเพื่อลดความเสี่ยงที่ไม่ได้ โดยให้ดำเนินการตามมาตรการที่ดำเนินการอยู่

โดยปกติแล้วการประเมินความเสี่ยงจะดำเนินการโดยหน่วยงานที่เกี่ยวข้องกับความปลอดภัยของการบิน

การประเมินความเสี่ยงจากเหตุการณ์ชนกันของอากาศยานกับสัตว์ป่า เพื่อใช้ประเมินความเสี่ยงของนกและสัตว์ป่าที่มีอยู่ตามธรรมชาติของนกและสัตว์ป่าในสนามบินและความเสี่ยงของนกและสัตว์ป่าที่มีอยู่ตามธรรมชาติของนกและสัตว์ป่าในสนามบิน

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The assessment is a structured procedure to identify, analyze, and evaluate the risk of aircraft colliding with animals, particularly birds. The core of the assessment involves evaluating two main factors:

- Probability of a Strike:** This is the likelihood of a collision occurring. It is assessed using both quantitative data (e.g., the number of days a species is observed annually, the average number of strikes per year) and qualitative, subjective evaluations of wildlife presence.
- Severity of Damage:** This considers the potential damage resulting from a strike. It is evaluated based on the animal's size and flocking behavior, the percentage of past strikes that caused damage, and the level of damage to the aircraft or potential for human injury.

These two factors are combined in a Risk Assessment Matrix to classify the risk level of each species into one of three categories:

- Acceptable (Green):** No additional control measures are required, though existing ones are maintained.
 - Example Species:** The Pacific Swallow (นกนางแอ่นแปซิฟิก) is an example of an acceptable risk.
 - Required Action:** Continue existing measures to minimize the bird's presence.
- Tolerable (Yellow):** Existing measures are reviewed and potentially enhanced.
 - Example Species:** The Asian Openbill (ปากห่าง) is categorized as a tolerable risk.
 - Required Action:** This species requires ongoing management, monitoring, and a review of control measures, especially if its risk level shows signs of increasing.
- Intolerable (Red):** Requires immediate action to reduce the risk.
 - Example Species:** The Brahminy Kite (เหยี่ยวแดง) is classified as an intolerable risk.
 - Required Action:** The airport must take action to reduce or eliminate this species from the airport environment.

Biodiversity Exposure & Assessment

Biodiversity Mitigating Actions



บทที่ 4 การจัดการสภาพแวดล้อม (Habitat Management)

ลักษณะพื้นที่บริเวณแหล่งที่อยู่อาศัย (Habitats) เป็นตัวบ่งชี้ถึงชนิดและขนาดประชากรของนกและสัตว์ที่จะถูกดึงดูดเข้ามาในสนามบินได้ การตระหนักและเข้าใจอย่างลึกซึ้งถึงนิเวศระบบนิเวศ (Ecosystem) และประเภทการใช้ประโยชน์ที่ดิน (Land-use types) ในสนามบินและบริเวณใกล้เคียง ถือเป็นข้อมูลพื้นฐานที่สำคัญในการวางแผนทางการบริหารจัดการปัจจัยอันตรายที่เกิดจากสัตว์ได้อย่างมีประสิทธิภาพ (Cleary and Dolbeer, 2005)

นอกจากนี้ การจัดการสัตว์ที่บินไปอย่างมีประสิทธิภาพนั้น จำเป็นต้องเข้าใจความต้องการของสัตว์ คือการหาความเข้าใจถึงปัจจัยพื้นฐานของที่อยู่อาศัยในการดำรงชีวิต (Habitat requirement) และความต้องการของสัตว์ โดยการจัดการแหล่งที่อยู่อาศัย (Habitat management) ควรพิจารณาเชื่อมโยงกับการปฏิบัติและขั้นตอนที่จำเป็นสำหรับการจัดการตามลักษณะเฉพาะและข้อจำกัดของสนามบิน ซึ่งรวมถึงการดำเนินการในระยะสั้น เช่น กิจกรรมในสนามบินที่เกี่ยวข้องกับการควบคุมพืชพรรณอย่างการตัดหญ้า การปรับพื้นที่น้ำขัง การตัดแต่งต้นไม้ต้น และดำเนินการในระยะยาว ซึ่งอาจเกี่ยวข้องกับการลงทุนกับที่ดิน พืชพรรณ และแหล่งน้ำ ทั้งในสนามบินและภายนอกสนามบิน

4.1 ระบบนิเวศ (Ecosystem)

ระบบนิเวศ หมายถึง ความสัมพันธ์ของสิ่งมีชีวิตในแหล่งที่อยู่อาศัย ณ ที่แห่งหนึ่ง โดยแหล่งที่อยู่อาศัยเป็นสภาพแวดล้อมที่มีชีวิตและไม่มีชีวิต "บ้าน" ในการดำรงชีวิต พืชพรรณ สัตว์ป่า เพื่อความอยู่รอดและดำรงเผ่าพันธุ์ องค์ประกอบหลักของแหล่งที่อยู่อาศัยนี้ แบ่งเป็น พื้น (space) น้ำ (water) อาหาร (food) และที่กำบัง (shelter หรือ cover) และระบบนิเวศมีหลายแบบ แตกต่างกันไปขึ้นอยู่กับลักษณะของพื้นที่และความสัมพันธ์กับสิ่งมีชีวิตอื่น ๆ

1. ส่วนประกอบที่ไม่มีชีวิต (abiotic component)

- 1.1 อนินทรีย์สาร (Inorganic matter) เช่น ไนโตรเจน คาร์บอนไดออกไซด์ ออกซิเจน น้ำ
- 1.2 อินทรีย์สาร (organic matter) เช่น ขยะพืช ขยะสัตว์
- 1.3 สภาพแวดล้อมทางกายภาพ เช่น อุณหภูมิ แสง ความชื้นกรด - ด่าง ความเค็ม และความชื้น

2. ส่วนประกอบที่มีชีวิต (biotic component)

2.1 ผู้ผลิต (producer) คือ สิ่งมีชีวิตที่สังเคราะห์แสงสร้างอาหารเองได้จากพลังงานแสงอาทิตย์และน้ำจากต่าง ๆ ได้แก่ พืช แล่งสังเคราะห์ และแบคทีเรียบางชนิด

While the AOT guidance document does not explicitly label its actions with the AR3T (Avoid, Reduce, Restore, Transform) framework, its mitigation strategies can be categorized within this structure. The primary emphasis is on **Avoidance** and **Reduction** of wildlife hazards.

Avoid

Actions taken to prevent the creation of conditions that attract hazardous wildlife.

- **Strategic Planning:** Considering wildlife hazards from the earliest stages of airport planning, including site selection.
- **Habitat Prevention:**
 - **Landscaping Choices:** Avoiding planting vegetation that produces fruits, seeds, or dense foliage that attracts birds and other animals.
 - **Waste Control:** Implementing strict waste management protocols to eliminate food sources for wildlife.
- **Stakeholder Collaboration:** Working with local authorities and landowners to manage land use developments near the airport to ensure they do not create new wildlife attractants.

Reduce

Actions taken to decrease the presence and population of hazardous wildlife already at or near the airport.

- **Habitat Management:**
 - **Water Management:** Ensuring rapid drainage of water and removing vegetation from canals to make them less attractive.
 - **Grass Height Control:** Managing the height of grass fields to deter birds from nesting and feeding. A height of 15-30 cm is often maintained as a deterrent for many species.
 - **Vegetation Maintenance:** Regularly pruning trees and shrubs to limit their use as shelter and nesting sites.
- **Active Dispersal Techniques:**
 - **Patrols:** Conducting regular patrols in vehicles to create a human presence that disturbs and deters wildlife.
 - **Acoustic Devices:** Using pyrotechnics (e.g., explosive shells) and broadcasting species-specific distress calls to frighten birds away.
 - **Visual Deterrents:** Employing lasers, scarecrows, and trained predator animals like falcons or dogs to disperse wildlife.
- **Population and Direct Control:**
 - **Trapping and Relocation:** Capturing animals such as stray dogs or monitor lizards and moving them to locations far from the airport.
 - **Lethal Control:** Used as a final option when other methods have failed to mitigate a serious risk. This is done in compliance with national laws and requires specific permits, especially for protected species.

Biodiversity Mitigating Actions

บทที่ 4 การจัดการสภาพแวดล้อม (Habitat Management)

ด้วยพื้นที่ที่บริเวณใกล้เคียง (habitat) เป็นตัวบ่งชี้ถึงชนิดและขนาดประชากรของนกและสัตว์ที่ถูกดึงดูดเข้ามาในสนามบินได้ การตระหนักและเข้าใจอย่างลึกซึ้งถึงระบบนิเวศ (ecosystem) และประเภทการใช้ประโยชน์ที่ดิน (land-use types) ในสนามบินและบริเวณใกล้เคียง ถือเป็นข้อมูลพื้นฐานที่สำคัญในการวางแผนทางการบริหารจัดการปัจจัยอันตรายที่เกิดจากสัตว์ได้อย่างมีประสิทธิภาพ (Cleary and Dolbeer, 2005)

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4.1 ระบบนิเวศ (Ecosystem)

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1. ส่วนประกอบที่ไม่มีชีวิต (abiotic component)

- 1.1 อนินทรีย์สาร (inorganic matter) เช่น ไนโตรเจน คาร์บอนไดออกไซด์ ออกซิเจน น้ำ
- 1.2 อินทรีย์สาร (organic matter) เช่น ขากพืช ขากสัตว์
- 1.3 สภาพแวดล้อมทางกายภาพ เช่น อุณหภูมิ แสง ความชื้นกรด - ด่าง ความเค็ม และความชื้น

2. ส่วนประกอบที่มีชีวิต (biotic component)

2.1 ผู้ผลิต (producer) คือ สิ่งมีชีวิตที่สามารถสังเคราะห์อาหารเองได้จากพลังงานแสงอาทิตย์และน้ำอย่างต่าง ๆ ได้แก่ พืช แล่อัลจีและพืช และแบคทีเรียบางชนิด

Transformative Mitigation Actions

The AOT "Guidance on Wildlife Hazard Management at Aerodrome" shows that its strategy is not implemented in isolation. It relies on a transformative approach that integrates the airport's safety needs with regional environmental management through collaboration and policy engagement.

- **New Partnerships Across Sectors and Supply Chains** The guidance mandates the formation of partnerships with a wide range of external stakeholders. This collaborative model is a core component of the Wildlife Hazard Management Programme (WHMP).
 - The airport is required to establish a process for coordinating with
 - **local government authorities, other agencies, and local landowners** to manage the environment surrounding the airport.
 - The airport's formal **Subcommittee for Wildlife Hazard Management** is recommended to include representatives from these external groups, such as local authorities and the Aeronautical Radio of Thailand Ltd.. This creates a formal structure for cross-sector collaboration.
- **Lobbying Government and Influencing Policy** The report details how AOT engages with local entities to influence regional planning and policy to protect nature and prevent the creation of new hazards.
 - AOT must coordinate with local government units regarding any **land-use development plans** near the airport that could attract wildlife.
 - By actively participating in these local planning discussions, AOT acts as an environmental steward, influencing decisions to prevent the establishment of problematic sites like landfills or certain agricultural operations. This directly shapes local policy to be more considerate of the natural environment in a way that aligns with aviation safety.
- **Advanced Detection Systems:** The report discusses implementing technology that transforms wildlife detection and monitoring such as RADAR, Camera Detection and Technological Deterrents, Aircraft Pulse Lights, and Drones (RPAS).

Biodiversity Mitigating Actions



Biodiversity Mitigating Action



AOT has been doing the plantation activity annually to increase the forest area as a regular basis. Since 2014, AOT has been consecutively planting the mangrove forest with an intention to restore the mangrove forest in particular area and to continuously increase the mangrove forest area. Besides, the other areas such as urban area, is included as the plantation area for this activity with the collaboration between partner of AOT and local communities. This is anticipated to raise the awareness among the stakeholders of AOT and communities regarding the biodiversity issues. The plantation activity can promote AOT's branding and reputation from these valuable activities accordingly. **The mangrove reforestation is deemed to be the compensation of current forest loss.** Additionally, plantation activity has been monitored the carbon dioxide absorption from planted tree as return for the environmental benefit.



Biodiversity Mitigating Action Approach

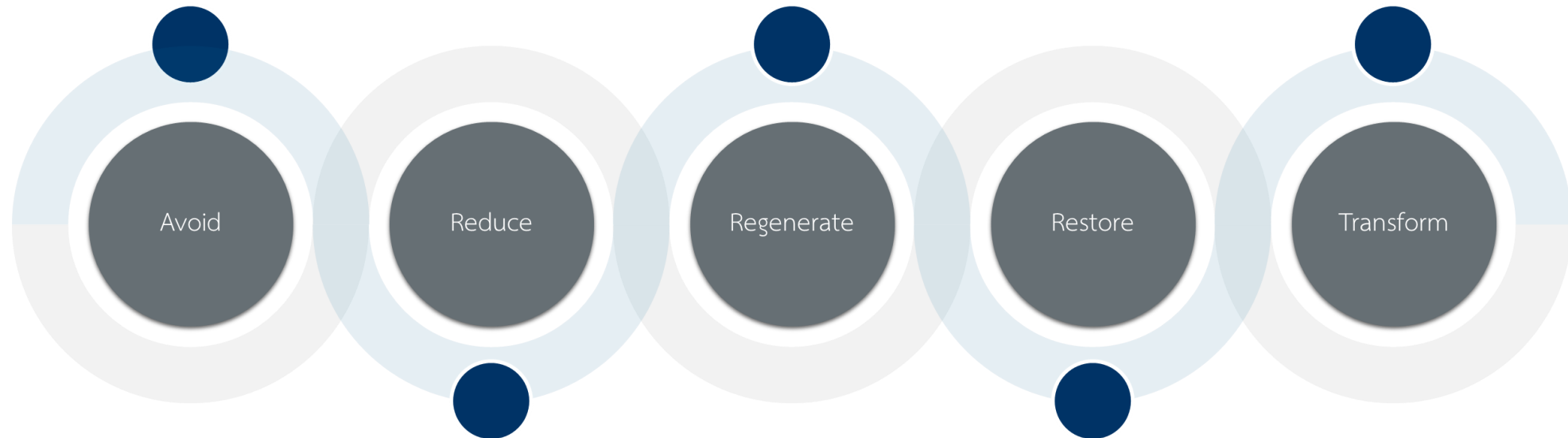


Regarding the plantation activity of AOT, the relative approaches can be raised through 5 particular mitigation actions as crucial drivers toward tackling biodiversity loss. This can be deemed AOT prevent natural loss by reduce the impact to biodiversity and strengthen both regeneration and restoration actions through these activities.

Identifying any action that can be the negative activity to the biodiversity to find out the approach in avoiding an identified negative impacts.

Establishing biodiversity strategy toward effective implementation in regenerating the biodiversity.

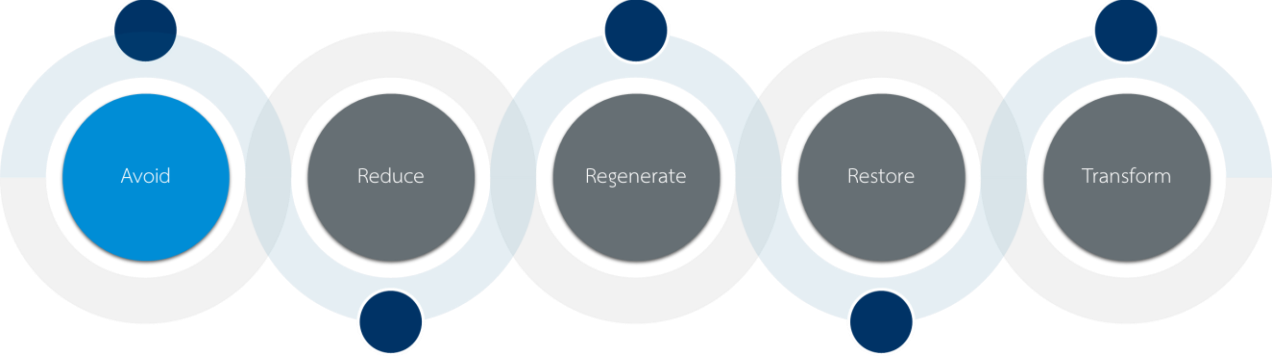
The action to change the traditional implementation and any strategies relevant to the biodiversity loss by driving and accelerating transition path approach.



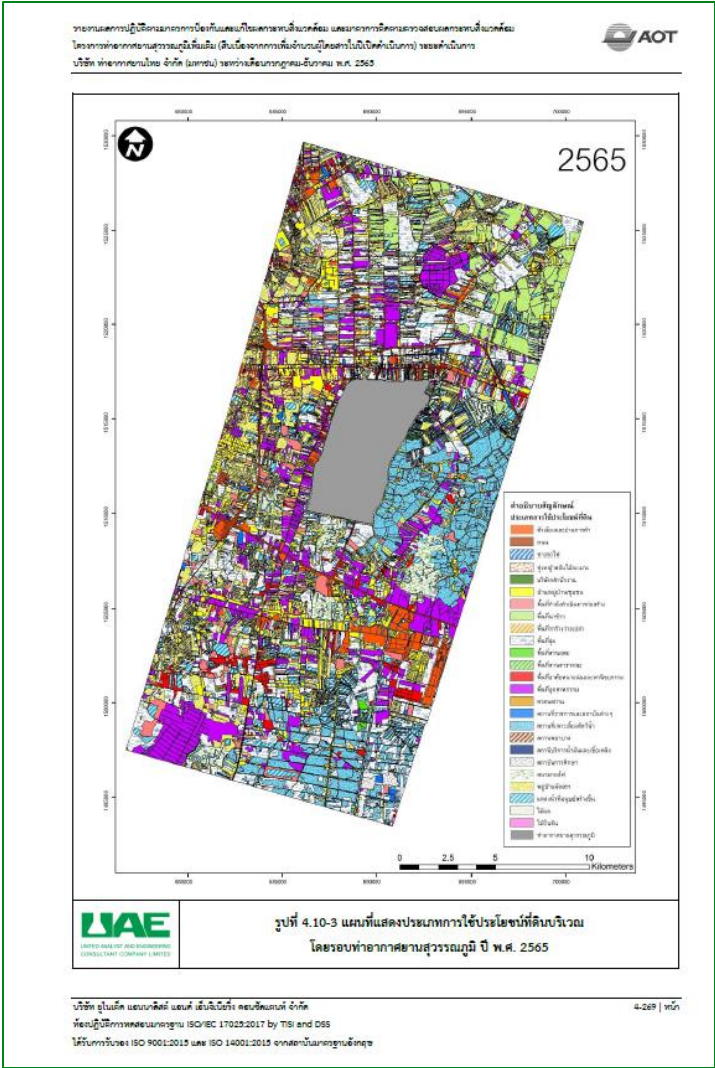
Once the identified negative activities have recognized, initial step toward avoiding the negative activity can be implemented through reduce the action

Apart from regenerative strategy, considering the biodiversity impacted by restoring the system to completely repair at the point of concern.

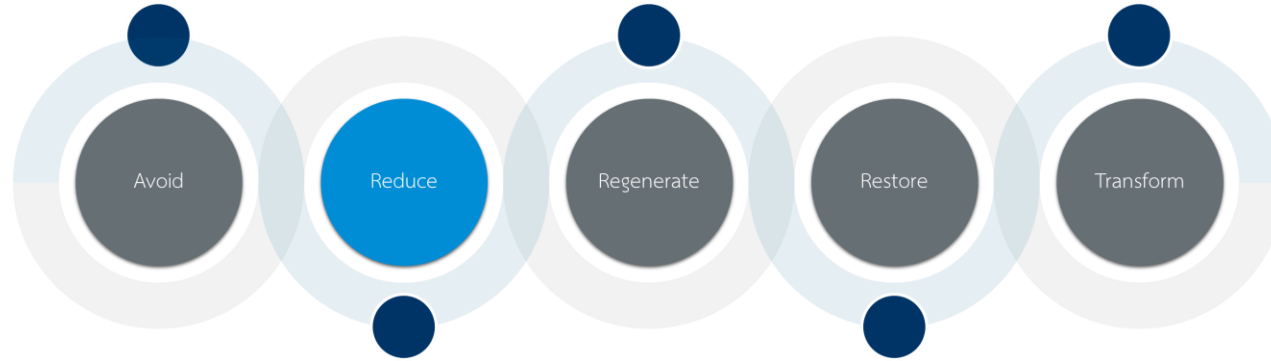
Biodiversity Mitigating Action – Avoid



Addressing the potential biodiversity issues across all AOT’s operation through Environmental Impact Assessment (EIA) and Environmental Impact and Health Impact Assessment (EHIA) is the applied approach of AOT in avoiding biodiversity-related impacts. These two reports clarified the issues of concern in accordance with the environmental topics. The identified issues of biodiversity have been accounted to be avoided with mitigation solutions.



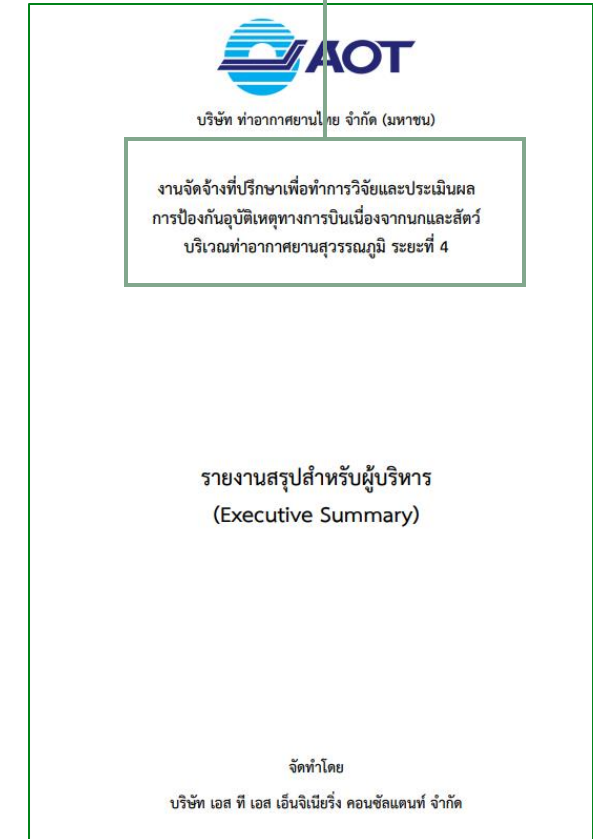
Biodiversity Mitigating Action – Reduce



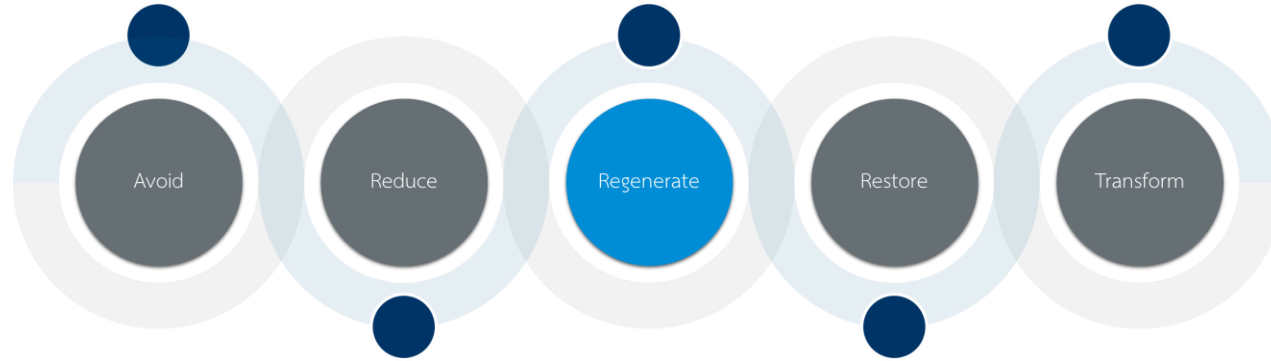
Research and assessment to prevent an accident from bird and other animals around airport

In the airport context, wildlife hazard is the significant problem for the operation that is the challenges to AOT's operation, especially bird strike. AOT established the Preventive Measures Against Potential Harms from Birds and Animals that Enter the Airport Areas. This measures constitutes:

- Assess the environment and manage factors that attract birds and animals to seek foods and to live in the area such as water drainage channel, irrigation canal, lawns, ground conditions, airside fences to prevent animal trespassing, resting area and waste storage areas, etc.
- Strictly control and disperse dangerous animals throughout 24 hours and give warning of any danger from animals.
- Assess and prioritize the potential risk that may lead to harmful effects of birds and animals in the airside areas which occur as a result of land use in the 13 kilometers radius of the airport, such as fishing ponds or agricultural activities, etc.
- Review and improve preventive measures to align with current ecological systems.
- Determine the implementation procedures and provide a report in case bird strike accident occurs.



Biodiversity Mitigating Action – Regenerate



The annual reforestation activity of AOT by planting new seed can alleviate the environmental burden toward regenerating the biodiversity for particular area, especially mangrove area. The vital area such as mangrove forest, is so-called nursery. This is the safe place for young marine life, a nest for hundreds of species of birds, a place for food and land protection, disaster prevention area, and carbon sink area, etc. These advantages associated with the benefit of mangrove forest can lead to the biodiversity regeneration as the mitigation approach.

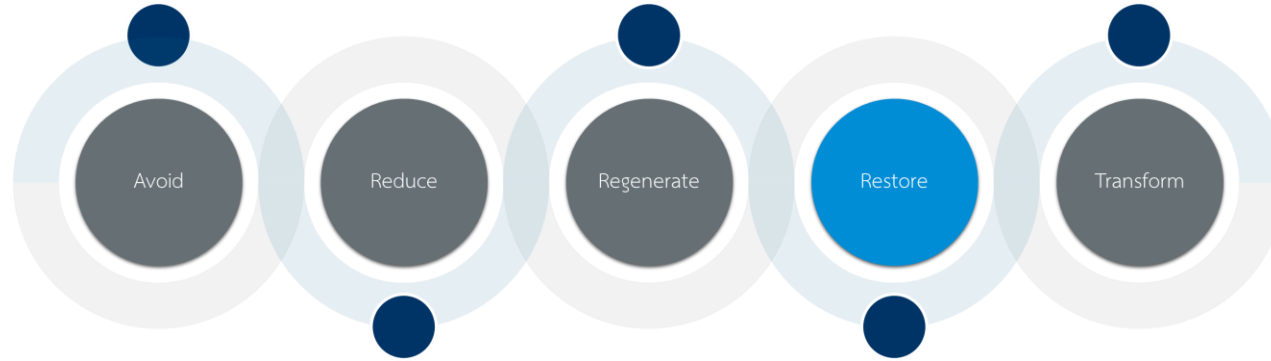


Forestation Project

72,000 trees

Total 360 rai

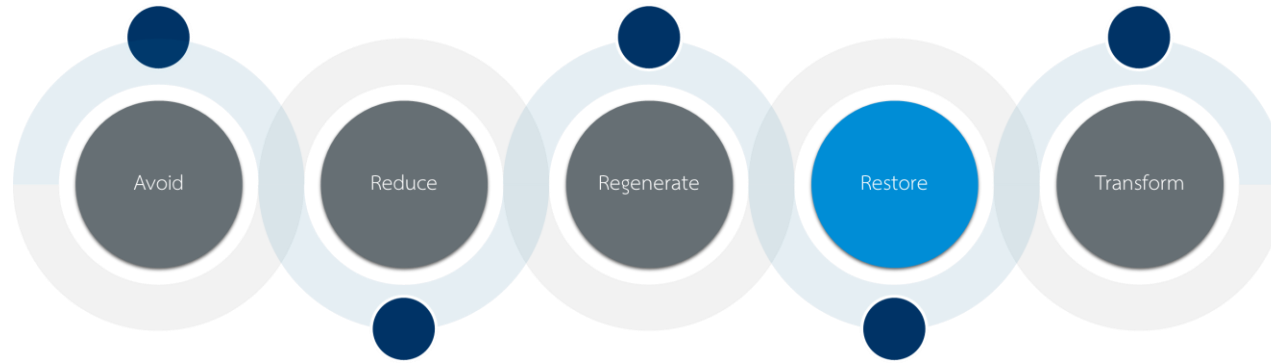
Biodiversity Mitigating Action – Restore (1/2)



Apart from the regeneration action, the restoration of biodiversity is one of the crucial approaches that AOT can raise through an annual reforestation activity. AOT has been planting new seed to accelerate and enhance the biodiversity of mangrove forest. It has gradually restored the ecosystem that can be led to environmental health recovery, including stabilize the coastline, protect water quality, reduce coastal flooding, provide habitat for fish, protect wildlife species, protect young fish from predators, serve as nesting area, and contribute the financial growth of local communities regarding the job creation.



Biodiversity Mitigating Action – Restore (2/2)



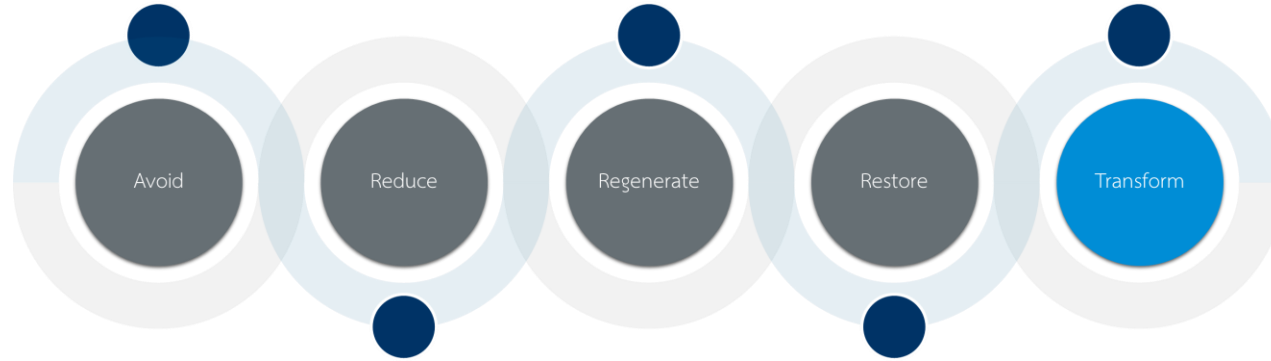
The implementation of environmental and carbon management projects benefits AOT in multiple dimensions. This includes the development of forest areas and other initiatives that serve as greenhouse gas sinks, while simultaneously supporting the progression of Airport Carbon Accreditation (ACA) certification levels.

The projects also create economic value by generating additional revenue through the sale of carbon credits in the voluntary market, while reducing long-term operational costs through the adoption of renewable energy and effective waste management practices. Together, these initiatives enhance AOT's competitiveness as a sustainability-focused airport operator in the region.

Furthermore, the implementation of these projects strengthens AOT's technical knowledge and institutional capacity in carbon credit project development, biodiversity restoration, and carbon management, establishing a scalable model that can be replicated across other airports in the future.

In addition, the programme fosters collaboration with key stakeholders, including the Royal Forest Department, the Thailand Greenhouse Gas Management Organization (Public Organization), private sector partners, and local communities, to promote collective action in forest and biodiversity restoration, environmental conservation, and sustainable natural resource management, while creating shared environmental, social, and economic value.

Biodiversity Mitigating Action – Transform (1/3)



As for reforestation activity of AOT is covered for some particular area, the value has been created to the surrounded area, e.g., school, local community, and provincial administrative organization. Whereas the benefit can be more generated to the outer mangrove forest ecosystem. As for mangrove forest has been planting annually, the restoration and regeneration approaches can be claimed and created more than its implication. This is referring to the transformation of biodiversity and ecosystem in parallel accordingly.



Biodiversity Mitigating Action – Transform (2/3)

Additionally, the implementation of EV for grounded vehicle of six airports can gradually alleviate the fossil fuel consumption by conventional vehicle that is the greater impact to biodiversity than using the EV. Additionally, AOT has been planning to integrate the technology approach to transform the business as usual

4. สิ่งแวดล้อม **Environmental Aspect**

4.1 การเปลี่ยนแปลงสภาพภูมิอากาศ (Global Climate Change) การเปลี่ยนแปลงสภาพภูมิอากาศอย่างรวดเร็วและส่งผลให้เกิดภัยพิบัติที่สร้างความเสียหายให้แก่ชีวิตและทรัพย์สิน รวมถึงระบบเศรษฐกิจ ซึ่งเป็นประเด็นที่ทั่วโลกให้ความสำคัญ ภาคส่วนต่าง ๆ ร่วมมือกันในการส่งเสริมการใช้พลังงานเชื้อเพลิงเพื่อรักษาสีเขียวสิ่งแวดล้อมแบบยั่งยืน การผลิตพลังงานทดแทนสำหรับอุตสาหกรรมการบินเพื่อลดปริมาณการปล่อยก๊าซ

เรือนกระจกเป็นแนวโน้มการพัฒนาแบบของพลังงานที่ทั่วโลกให้ความสนใจ ทั้งการวิจัยด้านการขับเคลื่อนด้วยพลังไฟฟ้าและระบบไฮบริด (Hybrid Electric Vehicle: HEV) เชื้อเพลิงไฮโดรเจน (Hydrogen fuel cell) กังหันก๊าซ (Hydrogen turbine) รวมถึงการใช้เชื้อเพลิงคาร์บอนต่ำ (Sustainable aviation fuels: SAF) ซึ่งการเปลี่ยนแปลงของรูปแบบพลังงานในอุตสาหกรรมการบินดังกล่าวส่งผลให้ท่าอากาศยานจำเป็นต้องปรับเปลี่ยนและเตรียมความพร้อมในด้านโครงสร้างพื้นฐานหรือสิ่งอำนวยความสะดวกสำหรับอากาศยานเพื่อพร้อมรับการเปลี่ยนแปลงที่อาจเกิดขึ้นในอนาคต

4.2 แนวนโยบายร่วมกันลดปริมาณการปล่อยก๊าซเรือนกระจก มีผลให้ภาคธุรกิจและภาครัฐประเทศต่างๆ แสวงหาเทคโนโลยี นวัตกรรมที่เป็นมิตรต่อสิ่งแวดล้อม สนับสนุนพลังงานสะอาดพร้อมออกนโยบายสนับสนุนวิธีการผลิตที่เป็นมิตรต่อสิ่งแวดล้อม เพื่อให้บรรลุเป้าหมายควบคุมอุณหภูมิโลกร่วมกัน แนวทางการดำเนินนโยบายระดับโลกที่เปลี่ยนไปเช่นนี้ หากธุรกิจและนโยบายประเทศใดปรับตัวสอดคล้องไม่ทัน อาจต้องเผชิญการสูญเสียโอกาสทางเศรษฐกิจการค้าการลงทุนได้ ดังนั้นองค์กรควรพิจารณา เตรียมความพร้อมในการเร่งปรับตัวผ่านการใช้เทคโนโลยี นวัตกรรมและพลังงานที่ไม่ทำลายสิ่งแวดล้อมจึงเป็นเรื่องสำคัญ

Integrating Hybrid
Electric Vehicle (HEV),
Hydrogen fuel cell,
Hydrogen turbine, and
sustainable aviation
fuels (SAF)

Mr. Keerati Kitmanawat AOT Director General said that the rooftop solar power generation system project at Suvarnabhumi Airport Terminal (AOT) As one of the major projects that will propel Suvarnabhumi Airport to become the first green airport in Thailand, AOT has collaborated with DCAP to install 4.4 MW (MW) of solar cells on the roof of the terminal building. AOT is confident that solar cells will reduce the heat inside the terminal by more than 7 degrees, reduce the energy consumption of the indoor cooling system by 2%, worth more than 11 million baht per year, and reduce carbon dioxide emissions by more than 3,600 tons per year, or equivalent to 360,000 trees per year that need to absorb carbon dioxide.



Biodiversity Mitigating Action – Transform (3/3)



fiscal Year	Name of Organization	Topic	AOT Stance	Expenditure	Activity
2565	ACI World Governing Board (ACI WGB)	- Digital Health Passport Safety / Security - Airport Slot - Airport Service Quality (ASQ) Programme - Net Zero Carbon Emission	Opportunity to exchange vision in airport management amongst leading airlines worldwide, as well as enhancing AOT and Thailand's image internationally.	Travel expenditure 837,874.20 baht	Conference attendance // President of AOT, as part of ACI World Governing Board
2565	ACI Asia-Pacific Regional Board (ACI APAC)	- Digital Health Passport - Net Zero Carbon Emission	For AOT to gain and exchange knowledge regarding airport operations, as well as forming relationships with the executives from other regional airports. This provides an opportunity to increase marketing channels or trade amongst business allies, further enhancing AOT's image as the leader in air freight logistics.	No expenditure	Conference attendance // President of AOT as Director of the ACI Asia-Pacific Regional Board
2565	Airports Council International Asia-Pacific Committee - ACI APAC Regional Aviation Security Committee (RASC) - ACI APAC Regional Operational Safety Committee (ROSC) - ACI APAC Regional Economics Committee - ACI APAC Regional Human Resource Committee - ACI APAC Regional Environment Committee - ACI APAC Regional Information Technology Liaison Group - ACI APAC Regional Task Force on Slot - ACI APAC Regional Task Force on COVID-19	- Measures to lift travel restriction - Update on regulations, evaluations and reports on runway surface conditions - Net Zero Carbon Emission - Airport COVID-19 Testing & Regulations - Sustainability risk management - Winter flight schedule planning	For AOT to gain and exchange knowledge regarding airport operations, as well as forming relationships with the executives from other regional airports. This provides an opportunity to increase marketing channels or trade amongst business allies, further enhancing AOT's image as the leader in air freight logistics.	No expenditure (Video conference)	Each committee hosts 2 conferences per year

Contributing to and being a membership in the trade associations that are positioning on the net zero carbon emission toward climate change agenda. This could help to contribute the impact reduction on biodiversity through the climate change issue that directly involve with the biodiversity issues.