



Thailand's Sixth National Report
on the Implementation of the
Convention on Biological Diversity

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June 2019

Forward

As a Party of the Convention on Biological Diversity (CBD), Thailand is responsible for addressing the challenges of safeguarding biodiversity and ecosystem services, which are national priorities.

CBD's parties are required to submit the National Report in accordance with the Convention's objectives (Article 26 of the CBD). Thailand's Sixth National Report covers the period of January 2015 to December 2018 and aligns with the agreed reporting guidelines of the CBD. We hope this report can contribute to the development of the Global Biodiversity Outlook and the Post 2020 Global Biodiversity Framework.

Thailand will continue to take concrete steps to protect its biodiversity, the unique natural heritage, and precious ecosystems, for the next generations. All Thais – including all levels of government, the public, private, local stakeholders and non-government organizations are responsible for biodiversity conservation.

Preface

Thailand's Sixth National Report (6NR) is one of the obligations under the Convention on Biological Diversity (CBD). As a party to the CBD, Thailand has been implementing prevalent policies and measures to fulfill the country's commitments to the CBD and its Protocols. In addition, Thailand has been actively participating in various international cooperation and regional biodiversity initiatives.

This 6NR describes the outcomes from the implementation of the Master Plan related to the Aichi Biodiversity Targets, and the performance of relevant sectors. The 6 NR contains seven sections as follows:

- Section I Information on the targets being pursued at the national level,
- Section II Implementation measures taken, assessment of their effectiveness, associated obstacles and scientific and technical needs to achieve national targets,
- Section III Assessment of progress towards each national target
- Section IV Thailand's contribution towards global Aichi Target.
- Section V Description of the national contribution to the achievement of the targets of the Global Strategy for Plant Conservation,
- Section VI Additional information on the contribution of indigenous peoples and local communities
- Section VII Updated biodiversity country profiles

In developing the 6NR, several assessment approaches were taken in the process. The Project Steering Committee comprised multi-sectoral stakeholders which was established to ensure the good quality of the comprehensive report. In addition to fulfill the country's obligation to CBD, the process of developing 6NR also helped to raise public awareness; established mechanisms for monitoring biodiversity and ecosystem conservation activities. This process enables us to work in close coordination and cooperation with the international community to tackle global biodiversity challenges.

On behalf of the government of Thailand, we would like to express our sincere appreciation and gratitude to the Global Environment Facility, the United Nations Development Programme, both the global and national teams, and the Secretariat of the Convention on Biological Diversity for the financial and technical support, as well as to the specialized institutes, national expertise and civil society organizations for their contributions to the preparation of this report.

Table of Content

Section 1 Information on the targets being pursued at the national level	5
Section 2 Implementation measures taken, assessment of their effectiveness, associated obstacles and scientific and technical needs to achieve national targets	19
Measure 1: Strengthening awareness and education on biodiversity	
Measure 2: Integration of and promotion of participation for biodiversity management	
Measure 3: Conservation, restoration and protection of biodiversity	
Measure 4: Reducing threats to, and enabling sustainable use of biodiversity	
Measure 5: Wetland management	
Measure 6: Management of invasive alien species	
Measure 7: Biosafety	
Measure 8: Protection of genetic resources	
Measure 9: Research and development for bio-economy	
Measure 10: Management of knowledge and databases	
Measure 11: Preservation and protection of local knowledge associated with biodiversity	
Section 3 Assessment of progress towards each national target	37
National Target 1	
National Target 2	
National Target 3	
National Target 4	
National Target 5	
National Target 6	
National Target 7	
National Target 8	
National Target 9	
National Target 10	
National Target 11	
National Target 12	
National Target 13	
National Target 14	
National Target 15	
National Target 16	
National Target 17	
National Target 18	
National Target 19	
National Target 20	
National Target 21	
National Target 22	
National Target 23	
National Target 24	
National Target 25	

Section 4 Description of the national contribution to the achievement of each global Aichi Biodiversity Target	93
Aichi Target A1	
Aichi Target A2	
Aichi Target A3	
Aichi Target A4	
Aichi Target B5	
Aichi Target B6	
Aichi Target B7	
Aichi Target B8	
Aichi Target B9	
Aichi Target B10	
Aichi Target C11	
Aichi Target C12	
Aichi Target C13	
Aichi Target D14	
Aichi Target D15	
Aichi Target D16	
Aichi Target E17	
Aichi Target E18	
Aichi Target E19	
Aichi Target E20	
Section 5 Description of the national contribution to the achievement of the targets of the Global Strategy for Plant Conservation	131
GSPC Target 1	
GSPC Target 2	
GSPC Target 3	
GSPC Target 4	
GSPC Target 5	
GSPC Target 6	
GSPC Target 7	
GSPC Target 8	
GSPC Target 9	
GSPC Target 10	
GSPC Target 11	
GSPC Target 12	
GSPC Target 13	
GSPC Target 14	
GSPC Target 15	
GSPC Target 16	
Section 6 Additional information on the contribution of indigenous peoples and local communities	157
Section 7 Updated biodiversity country profiles	163
Recommendations for biodiversity management in Thailand	173



Section 1

Information on the targets
being pursued at the national level

Section I

Information on national targets under the 2015 – 2021 Master Plan for Biodiversity Management

Since, 1998, Thailand has been continuously developing national strategies, policies and master plans on biodiversity management in response to the obligations under Article 6 of the Convention on Biological Diversity (CBD). The Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets were adopted as a guidance for the formulation of these national biodiversity plans, as well as for enabling their integration of the Aichi Targets into other relevant plans.

Currently Thailand has been implementing the 4th Master Plan for Integrated Biodiversity Management (2015-2021). The Master Plan prepared during the year 2014 by reviewing relevant information, evaluating successes and weaknesses in past operations, and organizing several brainstorming with relevant agencies to set the national targets along with defining strategies and operation details to achieve the targets. This Master Plan was approved by the Cabinet on March 10, 2015 as the country's principle framework on biodiversity. The Master Plan comprises of national strategies, measures for their implementation as well as national targets and milestones. Five sectors were identified as the main driving force for achieving the national targets, which are; 1) public sector, 2) private sector, 3) civil society and NGO, 4) education and research sector and 5) local community.

The Office of Natural Resources and Environmental Policy and Planning (ONEP) was assigned as the responsible agency for the implementation of the Master Plan in collaboration with 4 major government agencies: the Ministry of Natural Resources and Environment, the Ministry of Agriculture and Cooperatives, the Ministry of Public Health and the Ministry of Science and Technology. In addition, the Ministry of Interior, the Ministry of Education, the Ministry of Foreign Affairs, and the Prime Minister's Office were also identified as instrumental agencies in supporting the implementation of the master plan.

The full contents of the Master Plan are available online at http://chm-thai.onep.go.th/chm/publication_5.html#ms1

This 6th National Report (6NR) places an emphasis on the evaluation of national actions for achieving the 25 national targets set out by the Master Plan. Several parties were involved in the preparation of the 6NR either as members of the Drafting Committee or participants in the consultation workshops, and the public hearing process. Moreover, the draft 6NR was also presented to the National Committee on Conservation and Sustainable Use of Biodiversity for their review and approval.

Thailand Biodiversity Target

National Target	Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
Strategy 1: Integrate biodiversity values and management with participation at all levels			
<u>Measure 1: Strengthening awareness and education on biodiversity</u>			
1.	By 2020, every sector, particularly the general publics and local communities, have an understanding and awareness on the importance of conservation and sustainable use of biological diversity.	Thailand has continued to place emphasis on strengthening knowledge and participation of various sectors in conservation of natural resources. By focusing on benefits of the conservation, the interconnection between nature, livelihoods and impacts from destruction of natural resources, the society has gradually gained knowledge and understanding on the importance of nature conservation. Biodiversity is, however, a recently invented terminology and therefore not widely adopted for general use. The majority of the public has thus remained unable to fully comprehend the term and to recognize the interconnection between biodiversity and the conventional concept of natural resources conservation. To this end, every sector, particularly local communities whose livelihoods depend on biological resources bases, needs to acquire better knowledge and understanding on biodiversity, including its direct and indirect benefits, in order to become more aware and exert their roles in the conservation and sustainable use of biological diversity.	National <u>Aichi Targets</u> A1 Public awareness A2 Biodiversity values mainstreamed
2.	By 2021, Biodiversity is integrated in curriculums of education institutes at every level.	Education is required to ensure that learning is consistent to current environments, resulting in adoption of learner's behaviours that are compatible to present settings, particularly in the era with the pressing problem of natural resources and environmental degradation and its impacts on humans and other life on earth. To this end, Thailand has directed national education towards enhancing environmentally sound livelihoods with the view to	National <u>Aichi Targets</u> A1 Public awareness A2 Biodiversity values mainstreamed

National Target	Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets	
	offer a long-term solution to the problem of environmental degradation. Such directive focuses on enabling learners to acquire knowledge, understanding and awareness on values of natural resources and envisages creation of attitudes and concerns on the need for surveillance and prevention of impacts from their degradation.			
Measure 2: Integration of and promotion of participation for biodiversity management				
3.	By 2020, Biodiversity is integrated into policies and plans of relevance at every level.	The review of the previous policies and plans on biological diversity revealed that several public agencies were unaware of the development of the policies and plans and of the possible involvement of their own missions in the implementation of such policies and plans. Such shortcomings were particularly prevalent in local agencies where biodiversity content was found to be lacking in provincial development plans, local development plans and even provincial action plans for environmental management. Actions are therefore needed for ensuring the integration of biodiversity issues in both the context and the enforcement of laws, regulations, measures and mechanisms that are related to the promotion of and the creation of incentives for conservation, restoration and sustainable use of biological diversity.	National	<u>Aichi Targets</u> A2 Biodiversity values mainstreamed E17 NBSAPs <u>SDG Targets</u> 15.9 Ecosystem and biodiversity values
4.	By 2020, financial mechanisms are available for mobilizing the protection, conservation, restoration and sustainable use of biodiversity.	Financial mechanisms are vital for mobilizing practical management of biodiversity by providing both direct support and indirect incentives for relevant sectors to collaborate in the protection, conservation, restoration and sustainable use of biological diversity. Therefore, Thailand needs to pursue development and adoption of financial mechanisms that are compatible and effective for implementing under the country's	National	<u>Aichi Targets</u> A3 Subsidies and incentives E20 Resource mobilization <u>SDG Targets</u> 15.A Finance for biodiversity and

National Target		Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
		setting and lending themselves to enabling long-term cooperation between the sectors.		ecosystems conservation 15.B Finance for forest management
5.	By 2020, regulations and legislations that obstruct participation in biodiversity management are revised.	National policies on biological diversity in Thailand are not legally binding and several agencies have therefore remained unaware of their own missions under such policies. This shortcoming has resulted in the lack of regulation and legislation that encourage cross-sectoral participation in biodiversity management while pre-existing laws and regulations with focus on stringent control and preservation of biodiversity components have become an obstacle to the participation in sustainable management of biological diversity.	National	<u>Aichi Targets</u> A3 Subsidies and incentives B5 Habitat loss, degradation and fragmentation
6.	By 2021, management of biodiversity is mobilized with participation at every level.	With the lack of understanding on biodiversity in various sectors and the obstacle from pre-existing laws and regulations in enabling participation in biodiversity management, Thailand have placed an emphasis on eliminating these problems with the view to ensure participatory management of biodiversity from policy-making to planning, implementation, surveillance, benefit-sharing, monitoring and evaluation levels. Such efforts are especially important at the local community level.	National	<u>Aichi Targets</u> A3 Subsidies and incentives D15 Resilience and restoration
7.	By 2021, incentives that are harmful to biodiversity are eliminated and/or phased out, and positive incentives for the conservation and sustainable use of biodiversity are promoted.	Thailand has recognized the cross-sectoral participation in conservation and sustainable use of biological diversity as a driving force in developing mechanisms to eliminate and/or phase out incentives that are harmful to biodiversity and to promote positive incentives for conservation and sustainable use of biodiversity, particularly in local communities. This also takes into account the pre-existing efforts of private sector and research	National	<u>Aichi Targets</u> A3 Subsidies and incentives B5 Habitat loss, degradation and fragmentation

National Target	Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
	communities that contribute to the conservation and sustainable use.		<u>SDG Targets</u> 14.6 Eliminate subsidies to illegal fisheries
Strategy 2: Conserve and restore biodiversity			
<u>Measure 3: Conservation, restoration and protection of biodiversity</u>			
8.	By 2020, the rate of loss of all natural habitats, including forests and coastal ecosystems, is at least halved.	Continuous change in land use, derived from the expansion of farming areas for mono-cropping and urban sprawl, has adversely affected various kinds of natural habitats including forests, wetlands and coastal ecosystems. Such impacts have been further exacerbated by the increase in activities that are destructive and harmful to biodiversity such as farming in head watershed areas and illegal fishing. The continues loss of biodiversity from these activities and the lack of documentation on their impacts have hindered efforts to plan and take actions to combat the problem. Thailand has, therefore, identified this target with the view to enable relevant sectors to recognize the importance of reducing the rate of loss of natural habitats to a predetermined milestone.	National <u>Aichi Targets</u> B5 Habitat loss, degradation and fragmentation B6 Fisheries <u>SDG Targets</u> 14.2 Sustainably manage and protect marine and coastal ecosystems 14.4 End overfishing and illegal fishing 14.5 Conserve coastal and marine areas 14.C Enhance the conservation and sustainable use of oceans 15.1 Ensure the conservation, restoration and sustainable use of

National Target		Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
				terrestrial and inland freshwater ecosystems 15.5 Reduce the degradation of natural habitats and halt the loss of biodiversity
9.	By 2020, threatened species and endemic species have improved conservation status and measures are in place for conservation and protection of their habitats.	Threats to biodiversity including encroachment of natural habitats, deterioration of environmental quality and inappropriate use of natural resources, have continuously contributed to the loss of biodiversity in Thailand. Several species have been found extinct in nature, while several more are endangered or under threat. Such a problem is particularly critical for endemic plant species which are commonly found to have a very limited range. Measures for conservation and protection of the species' natural habitats are therefore urgently required.	National	<u>Aichi Targets</u> C12 Threatened species C13 Genetic diversity <u>SDG Targets</u> 15.5 Protect and prevent the extinction of threatened species 15.7 End poaching and trafficking of protected species
10.	By 2021, networks of protected areas and ecosystem representations are interlinked and measures for management of areas in crisis and areas of importance for biodiversity and ecosystem services are developed.	Thailand has retained a number of relatively undisturbed ecosystems which are of significant importance for biodiversity. These areas including head-watershed forests, wetlands and coastal areas, which have been partially declared protected areas and enjoyed a reduction in the level of threat brought about by their legal protection. Nevertheless, more systematic management of protected areas and areas with critically important ecosystems require not only effective management measures, but also networking, supporting research and monitoring on species, integrating management of ecosystems, expanding management landscape and enhancing the areas' ecosystem services.	National	<u>Aichi Targets</u> C11 Protected areas D14 Ecosystem services

National Target	Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets	
11.	By 2021, management, policy and legal mechanisms and measures are available for conservation and protection of the country's genetic diversity.	Thailand is an important genetic pool for both plant and animal species, as seen in the existence of no less than 10,000 varieties of native rice. However, varieties, traits and other genetic materials have continued to be loss due to the failure to enable their re-propagation and their replacement by commercial varieties as well as the loss of farmlands and their natural habitats to natural disasters, encroachment and change in land use. Introduction of exotic breeds and crossbreeding of livestock have been driving native breeds into extinction, reducing the genetic pools of livestock even further. To this end, measures are needed to manage, conserve and protect the country's genetic diversity.	National	<p>Aichi Targets</p> <p>C13 Genetic diversity</p> <p>C12 Threatened species</p> <p><u>SDG Targets</u></p> <p>15.5 Protect and prevent the extinction of threatened species</p> <p>15.7 End poaching and trafficking of protected species</p>
Measure 4: Reducing threats to and enabling sustainable use of biodiversity				
12.	By 2020, pollution has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Pollutions derived from household, agricultural, tourist and industrial activities have had both direct and indirect impacts on ecosystems and biodiversity. The most notable of the pollutions include chemical contamination, poorly disposed hazardous and other solid wastes, water and air pollution at the level which is detrimental to both human health and biodiversity. Controlling the emission of pollutants at their sources and taking precaution to prevent contamination in atmospheric and other environments are therefore needed to protect ecosystems and biodiversity from pollution.	National	<p><u>Aichi Targets</u></p> <p>B8 Pollution</p> <p>D14 Ecosystem services</p> <p><u>SDG Targets</u></p> <p>6.3 Reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials</p> <p>12.5 Substantially reduce waste generation</p> <p>14.1 Reduce marine pollution of all kinds</p>

National Target		Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
13.	By 2020, tools/ mechanisms/ guidelines on sustainable use of biodiversity are applied in all relevant sectors.	Relevant sectors in Thailand are still without adequate integration and adoption of tools, mechanisms and guidelines on management of sustainable use of biodiversity. To overcome such shortcoming, there is the need to conduct reviews on existing rules and regulations of relevance. Establishing mechanisms to monitor and control impacts of pollutions on ecosystems, taking into account the ecosystems' carrying capacity, monitoring and reducing impacts of human activities on biodiversity in fragile ecosystems such as coastal areas and wetlands and other ecosystems affected by urban expansion, pollution, overfishing, tourism activities that exceed the carrying capacity of the ecosystem functions and climate change. Thailand has set measures to reduce the impacts of tourism activities on ecosystems that have been affected from climate change. In addition, Thailand is to pursue the inclusion of biodiversity maintenance in various standards and criteria.	National	<u>Aichi Targets</u> B7 Sustainable agriculture, aquaculture, forestry A4 Sustainable production and consumption <u>SDG Targets</u> 12.2 Sustainable management and efficient use of natural resources
<u>Measure 5: Wetland management</u>				
14.	By 2021, effectiveness in wetland management is improved at every level.	Fourteen wetlands in Thailand were enlisted as wetlands of international importance or Ramsar Site by the Convention on Wetlands (Ramsar Convention). An additional 69 sites were identified as wetlands of international importance by Thailand's national wetland inventory, while 47 wetlands were found to be of national importance. Furthermore, nearly 20,000 sites were noted as wetlands of local importance and/or wetlands in need of protection and rehabilitation. However, effectiveness in management of these wetlands has not been systemically evaluated at all levels and reviews on management tools and mechanisms as well as on assessment of wetlands are therefore required with the view to enhance such effectiveness nationwide.	National	<u>Aichi Targets</u> C11 Protected areas B10 Vulnerable ecosystems

National Target		Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
15.	By 2021, loss of wetlands is significantly reduced with the view to ensure ecosystem services and to support climate change adaptation.	Thailand does not have specific legislation for management of wetlands, including those of international, national or local importance, and instead employs existing laws to regulate activities and prevent encroachment for various usages and development schemes that may adversely impact the wetland ecosystems and their functions as catchments and providers of water supply. An inventory carried out for wetlands at all levels has been accompanied by surveillance and monitoring of all possible threats to wetlands.	National	<u>Aichi Targets</u> C11 Protected areas B10 Vulnerable ecosystems <u>SDG Targets</u> 6.6 Protect and restore mountains, forests, wetlands, rivers, aquifers and lakes
Measure 6: Management of invasive alien species				
16.	By 2020, invasive alien species in various ecosystems are identified and enlisted.	Invasive alien species have been identified as a major threat to biodiversity. No less than 3,500 alien species were found in Thailand, and more species have continued to be introduced for commercial and agricultural purposes, as well as for being used as pets and ornamental plants. Some alien may become invasive and have adverse impacts on biodiversity as well as cause notable economic and social loss. Listing invasive alien species is therefore required to enable prevention, control, elimination and utilization of invasive alien species in conservation areas and areas of importance to biodiversity of various ecosystems.	National	<u>Aichi Targets</u> B9 Invasive Alien Species C13 Genetic diversity <u>SDG Targets</u> 15.8 Reduce invasive alien species
17.	By 2020, measures are in place to manage priority invasive alien species and their pathways.	The impacts of invasive alien species on biodiversity in Thailand required identification of the species' pathways in order to prevent their introduction and settlement in the country.	National	<u>Aichi Targets</u> B9 Invasive Alien Species C13 Genetic diversity <u>SDG Targets</u> 15.8 Reduce invasive alien species

National Target	Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
Measure 7: Biosafety			
<p>18. By 2021, rules and regulations adhering to the precautionary approach for biosafety are available and applied by relevant agencies for improvement and development of rules, procedures and mechanisms to regulate transboundary movement of living modified organisms (LMOs) in accordance to the obligations of the Cartagena Protocol on Biosafety</p>	<p>The national biosafety guideline for modern biotechnology was developed in order to provide a framework which is consistence to both the criteria of internationally recognized organizations and the pre-existing national regulations of relevance. However Thailand is still without specific legislation to regulate adverse impacts from modern biotechnology to biodiversity, remaining uncertain in addressing liability and redress of biodiversity damage derived from transboundary movement, transit, handling and use of Genetically Modified Organisms (GMOs). In addition, further building of biosafety capacity is required for public agencies, private sector and the general publics in implementing the Cartagena Protocol on Biosafety.</p>	National	<p><u>Aichi Targets</u> C13 Genetic diversity B9 Invasive Alien Species <u>SDG Targets</u> 15.8 Reduce invasive alien species</p>
Strategy 3 Protect country's rights and enable management to enhance and share benefits from biodiversity in line with green economy			
Measure 8: Protection of genetic resources			
<p>19. By 2020, mechanisms, rules and regulations on access to and benefit sharing of genetic resources and traditional knowledge are available for Competent National Authorities.</p>	<p>Thailand has assigned the Competent National Authorities with the tasks of regulating access to and benefit sharing of natural resources and biodiversity by utilizing relevant laws and the authorities' own regulations to approve such access as well as actions related to the conservation and sustainable use. However, most of these laws including National Reserved Forest Act (1964), National Park Act (1961) and Plant Variety Act (1975) have long been enacted before the adoption of the Nagoya Protocol on Access and Benefit Sharing (ABS). Therefore, these laws need to be reviewed and revised to accommodate specific provisions on the access to, and benefit of, sharing of genetic resources to</p>	National	<p><u>Aichi Targets</u> D16 ABS E18 Traditional knowledge <u>SDG Targets</u> 15.6 Fair and equitable sharing of the benefits arising</p>

National Target	Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
	provide practical guidance for current circumstance while meeting the need to protect traditional knowledge related to the genetic resources.		
20.	By 2020, mechanisms for management of access to, sharing of benefits derived from and monitoring of utilization of genetic resources are integrated.	National	<u>Aichi Targets</u> D16 ABS E19 Knowledge, science and technology <u>SDG Targets</u> 15.6 Fair and equitable sharing of the benefits arising 14.A Increase scientific knowledge
21.	By 2021, mechanisms, rules and regulations related to access and benefits sharing of genetic resources are developed by research and local communities.	National	<u>Aichi Targets</u> D16 ABS E19 Knowledge, science and technology <u>SDG Targets</u> 15.6 Fair and equitable sharing of the benefits arising 14.A Increase scientific knowledge
<u>Measure 9: Research and development for bio-economy</u>			
22.	By 2021, measures and mechanisms are available for	National	<u>Aichi Targets</u>

National Target		Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
	returning economic revenues from biological products to their origins in order to support conservation and sustainable use of biological diversity.	well as applications of biodiversity values and relevant traditional knowledge in utilization of its components in growing food, cosmetic, health care, herbal and local production businesses. Such benefits have yielded tremendous fiscal returns to the country, enabling better distribution of wealth to local communities. Therefore, measures and mechanisms for the management of benefits derived from ecosystem services and appropriate access to natural resources should be promoted to ensure that the benefits are returned to conserve their sources in a sustainable manner.		D16 ABS A4 Sustainable production and consumption <u>SDG Targets</u> 12.2 Sustainable management and efficient use of natural resources
Strategy 4: Develop biodiversity knowledge and database systems to be consistent with internationally recognized standards				
<u>Measure 10: Management of knowledge and databases</u>				
23.	By 2021, mechanisms are available for integrating and linking databases on biodiversity and other sources of relevant scientific information, enabling effective use of all existing technical resources.	Implementation of Thailand's Master Plan for Biodiversity Management involves actions by various sectors. In the public sector, major agencies under the Ministry of Natural Resources and Environment, the Ministry of Agriculture and Cooperatives, the Ministry of Public Health and the Ministry of Science and Technology were expected to take the lead in the implementation with support from the Ministry of Interior, the Ministry of Education, the Ministry of Foreign Affairs, and the Prime Minister's Office and in coordination with the Office of Natural Resources and Environmental Policy and Planning. To meet the needs of cross-sectoral and inter-agency actions, effective knowledge and information management are needed and would include conducting inventories, improving biodiversity databases, developing biodiversity meta-databases and enlisting biological resources and relevant local knowledge that adhere to internationally recognized standards.	National	<u>Aichi Targets</u> E19 Knowledge, science and technology D16 ABS <u>SDG Targets</u> 14.A Increase scientific knowledge

National Target		Rationale for the national target	Level of application	Relevance to the Aichi Biodiversity Targets and SDG Targets
24.	By 2021, databases on priority biodiversity issues are available.	In Thailand, authority over management of natural resources and the environment was partially decentralized and allocated to local administrations. The local administrators are to cooperate with central authorities (through their local branches) in maintaining and restoring natural resources, increasing urban green areas as well as protecting natural reservoirs, farmlands and natural vegetation. They are also tasked with encouraging municipalities to conduct systematic inventory on urban biodiversity with the view to enable more sustainable town management.	Local	<u>Aichi Targets</u> E19 Knowledge, science and technology A2 Biodiversity values mainstreamed <u>SDG Targets</u> 14.A Increase scientific knowledge 15.9 Ecosystem and biodiversity values
Measure 11: Preservation and protection of local knowledge associated with biodiversity				
25.	By 2021, biodiversity inventories are systematically carried out by municipalities of every level.	In Thailand, there are several shortcomings related to development and utilization of database on natural resources and biodiversity. These include limited scopes of databases developed to meet very specific needs of each specialized organization, the lack of data compatibility and linkage, poor documentation on local and traditional knowledge and the absence of databases on certain priority issues on biodiversity. Therefore, additional databases should be developed to expand coverage of information services vital to the protection of biodiversity related traditional knowledge with the rights and interests of the country and communities over the abovementioned knowledge.	National	<u>Aichi Targets</u> E19 Knowledge, science and technology E18 Traditional knowledge <u>SDG Targets</u> 14.A Increase scientific knowledge



Section 2

Implementation measures taken,
assessment of their effectiveness,
associated obstacles and scientific
and technical needs to achieve
national targets

Section II

Implementation measures taken, assessment of their effectiveness, associated obstacles and scientific and technical needs to achieve national targets

Thailand has developed 11 measures for the Master Plan for Integrated Biodiversity Management, 2015-2021.

This section is the compilation of information on measures taken for implementation of the national strategy for meeting the national targets with the view to assess effectiveness of the measures and to identify associated obstacles and technical needs in achieving the national target. The national report was prepared by gather information related to indicators, consultations with relevant parties, seeking experts' opinions, providing case studies when information is not sufficiently available and utilizing combinations of these methods when appropriate.

Measure 1: Strengthening awareness and education on biodiversity

Description

This measure consists of 2 actions which are; (1) building awareness and providing education on the importance of biodiversity, and (2) promoting and supporting for inclusion of biodiversity content in curriculums of education institutes at every level as well as revising and updating existing curricula to better accommodate current circumstances, including those on biodiversity. Several public agencies, education institutes, private sectors and NGOs were found to participate in activities or projects related to these actions, particularly in awareness building, promoting education and transferring relevant knowledge.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2020, every sector, particularly the general publics and local communities, have understanding and awareness on the importance of conservation and sustainable use of biological diversity.	A1 Public awareness A2 Biodiversity values mainstreamed
By 2021, Biodiversity is integrated in curricula of education institutes at every level.	

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

The 36.9 percent of respondents in a survey of relevant agencies were found to place an emphasis on building knowledge, understanding and awareness on the values and the

importance of biodiversity. They were reported to carry out projects or activities to strengthen awareness, knowledge and understanding on conservation and sustainable use of biodiversity while education institutes in various regions of the country were found to play greater roles in enabling their participation in building public awareness on these issues. Although participation of business and civil sectors was enhanced, integration of biodiversity context in policy-making and planning processes was found to remain lacking at agency, local, and community levels.

Both public and private organizations reportedly developed work plans to strengthen the awareness of their personnel. Additionally they provided relevant knowledge through exhibitions, and activities on important days for biodiversity, integrating natural resources and biodiversity contents across various subjects of formal curricula, establishing learning facilities such as biodiversity learning centres, and natural classrooms and botanical study centres. As far, these actions were implemented by education institutes as well as by a number of private firms in association with public organizations such as the National Science Museum, Thailand.

In addition, the National Education Plan, 2017-2036 stipulates the development of a strategy for providing education for enhancing environmentally sound livelihood and inclusion of biodiversity contents in the learning standards and indicators for science and mathematics, geography and social study programs (in the 2017 versions) of the 2008 general curriculum for basic education under the supervision of the Ministry of Education.

Obstacles and scientific and technical needs related to the measure taken

- Limited human resources in agencies undertaking biodiversity actions due to lack of career incentive.
- Knowledge on biodiversity management in several areas has not been adequately compiled and/or sufficiently integrated into other organizations. Awareness building actions were found to take place only in communities where public agencies had suitable information.
- Local administrative organizations and the public were found to be without adequate information on funding sources for local biodiversity actions and required public agencies in their respected regions to provide supervision for their actions.
- Actions are needed to enable exchange of knowledge on biodiversity management between different areas and to use lessons learned from activities to build on such knowledge.

Measure 2: Integration of and promotion of participation for biodiversity management

Description

This measure consists of 3 actions which are: (1) enhancing effectiveness in biodiversity management and in implementation of international obligations of relevance, (2) Integration of biodiversity management through inclusion of biodiversity context in policies and plans at national, sectoral, institutional, provincial, local and communities levels as well as in national account, and (3) promotion of community and other cross-sectoral participation in conservation, restoration and sustainable use of biodiversity. These actions were envisaged for implementation by public agencies, particularly in developing capacity of relevant sectors, promoting actions of involved parties on the ground and providing logistic and other support.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2020, Biodiversity is integrated in policies and plans of relevance at every level.	A2 Biodiversity values mainstreamed E17 NBSAPs
By 2020, financial mechanisms are available for mobilizing the protection, conservation, restoration and sustainable use of biodiversity.	A3 Subsidies and incentives E20 Resource mobilization
By 2020, regulations and legislations that obstruct participation in biodiversity management are revised.	A3 Subsidies and incentives B5 Habitat loss, degradation and fragmentation
By 2021, management of biodiversity is mobilized with participation at every level.	A3 Subsidies and incentives D15 Resilience and restoration
By 2021, incentives that are harmful to biodiversity are eliminated and/or phased out, and positive incentives for the conservation and sustainable use of biodiversity are promoted.	A3 Subsidies and incentives B5 Habitat loss, degradation and fragmentation

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

A cross-sectoral survey with focus on local communities and networks involved in protection, conservation, restoration and sustainable use of biodiversity noted networks of communities and community organizations for their contributions to study and research on local knowledge. Networks of public agencies were found to be instrumental in installing organizational structures (i.e. committees) for actions and in enabling conventional study and research. While networks of education institutes and businesses were reported to play a vital role in providing financial supports to communities for biodiversity protection, including those undertaken with coordinated actions by networks of forest protection marine and coastal resources conservation or local environment protection volunteers.

In addition, Thailand has integrated biodiversity management into a number of national policies, plans and measures, including the Thailand 20-year National Strategy (2018-2037), the 12th National Economic and Social Development Plan, 2017-2021, the 20-year Strategy of the Ministry of Natural Resources and Environment (2017-2036), the Policies and Plans for Promotion and Conservation of National Environmental Quality, 2017-2036, Environmental Quality Management Plan, 2017-2021, the National Master Plan for Climate Change Adaptation, 2015-2050, the National Maritime Security Plan, 2015-2021, Constitution of the Kingdom of Thailand, B.E. 2560 (2017), the Royal Ordinance on Fisheries, B.E. 2560 (2017).

Furthermore, a number of laws and regulation were revised to enable the integration of biodiversity management. These include the National Reserved Forest Act, B.E. 2559 (2016) and the Fisheries Act, B.E. 2558 (2015) and the Royal Ordinance on Fisheries, B.E. 2560 (2017). Notable actions taken by the private sector were those carried out by the petroleum

company and include: the development of a standard for management of biodiversity and ecosystem services with the view to clarify the process for submission of proposals for management actions in the companies and by its subsidiaries, formulation of guidance on biodiversity and ecosystem services with inclusion of methodologies on assessments of risk to and values of biodiversity and ecosystem services for the development of new projects. Several public firms, were found to actively participate in conservation and rehabilitation of natural forests and other ecosystems. This includes the Forest Industry Organization, who participated in the sustainable forest management project for the ASEAN Economic Community by identifying indicators for Forest Standard Certification (FSC) and conducting surveys and inventory on plants and animal diversity with participation of local communities.

In 2018, The National Committee on Conservation and Sustainable Use of Biodiversity appointed 3 additional subsidiary bodies which are (1) the Sub-committee on Mobilizing Bio-Economy, (2) the Sub-committee on Biodiversity Information and (3) the Sub-committee on Biodiversity Laws. The sub-committees were comprised of representatives from various sectors and envisaged to mobilize more collective efforts on biodiversity management in each of their respected fields. An overview of participation found an increase in cooperative networks in numeral aspects of biodiversity management, including community participation in networks of forest protection and local environmental protection volunteers, although it has not yet been able to determine whether such increase is of any statistical significance. The actual numbers of marine and coastal resources conservation networks and marine protection volunteers were, on the other hand, documented. In general, the current trend suggests a continuous increase in participation by local populations and their networks, particularly among networks for protection, restoration and sustainable utilization of biodiversity.

Several kinds of financial mechanisms have been made available in Thailand to support biodiversity actions. These include the Environment Fund, the mechanisms developed by Enhancing the Economics of Biodiversity and Ecosystem Services in Thailand/Southeast Asia (ECO-BEST) program, Tree Bank, pilot initiatives for Payment for Ecosystem Services (PES) and outcomes of a study on Natural Capital Accounting (NCA). As for incentive measures, the Royal Thai Government approved a royal decree on revenue code to provide tax exemptions for actions that support contributions of community forests in climate change mitigation. Under the royal decree, any company or registered ordinary partnership can file for tax exemption on donations to the community forests, providing that such payments do not exceed 2% of their net profit. The decree also provides tax break for private sectors that conduct research and inventories or take other actions on conservation and sustainable use of biodiversity.

Obstacles and scientific and technical needs related to the measure taken

- Information and knowledge on biodiversity remain technically oriented and is not readily comprehensible by the general public, particularly in enabling the understanding of its roles in linking natural environment with livelihoods. Such difficulty has hindered wider understanding of the concept and cross-sectoral participation in planning for and sustainable use of biodiversity, including at the community level.

Measure 3: Conservation, restoration and protection of biodiversity

Description

This measure consists of 5 actions which are; (1) enhancing effectiveness and efforts in management of protected and conservation areas, (2) reducing the rate of habitat loss and rehabilitating deteriorated ecosystems with the view to maintain their ecosystem services for climate change adaption and for combating desertification, (3) developing mechanisms to protect and rebuild populations of endemic species and threatened species identified in Thailand Red Data, (4) conserving and protecting genetic diversity of plants and animals used in agriculture, including native species, wild relatives and microbes, as well as other species of economic, social, cultural and ecological importance, and (5) promoting the adoption of landscape and seascape approaches in managing biodiversity in order to enhance conservation and sustainable use of biodiversity in addition to maintaining ecosystem services. Most agencies identified to carry out these actions had been known to undertake activities on biodiversity conservation, restoration and protection and had continuously initiated projects and programs to protect, maintain and rehabilitate natural habitats and ecosystems. Of these, the public agencies were found to play more active roles and undertake more diverse measures than those in other sectors.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2020, the rate of loss of all natural habitats, including forests and coastal ecosystems, is at least halved.	B5 Habitat loss, degradation and fragmentation B6 Fisheries
By 2020, threatened species and endemic species have improved conservation status and measures are in place for conservation and protection of their habitats.	C12 Threatened species C13 Genetic diversity
By 2021, networks of protected areas and ecosystem representations are interlinked and measures for management of areas in crisis and areas of importance for biodiversity and ecosystem services are developed.	C11 Protected areas D14 Ecosystem services
By 2021, management, policy and legal mechanisms and measures are available for conservation and protection of the country's genetic diversity.	C13 Genetic diversity C12 Threatened species

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

Only mangrove forests, coral reefs and wetlands were found to have reduced in the rate of habitat loss. The habitat loss and degradation for forests and seagrass beds remained significant. However, there have been educational activities such as promoting local participations in restoration, awareness raising, and annual assessment of seagrass beds. Therefore, some positive trends on the loss were reported. The national target of having 40% of the country as forest areas has not been achieved. Nevertheless, agencies from every sector were found to consistently commit to expanding forest cover, making it possible for the target to be met in the foreseeable future.

An additional protected area was established after the previous national reporting. Tools for assessment of protect areas' effectiveness were introduced and applied in selected types of protected areas including environment protected areas, national parks and wildlife sanctuaries. Continuous conservation efforts reportedly contributed to the increase in population sizes of threatened species of elephants, gaur, tapirs, tigers and leopards. The previously extinct Sarus Crane was reintroduced into the wild after the success in captive breeding of the species.

Management effective Tracking Tools (METT) was adopted for the evaluation of management effectiveness in all 14 wetlands of international importance (Ramsar site) in 2017. In addition, thirteen pilot protected areas and an additional forest complex were assessed for their management effectiveness under a project on Catalyzing Sustainable Protected Areas (CATSPA) and contributed to the development for the 2017-2021 integrated master plan for national parks. Furthermore, ecosystem-based management of the Western Forest Complex expanded scope of its activities to 17 protected areas and enabled studies on overall potential of the Forest Complex, management at forest level and development of land use plans at provincial level. Such actions were envisaged to made available appropriate land use measures, reduce forest encroachment, protect habitats of notable plant and animal species the like of Onion plant and Spoon-billed Sandpipers, and enhance management of national parks in accordance to internationally recognized standards.

A cabinet decision on December 22, 2015 approved, in principle, a land acquisition policy for local communities. Under the policy, communities were to be provided with collective plots of public land without being given any entitlement and allowed to utilized the land as groups or communities in accordance to conditions stipulated by the National Committee on Land Policy, including by operating as cooperatives or any other kinds organization found appropriated by the committee. To this end, public agencies assigned to ensure compliance to land laws, codes, regulations and criteria were to be instructed by the National Committee on Land Policy (with advices by Ministry of Natural Resources and Environment) to identify lands for allocation under the policy. These lands generally fall under 2 categories which are public lands with pre-existing occupation and unoccupied state lands and consisted of reserve forests, mangrove forests, areas in land reform reservations, public lands, state properties and reservations for self-settlement in 70 provinces, covering approximately 2094.4 square kilometres in total. Roughly 756.8 square kilometres of 50,281 plots of land in 57 provinces were allocated to 40,380 applicants and certificates were issued for 11,338 applicants in 21 provinces. Job training was organized for the applicants in 56 provinces for actions on 6 aspects of land use management which are land development, land use enhancement, zoning, reservoir development, enhancement of public utility and enabling employment.

Obstacles and scientific and technical needs related to the measure taken

- Economically oriented development policies which are harmful to biodiversity. These include activities that lead to crossbreeding between native and exotic species and introduction of invasive alien species.
- Plans, procedures and measures on conservation were often developed without feedback from implementers, resulting impractically and ineffectiveness in their implementation.
- Integration of efforts in conservation and restoration of biodiversity between agencies remained lacking.

Measure 4: Reducing threats to and enabling sustainable use of biodiversity

Description

This measure consists of 4 actions which are; (1) ensuring sustainable and environmentally responsible management of farmlands, aquaculture and forestry by integrating biodiversity in environmental standards of relevance with the view to enable conservation of biodiversity and ecosystems, (2) protecting natural resources of marine and coastal areas, wetlands and other fragile ecosystems from the impacts of urban expansion, pollution, overfishing and climate change, (3) promoting sustainable tourism with local participation and by taking into account ecosystem services and biodiversity conservation and (4) regulating and managing populations of plants and animals, taking into account ecological balance and the need to prevent emerging disease that may adversely affect biodiversity. The majority of these actions were expected to be undertaken by public agencies at both policymaking and implementation levels and supported by the education sector in developing capacity for rehabilitation and sustainable use of biodiversity and by the private sector in enabling action at local levels.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2020, pollution has been brought to levels that are not detrimental to ecosystem function and biodiversity.	B8 Pollution D14 Ecosystem services
By 2020, tools/mechanisms/guidelines on sustainable use of biodiversity are applied in all relevant sectors.	B7 Sustainable agriculture, aquaculture, forestry A4 Sustainable production and consumption

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

Agroforestry and sustainable agriculture system were promoted, particularly in buffer zones of protected areas. In addition, the 6th guideline of the 10 operational guidelines for sustainable agriculture was noted for placing a focus on “utilization of biodiversity to enable diversity of farming activities, mutually supportive combination of production activity, natural based pest control and chemical free farming production”.

Sustainable use of forest biodiversity was promoted with local restoration and conservation of cultural forests as well as development of incentives for conservation and sustainable use through rehabilitation of natural environments of national parks, promotion of ecotourism and enabling community participation in conservation and rehabilitation of forests in several areas. Furthermore, the national work program on forest biodiversity (consisted of 130 activities for 27 objectives of 12 targets under 3 headings) was revised to include guidance on promotion of sustainable use of forest biodiversity for achieving the objective of enhancing the use of forest resources to support conservation of forest biodiversity (Objective 1) of the target on promotion of sustainable use of forest resources (Target 4) under the heading on conservation, sustainable use and benefit-sharing (Heading 1).

Public, private and civil sectors jointly made a declaration to “cooperate in improving Long tail Tuna fishing in the Gulf of Thailand for sustainable use of the species”. The declaration aimed to ensure sustainable use of oceans and marine resources as well as to promote and build incentives for their conservation and sustainable use. For freshwater fishery, approximately 800,000 freshwater fishes were released at 80 sites nationwide in an effort to motivate local communities to conserve the species. In addition, networks of the civil sector were provided opportunities to participate in actions against overfishing and other activities that adversely impact aquatic species and their habitats, including by using mechanisms made available by the provincial committees on regulation and protection of marine and coastal resources in every coastal province.

Sustainable tourism was promoted with the development of the national policy and guideline for development of ecotourism (1995-1996) and the adoption of the action plan on ecotourism (with 37 projects of 14 work plans) as national guidance.

Efforts to reduce water pollution included the monitoring of water quality in 59 riparian reservoirs and 6 static reservoirs. Using the Water Quality Index (WQI), the 2017 water quality report found that 17% of freshwater reservoirs had deteriorated water quality, indicating a reduction from that of the previous year. No reservoir was reported to have severely deteriorated water quality. Another report on water quality for marine environment utilized Marine Water Quality Index (MWQI) and noted that water quality of 4% of marine was in the state of deterioration to severe deterioration in 2017 (also a reduction from that in the previous year).

Obstacles and scientific and technical needs related to the measure taken

- Models are required to ensure that expansion of forestlands is compatible with other land-use.
- Providing supports for agricultural researches on value added initiatives and development of biodiversity innovations as a driving force toward bio-economy.

Measure 5: Wetland management

Description

This measure consists of 4 actions which are; (1) integration of wetland issues in relevant policies, plans, tools, mechanisms and networks in order to enhance effectiveness of wetland management, (2) building capacity of public agencies, NGOs and local communities to ensure effectiveness in undertaking the conservation and sustainable use of wetlands, (3) developing inventories of important wetlands and (4) conducting surveillance of and monitoring threats to wetlands as well as promoting their sustainable use. While most of these actions were expected to be implemented by public agencies responsible for integration of wetlands issues into policies and plans at various levels, protection of wetlands at local level would require cross-sectoral participation including contributions of the education sector in building awareness on importance of wetlands and of the private sector in building civil capacity for their conservation and management.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2021, effectiveness in wetland management is improved at every level	C11 Protected areas B10 Vulnerable ecosystems
By 2021, loss of wetlands is significantly reduced with the view to ensure ecosystem services and to support climate change adaptation.	

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

The national mechanism for wetland management is the National Committee on Wetland Management and the Technical Working Group on Wetland as well as the Ministry of Natural Resources and Environment who was appointed as the main responsible agency for wetland action. Wetlands committees were also established at provincial level in order to support activities in local areas and to provide for cross-sectoral participation in supervising and implementing the activities.

Measures were developed for conservation of wetlands of international and national importance and for wetland conservation in general. These measures were endorsed by the cabinet on November 3, 2009 and May 12, 2016 and aimed to reduce the loss of wetland ecosystems, to ensure appropriate use of their ecosystem service and enable wetlands to support climate change adaptation.

Ramsar sites in Thailand were mostly supervised by public agencies and found to be relatively unchanged at landscape level, despite impacts of tourism on ecosystems and other environmental quality. For other wetlands, reports by relevant agencies indicated that most of gullies, ponds and natural swamps were lost to other kinds of land uses, including urban expansion and farming.

The situation regarding coastal wetlands in 2017 was relatively stable and natural resources found in these wetlands were reported to remain largely intact, contributing to maintenance of the area's unique features and meeting the needs of local and regional populations. Wetlands of Phang Nga Bay were noted for being under-utilized by migratory birds due to intensive tourist activities, particularly those related to water-sport. It's believed that the migratory birds chose to visit adjacent areas of the wetlands instead.

Obstacles and scientific and technical needs related to the measure taken

- Importance of wetlands was inadequately presented and/or highlighted in various aspects of spatial development.
- Uncertainty of wetlands' boundaries.

Measure 6: Management of invasive alien species

Description

This measure consists of identification, classification and prioritization of invasive alien species and their pathways; controlling and eradicating priority alien species and taking measures to manage the pathways with the view to prevent the introduction and settlement of the invasive alien species. The measure was to be mostly implemented by the responsible public agencies, with supports by the education sector on information gathering and inventory and by the private sector in promoting the use of native species (instead of introduced species) for habitat rehabilitation and other relevant activities.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2020, invasive alien species in various ecosystems are identified and enlisted.	B9 Invasive Alien Species C13 Genetic diversity
By 2020, measures are in place to manage priority invasive alien species and their pathways.	

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

A revision on the national measures on protection against, control of and eradication of invasive alien species was endorsed by the cabinet on February 2, 2018 and includes an additional operational guidance on invasive alien species identified to be economically viable. The national inventory of alien species was also updated and presently contained 323 species (an increase from 273 species in the 2009 list). In addition, the revised inventory contains guidance on control and eradication of priority alien species in order to provide relevant agencies with a tool for taking effective steps in dealing with invasive alien species. A handbook on invasive plant species was also made available for the general public.

Five measures developed for protection against, control of and eradication of alien species consist of (1) development of policies, plans, regulation and budgets for actions, (2) management of alien species, (3) surveillance and monitoring of alien species, (4) providing supports to researches on alien species and (5) building awareness and providing knowledge on alien species. In addition, a guideline on for control and eradication of priority alien species was drafted for both priority alien plants and animal species.

Obstacles and scientific and technical needs related to the measure taken

- Inventories and development of measures on management of invasive alien species in different ecosystems.
- Establishing communication channels and networks for notifying information on alien species and a simple tool for identifying invasive alien species.
- Species identification sometimes can be quite difficult; therefore, people will not know exactly if something is an alien species.

Measure 7: Biosafety

Description

This measure concerns the establishment of a system to operate processes for living modified organisms (LMOs) and pursuing implementation of the Draft Biosafety Act. This measure was to be almost entirely implemented by the responsible public agencies with relatively little participation by the education, private and civil sectors.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2021, rules and regulations adhering to the precautionary approach for biosafety are available and applied by relevant agencies for improvement and development of rules, procedures and mechanisms to regulate transboundary movement of living modified organisms (LMOs) in accordance to the obligations of the Cartagena Protocol on Biosafety	C13 Genetic diversity B9 Invasive Alien Species

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

Thailand has formulated and amended 7 Biosafety regulatory practice guidelines so as to apply them as rules in executing operations in accordance with the precautionary principles. These are:

- 1) The Biosafety Guidelines for Work Related to Modern Biotechnology or Genetic Engineering, amended B.E. 2559 (2016) to serve as monitoring tools to ensure Thailand's safe modern biotechnology research works,
- 2) The Biosafety Guidelines for Contained Use of Genetically Modified Microorganisms at Pilot and Industrial Scales, amended B.E. 2559 (2016) to serve as guidelines for the industrial sector involved with genetically modified microorganisms under certain controlled conditions,
- 3) The Biosafety Assessment Guidelines for Living Modified Plants with Stacked Gene and their Derivatives, amended B.E. 2558 (2015) for monitoring agencies to assess the biosafety of living modified plants with stacked gene, as well as the environment and food,
- 4) The Biosafety Guidelines for establishing the Research Greenhouses for Genetically Modified Plants, operated B.E. 2556 (2013) for agents to conduct biosafety tests for genetically modified under control conditions to design locations needed as most proper and suitable for any control to ensure that the genetically modified plants shall not slip off unnoticed,
- 5) The minimum assessment submission requirements for food biosafety assessment for genetically modified plants, revised B.E.2560 (2017), to be served as guidelines for those in need of food biosafety assessment from genetically modified plants and for

the documentary preparation of the related assessment submission. Such will also serve as their biosafety assessment criteria.

- 6) The minimum assessment submission requirements for assessing foods produced from genetically modified microorganisms for the documentary preparation of the related assessment submission. Such will also serve as their biosafety assessment criteria.
- 7) The minimum assessment submission requirements for assessing foods of genetically modified animals, revised B.E.2560 (2017) to serve as guidelines for those in need of the biosafety assessment submission for foods produced from genetically modified animals for the documentary preparation of the related assessment submission. Such will also serve as their biosafety assessment criteria.

Efforts were further made to pursue enforcement of the new rules and regulations on biosafety in modern biotechnology by ensuring their inclusion in the Draft Biodiversity Act to develop additional ministerial regulations and criteria of relevance and to establish biosafety committees at various levels.

Obstacles and scientific and technical needs related to the measure taken

- The lack of consistent allocation of national budget for implementation biosafety measures and the lack of attention on biosafety in general.

Measure 8: Protection of genetic resources

Description

This measure concerns the protection of and sharing of benefits derived from utilization of biological and genetic resources in order to maximize national interest. This measure was to be mostly implemented by limited number of public agencies with relevant missions and focuses on actions to protect genetic pools and resources and to enable access and benefit sharing in accordance to the Nagoya Protocol. Implementation of the measures is also a part of ongoing efforts in gathering information on good practices, developing legislation to protect genetic pools, regulating access to native plants and wild relatives for research and breeding purposes and ensuring ethics in animal experimentation and other aspects of research. To this end, the education sector, the private sector, NGOs, and local communities have minimal involvement in the implementation of this measure.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2020, mechanisms, rules, and regulations on access to and benefit sharing of genetic resources and traditional knowledge are available for Competent National Authorities.	D16 ABS E18 Traditional knowledge
By 2020, mechanisms for management of access to, sharing of benefits derived from and monitoring of utilization of genetic resources are integrated.	D16 ABS E19 Knowledge, science and technology
By 2021, mechanisms, rules and regulations related to access and benefits sharing of genetic resources are developed by research and local communities.	

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

Of 10 laws and regulation related to biological resources, none was found to stipulate any mandatory sharing of benefits derived from access to and utilization of the resources, and no information was reported on any law enforcement that constitute such benefit sharing. The National Center for Genetic Engineering and Biotechnology was noted for its current effort to develop a regulation on access to and benefit sharing of biological resources in its custodian. Taking into account the drafting of the bill on promotion and conservation of native species of domesticated animals and the pre-existing laws and regulations related to access and benefit sharing of natural resources, the scope of current legislations has not covered traditional and local knowledge of relevance as well as components of marine and coastal biodiversity.

The revision of the bill on biodiversity may include concise regulation on access and benefit sharing while local rules/regulations on access and benefit sharing of genetic resources were being drafted to enable pilot implementation of these rules/regulations in selected communities. The rules/regulation were developed in accordance to internationally recognized principles and criteria of relevance and to be accompanied by inventory and mapping of biological resources and associated traditional knowledge as well as by establishment of community committees on protection and maintenance of biological resources and associated local knowledge.

The Patent Act was being revised to accommodate disclosure of origins of genetic resources and associated traditional knowledge, while efforts were made to pursue revision of other related laws and regulation including the law on promotion and protection of intellectual heritage, and the regulation on access to rice genetic resources.

Obstacles and scientific and technical needs related to the measure taken

- The lack of management on conservation by and benefit sharing for locals. For example, the need for local participation in tourist operations in coral reefs in order to provide income to local communities and ensure local protection of the reefs.
- The lack of measures to accommodate appropriate tourist activities in conservation areas, including zoning and criteria for public usage of the areas.

Measure 9: Research and development for bio-economy

Description

This measure consists of 3 actions which are; (1) promotion of research on value added, (2) building capacity for development of bio-economy and (3) promoting and developing mechanisms for management of benefits derived from ecosystem services and access to biological resources with the view to use the benefits for the conservation and sustainable use of biodiversity. Implementation of this measure concerns research organizations and their donors in both the public and the education sectors. Although very few organizations were found to be interest on bio-economy, modern information technology has continued to expand knowledge on the issue by enable better access to associate information.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2021, measures and mechanisms are available for returning economic revenues from biological products to their origins in order to support conservation and sustainable use of biological diversity.	D16 ABS A4 Sustainable production and consumption

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

Researches were conducted to add values to various products including silks and orchid extracts as well as to utilize Nano Technology to enhance herbal derivatives, and to investigate local herbs for their industrial applications. In addition, continuous efforts were made to develop community enterprises for conservation and sustainable use of biodiversity while standards and certification systems were developed to enable bio-economy branding that indicates efficient use of biological resources and their associated local knowledge, returning of revenue toward conservation and restoration of origins of the resources and its contribution to development of sustainable economy. Furthermore, bio-based business centres and bio-based economic institutes were established in association with efforts to build market opportunities for bio-based products and to create networks to return economic benefits to ecosystems in accordance to the Payment for Ecosystem Services (PES) concept.

No common format or mechanism was found available for managing benefits derived from ecosystem services and access to biological resources for conservation and sustainable use of biodiversity.

Obstacles and scientific and technical needs related to the measure taken

- In building capacity for development of biodiversity-based products, public agencies were often found to provide support to groups with lesser needs for additional capacity and should direct their efforts to other potential producers in need for such capacity.

Measure 10: Management of knowledge and databases

Description

This measure consists of 3 actions which are; (1) development and improvement of biodiversity databases with internationally recognized standards, (2) supporting operations and pursuing establishment of museums and gene banks of plants, animals and microbes with internationally recognized standards, and (3) promoting and improving the management of biodiversity information, including by applying and transferring technologies associated with sustainable use of biodiversity. Implementation of this measures involved several technical institutions including institutes for taxonomic study of marine organisms, colleges in several regions of the country with research programs on local knowledge and national universities that conducts studies on herbs, local species and other biodiversity components. In addition, public agencies were found to gather information, develop databases and disseminate

knowledge on biodiversity while the business sector, NGOs and local communities adopted the knowledge and made use of the databases for actions on sustainable uses.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2021, mechanisms are available for integrating and linking databases on biodiversity and other sources of relevant scientific information, enabling effective use of all existing technical resources.	E19 Knowledge, science and technology D16 ABS
By 2021, databases on priority biodiversity issues are available	E19 Knowledge, science and technology A2 Biodiversity values mainstreamed

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

Agencies in both the public and the education sectors were found to be involved in development of inventories and databases as the means of providing technical supports to formulation of biodiversity policies and plans. These include the general inventory on biological resource, the inventory on biological resources and their associated local knowledge for conservation, the lists of species in Thai waters, the database on pests and quarantine plants, the database on Thailand’s plant genetic resources and the database on herbal plants. These inventories and databases were, however, found to be stand-alone systems and only accessible through websites of their custodian agencies. To this end, the Office of Natural Resources and Environmental Policy and Planning was developing the national portal for biological resources information as a hub for connecting the biodiversity databases together, in accordance to a governmental policy on enabling greater use of biodiversity information for development of national economy. Continuous efforts were also made in building technical capacity for taxonomists, despite the fact that database on the taxonomists in several agencies remained lacking.

Obstacles and scientific and technical needs related to the measure taken

- Information incompatibility and the lack of a common system for data management, resulting in diverse systems of data gathering and access and difficulty in utilizing the information for research and economic development.
- Most researches were not made available and/or adopted for their potential applications, resulting in the lack of technical support for planning on sustainable use of biodiversity.
- The measure was not consistently supported by the national budget.

Measure 11: Preservation and protection of local knowledge associated with biodiversity

Description

This measure consists of 2 actions which are; (1) promotion and preservation of local knowledge associated with conservation and sustainable use of biodiversity through continuous use of, transfer of and building on the knowledge and (2) developing database on and enlisting local knowledge associated with conservation and sustainable use of biodiversity in order to enable protection of the national interest derived from the knowledge. This measure was to be mostly implemented by public agencies, with support from research, the private sector, and NGOs in transferring the knowledge.

National or Aichi Biodiversity Target(s) it contributes.

National targets	Aichi targets
By 2021, biodiversity inventories are systematically carried out by municipalities of every level.	E19 Knowledge, science and technology E18 Traditional knowledge

Effectiveness of measures

- Measure taken has been effective
- Measure taken has been partially effective
- Measure taken has been ineffective
- Unknown

Assessment of the effectiveness of the implementation measure

Efforts were made to develop and improve databases on biological resources and associated traditional knowledge, to correlate local knowledge with agricultural innovations and to develop databases on herbal plants for traditional medicine. However, several agencies identified as custodians of information on local and traditional knowledge associated with conservation and sustainable use of biodiversity had not made their information available online or even in digital format. Thus, Plant Genetic Conservation Project has been established following Her Royal Highness Princess Maha Chakri Sirindhorn's initiative to encourage and build capacities of local communities in collecting, documenting, and developing database on local resources and keep in the local administrative organizations as well as sharing information through the project. The project would also involve local children to help in the survey and documentation process. as well as to promote the various initiatives in developing businesses in applying local wisdom, developing local learning centers, and transferring bodies of knowledge in integrating the media networks of biodiversity and local wisdom.

In addition to these, various sectors' agencies have been collecting related data and data bases for some specific biodiversity themes with highlighted priorities, such as data bases of plants, Thailand's island databases and biodiversity databases. To date, certain studies and designs have been accomplished for 6 biodiversity database systems. They are: forest insects, forest microorganisms and fungi, plants, climates and plant growth, soils, and wild plant genetics. Additionally, national reform biodiversity plans have also been made, identifying indicators for the central data bases that can be centrally processed. There have also been groupings of various biodiversity data centers, significant for Thailand's various dimensions. And, to ensure their capacity, certain networking mechanisms have been installed to connect the various existing data systems to effectively drive for promising actions in sustainable biodiversity conservation and utilization. This has been coupled with the data registration for

their maximum rights prevention and protection of the related local resources and wisdom under the operation time frame for 2018 – 2022.

Obstacles and scientific and technical needs related to the measure taken

- Local knowledge was reportedly gathered only when its sources, including its custodian networks, made its available to relevant public agencies. Substantive amount of the knowledge remained undocumented and unavailable while mechanism to access and/or link information on the knowledge in possession of the research sector and NGOs remained lacking.



Section 3

Assessment of progress
towards each national target

Section III

Assessment of progress towards each national target

The Thailand's Master Plan for Integrated Biodiversity Management, 2015-2021 was formulated to address the underlying causes of biodiversity loss by aiming to conserve, restore and protect biodiversity and ecosystem services. Additionally, it aims to enhance their benefits, along with raising public awareness and understanding of the roles and importance of biodiversity to human well-being, while collaborating with all relevant sectors in integrated management.

The overall target of the master plan is "by 2021, to implement the management of biodiversity through participation at all levels". The strategies for integrated biodiversity management comprise 4 strategies as follows:

Strategy 1 Integrate biodiversity values and management with participation at all levels	National Target 1-7
Strategy 2 Conserve and restore biodiversity	National Target 8-18
Strategy 3 Protect country's rights, and enable management to enhance and share benefits from biodiversity in line with green economy	National Target 19-22
Strategy 4 Develop biodiversity knowledge and database systems to be consistent with internationally recognized standards	National Target 23-25

This section of this report is the collected information of the progress made towards the attainment of each national target. The information collection tool is same as the previous section. The assessment indicates the five level of progress as on track to exceed target, on track to achieve target, progress towards target but at an insufficient rate, no significant change, moving away from target, and unknown.

National Target 1: By 2020, every sector, particularly the general public and local communities, have understanding and awareness on the importance of conservation and sustainable use of biological diversity.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

A survey of relevant agencies found that several had placed an emphasis on building knowledge, understanding and awareness on the values and the importance of biodiversity. The 37percent of the respondents noted that plans had been developed by biodiversity related agencies and adopted to strengthen the awareness of their personnel. They also provide relevant knowledge through exhibitions and activities on important days for biodiversity. In addition, natural resources and biodiversity content were integrated in various subjects of formal curricula and establish learning facilities such as biodiversity learning centres, natural classrooms and botanical study centres. These facilities were reportedly operated by education institutes as well as a number of private firms.

There was a reported increase in a number of biodiversity conservation networks initiated by the civil sector as well as activities and projects to campaign for conservation of biodiversity in various sectors. Several kinds of promotional media were developed by various agencies for conservation and restoration of biodiversity and maintenance of ecosystems, including documentaries, books, posters, exhibition sets, e-books and educational games. The internet was employed as the primary channel for communication in order to reach the target groups of working populations and adolescents, while the wireless and the television broadcasting were continued to be used for their accessibility by the mass. Furthermore, events such as workshops, learning camps and corporate social responsibility activities of relevant were regularly organized to build awareness on biodiversity, including campaigns on biodiversity conservation held on important days for the environment.

One case study of actions taken for this Target was the monitoring on the implementation of a plan for participatory biodiversity management in Khao Mae Kratu Forest of Nakhon Sawan Province. This activity included an assessment of community satisfaction on the adoption of biodiversity information for the management of forests located adjacent to the communities in order to determine the percentage of satisfaction on accuracy, comprehensiveness, formats, presentation and applicability of the information in relation to management of the forests. Using a questionnaire as a primary tool for data gathering, the assessment reflected views and opinions on local biodiversity information and contributed to development of an integrated plan for biodiversity management of the forests. (Royal Forest Department, 2017)

Indicators

- Percentage or number of agencies and sectors with knowledge and awareness on values and importance of biological diversity.
- Guidelines and plans on strengthening awareness on values and importance of biological diversity in public and private agencies.

- Number of activities/networks on biodiversity conservation that initiated by the civil sector.
- The increase in number of projects/activities on conservation and restoration of biodiversity.
- The increase in public relation on conservation, restoration and sustainable use of biodiversity with more channels of communication and accessibility to wider target groups.
- Percentage of awareness and understanding of values and importance of biological diversity in each sector.
- Percentage of understanding of the conservation and sustainable use of biological diversity in each target group.

Describe any other tools or means used for assessing progress

Consider the data from the questionnaire.

Gather information from meetings with the parties.

Relevant websites, web links and files

- <https://goo.gl/vu655n>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Limited sampling group.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 2: By 2021, Biodiversity is integrated in curricula of education institutes at every level.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

The National Education Plan, 2017- 2036 stipulates development of a strategy to provide education for enhancement of an environmentally sound livelihood. The strategy aims to ensure an environmental conscience for every age group by making available curricula, learning

facilities and educational tools for promotion of environmentally sound quality of life as well as by providing guidance on development of the curricula, facilities and tools.

In addition, biodiversity context was included in the learning standards and indicators for science and mathematics, geography and social study programs (in the 2017 versions) of the 2008 general curriculum for basic education under the supervision of the Ministry of Education. For example, the indicators for the curriculum for Grade 9 students consist of the capacity to describe importance of biodiversity in maintaining ecological balance and for human-being (heading 10) and to express their awareness on values and importance of biodiversity as well as on how to be involved in the maintenance of biodiversity (heading 11) (S (science) 1.3 Standard in Section 1 of the Ministry's learning standards and indicators).

Education institutions of various levels were reportedly found to include biodiversity context in their curriculums:

Case study in high school:

- Kasetsart University Laboratory School included genetics and biodiversity in the science program for Grade 8 students and produced textbooks and digital learning tools (CD-ROM) on the subject. An assessment was also carried out to determine the effectiveness of the textbooks and the learning on the subject in general.
- Bo Rai Witthayakhom School reportedly offered a biodiversity program for the Grade 12 science course. The program highlights issues related to biodiversity and environmental sustainability, including population density and distribution, principles of natural resources conservation and environmental impacts of alien species.

Case study in University:

- Khon Kaen University provided a program on biodiversity and conservation to offer studies on biodiversity loss, biodiversity protection, conservation of local plant and animals, utilization of biodiversity components as well as international and domestic laws related to biodiversity. The university also established a museum on biodiversity and human diversity.
- Faculty of Science and Technology of Thammasat University included biodiversity and evolution science in the curriculum and provided for studies on biodiversity assessment and biodiversity loss in Thailand, sustainable use of natural resources through adoption of appropriate technologies and application of molecular technology for biodiversity studies and evolution science.

It's believed that several curricula had not been titled "biodiversity" despite offering studies on subjects related to biodiversity and associated local knowledge. These include a curriculum jointly developed by Biodiversity-Based Economy Development Office (Public Organization) and technical experts.

Indicator

- Biodiversity issues are integrated in basic and advance curriculums of education institutes at every level.

Describe any other tools or means used for assessing progress

Consider the information search.
Consider the case study.

Relevant websites, web links and files

- <http://www.lib.ku.ac.th/KUCONF/KC4408017.pdf>
- <http://gsmis.gs.kku.ac.th/curriculum/course/detail?courseid=3317051>
- <https://goo.gl/6mvs4r>
- <https://goo.gl/APnMU9>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 3: By 2021, Biodiversity is integrated in policies and plans of relevance at every level.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Notable policies, plans, and measures that had explicitly incorporated biodiversity management included...

- (1) Constitution of the kingdom of Thailand, B.E. 2560 (2017): The Constitution reaffirms the right of citizens and communities to manage, maintain, and utilize natural resources, the environment and biodiversity in balance and sustainable manners as stipulated by relevant legislations and the duty of the citizens to cooperate in and provide supports to conservation and protection of the environment, natural resources and biodiversity. The Constitution further stipulates the obligation of the state in managing natural resources, the environment, and biodiversity in a balanced and sustainable manner.
- (2) The Emergency Decree on Fisheries, B.E. 2560 (2017): Prohibition of illegal fishing by this law was aimed to enable conservation and appropriate management of fishery resources. The law also provides criteria for controlling and conducting surveillance on harvest, transports and import of fishery resources.
- (3) The Determining Plan and Procedures in Decentralizations to the Local Administrative Organization Act, B.E. 2542 (1999): The law stipulates authority and responsibility of local administrations in providing public services including

development of local development plans, improvement of communities, encouraging public participation in local development, management of public health services and waste disposal as well as maintenance and utilization of forest, land, and other natural resources and the environment.

- (4) The Draft Biodiversity Act, The bill was expected to provide a unified and effective tool for biodiversity management in Thailand and for meeting the country's obligations under the Convention on Biological Diversity, and other related international agreements.
- (5) The 20-year National Strategy (2018-2037): The 5th Strategy of the National Strategy stipulates enabling national growth on the basis environmentally sound quality of life by developing guidance on solutions for the country's natural resources and environmental problems including reduction of forestlands, land degradation, threats to biodiversity, as well as poor allocation and potential shortage of water resources.
- (6) The National Reform Plan on Natural Resources and Environment: The plan provides a directive for management of the country's biodiversity with the view to enhance the quality of life while strengthening awareness on values and importance of biodiversity.
- (7) The 12th National Economic and Social Development Plan (2017-2021): The 12th Plan aims to achieve sustainable development by meeting compatible goals on "security, wealth and sustainability". To this end, the Plan adopted the strategy on enabling growths on the basis environmentally sound quality of life and places focus on conserving, restoring and securing natural resources and environmental bases as well as balancing conservation with sustainable and fair use of the resources.
- (8) The 20-year Strategy of Ministry of Natural Resources and Environment (2017-2036): The Strategy emphasizes conservation and utilization of natural resources and the environment as the basis for development by mobilizing efforts for implementation of strategies and measures on conservation, protection, restoration and utilization of natural resources and the environment, as appropriate.
- (9) The Policy and Plan for Promotion and Conservation of National Environmental Quality (2017-2036): The policies incorporate provisions for securing fair and sustainable management of natural resources with the view to maintain the resources and biodiversity, ecological balance as well as food, water and energy security.
- (10) The Environmental Quality Management Plan (2017-2021): The Plan places an emphasis on conservation, restoration and utilization of natural resources in fair and balance manners in order to enable environmentally sound states in various aspects, including in attaining national growth, and to ensure more efficient, cost-effective and sustainable use of natural resources and the environment.
- (11) The Climate Change Master Plan (2015-2050): The Plan provides a long-term framework for actions on climate change and includes measures to promote protection of rights to access to and sustainable use of biodiversity.
- (12) The National Maritime Security Plan (2015-2021): The Plan was developed to protect and preserve national sovereignty, sovereign rights and jurisdiction in Thai water from every kind of threats.
- (13) The Master Plan for Integrated Biodiversity Management (2015-2021): The Plan was formulated to ensure effective integration of biodiversity management and utilization with the view to halt biodiversity loss and enable cross-sectoral participation at every level. Implementation of the Action Plan for Biodiversity Management, 2017-2021

to facility practical adoption of the components of the Integrate Management Plan by relevant agencies.

Biodiversity management was reportedly not being substantively included in policies, plans, and measures at provincial and local levels.

Concerning availability of fiscal resources, the 2018 national budget allocated funding for implementation of the water management strategy and actions for enabling national growth on the basis environmentally sound quality of life. This contributed to the increase in budget allocation for biodiversity management by 12.6% from that in 2017.

Indicators

- Increase in proportion of allocation from the national budget for biodiversity plans.
- Number of policies, plans, and measures with biodiversity management at national, provincial, and local level.

Describe any other tools or means used for assessing progress

Consider the information search
Consider data from statistics

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- <http://www.bb.go.th/topic.php?gid=548&mid=311>
- http://www.ratchakitcha.soc.go.th/DATA/PDF/2561/A/082/T_0001.PDF
- <http://www.ratchakitcha.soc.go.th/DATA/PDF/2561/E/054/29.PDF>
- http://www.ratchakitcha.soc.go.th/DATA/PDF/2561/A/024_4/1.PDF
- <http://www.ratchakitcha.soc.go.th/DATA/PDF/2560/A/067/1.PDF>
- <http://www.ratchakitcha.soc.go.th/DATA/PDF/2560/A/040/1.PDF>
- https://www.deqp.go.th/media/36631/%E0%B9%81%E0%B8%9C%E0%B8%99%E0%B9%81%E0%B8%A1-%E0%B8%9A%E0%B8%97_2558_2593.pdf
- <http://www.reo4.go.th/upload/REO4-519.pdf>
- <http://oops.mnre.go.th/th/news/detail/9272>
- http://www.mot.go.th/file_upload/2560/environment_plan2560-2564.pdf
- <http://www.onep.go.th/wp-content/uploads/3.3-Action-plan-biodiversity-2560-2564.pdf>
- <https://goo.gl/YHXaTF>
- <http://www.nsc.go.th/Download1/policy58.pdf>
- http://www.nesdb.go.th/ewt_dl_link.php?nid=6422

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Existing evidence can reflect the real situation.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 4: By 2020, financial mechanisms are available for mobilizing the protection, conservation, restoration and sustainable use of biodiversity.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

International financial mechanisms that supported biodiversity actions in Thailand reportedly include Global Environment facility (GEF), the United Nations Development Programme (UNDP), the European Union (EU) and the German Government (through GTZ program). A notable example of the GTZ supports was the funding for the project on Enhancing the Economics of Biodiversity and Ecosystems Services in Thailand/South-East Asia (ECO-BEST). Domestically, the Environment Fund established by the National Environmental Quality Promotion and Preservation Act, B.E. 2535 (1992) was found to provide fiscal incentives for public agencies, local administrations, state enterprises, private organizations and NGOs to participate in the protection and maintenance of environmental quality and natural resources, by offering both direct funds and low-interest loans.

Tree Bank was noted as an initiative to promote reforestation in privately owned lands or public lands by allowing the trees to be used as collateral for specific types of lending. The Cabinet's decision of July 14, 2018 endorsed, in principle, the draft of ministerial regulation on alternative business collateral which identifies trees of significant economic value as collateral for lending from financial institutions.

Payment for Ecosystem Services (PES) is a mechanism to ensure environmental compensation by having users and other beneficiaries of biodiversity components and ecosystems pay those undertaking the protection, restoration and maintenance of the components. By ensuring that the payment adequately reflects the benefits, the PES can provide economic incentives for the custodians of biodiversity and natural resources. Case studies of the PES in Thailand include...

- Ecotourism at Ban Ko Klang Village in Khlong Prasong Sub-district of Muang (city) District in Krabi Province was organized with establishment of a PES group, comprising of tourist operators and other beneficiaries from tourism. The local mangrove conservation association was identified as a recipient of the PES program, while the local administration supervised the program's implementation in general.
- At Railay Bay and Phra Nang Cape of Krabi Province, the Railay Bay Tourist Association provided payments to local populations for treatment of wastewater. The PES arrangement in the areas also stipulated that the tourist association is responsible for ensuring the safety of tourists and the maintenance of tourist sites.
- At Chum Kho Sub-district in Pathiu District of Chumphon Province, Foods Company. reportedly provided supports to locals in replanting, maintaining, and conserving mangrove forests. The PES program was supervised by the local mangrove development office.

- At Ban Hua Lao Village of Pa Pae Sub-district in Mae Taeng District of Chiang Mai Province, payments were made by the Regional and Provincial Waterworks Office to local Karen for building weirs, maintaining dikes, creating firebreaks, organizing forest fire patrols as well as replanting and protecting forestlands.

A study on Natural Capital Accounting (NCA) was carried out by the Biodiversity-Based Economy Development Office (Public Organization) to provide a framework for identifying, measuring, and assessing direct and indirect impacts of businesses from their reliance on natural capital. The framework was expected to make available information for decisions on investments or planning of activities and projects in both public and private sectors.

As previously mentioned, the Royal Thai Government enacted a royal decree on revenue code to provide tax exemptions to any company, or registered ordinary partnership, for donations that support contributions of community forests in climate change mitigation, provided that such payments do not exceed 2% of the net profit. Such incentives were envisaged to enable communities to take action in protecting their community forests and to enhance civil cooperation on the issue.

Other lesser known financial mechanisms for conservation and sustainable use of biodiversity include tax deductions for privately funded studies, research and other technical activities as well as actions on the conservation and sustainable use of biodiversity, and monetary measures such as the Forest Bond.

Indicator

- Practical financial mechanisms for mobilizing the protection, conservation, restoration and sustainable use of biological diversity.

Describe any other tools or means used for assessing progress

Consider the information search.
Consider the case study.

Relevant websites, web links and files

- UNDP. (2017). Biodiversity Finance Initiative (BIOFIN) Public, Private and Civil Society Biodiversity Expenditure Review in Thailand. Bangkok.

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 5: By 2020, regulations and legislations that obstruct participation in biodiversity management are revised.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Revisions were made on the rules, regulations and legislations related to biodiversity with the view to bring them up to date, as well as to provide opportunity for and enable promotion of public participation. The revised regulations and legislations include:

- (1) Promotion of Marine and Coastal Resources Management Act, B.E. 2558 (2015):** Provisions of the law's predecessor had been noted for the lack of unity in their substance, for poor integration of issues and actions and for hindering participation of the publics and local communities. The revision was also made to address the ever-growing encroachment and conversion of marine and coastal environments and the findings that coverage of pre-existing laws do not provide the protection of marine and coastal resources in certain areas. The revised act provides criteria for management, maintenance, conservation and restoration of marine and coastal resources, including protection against coastal erosion, as well as enables participation of local populations and communities in maintenance, conservation and restoration of marine and coastal resources in balance and sustainable manners. In addition, the revision enables the establishment of provincial committees on regulation and protection of marine and coastal resources in every coastal province to facilitate development of local plans for marine and coastal resources management.
- (2) National Reserve Forest Act, B.E. 2559 (2016):** The revised legislation of the original 1964 Act provides for measures on protection and maintenance of natural resources by enabling systematic management of the resources and ensuring public benefits derived from the management. Accordingly, the revision stipulates the establishment of provincial committees for national reserves to develop measures that are necessary and appropriate for regulating, maintaining, and rehabilitating national reserves as well as promoting reforestation in areas of the committees' supervision. A national committee was also established under the law to recommend measures and provide guidance on the utilization of the national reserves.
- (3) The Emergency Decree on Fisheries, B.E. 2560 (2017):** Given that the predecessor legislation of 2015 had been noted for placing restriction on the rights and freedom over fishery resources, the revision enables greater participation in conservation and management of fishery resources and for sustainable fishery. The revised law also provides for the establishment of a committee to effectively and efficiently employ administrative measures to address issues where the use of pre-existing legal actions had been found cumbersome in attaining resolutions and/or led to discord.
- (4) The Draft Biodiversity Act:** The bill was being developed by the National Subcommittee on Biodiversity Law of the National Committee on Conservation and Utilization of Biodiversity. When approved, the legislation was expected to enable

integration of laws and regulations related to biodiversity and to provide an administrative tool for biodiversity management in Thailand.

- (5) **The Community Forest Act, B.E. 2562 (2018):** aims to secure resource bases and achieve equilibrium between conservation and sustainable use through the expansion of community forests. The bill was developed as a specific legislation to promote local and community rights to participate with the state in conservation, restoration, maintenance and utilization of forest, environmental and biodiversity resources in balance and sustainable manners. The bill also creates incentives for, and reaffirms, the rights of communities to develop community forest management plans and enables the communities' members to legally utilize products and services from community forests, including harvests and studies of forest resources. In addition to active participation in management of community's forests, public agencies are responsible for providing administrative and bureaucratic support for the management, including through the national committee on community forest policies, provincial committees on community forest and community committees. Such set-up would ensure cooperation between communities and the public agencies for effective management of community forests.
- (6) **Revoking the ban on possession of valuable woods and promotion of planting and earning from trees of significant economic values** are the two main components in mobilizing the valuable woodland community project endorsed by the Cabinet on September 18, 2018. The initiative aimed to overcome grass-root economic problems by encouraging locals to plant trees of significant economic value and increasing areas of economically viable woodlands. To this end, various legal and administrative measures are utilized to enable the planting on lands with entitlement certified by the Land Code as well as on state lands permitted for the planting activities, with focus on provision of jobs and saving for locals on these lands. Royal Forest Department, National Research Council of Thailand, Biodiversity-based Economy Development Office (BEDO) and Bank for Agriculture and Agricultural Cooperatives were assigned to undertake this initiative and instructed to pursue the goal of having 20,000 communities with economically valuable woodlands covering the total area of 41,600 square kilometres within a period of 10 years. Such an endeavour was expected to be achieved by (1) removing legal and administrative obstructions, (2) breeding and providing seedling of economically valuable tree species, (3) conducting research on ensuring effectiveness and sustainability of the initiative, (4) enabling nationwide actions and (5) undertaking economic valuation of, marketing and processing valuable woods.

Indicator

- Numbers of revisions on laws and regulations that hinder participation in management of biological diversity.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <http://www.ratchakitcha.soc.go.th/DATA/PDF/2560/A/067/1.PDF>
- https://www.fisheries.go.th/cf-kung_krabaen/fishlaw2558.pdf
- http://forestinfo.forest.go.th/Content/file/forest_low/forest-law2559.pdf
- http://library2.parliament.go.th/giventake/content_nla2557/law21-260358-49.pdf

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 6: By 2021, management of biodiversity is mobilized with participation at every level.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

The National Committee on Conservation and Utilization of Biodiversity was established in 2003 to supervise actions on, and develop policies for, biodiversity conservation, biosafety, as well as access to and benefit sharing of biological resources. The Committee also serves as the principle mechanism for mobilization of efforts in implementing the Convention on Biological Diversity. The Committee is comprised of representatives from various sectors and operates with assistance of the following subsidiaries.

- Subsidiary bodies appointed by the decision of the first meeting of the National Committee on Conservation and Sustainable Use of Biodiversity of 2018. These are (1) the Sub-committee on Mobilizing Bio-Economy, (2) the Sub-committee on Biodiversity Information and (3) the National Sub-committee on Biodiversity Law.
- The Sub-committee on the Convention on Biological Diversity
- The Sub-committee on the Cartagena Protocol on Biosafety
- The Multilateral Advisory Group on Protect Area
- The Sub-committee on Promotion of Conservation and Sustainable Use of Biodiversity in Business Sector

Cross-sectoral participation on conservation and sustainable use of biodiversity was demonstrated by contributions made by various networks, including community and community organization networks (for research and study of local knowledge), networks of public agencies (for enabling organization for researches and other actions), networks of education institutes (for making available technical resources) and business networks (for providing financial resources). Local communities were found to participate in the protection of biodiversity by being involved in networks of forest and environmental protection volunteers

at the village level. With exception of networks for conservation of marine and coastal resources where participating communities and volunteers were officially registered, significant change in the community participation remained unknown despite the positive trend on involvement of local communities and their networks in protection, conservation, restoration and sustainable use of biodiversity.

Notable actions taken by the private sector were those carried out by petroleum company. These include development of an internationally recognized standard for management of biodiversity and ecosystem services with the view to clarify biodiversity management actions of the companies and its subsidiaries, and formulation of guidance on assessments of risk to and values of biodiversity and ecosystem services for development of new projects. A biodiversity action plan was also developed to address the company's and its subsidiaries' actions that have high risks and may have significant impact on biodiversity, including by providing for monitoring and assessment of such actions.

Actions taken by the Forest Industry Organization provide an example of the participation of state enterprises in conservation and sustainable use of biodiversity. By participating in the sustainable forest management project for development of ASEAN Economic Community, 10% of forest parks were set aside for biodiversity conservation as stipulated by the project's indicator. In addition to enabling preservation of plants and animals in their natural environments, the reserved sections of forest parks allowed for inventory and data collection on plants and animal diversity and consequently, biodiversity conservation of forest parks themselves, with participation of local communities.

Indicators

- 30% increase in number of biodiversity committees at agency, institution and provincial levels.
- The increase in number of networks between public sectors, business sector, education institutes and local communities for actions on biodiversity
- Mechanisms to coordinated biodiversity management between different levels.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- <http://www.pttplc.com/th/Sustainability/Environment/Biodiversity/Pages/default.aspx>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Difficulty of data surveillance at all level.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 7: By 2021, incentives that are harmful to biodiversity are eliminated and/or phased out, and positive incentives for the conservation and sustainable use of biodiversity are promoted.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Guidance for phasing out incentives, that are harmful to biodiversity and promoting positive incentives for the conservation and sustainable use of biodiversity was found in both the public and private sectors. These incentives are as follow;

Elimination and/or phasing out incentives, that are harmful to

The Royal Forest Department and the Department of National Parks, Wildlife and Plant Conservation formulated a master plan on rehabilitation and conservation of forests and other ecosystems in 25 watershed areas with the view to unify delineation of forestlands, provide for a common database on forests, and establish buffer zones that better meet local needs and circumstances. In addition, a number of forest laws were revised to simplify bureaucratic processes on forest management. The most notable of the revision is the lifting of the pre-existing ban on the possession of economically valuable trees in privately owned properties in order to promote planting of the species and contribute to efforts to expand forest cover.

The Royal Thai Government developed a framework measure to address local settlement in conservation forest and instructed Department of National Parks, Wildlife and Plant Conservation to conduct an inventory of undisturbed and encroached conservation forests in the implementation of the action plan on management of conservation forests and rehabilitation of head watershed forests. In addition, actions were taken to enable communities, public agencies and private sector to participate in development of databases for management of conservation forest and protection against forest encroachment as well as for enabling more informed actions on forest reclamation and rehabilitation. Participatory and systematic management of information would allow for common understanding in management of conservation forests and accommodate continuation of local settlements in the forests in accordance with rules and regulation derived from the participation process. Such common understanding also reduces conflicts derived from competing utilization of resources, enables peaceful co-existence between communities and nature and prevents future encroachment on rehabilitated forests.

Special taskforces of the Royal Forest Department, Department of National Parks, Wildlife and Plant Conservation and Department of Marine and Coastal Resources were reportedly consolidated their efforts in conducting patrols and enforcing laws against encroachment and destruction of forest and other natural ecosystems as well as illegal hunting of wildlife nationwide. A 24-hour hotline was made available for reporting by the interested public on these illegal activities.

Promotion of positive incentives for the conservation and sustainable use of biodiversity

A National Master Plan on Development of Thai Herbal Plants, 2017-2021 was formulated by Department of Thai Traditional and Alternative Medicine and includes the promotion of community-based economic forests to accommodate sustainable management and utilization of herbal plants. Such measure also envisages the protection of herbal plant species and their associated knowledge and minimization of threats to species' genetic diversity in the wild.

Department of Local Administration reportedly developed a policy to support local administrations in managing local resources bases and assigned personnel to supervise the task in at least one sub-district or municipality of every district nationwide. Under the policy, the local administrations were encouraged to conduct inventories on biological, physical and cultural/intellectual resources found in their jurisdictions in order to enable conservation and sustainable use of the resources, including by planning for their utilization for local development. Another notable action at local level is the royal initiative of Her Royal Highness Princess Maha Chakri Sirindhorn on conservation of plant genetic resources. The initiative was noted for gradual expansion of participation and more diverse approaches in implementation at local level.

Supports were reportedly provided to Community BioBanks by the Biodiversity-Based Economy Development Office (Public Organization) in building the capacity of community organizations for the development of processes for gathering and storing information on biological resources and their associated local knowledge in their respective communities. Availability of the information was expected to drive communities' efforts toward becoming a viable mechanism for conservation and sustainable use of genetic resources, contributing to development of the country's Bio-Economy. Another notable activity on local actions is a project on Sustainable Management Models for Local Government Organizations to Enhance Biodiversity Protection and Utilization in Selected Eco-regions of Thailand. The project was jointly implemented by the Biodiversity-Based Economy Development Office (Public Organization), the Ministry of Natural Resources and Environment and the United Nations Development Program (UNEP) with supports Global Environment Facility (GEF). Efforts were also made to encourage local businesses to adopt a concept on Business & Biodiversity Check. The concept was developed by the Global Nature Fund (GNF) and various organizations in the European Union for detecting impacts of business on biodiversity and can yield information for assessment of environmental management system, developing guidance for sustainable conservation of natural resources and enabling application of the Payment for Ecological Service concept.

Several actions were reportedly taken by the business sector to promote conservation and sustainable use of biodiversity. These include providing awarding for efforts on the conservation and sustainable use such as the Green Globe Award initiated by private company for groups of individuals found to co-exist with and/or contribute to maintenance of natural resources and biodiversity as well as the joint initiative of the Royal Forest Department and private company on mutual interaction between people, forest and communities, where awards were handed to communities with outstanding community forest management. In addition, commercial companies were evaluated for their biodiversity responsible business practices. Companies listed in the Stock Exchange of Thailand (SET) were encouraged to gear toward sustainable business practices by being included in the SET's list of Thailand Sustainability Investment. Compiled since 2016, the list was comprised of companies found to meet at least 50% of economic, environmental and social indicators and the qualification for listing by Dow Jones Sustainability Indices (DJSI) as well as those with qualified business performance and disclosure on business practices and their social and environmental impacts. Furthermore, some

companies have reaffirmed its commitment to sound management of biodiversity, adopted norms and operational guidance on the issue and assessed effectiveness of biodiversity related actions in consistent manner.

Indicators

- Actions were taken to eliminate and/or phase out incentives that are harmful to biodiversity and to promote positive incentives for conservation and sustainable use of biodiversity in at least 2 sectors of relevance.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <http://www.lawamendment.go.th/index.php/laws-independent-entity/item/1245-1-18-2561>
- <http://www.mnre.go.th/th/news/detail/12872>
- <http://www.bedo.or.th/bedo/new-content.php?id=841>
- <http://www.bedo.or.th/bedo/new-content.php?id=588>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 8: By 2020, the rate of loss of all natural habitats, including forests and coastal ecosystems, is at least halved.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

In Thailand, the improvement in rate of loss of natural habitats occurs in the mangrove areas, coral reefs and the wetland areas, while in the forest and sea grass areas, there is still increasing in the rate of loss of natural habitats or becomes deterioration. However, at present, Thailand still cannot meet the target rate of loss of the natural habitats in the forest at 40%, but

every government agencies has setup their target on increasing the forest area and give the priority to this issue, therefore, in the future, this indicator can promisingly be achieved.

In order to reduce the loss of natural habitats, including the forest and coastal ecosystem, both government and private sector play an important role in operation. The main activities are looking after the natural areas, restoration of onshore ecosystem by expand the area (size), restoration of both land and mangrove forest, monitoring the rate of survival of new forest, fire protection zone, put the wooden poles to prevent the erosion of coastal/bank from waves, reduce the burning of the rice stubbles and other agricultural waste, build the weir for slowdown the current, protect the water resources as well as enhance the efficiency of protecting the natural habitats by setting up the protection units, and check points that their operation will cover the entire boundary as well as encourage the operation in the vulnerable areas. In addition, there are sessions of training the forest protection civil volunteers, collaboration with various networks in protection and improvement of the forests as well as approve the right to make a living in the conserved forest. The past information shown the rate of loss of natural habitats including forest area and coastal ecosystem as follows:

Forest Area: In 2018, Thailand has total forest area of 102,488,302.19 rai* (or 31.68% of total area of Thailand). The forest area seems constant when compared with the area in year 2017 but the rate of loss shown the improving trend if compare with the area of the past 5 years (2014-2018).

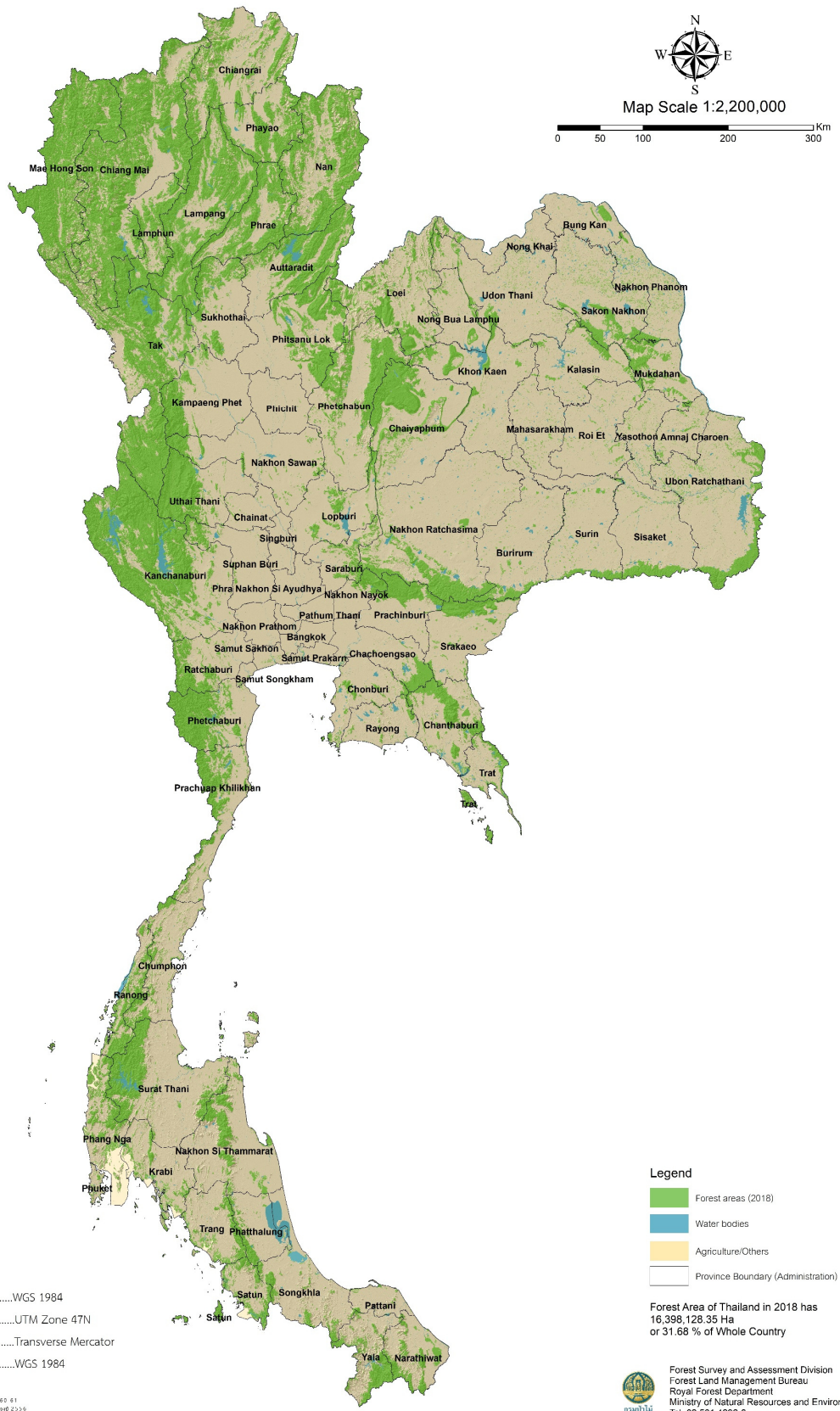
Table 1: Forest area and Proportion of forest area to total area of Thailand 2000-2018

Year	Forest area (rai)	Proportion of forest area (percent)	Rate of change (percent)
2000	106,319,237.50	33.15	31.13
2003	104,744,362.50	32.66	-1.48
2005	100,625,812.50	31.38	-3.93
2006	99,157,868.75	30.92	-1.46
2008	107,241,031.25	33.44	8.15
2013	102,119,539.55	31.57	-4.78
2014	102,285,400.62	31.62	0.16
2015	102,240,981.88	31.60	-0.04
2016	102,174,805.09	31.58	-0.06
2017	102,156,350.51	31.58	-0.02
2018	102,488,302.19	31.68	0.32

Source: Royal Forest Department, 2019

Development of urban forests under the “Civil Forest Parks” project was another mechanism to support the building of public awareness on biodiversity, promoting use of forestlands and plantations in urban and semi-urban areas for enhancing quality of life, and enabling cross-sectoral participation in preservation, restoration and development of urban Green areas with the view to ensure their maximum and sustainable benefits for urban inhabitants. Of the target of 31 site covering 63.1164 square kilometres for the 2018 budgetary year, thirteen forest parks were established in Khon Kaen, Nakhon Ratchasima, Prachin Buri, Phuket, Surin, Songkhla, Phetchaburi, Nakhon Sawan, Samut Prakan, Prachuap Khiri Khan, Tak and Mae Hong Son Provinces, covering the total area of 26.8576 square kilometers. The remaining was expected to be established by the end of 2019.

Figure 1: Map of forest area in Thailand 2018



Source: Royal Forest Department, 2019

Mangrove forest area in Thailand is 2,869,484 rai* in 2017 which can be divided into “Typical mangrove forest”: area of 1,534,584 rai compare with year 2009 with area of 1,527,761 rai or increasing 0.45% which usually found along the coastal area in the Central, the East and the South (Andaman and along the gulf of Thailand in 24 coastal provinces. During the years 2000 – 2014, the area of mangrove forest has been increased which resulted from the strong cooperation among government, private and local communities in continuing conserve and restore the mangrove forest. (Department of Marine and Coastal Resources, 2017)

Management of marine and coastal resources included (1) reclamation of approximately 14.1 square kilometres of mangrove forests (total nationwide coverage of 4,480 square kilometres), (2) rehabilitation and afforestation of roughly 8.6656 square kilometres of mangrove forests, (3) allocation of 3.1552 square kilometres of coastal area for local settlements, (4) declaration of conservation mangrove forests in accordance to Article 18 with protection measures stipulated by Article 23 through formulation of a ministerial regulation to declare 6 mangrove forests as conservation areas, (5) implementation of the “Civil Forest Parks” project with establishment of 18 of 20 forest parks in 16 coastal provinces and (6) planning for establishment of 10 marine and coastal protected areas in Trang, Rayong, Trat, Phang-nga and Phuket Provinces.

Table 2: Mangrove Forest Area 2000-2014

Year	Area (rai)	Mangrove Forest area per Total area (percent)	Rate of change (percent)
2000	1,579,593	15.79	0.48
2004	1,458,174	14.58	0.52
2009	1,527,761	15.25	0.92
2014	1,534,584	15.35	0.12

Source: Department of Marine and Coastal Resources, 2017

Wetland: Total area of wetland is approximately 36,616.16 sq.km. or 22,885,100 rai which is about 7.5% of total area of Thailand. The wetland comprises of freshwater area 44.8% and saltwater area of 55.2%. The benefits of the wetland are water resources, holding the rainwater and river/canal water, preventing saltwater to flow into the mainland, preventing coastal erosion, filtering the suspension and minerals, and mitigating natural disasters. The wetland is the main resources of natural products that human beings can access and utilize such as food sources, herbal medicines since it is the place that gathers the variety of biodiversity, various type of plants and animals. Therefore, the wetland has significant impact on the ecology and nature conservation, especially it is the source of food chain (Office of Natural Resources and Environmental Policy and Planning, 2015). During 2015-2016, it is found that the area of wetland was about 3,445,804 rai which comprise of pus, swamp, lake approximately 1,567,580 rai, the lowland approximately 1,482,616 rai and Peat area approximately 395,608 rai (Land Development Department, 2018). In 2013, Office of Natural Resources and Environmental Policy and Planning had evaluated the overall condition of the wetland in Thailand, it was found that the condition of 17 out of 25 representative wetlands was improved.

Seagrass beds were found to cover the total area of 255.7248 square kilometres in 2018 and accounted for 7.91% increase from the previous record in 2015 (235.4944 square kilometres). The seagrass beds in the Eastern Gulf of Thailand were found to be in good, to very good conditions and exhibit signs of improvement. The only exception was found off the coast of Chonburi Province where seagrass was noted to be in the state of decline due to natural causes, including expansion of mudflats. Adding significant reduction of seagrass beds in Trat Province, the habitat in the Eastern Gulf of Thailand could be considered in the state of decline. On the western coast of the Gulf of Thailand from Phetchaburi to Narathiwat Provinces, seagrass beds were found to be in good to very good conditions, particularly at Ban Don Bay of Surat Thani Province where the state of the habitat was found to be stabilized and improved. Phetchaburi is the only province on the western coast with deteriorated seagrass beds due largely to the construction of coastal protection barriers. An overview of the seagrass beds on the western coast however found the habitat to be thriving over larger area than that recorded in 2015. Seagrass beds were also found to be in good to very good conditions and exhibit signs of improvement on the coast of the Andaman Sea, except in Krabi and Satun Provinces where seagrass beds were found to be deteriorating due to changes in discharging tributaries. Seagrass beds on the coast were found to remain relatively unchanged in overall coverage from the previous record in 2015 (Department of Marine and Coastal Resources, 2019).

Coral reefs were found to cover the total area of 238.44 square kilometres and account for an increase of 0.05% from that in the previous record in 2015 (238.3264 square kilometres). Of these, 121.056 square kilometres of coral reefs were found in the Gulf of Thailand while 117.384 square kilometres of the habitat was found in the Andaman Sea. Coral reefs in the Eastern Gulf of Thailand were noted to be in moderate, to severely deteriorate conditions, with particularly degraded reefs found in Trat Province. The state of the habitat was found to remain relatively unchanged from the previous report in 2015, however. Coral reefs in the Central Gulf of Thailand was found to be deteriorated, or severely deteriorated, with those in Chumphon and Surat Thani documented for being in the worst condition. The overall state of the coral reefs on the coast was found to be stable and without any significant change from the record in 2015. Coral reefs in the Lower Gulf of Thailand were found to be in moderate condition and remain relatively unchanged from the previous report in 2015, also.

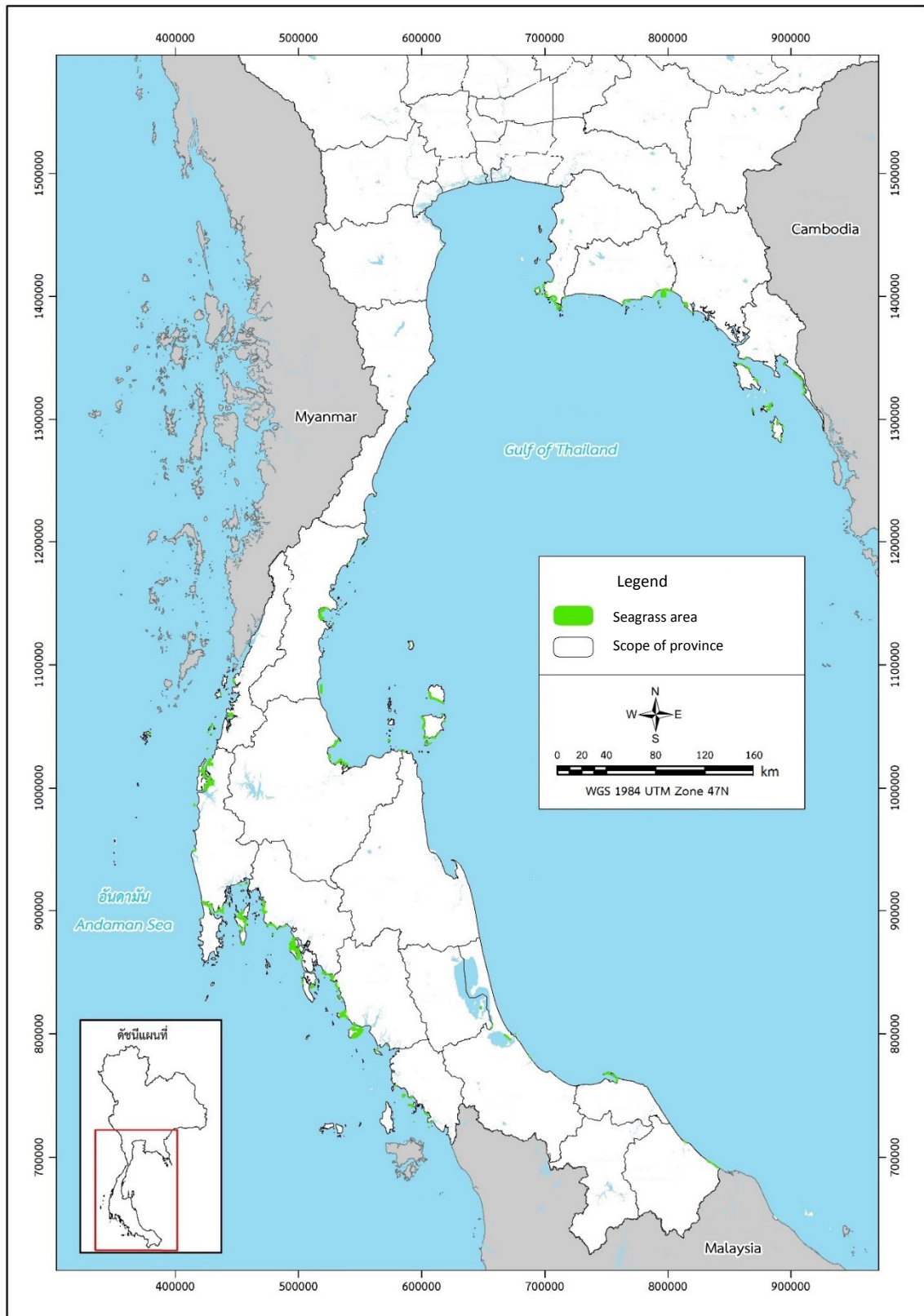
Table 3: Proportion of condition of coral reefs in Thailand 2015

	Area (rai)	condition of coral reefs (percent)				
		excellent	good	moderate	damaged	very damaged
Gulf of Thailand coast	75,790	1.8	3.2	16.0	32.2	46.7
Andaman coast	73,364	2.3	4.1	15.8	24.0	53.8
total of Thailand	148,954	2.0	3.7	15.9	28.3	50.1

Source: Department of Marine and Coastal Resources, 2017

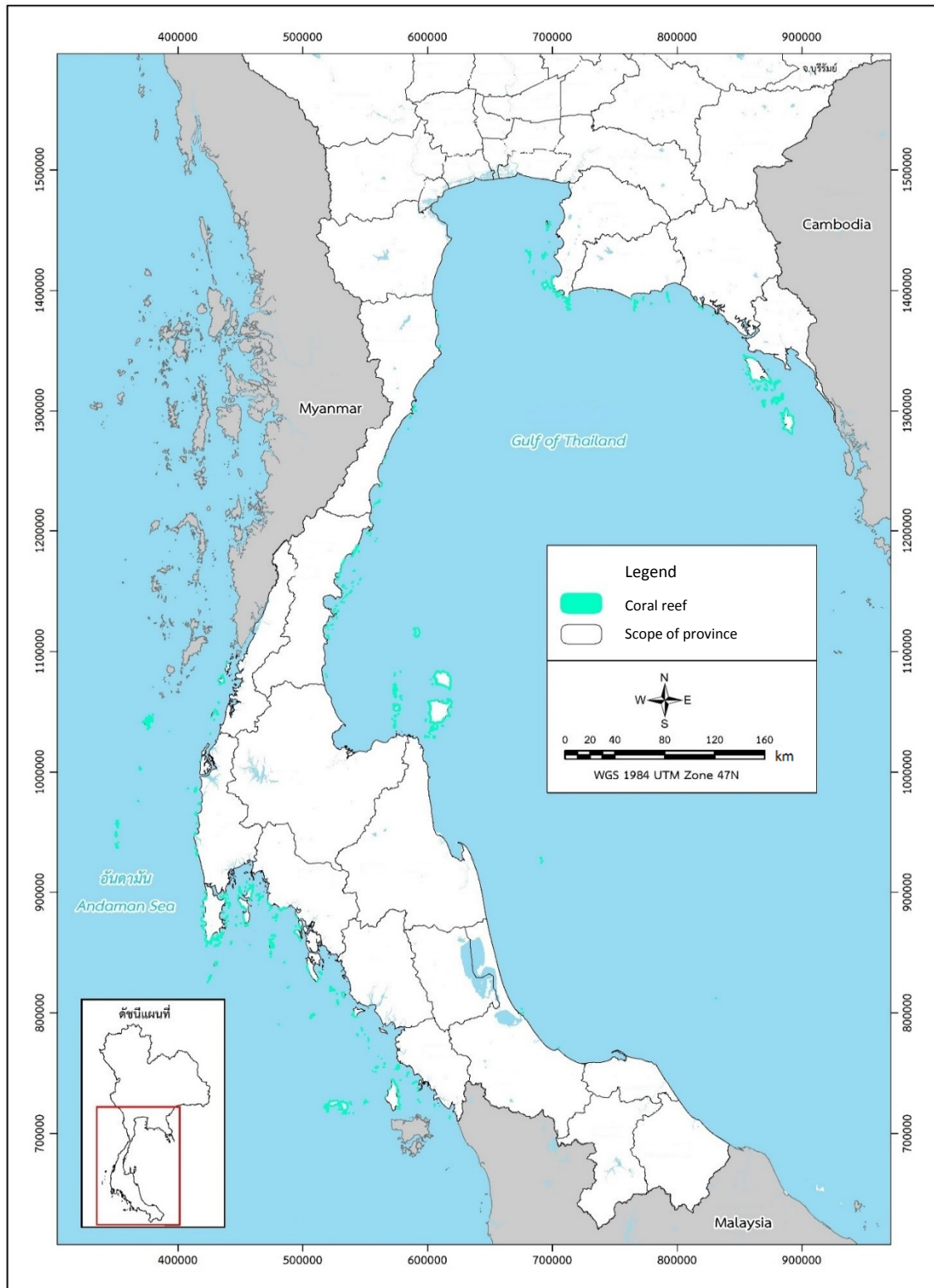
In summary, the result of evaluation of the operation to reduce the loss of all Natural Habitats is in the level 3 which means there is the progress in operation but still does not meet the indicative national target of 50% of total area of Thailand. But with the strong cooperation from all sectors, there is a high possibility that the area of Natural Habitats, Forest and Coastal Ecosystem will meet the target in the future.

Figure 2: Map of seagrass beds in Thailand 2018



Source: Department of Marine and Coastal Resources, 2019

Figure 3: Map of coral reefs in Thailand 2018



Source: Department of Marine and Coastal Resources, 2019

Indicators

- Reduction in the rate of loss of all natural habitats.
- Forest areas cover 40 % of the total area of the country.
- The rate of loss of all natural habitats, including forests and coastal ecosystems, is at least halved of that found in 2004.

Describe any other tools or means used for assessing progress

Consider the information search.
Consider data from statistics

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- http://www.onep.go.th/env_data/00_1/

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Existing evidence can reflect the real situation.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 9: By 2020, threatened species and endemic species have improved conservation status and measures are in place for conservation and protection of their habitats.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

The evaluation is at the level of meeting the target. The data on 6 species of animal which are wild elephant, bull, tapir, tiger, leopard and eastern sarus crane (already extinct in the wild but the successful experiment of reproduction could rescue this species) found numbers of these animals have been continuously increased with the strict measures of conservation and protection are in place.

From the report of situation of wild animal which nearly extinct by Department of National Parks, Wildlife and Plant Conservation, together with the research team of Freeland Foundation and Panthera Foundation, the survey of wild animal in the Dong Phrayen, Khao Yai National

Park, the forest world heritage, indicated that during June 2016 to February 2017, the VDO cameras had recorded the group of 18 tigers (5 males, 7 females and 6 cubs). It is shown that the ecosystem in this forest is still fertile enough that this group of tigers can live and reproduce. From the annual report of Department of National Parks, Wildlife and Plant Conservation, 2013-2015, the total number of tapir in all 7 conservation forests is estimated to be between 538-720. The number of Tapir in the Klong Saeng-Khao Sok Forest, Kang Krajarn Forest and The West Forest are estimated to be more than 50 tapirs in these forests.

Phu Kheaw Wildlife Breeding Center has successfully breed, taken care of, and returned distinct animals back to the forest such as Hog Deer and Pheasants (more than 100). From the start of 2010, Phu Kheaw Wildlife Breeding Center has released more than 7 animals species of 2,900 living Wild Deers, Hog Deers and Phesanta back to the Northeastern Conservation Forest such as Phu Kheaw, Phaphung and Phu Luang. From the survey in 2017, it is found that there are more than 150 wild elephants, 100 bulls, more than 200 Hog Deers & Pheasants spread out in Phu Kheaw and Nam Naw area. In addition, the footprints of Deers, Barking Deers, Tigers and Leopards were found in the area too.

In 2018, Department of Fisheries collected rare-endemic species and endangered species including conducted a breeding for returning to nature in total 14 species as list;

- four species of Critically Endangered (CR) fish; Mekong Giant Catfish, Asian bonytongue, Chao Phraya giant catfish and Redtail Sharkminnow
- four species of Endangered (EN) fish; Common Freshwater Stingray, Striped catfish, Mini dragon loach and Isok barb
- six species of Vulnerable (VU) fish; Giant barb, *Scaphognathops bandanensis*, Small scale mud carp, *Heteropneustes kemratensis*, *Bangana devdevi* and *Wallago micropogon*

At the same year, revisions were made on the measures on prevention, control and eradication of invasive alien species with emphasis on building accurate public understanding and awareness on the measures and on identification of non-indigenous species that have adverse impacts on local ecosystems and human health, are vectors of communicable diseases and/or hazardous in nature. The revisions have been approved by the Cabinet in the same year (the Secretariat of the Cabinet, 2018)

From the Conservation and Protection Measures, it is found that

- In order to improve the efficiency in protection of natural habitat, 81 areas were announced to be National Park, 38 areas are Wildlife Conservation Area, 48 areas are No-Hunting Zone including the areas that are classified as Level 1 Lowland and Mangrove Conservation Area
- The establishment of the various projects of restoration of ecosystem of Sea Grass Ecology, Mangrove Forest, Land Forest, Coral Reefs, Sea Turtles, Dugong, etc.
- Working Group on Alien Species under the National Sub-committee on Convention on Biological Diversity, has setup the Guidelines to control and prevent the loss of Biodiversity due to the Invasive Alien Species.
- The Royal Forest Department has started Community Forest Development Project since year 1987
- Office of Natural Resources and Environmental Policy and Planning has started the Cultural Forest Project at Maha Sarakam and Surin Provinces.

In 2017, Department of Marine and Coastal Resources conducted an assessment on the state of rare marine wildlife. The study documented finding 699 dolphins and whales, 200 dugongs, 13 whale sharks as well as 333 sea turtle nests. The study also recorded rescuing efforts on 1,209 beaching marine animals and reported the success rate of the rescue at 86.9%. The study further identified marine waste as the cause for beaching of 129 marine animals. and recorded releases of 854 sea turtle hatchlings into the wild. In addition, the nursery and breeding of rare and endangered marine species have resulted to nurse sea turtles and return to nature 854 reptiles. It can increase the amount of sea turtles in nature and can find leatherback sea turtles laid eggs 3 times at 2 beaches of Phang Nga Province in 2018 – 2019, while it was not found during the past 5 years. This is an opportunity for the signing of the Thailand Sea Turtle Conservation Declaration on 20 February 2019 by 59 organizations; government, private organizations and local governments. Moreover, the capacity building of the Rare and Natural Marine Animal Rescue Center has conducted that result to help young dugong grow in nature.

In the same year, Department of Marine and Coastal Resources conducted an assessment on the state of rare marine wildlife. The study documented finding 699 dolphins and whales, 200 dugongs, 13 whale sharks as well as 333 sea turtle nests. The study also recorded rescuing efforts on 1,209 beaching marine animals and reported the success rate of the rescue at 86.9%. The study further identified marine waste as the cause for beaching of 129 marine animals and recorded releases of 854 sea turtle hatchlings into the wild.

The Office of Natural Resources and Environmental Policy and Planning, the Zoological Park Organization under the Royal Patronage of His Majesty the King and the United Nations Development Programme (UNDP) jointly implemented a project on conservation of habitats of 3 endangered species which are Spoon-billed Sandpiper, Water Onion and Sarus Crane.

A wildlife overpass was constructed to connect Khao Yai National Park to Thap Lan National Park between 194+485 and 194+990 kilometre marks of the highway that separates both parks. By adding vegetation and making certain improvement on the landscape, the overpass was found to be a success in providing a corridor for wildlife movement as evidence by finding of animal footprints. A 570 meters traffic bridge constructed at 192+935 and 193+505 kilometre marks and the other 340 meters bridge built at 209+483 and 209+823 kilometer marks further accommodated wildlife underpass between the national parks and contributed to the protection of Dong Phrayayen - Khao Yai Forest Complex World Heritage Site.

Indicators

- Increase in population size of at least 5 endangered species and 5 endemic species.
- Measure for conservation and protection of natural habitats of at least 5 endangered species and 5 endemic species found with increasing population size.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- https://www2.moac.go.th/ewt_news.php?nid=199&filename=index
- https://www.khaosod.co.th/around-thailand/news_1120093
- <https://www.bbc.com/thai/thailand-39421564>
- <https://news.mthai.com/special-report/616041.html>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Existing evidence can reflect the real situation.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 10: By 2021, networks of protected areas and ecosystem representations are interlinked and measures for management of areas in crisis and areas of importance for biodiversity and ecosystem services are developed.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Management effective Tracking Tools (METT) was adopted for evaluation of management effectiveness in all 14 wetlands of international importance (Ramsar site) in 2017. In addition, thirteen pilot protected areas and an additional forest complex were assessed for their management effectiveness under a project on Catalyzing Sustainable Protected Areas (CATSPA) and contributed to the development for the 2017-2021 integrated master plan for national parks

An example of the Case Study of the West Region Ecosystem Management with the cooperation of Department of National Parks, Wildlife and Plant Conservation and Seub Nakhasathien Foundation has shown the expansion of the operation to cover other 17 protected areas in the West Protected Forests. In order to study the potential of each forest, the direction of area management is set by emphasizing on strong collaboration and creating the network with local residents in and around the forest. To solve the problem of conflict in land utilization, the clear landmarks are set and mutually accepted. With the nature The activities that encourage the residents to look after and restore the natural resources, promote the sustainable harmony living with the nature as well as promote the forest management of the area around National Forest to be the Community Forest with the main mutual objective “people can live, forest can exist, tiger can survive”. The regular patrol routine is set to monitor the illegal forest invasion from mutually agreed forest boundary. These activities reduce the conflict between the officers and the locals, reduce the arrested cases which resulted in proper protected area management which operates by the participation of local communities.

The information from the study is used for setting up the Provincial Land Utilization Plan for 4 provinces with the aim to setup the land utilization measures, reduce the land invasion

and to manage the suitable area for natural habitats for both plants and animals (Water Onion and Spoon-billed Sandpiper) under the Project of Conservation the natural habitat of Plants and animals that have world significant in the production sector supported by Office of Natural Resources and Environmental Policy and Planning and United Nations Development Program (UNDP) with financial support by Global Environment Facility (GEF).

To meet the international recognizable standard for national park management, efforts were made to preserve outstanding features of national parks and restore their terrestrial and marine resources. These included banning of plastic and polystyrene packaging in national parks where at least 10 million visitors were expected to participate in reducing no less than 3 million plastic containers and packages. Accompanying by a campaign to promote reusable packages and containers (i.e. cloth bags and lunch boxes), 2.85 million participants took part in the activity and contributes to reduction of 1.07 million of single-use plastic bags by the end of December 2018. In addition to the solid waste management activity, efforts were made to ensure safety of visitors by ensuring that facilities remain in good condition and by providing visitors with accurate and concise information on rules and regulations of the national parks.

Indicators

- Declaring at least one marine protected area in the effort to support marine and coastal conservation.
- Developing at least one ecosystem restoration project in each province.
- At least 30 % of the protected areas are evaluated to be effectively managed.
- Adding at least 5 networks of protected areas and ecosystem representations with inter-linkage for better management to the national list of the networks.
- Measures for management of areas in crisis and areas of importance for biodiversity are available in at least 2 sites.

Describe any other tools or means used for assessing progress

Consider the information search.
Consider the case study.

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- <https://goo.gl/L5b9UL>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Existing evidence can reflect the real situation.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 11: By 2021, management, policy and legal mechanisms and measures are available for conservation and protection of the country's genetic diversity.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Tools, Mechanism and Measures on administrative management, policy or law for Conservation and Protection of Genetic Diversity in Thailand are as follows:

- (1) Law that relate to the conservation and utilization of genetic resources of plant in Thailand such as Forest Act, B.E. 2484 (1941) National Reserved Forest Act, B.E. 2507 (1964), National Park Act, 2504 (1961). These 3 Acts are the main Law that aims to Protect and Preserve the Natural Resources of Thailand due to the illegal smuggling the woods from the forest and caused the negative impact to the Environment. The Plant Variety Protection Act, B.E.2542 (1999) is the law that follows the principle in the Convention with the aim to promote the improvement and development of plant varieties, to protect the new plant varieties, promote the accessibility, and benefit sharing of utilizing the resources for development and sustainable utilizing the new plant variety, the order of the National Committee on Conservation and Utilization of Biodiversity, on the criteria and procedure of utilizing and the benefit from the Biological Resources Year 2011.
- (2) Setting up the Rice Genetic Conservation Centre in 1981 to manage and keep the stock of National Rice Seeds at the Rice Research Centre (Phatum Thani Province). This Rice Genetic Conservation Centre aim to be the place to collect, conserve and utilize the rice genetic resources, operation centre and keep the national rice seeds from 1981, the centre has started to survey and collect the varieties of rice seeds around the country. At present, the centre has collected over 20,000 sample of rice seeds.
- (3) Plant Genetic Conservation Project under the Royal Initiation of Her Royal Highness Princess Maha Chakri Sirindhorn (RSPG) with the objective of build up the human capacity, conserve, develop the Plant Genetic Resources and maximize the benefit of utilization of this resource for Thai people. The project has started from 1992 until present, there are participate government agencies more than 150 agencies and more than 2,500 schools around the country become botanical garden members.
- (4) Improve and Revise the Animal Breeding Development Act, B.E. 2509 (1966) which aims to respond to the conservation and animal genetic development in order to conserve the animal genetic of endangered species. In addition, the Department of Livestock Development succeeded in conserving the genetic diversity and developing the genetic improvement of 12 types of local animals such as local bull, Lumpoon white cow, northeast and south bull, red bull, Bali bull, fluff-horn bull, local goat, local pig, local black duck, local white duck, local duck (estuary breed), local duck (Nakorn Phatom breed), goose, and local hen. The basic data of the conditions of local animals in Thailand and these data may be useful in the future.

- (5) Set up 6 Wild Plant Genetic Gardens “Wanawat Research Center” situated around the country. The main responsibility of this garden is to select the vegetation that has economic value and has good characteristic from the forest for 15 types (300 each). Then distribute this vegetation to plant in each centre in the demonstration block, which is permanently displayed for conservation and for research of plant genetic sources in 7 different natural biological ecologies in the 15 gardens around the country.
- (6) National Biobank Project is set up as a national infrastructure aiming to conserve and to better utilize Thailand valuable resources. With the support from the government initiative in the year 2018, National Biobank of Thailand (NBT) was established. Wild species of plants including both indigenous and endemic species are systematically conserved via seed banking, DNA banking, tissue banking, as well as herbarium. In addition to plants, NBT also promotes conservation of microbes including fungi, bacteria and mushrooms. Advanced cryopreservation platforms and molecular technologies with international standard operating procedures (SOPs) are utilized to secure viability and authenticity of our bio resources. To promote R&D and utilization, NBT provides on-line well-curated biodata such as databases of plant biobank, microbe biobank, and poisonous mushroom biobank etc. With the international standard and the cooperation of partners, NBT is one of the country’s bio banking infrastructures available for ex situ conservation, protection, and utilization of Thailand biodiversity.
- (7) A bill on biodiversity was being developed by the Sub-committee on Biodiversity Act of the National Committee on Conservation and Sustainable Use of Biodiversity. The bill was expected to include articles on access to and benefit-sharing of genetic resources.

Indicator

- Tools, mechanisms or regulations are available for managing conservation and protection of the country’s genetic resources.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <http://www.rspg.or.th/information/index.htm>
- <http://www.ricethailand.go.th/rkb/varieties/index.php- file=content.php&id=109.htm>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Existing evidence can reflect the real situation.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 12: By 2020, pollution has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

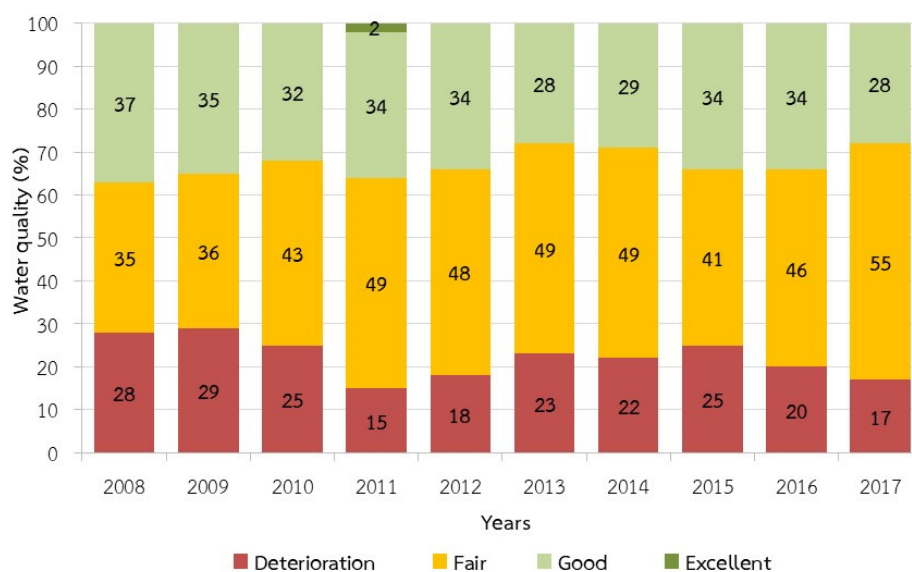
Date the assessment was done: 28 February 2019

Additional Information

The evaluation as per indicator has related to the quality of freshwater and seawater. It is found that:

Water quality of water source on land: The monitoring of water quality was done on the main 59 rivers and 6 still water sources by using Water Quality Index (WQI) as an indicator. In 2017, about 83% of water source, the water quality was in the level of average to good which increases from the year 2016 (at 80%). The water quality in the level of deterioration was 17% which reduced from last year (20%). There was no source in the level of excellent or very deterioration. In comparison of the quality of land water sources by region, it is found that the best quality of water source was in Northeastern region such as Songkram River and She River. The worst of water quality was the water source from central region, the same as past years such as from Nonthaburi province to Samutprakarn province. Ranking the best quality of water was Songkram River, She River, Nong Harn, upper Ta-pee and Saiburi. The worst 5 quality was lower Chao Phraya River, lower Tha Chin River, upper Phung raj River, lower Rayong River and Kuang River. In the past 10 years (2008 – 2018), it is found that the water quality of land water sources in Thailand was in the average level and from 2008, there was no source in level of very deterioration. The trend of quality improvement and the increase of water source in the good level starting from year 2014.

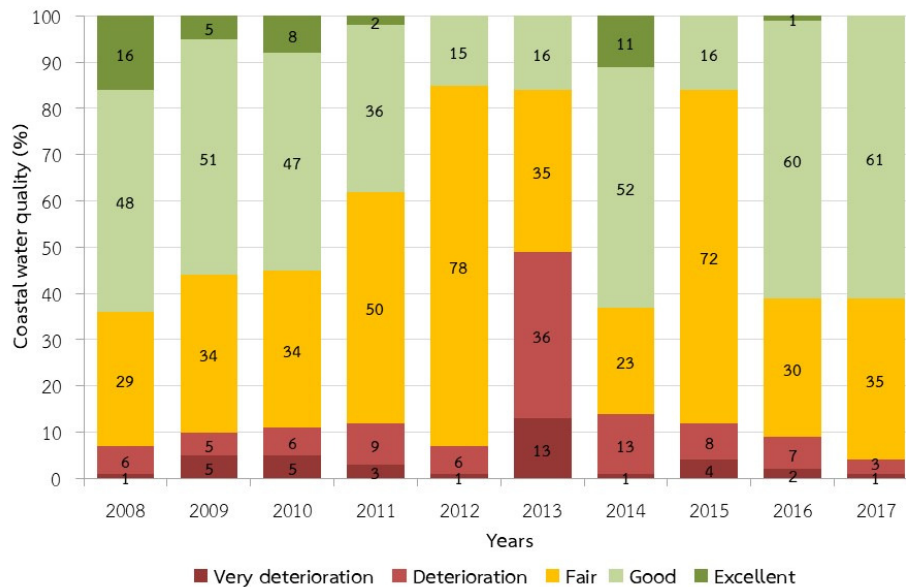
Figure 4: Freshwater quality, 2008-2017



Source: Pollution Control Department, 2018

Coastal water quality: The monitoring of coastal water quality was done by using Water Quality Index (WQI) as indicator. In 2017, it is found that the quality of sea water had improved and in the level of average to good. About 96% of water source, the water quality was in the level of average to good which increases from the year 2016 (at 91%). The water quality in the level of deterioration was 4% which reduced from last year (9%). In the past 10 years (2008-2018), it is found that the water quality of sea sources in Thailand was in the average level. In 2017, the quality of costal sea water was in the level of good to excellent.

Figure 5: Coastal water quality, 2008-2017



Source: Pollution Control Department, 2018

Efforts to prevent and resolve plastic waste problem consisted of the following programs and activities;

- 1) A measure on waste reduction and segregation in public organizations was developed the Pollution Control Department and the national committee on improvement of public bureaucracy as a performance indicator for the 2019 budgetary year. The measure was to be used in assessing efforts of administrators, including permanent secretaries, director–generals and provincial governors, in reducing at less 5% of solid waste and 10% of single use plastics and in banning polystyrene packaging in their respected offices.
- 2) Reduction of plastic bags and banning of polystyrene packaging in 154 national parks. As a joint effort by Department of National Parks, Wildlife and Plant Conservation and the Zoological Park Organization, the ban on polystyrene containers was accompanied by a campaign to reduce single-use plastic bags, spoons and straws and bottles with seal-caps.

Reduction of marine wastes through management of land-based wastes was carried out by Department of Marine and Coastal Resources in 24 coastal provinces and included removing wastes from ecosystems, banning cigarette littering on beaches, using buoyant nets to remove marine wastes and enabling waste disposal in critical areas

Ten years roadmap for plastic waste management and the 2018 – 2027 action plan on plastic waste management were developed by Pollution Control Department as a guidance for actions by relevant sectors in adoption concepts of Circular Economy, 3R (reduce, reuse, recycle), Public Private Partnership and producers' responsibility. The guidance consisted of 2 main targets which are (1) enabling 100% recycle of plastic products and packages by the year 2027 and (2) reducing use of plastic products and packages including by phasing-out seal-caps and plastic with Oxo and Microbeads components by 2019 as well as plastic bags with thickness less than 36 micro meters, polystyrene containers, single-use plastic cups with thickness less than 300 micro meters and plastic straws by the year 2022.

Indicators

- Eighty percent of freshwater reservoirs are found to be in good quality.
- Eighty percent of marine areas are found to have good water quality.

Describe any other tools or means used for assessing progress

Consider the information search.
Consider data from statistics

Relevant websites, web links and files

- http://www.onep.go.th/env_data/2016/01_49/
- http://www.onep.go.th/env_data/2016/01_51/

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 13: By 2020, tools/mechanisms/guidelines on sustainable use of biodiversity are applied in all relevant sectors.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

In Thailand, there are Tools and Rules to drive various activities especially the Prevention of the impact on plant seeds, natural habitat and the excess fishing. For driving mechanism,

apart from government officers, there is the network of local residents from the encouragement of public participation, for example, The Committee on Protection and Control of Marine and Coastal Resources.

There are many government agencies that give priority to the biodiversity by including this issue in their standard, indicator or other criteria for evaluation which result to target no. 8 in the opportunity to add the biodiversity issue in the standard and criteria to meet the target in the set schedule.

From the monitoring of Tools / Mechanism / Guidelines for promoting the sustainable use of biodiversity, it is found that

- The establishment of National Committee on Conservation and Utilization of Biodiversity, by the Office of the Prime Minister in order to define the criteria and direction to access or utilize, biological safety and technology transfer.
- Master Plan for Integrated Biodiversity Management, 2015-2021 is defined to follow the principle of public participation activities on conservation of Biodiversity both inside and outside the natural habitats, species diversity and sustainable Ecology including promote the activities that encourage the fair and equal benefit sharing from the use of genetic resources.
- The Regulations of the Office of the Prime Minister on the Conservation and Utilization of Biodiversity year 2000, in order to support the adjustment of government offices, the government, therefore, adjust the regulations to “The Regulations of the Office of the Prime Minister on the Conservation and Utilization of Biodiversity, (2nd Edition) year 2005.”
- The Regulations of the Office of the Prime Minister on the Conservation and Utilization of Biodiversity emphasized on criteria and direction of the access to biological resources and the benefits of using this biological resources, year 2011.
- The setup of “Policies, Measures, Plan on Conservation and Sustainable Utilization of Biodiversity” in order to use as guideline for action in National Level (5 years plan). The aim is to create the incentive to locals to conserve the biodiversity, as well as to control and to monitor the activities that treat the biodiversity, reduce the loss of biodiversity, create the conservative network, conserve and restore the forest and turn to be the community forest for mutual use. Building up the fertility of biodiversity will strengthen the basic foundation of the living standard of the Thais together with the valuable research on biodiversity will lead to the sustainable economic utilization.

Agricultural Sector: The Tools / Mechanism / Guidelines that promotes the sustainable use of Biodiversity in agricultural sector are as follows: Department of Agriculture promotes “**Agroforestry**” and “**Sustainable Agricultural System**” especially in the buffer zone around the protected area. There are 10 guidelines for sustainable agriculture; the 6th guideline emphasizes on “use the benefit of biodiversity to create the variety of activities in agricultural production in the field and blend these production activities to maximize the mutual benefit, natural pest control and create various chemical free activities.

Forestry Sector:

- 1) Promote the sustainable use of by restoration and conservation of cultural forest in Dong Yai forestry area, Maha Sarakham province, Surin province, Sri Saket province and Roi-et province

- 2) Promote and create the incentive in conservation and the sustainable use by restoration of natural environment in the conserved forest, promote the conservation tourism and promote the activities that encourage the participation of communities in conservation and restoration of forests in various locations.
- 3) Improvement of work program of biodiversity of forestry from the agreement of Parties to the Convention on Biological Diversity no.6, 2002. The work program that required improvement has 3 components, 12 targets and 130 activities. The guideline of promoting the sustainable use of biodiversity of forestry are in component 1 of work program (which are the conservation, the sustainable use and the share benefits), in target 4 (promote the sustainable use of forestry resources) and in objective no.1 (promote the sustainable use of forestry resources to support the conservation of Biodiversity).

Fisheries Sector: The Department of Fisheries collaborate with the Southeast Asian Fisheries Development Center (SEAFDEC), the World Wide Fund for Nature (WWF), and the Thai Tuna Industry Association (TTIA) have all signed the MOU on “Collaboration of improvement the Long-tail Tuna Fishing in the Gulf of Thailand to sustainable fishing” for sustainable use of resources from the ocean and the sea as SDGs 14. In addition, the Department of Fisheries is also promoting and creating the incentive in conservation and sustainable use by release about 400-600 million /year of various species of aquatic in 800 fresh water fish sources around Thailand in order to motivate the local’s and community residents to conserve the aquatic species.

Tourism Sector: Promote the Sustainable Tourism as well as setup the policy and guidelines for Ecotourism in year 1995 – 1996 and Action Plan of National Ecological Tourism which comprise of 14 Action Plans, 37 Projects.

Energy and mining sectors: promoting good governance and environmentally sound practices for mining in accordance with the 2017 Mines Act. This act requires the national committee on mining to be established in order to sustain maximum benefits for the economy, the society, and the environment, ensuring true public ownerships of mineral resources in accordance to the 20-year national strategy. Thailand Green & Smart Mining Forum was continuously held as a social measure for encouraging relevant private sectors to exceed legally binding standards which their businesses adhered to.

Indicators

- Number of tools, mechanisms and regulations for protection of species and their habitats from impacts of pollution, overfishing, development schemes and climate change.
- Guideline on integrating biodiversity in standards and criteria of relevance.
- Number of tools/mechanisms/guidelines for promotion of sustainable use of biodiversity in each sector (agriculture, forestry, fishery and tourist sectors).

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- http://chm-thai.onep.go.th/chm/policy_2.html
- http://chm-thai.onep.go.th/chm/programme/forest_details.html
- <http://www.sa.ac.th/biodiversity/contents/articles/oepp/oepp08.html>
- http://www.wwf.or.th/news_and_information/?uNewsID=329031

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Difficulty of data surveillance at all level.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 14: By 2021, effectiveness in wetland management is improved at every level.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done: 28 February 2019

Additional Information

National Level: The wetland management in national level has done by setting up the “Subcommittees of Wetland Management” which Ministry of Natural Resources and Environment is the main responsible agency, Office of Natural Resources and Environmental Policy and Planning is a secretary and coordinate with other agencies and Secretary General of Subcommittees of Wetland Conservation. There are other agencies get involve such as Department of National Parks, Wildlife and Plant Conservation, Department of Marine and Coastal Resources, Department of Fisheries, Department of Agriculture, Royal Forest Department, Royal Irrigation Department and Department of Provincial Administration.

Provincial Level: The wetland management in provincial level has set up the Provincial Committee of Wetland Management and Wetland Working Committee to support the activities in the target area by promoting the participation from all related parties. The examples of the activities are:

- Project of Wetland Management along Kong River encourages the participation of the community residents both in Thailand and in Lao. The wetland management promotes the participation of all related sectors either government, private, local communities, national level or network of residents along the Kong River Area. The target areas are Kud-ting wetland and Khong-Lhong swap in Nong Kai Province. The guideline of provincial wetland management follows the 13 measures of national wetland conservation measures which was approved by the government on 1st August 2000. The activities in this target area encourage the participation of all related sectors.
- The Project of Wetland Restoration of Lower Songkram River promote capacity strengthening and participation of the communities in water resources management

and restoration of the Ecology in the Wetland along lower Songkram River, Nakorn Panom Province. The mechanism of the provincial wetland management was to setup the “Songkram River Wetland Managing Committee, Nakorn Panom Province” and “District Working Committee” to be the working team and provide the opportunity for the stakeholders to participate in the project activities.

Efforts to enhance effectiveness of wetland management included gathering of information on the state of 14 wetlands of international importance (Ramsar sites), assessment on 2 potential candidates for inclusion in Ramsar Convention’s List of Wetland of International Importance, evaluation on management effectiveness at Ramsar sites, mapping of wetland sites and their buffer zones, development of geographical information databases on wetlands and development of management plans for the 14 Ramsar sites and 2 candidate sites.

Indicator

- Tools/mechanisms for wetland management at provincial level are available by 2020.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- http://www.wwf.or.th/what_we_do/wetlands_and_production_landscape/projectsall/wetland_community/
- http://www.wwf.or.th/what_we_do/wetlands_and_production_landscape/projectsall/bkl/

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 15: By 2021, loss of wetlands is significantly reduced with the view to ensure ecosystem services and to support climate change adaptation.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

In Thailand, the Policies, Measures, and Wetland Management Plans have been established with the aim to reduce the loss of ecology of the wetland and to ensure that the use of wetland ecosystem services support the climate change adaptation as follows;

- (1) The Policies, Measures and Wetland Management Plans, during 1997-2003 comprise of 28 plans, 43 projects from 14 agencies which were approved from the cabinet on 15th July 1997. The wetland management plan, 2003-2007 was combined with the Policies, Measures and Sustainable Biodiversity Conservation Plans which comprise of 4 sub-action plans, 168 Projects from 41 agencies which were approved from the cabinet on 11th June 2003. The Wetland Management Plans, 2008-2012 was approved under the Conservation and Sustainable use of Biodiversity Plans, 2008-2012 which give priority to the impact of the development which ignore the sustainable biodiversity resources that caused significant damage to the biodiversity which becomes global problems. The plans comprise of 2 main measures 1) conservation of Ecosystem of Seashore and Islands 2) protect the ecosystem of the wetland and promote sustainable use.
- (2) The measures of wetland conservation becomes a significant issue in both national and international level: From the cabinet resolution on 3rd November 2009 for 17 measures, there was an announcement that all wetland around the country became the public area especially the fresh water wetlands are the “Green Area” and not allow any government agencies to use that the area is reserved only for receiving the water and keep water as reservoir. The registered wetlands, which are important to the locals in receiving & keeping the water, are regularly monitored and looked after. These wetlands are also registered as national water resources for public use.

In addition, the cabinet resolution on 12th May 2015, assigned Office of Natural Resources and Environmental Policy and Planning together with National Sub-Committee on Wetland Management, setup the list of project list (type & size) that do not require EIA as per Article 46 of National Environmental Quality Promotion and Preservation Act, B.E. 2535 (1992) but are vulnerable and potentially can cause significant damage to the Wetland as well as define additional measures to prevent and solve the environmental impact.
- (3) The Convention on Climate Change and the Convention on Biological Diversity for Work Program of Ecosystem of Water Resources of Land, Sea and Coastal. The Agreement of Alliances on Habitat Conservation of Migrate Birds route East Asia – Australia: from the cabinet resolution on 20th July 2010, Office of Natural Resources and Environmental Policy and Planning was assigned to be coordinator of this project.

Indicator

- Management plans/measures are available for at least a half of wetlands of international importance by 2021.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <http://chm-thai.onep.go.th/chm/Inlandwater/webpage/managmentplan.html>
- <https://prachatai.com/journal/2008/02/15643>
- <http://chm-thai.onep.go.th/wetland/cabinet.html>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Uneasily assessment.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 16: By 2020, invasive alien species in various ecosystems are identified and enlisted.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

In Thailand, the agencies that are responsible for updating the database of invasive alien species are the Royal Forest Department, the Department of National Parks, the Wildlife and Plant Conservation, and the Department of Livestock Development, but the invasive routes have not been included yet. In parallel, the Office of Natural Resources and the Environmental Policy and Planning, and the Department of Agriculture are responsible in producing the handbook of list of invasive alien species as well as the invasion manner. With the existing database, it is possible to update and extend the information of invasive alien species of animals and the invasion routes/manners of both plant and animals.

For the action on defining the types and updating the database of invasive alien species in Thailand, the cabinet has approved on 20th February 2018 to add the additional Register and became 4 Registers in total for invasive alien species that should be prevented, controlled and got rid of including the specific measures in each Register. The 4 Registers are as follows;

- **Register No.1:** The Alien Species that have already invaded and are increasing numbers (from 81 to 138 species). While 16 species are the species that are promoted for economic use and specific measures shall be applied.
- **Register No.2:** The Alien Species that tend to invade. The number is increasing from 52 to 58 species. While 15 species are the species that are promoted for economic use and specific measures shall be applied.
- **Register No.3:** The alien species that have already invaded other countries but still have not found the invasion in Thailand. Due to the adjustment of the category from this list to list no. 1 or 2, therefore, the number of species is decreasing (from 49 to 45

species). While 4 species are the species that are promoted for economic use, and specific measures shall be applied.

- **Register No.4:** The Alien Species that have not found in Thailand. The number is decreasing (from 91 to 82 species) due to the scientific proof that some species are local species in Thailand, therefore those species are moved to list no 1, 2 or 3.

Indicators

- Listing of invasive alien species and their major pathways.
- At least one list of invasive alien species is available for important ecosystems of Thailand with measures on prevention, control, elimination and utilization of invasive alien species

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- <http://chm-thai.onep.go.th/chm/alien/ias/index.html>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Existing evidence can reflect the real situation.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

Target 17: By 2020, measures are in place to manage priority invasive alien species and their pathways.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

The action on management of high priority Invasive Alien Species and invasion pathways in Thailand are as follows;

- 1) The Preventive Measures, the Control and Destroy the Invasive Alien Species (Plant, Animals, Microorganisms): The Ministry of Natural Resources and Environment has adjusted and defined new measures and guidelines for the species that claim to used for economic purposes, including the adjustment of registered database for the species

that should protect, control and destroy in Thailand in register No. 1-4 to match with current situation as well as adding the additional guidelines for control or destroy the species that are prioritized as dangerous. This updated measures and guidelines will be the tools for related agencies to follow all the actions efficiently and match with current situation.

- 2) (Draft) Preventive measures, control and destroy the invasive alien species comprises of 5 measures as follows;

Measure 1: Define the policies, action plans, laws and budgets

Measure 2: Manage the invasive alien species

Measure 3: Stay alerted and closely monitor the invasive alien species

Measure 4: Support the research on alien species and educate the invasive alien species

Measure 5: Publish, Create Awareness

- 3) (Draft) Control guidelines and destroy methods the invasive alien species that are classified as very dangerous in Thailand are as follows;

(1) High Priority Alien Species (Plants)

(2) High Priority Alien Species (Animals)

There are 4 action guidelines as follows;

3.1) Update the register, prioritize and define the measures to control, destroy or use the Alien Species that are invading in the conserved area of Biodiversity and in other ecosystem.

3.2) Gathering the study analysis, invasion pathways and/or important directions of invasion in Thailand, risk assessment and measures of managing pathways and /or type of invasion.

3.3) Support the Research on utilizing the alien species that are invading or tend to invade

3.4) Publish the knowledge of alien species management and promote the capacity of related agencies, officers, local administrative offices and publics to access to the information, monitor, prevent, stay alerted, control and destroy the invasion alien species understand the pathways and prevent the smuggling into the country/area.

Indicators

- Measures for managing at least 5 invasive alien species found in important ecosystems of the country.
- Means and/or measures for eliminating pathways of alien species.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <http://www.gad.moi.go.th/cabnetpdf/2102611.pdf>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 18: By 2021, rules and regulations adhering to the precautionary approach for biosafety are available and applied by relevant agencies for improvement and development of rules, procedures and mechanisms to regulate transboundary movement of living modified organisms (LMOs) in accordance to the obligations of the Cartagena Protocol on Biosafety.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

The Enforcement of Laws and Regulations on the control of negative impact on Biodiversity from advance biological technology is still unclear due to there are no specific law. However, in the past, there is a movement to propose the biosafety law. But it was resisted by public networks, farmers, scholars, therefore, the proposal was withdrawn.

From the survey, it is found that Thailand had adjusted “Biosafety Guidelines for Modern Biological, 2016” which the Technical Biosafety Committee has updated the content to follow the latest international criteria for Biosafety such as Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules, of National Institute of Health (NIH) and Biosafety in Microbiological and Biomedical Laboratories, 5th edition of Centres for Disease Control and Prevention; CDC, USA, etc. The adjustment was also complied with Thailand Rules & Regulations in order to gain the confident that the activities related to new biological technology are safe for operators, communities and environment and to encourage the operators on new biological technology to use this new guideline to apply for permission to evaluate and define risk level of the research. In addition, there is the preparation and update of other guidelines of biological safety control such as

- (1) The Biosafety Guidelines for Contained Used of Genetically Modified Microorganisms at Pilot and Industrial Scales, amended B.E. 2559 (2016) to be the guidelines for researchers, operators and evaluators that do activities related to genetic modification to understand the steps of safety evaluation and the controlled environment that suitable for their activities for safety of operators, communities and environment.
- (2) the Biosafety Assessment Guidelines for Living Modified Plants with Stacked Gene and their Derivatives, amended B.E. 2558 (2015) to use as the guidelines for biological safety evaluation of plant genetic modification (Stack Gene type) which developed from conventional breeding between genetically modified plants (male-female parents)

and environmental safety evaluation (food aspect) and preparation of the use of Genetic Modification (Stack Gene type) and future invented products.

- (3) The Biosafety Guidelines for establishing the Research Greenhouses for Genetically Modified Plants, operated B.E. 2556 (2013) base on A Practical Guide to Containment: Plant Biosafety in Research Greenhouses where the Rules are applied from US Regulatory Agency in charge of Research and Use of Genetically Modified Organisms, together with the information from the conference of experts on various occasions. From the mentioned source, the information and guidelines are applied for the establishment and consideration of suitable context for test/pilot school in Thailand for researchers and Project evaluators that related to Genetic Modification that experiment in the test/pilot school.
- (4) Draft Biodiversity Act, is the law that is being drafted by the National Sub-Committee on Biodiversity Law under the National Committee on Conservation and Utilization of Biodiversity, which included the of biological safety measures.

Aware of law lacking to directly monitor the biosafety, Thailand has formulated and ameliorated necessary guidelines to ensure the biosafety and to promote the mechanism development for keeping track of living genetically modified plants, earlier referred, so as to set out guidelines that can very well result in law amendments coherent with the obligations of The Cartagena Protocol on Biosafety in the various contexts, such as its utilization in restricted areas, utilization as foods, animal foods and the assessment of the potential risks.

For the application of future precaution on biosafety in the improvement and development of rules & regulations and mechanism to follow on control the trans-border of biological genetic modification. In 2016, the Office of Natural Resources, the Environmental Policy and Planning, together with the National Centre for Genetic Engineering and Biotechnology, National Science and Technology Development Agency (NSTDA), started the “Project of Guideline Preparation for biosafety Precautions to support the AEC”, developing the precautionary principle in biosafety; for Entering ASEAN Economic Community, to be the guidelines for responsible agencies and related agencies in developing and improving their Rules and Mechanisms on controlling the trans-border of Biological Genetic Modification to support AEC. At present, Thailand does not have the specific Rule, but applying the existing Plant Quarantine Act, B.E.2507 (1994) to control the trans-border of Biological Genetic Modification and Food Act, B.E. 2522 (1979), which controls the package label of genetically modified corn and soy beans. However, Thailand still applies other existing acts or laws to control the trans-border plants such as Export and Import of Goods Act, B.E. 2522 (1979) Agricultural Standards Act, B.E. 2551 (2008) and Administrative Procedure Act, B.E. 2539 (2013), etc. But at present, the government has never applied the above acts to control the genetic modification and other related activities.

Indicators

- National tools and mechanisms in ensuring biosafety for agencies and sectors of relevance.
- Improved guidance for actions and utilization of tools and mechanism to ensuring biosafety in modern biotechnology for agencies and all sectors of relevance in Thailand.
- The precautionary approach for biosafety is applied by relevant agencies for improvement and development of rules, procedures and mechanisms to regulate transboundary movement of living modified organisms (LMOs).

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- <http://www.biotec.or.th/biosafety/index.php/guideline/2-uncategorised>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 19: Within 2020 there are in place mechanisms and regulations in authorizing the permission for the access and the sharing of benefits from the utilization of genetic resources and local wisdom in Thailand's key agencies

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Thailand currently has the following laws and regulations that include and cover the administration, monitoring and supervision of the access and the sharing of benefits from the genetic resources:

- The Forestry Act, B.E 2484 (1941) to control and stop wood logging and to accelerate forest condition restoration,
- The National Park Act, B.E. 2504 (1961) to determine the protection of the existing natural resources, assuring their unchanged and unspoiled traditional natural condition conservation,
- The Wildlife Conservation and Protection Act, B.E. 2535 (1992), defining the access and the utilization in restricted areas, as well as types of related actions allowed by this act that emphasizes the conservation and protection with no mention on the sharing of any benefits,
- The Plants Variety Act, B.E. 2535 (1992), restricting their access and protection, sales, importing, as well as exporting their seeds for commercial purposes which shall be permitted only by competent agencies,
- The Plant Variety Protection Act, B.E. 2542 (1999), promoting the plant improvement and development, as well as the conservation and utilization development of endemic

plants to ensure local participation in their care, attention, sustainable conservation and utilization,

- The Protection and Promotion of Knowledge on Thai Traditional Medicine Act, B.E. 2542 (1999) , defining appropriate measures for protecting and promoting individuals, communities and private organizations, ensuring their recognition of the values of the Thai medicine and herbal wisdom and participation in their sustainable conservation, development and utilization,
- The Pathogens and Animal Toxins Act, B.E. 2558 (2015), defining criteria, methods and conditions for safety protection and danger prevention for the general public against animal germs and pathogens, improving and assuring their control with high proficiency, adding provisions related to civil liabilities, as well as additional amendments on proper penalties and fee rates,
- The National Reserved Forests Act (No. 4) B.E 2559 (2016), defining that the competent authorities to be authorized to confiscate or attach properties acquired or utilized in committing crimes or subject to reasonable grounds to suspect in being used for committing crimes, and to improve the provisions related to penalties, fee rates, royalties and forest conservation fees,
- The National Committee on Conservation and Utilization of the Biodiversity Regulation on the criteria and methods for accessing the biological resources, B.E.2554 (2011), defining criteria and methods in accessing the resources with bio-diversity and the acquisition of benefits from the resources with bio-diversity, thus ensuring their similar directions and coherence with Convention on the Bio-diversity, and
- The National Research Council Regulation on the permission for foreign researchers to conduct researches works in Thailand, B.E. 2550 (2007).

However, in the course of the past years there have been 2 legal developments in relation to the access and the sharing of benefits covering the related endemic biological resources and wisdom. These include a bill on the draft Promotion and Conservation of Endemic Animals Act, which is related to the access and sharing of benefits covered in the types of animal resources, and the National Genetic Engineering and Biotechnology Centre Regulation related to the access and the sharing of benefits from bio resources kept therein, once together with the old laws or regulations concerning the access and the utilization of the natural resources, which are found that they still do not include the biological resources and the related local wisdom, and still exclude the marine and coastal resources, as well as local wisdom.

Apart from these, another study was done on development of tools and mechanisms for accessing biological resources and the fair and just sharing of benefits, mainly based on the access of biological resources and sharing of benefits, that is, through an advance notice, a mutual agreements on fair and just sharing of benefits highlighting conservation, defining agreements on the transfer of certain materials under the formulation project of the provisos under the draft Biodiversity Act. so as to serve as a common standard for the conservation of the biodiversity, the access, the utilization, and the sharing of benefits from the genetic resources to ensure the biological safety and the active community participation. There has currently been progress in the improvement and amendment of the draft Biodiversity Act and the draft provisos and the draft local regulations and provisions on the access to the biological resources and the sharing of the benefits from genetic resources coherent with the universal principles and international criteria that are on the registration of the related biological resources and local wisdom, as well as (preliminary) maps. A committee has been set up to protect and supervise the biological resources and local wisdom at the community level (Office of Natural Resources and Environmental Policy and Planning, 2018)

Indicators

- Rules and regulations related to the access and benefit sharing are available and used by the Competent National Authorities (CNA) who responsible for regulating access to and benefit sharing of genetic resources.
- Mechanisms are available for implementation of the Nagoya Protocol.
- Legislation related to the access and benefit sharing of biological resources and traditional knowledge of relevance is developed.
- Mechanisms for approval of access to and sharing of benefits derived from utilization of genetic resources and traditional knowledge are developed or revised in 80% of the Competent National Authorities.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- <https://sp.mahidol.ac.th/pdf/law/germs-toxin-58.PDF>
- <http://www.lbo.moph.go.th/rxthai/rxthai1/law/law01.pdf>
- <http://www.doa.go.th/pvp/images/stories/indexpvp2542/pvp2542.pdf>
- http://forestinfo.forest.go.th/Content/file/forest_low/forest-law2559.pdf
- http://www.acfs.go.th/km/download/act_plant_2535.pdf
- http://www.codi.or.th/downloads/laws/law/Laws_environment_agriculture-6.pdf

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 20: Within 2019: Integration of mechanisms for the administration of the access, the sharing of benefits, monitoring and control of the genetic resource utilization.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Regulations related to the access, the benefit sharing, monitoring and control of the genetic resource utilization include the following:

- **The National Reserved Forest Act (No.4), B.E. 2559** (2016) defining measures in protecting, preventing and conserving natural resources, requiring systematic natural resource administration and management to ensure public benefits through a committee in charge of the utilization of the national forest reserves to be authorized and permitted by the competent authorities
- **The National Park Act, B. E. 2504** (1961) emphasizing the protection and conservation of the existing natural resources, such as plants, forest products, wild animals, as well as wild landscape views and mountains, so that they are kept in their original conditions, unspoiled or unchanged, to facilitate their benefits - direct and indirect - for the continual benefits of the state and the general public,
- **The Plant Variety, B.E. 2535** (1992) controlling the access and providing protection for certain kinds of plants: seed control, preserved seeds and plants, conserved plant varieties, restricted non-natural propagation of certain plant varieties, of which the collection, sales, importing and exporting have to be authorized by competent authorities; plant varieties that have to be registered, guaranteed in cases where promotion for innovative identification and improvement are involved so as to become beneficial for the country's further development,
- **The Plant Variety Protection Act, B.E. 2542** (1999) defining the conditions for accessing common plants, wild plants and endemic plant species and their benefit sharing: (1) accessing common plants, wild plants for breeding, study, test, or research for commercial purposes, it shall be authorized by competent officers and due agreements be made on the benefit sharing, (2) accessing common plants, wild plants for non-commercial ones, shall be notified using letter format as attached (3) accessing endemic plants for breeding, study, test, or research for commercial purposes need agreement for benefit sharing. The authorization and development of agreement on benefit sharing shall be led by either concerned local administrative organizations, or the concerned farmers' groups or cooperatives previously authorized for such endemic plants to perform legal acts on behalf of local communities, and need prior approval from the Plant Variety Protecting Committee with which benefit sharing shall be made and based on the allocations set by local provisions.
- **The Protection and Promotion of Knowledge on Thai Traditional Medicine Act, B.E. 2542** (1999) defining the processes for accessing the Thai medicine and herb wisdom as follows: (1) As for traditional Thai medicines, their commercial utilization shall be authorized, along with the restriction of rights and remunerations which shall follow the set criteria, (2) As for Thai general medicines and Thai general medicine texts, no permission is required to access, (3) As for the personal Thai medicine books and the personal Thai medical textbooks, the permission shall be sought from the registered patents holders (4) Herbs under certain control: their access requires permission, (5) As for the origins of the controlled herbs, permission is required for the access to the controlled area and necessary actions be complied with the stated regulations
- **The National Sub-committee on Convention on Biological Diversity Regulations** on the criteria and methods for accessing the biological resources and acquiring benefits from these biological resources B.E. 2554, define criteria and methods in

accessing these biological resources and in acquiring benefits from them for related state agencies that they compile appropriate guidelines and agreements for the access of those biological resources and the acquisition of returned benefits from those biological resources among state agencies and the permitted agents,

- **The National Research Council Regulation** on the permission for foreign researchers to conduct research works in Thailand B.E. 2550,
- **The Draft Biodiversity Act**, which is a draft in the drafting process of the law sub-committee on the bio-diversity under the National Committee on Conservation and Utilization of Biodiversity. This draft has several sections dealing with the access to and the utilization of benefits.

Apart from these, there has been a new development on the Community-ABS (C-ABS), which highlights the various communities as care-takers and supervisors of biological resources who can claim benefit sharing in the forms of cash and in kind, thus underlining the fair and just income distribution principle.

Indicator

- Mechanisms for management of access to, sharing of benefits derived from and monitoring of utilization of genetic resources are integrated.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <http://www.ratchakitcha.soc.go.th/DATA/PDF/2560/A/067/1.PDF>
- <https://sp.mahidol.ac.th/pdf/law/germs-toxin-58.PDF>
- <http://www.lbo.moph.go.th/rxthai/rxthai1/law/law01.pdf>
- <http://www.doa.go.th/pvp/images/stories/indexpvp2542/pvp2542.pdf>
- http://forestinfo.forest.go.th/Content/file/forest_low/forest-law2559.pdf
- http://www.acfs.go.th/km/download/act_plant_2535.pdf
- http://www.codi.or.th/downloads/laws/law/Laws_environment_agriculture-6.pdf
- <http://www.ratchakitcha.soc.go.th/DATA/PDF/2554/E/026/8.PDF>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 21: Within 2021 the research community and the local community organize and ratify necessary mechanisms and regulations related to the access and the sharing of benefits arising from genetic resources

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Thailand has now developed the Community BioBank, highlighting the local community's participation and consent, as well as the just and fair benefit sharing through the various communities' networks and cooperation, youth networks, local administration organizations, intellectual agencies currently supporting new knowledge and developing various resources that their values are highly upheld. This action has been carried out by the Community BioBank, acting as their common information centre for the national and the community resources. Besides this, this can further develop into a small learning centre on biodiversity and local wisdom for urban dwellers. It can very aptly serve as a centre for learning community development, cultural histories and local resources, a local public site where the community can easily access and use to further protect other types of local resources, thus helping crystalizing their locally striking identity due to be registered for their geographically own uses. One that can be exemplified is like a centre for collecting banana varieties recently carried out by Pakchong Research Station in Nakhon Ratchasima in collaboration with Kasetsart University acting as an information centre, another example is the development example plot in the botanical garden of Kasetsart University in Mae Rim District, Chiangmai. It is based on banana varieties collected as part of the community biobank. Another one is the integrated Longan variety collection garden in Lampoon Province carried out in collaboration with a number of local learned village persons and researchers, thus capable of developing a community-ABS (C-ABS) to a very high level of scalability to other similar areas' interests, highlighting the just and fair distribution and sharing of accrued benefits based on biological resources – in cash and in kind.

Apart from these, genetic resource cooperation networks have been set up among 25 agencies, mostly overseas, to highlight international meetings on intellectual activities based on bio-diversity. Such certainly includes international expositions. In this collaboration some 38 Rajabhat universities are included. This is to support and help develop local knowledge already and currently collected by the various local communities and biobanks that one day they will be located in various locations and can aptly nurture their close cooperation.

Indicator

- Mechanisms, rules and regulations related to access and benefits sharing of genetic resources are developed by research and local communities.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <https://cloud.forest.go.th/index.php/s/XXpZv5ws674O0V4#pdfviewer>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Limited sampling group.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 22: Within 2021 are in place necessary measures and mechanisms that will help bring back economic benefits acquired from biological products to their source origins to support their conservation and utilization for further sustainable bio-diversity.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Thailand has already formulated and has got in place a 20-year (A.D. 2017-2038) strategic economic development plan based on biodiversity. This has already served as the guidelines for main future tasks integrated with all other related agencies. 3 main strategies have thus been set to be applied for the sustainable utilization and conservation of biodiversity. They are to 1) Strengthen the community's business sector, 2) Promote and support participation with and from the various sectors, and 3) Formulate databases and knowledge bodies based on biodiversity to protect and prevent the commercially based conservation and utilization of the biodiversity. One key strategy to strengthen the community business sector is to create various value-added lines based on biodiversity and apply the accrued economic values for the community's biodiversity conservation and restoration in the community's existing ecosystem. Based on a case of a successful community, the community can easily collect a certain amount of money from sales of bio-diversity products for its community forest conservation fund.

There have been several ways for the spending of the incomes earned in the ecosystem. One is called the payment for the ecosystem services (PES). In this case volunteers and tourism entrepreneurs currently support the community's Mangrove Conservation Forum under the local administration organization's care which involves the coastal resource management through waste management and tourists' safety care. Another case involves a regional waterworks distribution station. Therein waterworks service beneficiaries are supporting the retarded flow of raw waters through the construction of small earthen dikes, the cleanliness and healthy condition care of water courses, preventing fires capable of burning woods and planted trees in the watershed areas along the waterworks water courses.

Apart from this, campaigns have been launched to encourage tourists to cooperate with the involved communities to carry out certain activities in touristic sites to conserve, protect and restore coral reefs. The selected activities carried out called for participation from the educational sector, the private sector, and the general public. These are Project: Coral reef cleaning (Fish Homes), Project: Boat buoy installation, and Project: Restoring coral reefs and other related ecosystems. Activities related to conservation: Raising the youth and children's ecosystem awareness in various occasions: Children's Day, and World Sea's Day, etc. To do these, there will first be effective training for diving volunteers for reef watching to encourage active participation in coral reef supervision on the part of the children or youth trainees after their training.

Indicator

- Measures and mechanisms for returning economic revenues from biological products to their origins in order to support conservation and sustainable use of biological diversity.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- http://www.bedo.or.th/bedo/backend/upload/content/2018_03/1520496784_7221.pdf
- <https://www.dmcg.go.th/miniprojects/50/19898>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 23: Within 2021 there are in place necessary mechanisms for the integration and connectivity of the biodiversity databases and bodies of scientific knowledge for their effective application.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Progress has been achieved in the development of the scientific data base systems to support the policy formulation and biodiversity action plans. Moreover, new biodiversity taxonomists have been trained to increase their capabilities in new challenge areas. More have been recruited into new organizations dealing with biodiversity operations that the related organizations and personnel can more aptly apply bodies of scientific knowledge of some specific areas into the policy and action- plan formulation that they can successfully make needed progress and achieve the biodiversity-specific as planned.

Office of Natural Resources and Environmental Policy and Planning does have a number of agencies in charge of collecting biodiversity databases. These agencies function in various ministries, as well as in certain data sections of educational and research institutions. The private sector does also have some databases. At present, it has been indicated that the Office of Natural Resources and Environmental Policy and Planning is in charge of the integration and connectivity of biodiversity databases of the whole country. However, all these are still in the preliminary and temporary development phase and not all the designated databases can fully and aptly be interconnected. Indeed, in that connection, not all objectives and indicators have been achieved and can be applied for the biodiversity purposes

The driving roles and efforts to make use of the databases for conservation and biodiversity purposes have not yet been fully accomplished by any agency yet. However, the Office of Natural Resources and Environmental Policy and Planning has recently started a new course of action when it got in touch with the Biodiversity-Based Economy Development Office (Public Organization). Lots of innovative measures have yet to be invested to ensure that a driving force will achieve the bio-diversity-based goals.

Multiple domestic agencies have been involved with the collection of biodiversity databases. These include: Office of Natural Resources and Environmental Policy and Planning (ONEP), Pollution Control Department, Department of Environmental Quality Promotion, Department of Agriculture, Department of Fisheries, Department of Agriculture Extension, Rice Department, Department of Livestock Development, Royal Forest Department, Department of National Parks, Wildlife and Plant Conservation, Department of Marine and Coastal Resources, Biodiversity-Based Economy Development Office (Public Organization), Botanic Gardens Organization, Zoological Park Organization Under the Royal Patronage of H.M. The King, National Science Museum, The Institute of Marine Science of Burapha University, Suan Luang Rama IX Park, Southern Gulf Fisheries Research and Development Center (Songkhla), Agro-Ecological System Research and Development Institute, Green World Foundation and World Wildlife Fund (Thailand) etc. However, all these databases are still in the stage of organizational administration and management, jointly carried out by several organizations, and have been without any pivotal agency to drive for some specific targets and to make a fuller use of these existing databases.

The connectivity and the extension of mechanism networks to publicize and disseminate biodiversity databases to cover and include related agencies to ensure the effective biodiversity data utilization for maximum benefits in accordance with Section 18, Paragraph 3 of the Convention on the Biodiversity require that necessary mechanisms be established to disseminate data and information to promote and facilitate the good scientific and technological cooperation, as well as the transfer of technology and expertise data cooperation. In this regards, the Office of Natural Resources and Environmental Policy and Planning, as the coordinating agency, has set up its webpage with necessary mechanisms to disseminate biodiversity data and information to serve as a Clearing House Mechanism to further work in

coordination and cooperation with other related agencies' database systems which include the following:

- The biodiversity database systems of the Department of National Parks, Wildlife and Plant Conservation
- The biodiversity database systems of Royal Forest Department,
- The biodiversity database systems and local wisdom of the Biodiversity-Based Economy Development Office (Public Organization)
- The central database system and the standards for the marine and coastal resources of the Department of Marine and Coastal Resources,
- The plant databases of the Botanical Gardens Organization,
- The international buffalo databases, Kasetsart University, and
- The economic insect databases, the Department of Agricultural Extension

It was found there are many more agencies that are collecting biodiversity data and information. However, it should be noted here that this connectivity is based only on the web addresses of the agencies.

The strategies on the research work based on biodiversity have been identified in order to help conserve, restore, and develop the local ecosystems so as to enhance the clever and efficient utilization of their biodiversity benefits to further sustain their ecosystem and natural affluence to the maximum. This will serve as the secure base for Thai society's future living conditions supported by the biodiversity of which the value is greatly increased by the biodiversity-based research which further helps distribute fair and just benefits in Thailand's overall economy at the local and national levels.

Indicators

- Databases on scientific information supportive to development of biodiversity policies and plans.
- Greater proportion of taxonomists in rosters of technical personnel in agencies that undertake actions on biodiversity.
- Mechanisms for integrating and linking biodiversity databases.
- Clearing houses agencies are available for mobilizing and utilizing existing databases for conservation and sustainable use of biodiversity.
- Expanding biodiversity clearing-house mechanisms to every agencies of relevance.
- Mechanisms to deliver scientific knowledge for development of biodiversity policy and plans.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- http://chm-thai.onep.go.th/chm/links_3.html
- <http://chm-thai.onep.go.th/chm/datalink/>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Existing evidence can reflect the real situation.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 24: Within 2021 the databases with the biodiversity-specific of high priority are available.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Thailand has made available national databases on local wisdom and folklore that includes and covers local wisdom, Thai medicine and alternative medicine. Various forms of local wisdom have been compiled into several forms of encyclopaedia. In each region, there are agencies that collected biodiversity data, mostly those that are of high priorities to them like the following:

- Plants databases, collecting data and information about plants on display in the Queen Sirikit Botanical Garden. Plant samples are kept dry. The plants on display are those written about in the books published by the Botanical Garden Organization and those from other data sources. At present, plant data is subdivided into groups differentiated by ways of collection means and their origins which are categorized into alive and dry groups, endemic and threatened or near-extinction groups;
- Islands databases-all the islands of Thailand; islands representing varieties of plants: drifting with water; once stuck on the island's limited land, forced to be differently evolved; a number, quite outstanding in terms of genetic sources and deriving into plants with special genetic characteristics in terms of sizes and shapes-stunted, losing their internal self-protecting organisms, genetic variety distribution, population size distribution within limited spaces
- Biodiversity databases systems: Based on the study and the designing for the 6 biodiversity database systems-forest insects, forest and fungus microorganisms, plants, climate and plant growth, soil, and forest genetics, the results of the studies were formulated into an applied program to process and collect the data accumulated, displaying them in the management information system (MIS) and in the geographic information system (GIS) for public usages and access to the forestry data and information sites.

Moreover, in order to correspond to Thailand's revolution plan in terms of biodiversity, a number of indicators are identified. The central databases should serve as a one-stop service processing spot. The various biodiversity databases should be centralized, based on their

various national priorities and dimensions. Mechanisms should be available to connect the various database systems in order to drive them for the conservation purposes and the sustainable utilization of the biodiversity benefits. In addition, there should be a comprehensive protecting system for the registered data, as well as for the right to access these resources, bodies of knowledge, and local wisdom. This action plan should be operational during 2018-2023. The guidelines for all these actions should be:

- Prioritize and update all the biodiversity resources data, based on their national significance. Each plant category should be detailed as much as possible. Node systems can help identify data groups which should be at least of 2. The first are those that can have high potential in Thailand's socio-economic development growth. These are thus of high priorities and should be kept away from foreign access and utilization. The second are those that are threatened by extinction and those alien plants that can have strong negative effects on Thailand's existing biodiversity conditions and status.
- Data verification shall be maintained, evaluated and sustained on a continual basis for their updated reliability.
- A coordinating biodiversity centre is a must for connecting the various nodes of regional biodiversity databases, including those attached to or in the various agencies and organizations – administration or educational.

Indicators

- Numbers of databases and inventories on traditional and local knowledge that is supportive to conservation and sustainable use of biodiversity.
- Databases on priority biodiversity issues.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <https://goo.gl/vu655n>
- <http://www.qsbg.org/Database/plantdb/lcd/>
- https://km.dmcr.go.th/th/c_52/d_1116
- <http://web3.dnp.go.th/bio/about.php>

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed

National Target 25: Within 2021 all municipalities of every level systematically shall collect urban biodiversity data.

Category of progress towards the implementation of the selected target:

- On track to exceed target
- On track to achieve target
- Progress towards target but at an insufficient rate
- No significant change
- Moving away from target

Date the assessment was done:

28 February 2019

Additional Information

Based on the survey, it was found that 8 municipalities which have collected urban biodiversity data and applied them in their urban development action plans in the past years have greatly achieved in uplifting the people's quality of life. These are Bangkok Metropolis, Chiangmai Municipality, Chiangrai Municipality, Krabi Municipality, Srisaket Municipality, Pitsanuloke Municipality, Nakhon Sawan Municipality, and Sakhon Nakhon Municipality.

Bangkok Metropolis collected data on green areas and the number of bird varieties; Chiangmai collected data on green areas, and the urban ecosystem; Chiangrai collected data on biodiversity, green areas, urban ecosystem, forests, and wetlands; Krabi collected data on green areas; Srisaket collected data on endemic plants and local animals; Pitsanuloke conducted a registration for plants, big trees in various communities, big trees in the municipality, conducted and collected data on plant seeds and animal categories in the municipal area; Nakhon Sawan collected data on endemic plants; Sakhon Nakhon collected data on endemic plants and green areas. (Office of Natural Resources and Environmental Policy and Planning, 2013)

Indicator

- Number of municipalities with inventory on urban biodiversity.

Describe any other tools or means used for assessing progress

Consider the information search.

Relevant websites, web links and files

- <http://www.onep.go.th/urban/images/green/KrabiCBI/SI-Chiangrai56.pdf>
- http://chm-thai.onep.go.th/chm/Doc/Publication/2013/City_and_Biodiversity/City_and_Biodiversity.pdf

Level of confidence of the above assessment

- Based on comprehensive evidence
- Based on partial evidence
- Based on limited evidence

Provide an explanation for the level of confidence

Partly existing evidence.

Adequacy of monitoring information to support assessment

- Monitoring related to this target is adequate
- Monitoring related to this target is partial (e.g. only covering part of the area or issue)
- No monitoring system in place
- Monitoring is not needed



Section 4

Description of the national contribution to the achievement of each global Aichi Biodiversity Target

Section IV

Description of Thailand's contribution to the Achievement of each Global Aichi Biodiversity Target

The Aichi Biodiversity Target and the Strategic Plan for Biodiversity (2011-2020) have been adopted at the Tenth Meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 10) in Nagoya, Japan, in October 2010. This led to the implementation framework for the Parties to the Convention on Biological Diversity (CBD) in the year 2011-2020 (B.E., 2554-2563). The CBD Strategic Plan and the Aichi Targets have been translated into national biodiversity strategies and action plans (NBSAPs) for the CBD Parties.

The vision explained by the Strategic Plan is that “By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.” The plan consists of 5 Strategic Goals and 20 Targets; a so-called Aichi Biodiversity Targets.

Strategic Goal A: Address the underlying causes of the biodiversity loss by mainstreaming biodiversity across government and society	Aichi Target A1-A4
Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use	Aichi Target B5-B10
Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity	Aichi Target C11-C13
Strategic Goal D: Enhance the benefits to all the people from biodiversity and ecosystem services	Aichi Target D14-D16
Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building	Aichi Target E17-E20

This section describes Thailand's biodiversity implementation progress to 2020 Aichi Biodiversity Targets. The collation of data and information obtained under this section have been undertaken across a wide range of areas. We have enlisted the collaboration and support from many organizations, including the government, agencies, academics, NGOs and research institutes. Some information in this section has already been clarified in the previous Section 2.

Aichi Target A1 By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably

Thailand's implementation that contributes to the Aichi Target

In pursuit of his goal of sustainable development in rural Thailand, His Majesty the Late King Bhumibol Adulyadej initiated the establishment of six Royal Development Study Centers (RDSCs) throughout the country. In these centers, research is carried out to find development strategies, which are suitable for the distinctive conditions of each region. The centers serve as “living natural museums” from which farmers and people can expand and apply their knowledge.

Thai government agencies have followed His Majesty the Late King's initiatives in the biodiversity protection by establishing the Bhumirak Learning Center that aims to educate and raise awareness of the people on the importance of natural resources and ecosystems that provide necessary services. The Sirinart Rajini Mangrove Forest Learning Centre is an outstanding example of human effort to turn overexploited lands into a mangrove in Pran Buri. The center provides biological knowledge on the life cycle of sea turtles and enhances the understanding while it encourages the conservation of sea turtles, which will result in the conservation of relating natural resources that benefit the nature in various aspects. Moreover, other Royal Initiatives under the Patronage of the Royal Family that have promoted the biodiversity conservation and ecosystem restorations are all over the country.

Apart from the above initiatives, the Plant Genetic Conservation Project, is also established under the Royal Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn to provide training for the trainers as well as development of plant genetic resources learning centers.

In terms of the Thailand National Education Plan 2017-2036, the strategic management education to enhance an environmentally friendly quality of life was appointed to provide people of all ages with environmental consciousness, which aims to promote and develop the school curriculum, learning process, learning Centers, and learning materials related to the enhancement of the environmentally friendly quality of life. Consequently, biodiversity has been integrated and embodies the learning standards, which includes the Mathematics and Science Learning Core Group. As for the Geography Learning Core group, biodiversity is embodied within the Social Studies, Religion and Culture Learning Core Group (Revised B.E., 2560) and as the Core Curriculum of the Basic Education Act, B.E. 2551 (2008) of the Ministry of Education. Biodiversity issues are also part of the core curriculum throughout the schools, indicating its importance; secondary school students in Year 3 engage in their first main activity, which is raising awareness of biodiversity for the school children in the country.

Learning and education materials have been continuously produced and widely distributed. The government organization, under the Ministry of Natural Resources, has periodically issued documentaries, published material, books, and films. These materials, which are accessible free of charge, provide information and knowledge on biodiversity and ecosystem services while they benefit the wellbeing of people. Every year, the Ministry also organizes collaborative activities to promote biodiversity conservation and the sustainable use of biodiversity according to the Biological Diversity Day.

As for the outdoor learning, almost all of the national parks in Thailand provide useful starting points for visitors, which are located at the visitor center within the park headquarters.

This emphasizes the importance of learning about wild animals and plants. It contains information and interpretive facilities upon the entrance, capturing the visitor's appreciation of the park. The visitor center also includes exhibits on the natural environment and wildlife and has information on day hiking trails.

Not only the government but also the business sectors and non-profit organizations both national and international also support the government in establishing nature learning centers. The Royal Thai Army joined the non-government in 2003 to develop The Bangpu Nature Education Centre conservation project, which runs on more than 600 rai that is supported and funded by private sector corporations. With this generous support, the nature education centre has been developed to make nature and environmental education available to the general public and other sectors.

Thai private sectors also play active roles in contributing to biodiversity conservation. One of the leading agricultural companies in Thailand has been working on promoting sustainable use and benefit sharing on animal genetic resources. Learning centers that promote communication and education activities among local people who conserve native animals are routine twice a year. The company also initiates learning activities that focus on the school children who will play an important role in the livestock genetic resource conservation and in the importance of the conservation of these genetic resources for food security. Under the private company, the foundation relating to agriculture, has initiated biodiversity conservation projects in 2002. The projects are: “the cattle and buffalo bank” under the patronage of H.M the King, as the model of in- situ conservation and “Conservation of pet genetic resources.”

Finally, the survey output of attitudes and understanding of biodiversity of authorities from various government agencies, education sectors, local governments, and environmental voluntary groups are well aware of the importance of biodiversity.

Related website and other documents:

- <https://www.bangkokpost.com/travel/inthailand/>
- <http://www.museumthailand.com/en/museum/SEA-TURTLE-CONSERVATION-CENTER-ROYAL-THAI-NAVY>
- <http://chm-thai.onep.go.th/chm/Business/>

Aichi Target A2 By 2020, at the latest, biodiversity values have been integrated into national and local developments, poverty reduction strategies and planning processes, and are being incorporated into national accounting, and reporting systems, as appropriate.

Thailand’s implementation that contributes to the Aichi Target

Integration of biodiversity in National Plans

Biodiversity has been integrated into the national planning process since the 8th National Economic and Social Development Plan (1997-2001), which has been adopted by His Majesty’s “Sufficiency Economy” principle to adjust the concept of national development. This was an important turning point in the country’s development planning. The principle is part of the country’s guidance that is in line with the conservation of natural resources and protection of the environment. The 12th National Economic and Social Development Plan 2017-2021 targets to conserve and restore the stock of natural resources, increase the area of

forest both mangrove and commercial forest, reduce the rate of biodiversity loss, resolve public land encroachment (including setting the biodiversity index), especially endangered and threatened species.

However, biodiversity values have not yet been widely integrated into the mainstream planning, policy and reporting frameworks. However, knowledge and experiences obtained from studies and various researches have been noted, even though they have hardly been applied to real cases.

Ecosystem valuation in Thailand

Ecosystem valuation in Thailand is partially conducted and focuses on some elements of the ecosystem or rare and endangered species valuation. To date, the valuation of major ecosystems has been undertaken: the analysis of marine ecosystem valuation in the local community participation in the conservation of natural resources and cost analysis to assess the impact on marine ecosystems. Additionally, local community participation in the conservation of resources, the estimation of the economic value of mangrove ecosystems, seagrass and coral, the economic valuation of whale sharks and the study on economic valuation of Dolphins. The valuations of the forest ecosystem are conducted for the forest and forest watershed valuation model, for the evaluation of the ecosystem services and their benefits to the wellbeing of local communities, and for the assessed the value of willingness to pay for entrance into the Khao Yai National Park. Thailand also conducted the valuation of the ecosystem services of inland waters for urban utilizations.

Data and information obtained from the studies mentioned above as well as other research and studies are partially used as inputs for the planning process of the mega project construction, especially when undertaking the Environmental Impact Assessment (EIA). As for the mega project(s) that tend to create greater environmental impacts, the assessment of the economic evaluation and the cost-effectiveness method will also be carefully considered in the process.

Other activities undertaken that support this Aichi Target

Although the implementation under this target has not yet been officially applied at the policy level for all natural resources and ecosystem management, the outcomes of the research and projects undertaken have already been shared among the global community. For example: the concept of Payment for Ecosystem Service (PES), which have been applied in many projects, the Enhancing the Economics of Biodiversity and Ecosystem Services in Thailand/South East Asia project, the Catalyzing Sustainability of Thailand Protected Area System, the Tree Banks project, and the pilot project “Developing Payment Mechanism for Water Shed Protection Services and Improved Livelihood of Rural Poor”. These projects refer to the role of PES as an economic tool in supporting and promoting sustainable local development.

Aichi Target A3 By 2020, at the latest, incentives, including subsidies harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, which are consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Thailand's implementation that contributes to the Aichi Target

The Thai economy is booming, but much of the rapid economic growth is being fueled by the unsustainable use of natural resources, resulting in a loss of biodiversity. Based on the premise that conservation would be most successful if it were to be promoted by economic incentives, there is a range of subsidies and positive incentives available. Incentives were defined in the first Master Plan for Integrated Biodiversity Management up to the latest and fifth Master Plan for Integrated Biodiversity Management, 2015-2021. Incentive measures are one of the biodiversity conservation strategies in order to act as guidelines for reducing and eliminating harmful incentives that have adverse effects on biodiversity and in promoting positive incentives that support the conservation and sustainable utilization of biodiversity.

Relevant agencies have developed their plans by integrating incentive measures accordingly. Details are as follows:

- **The 12th National Economic and Social Development Plan, 2017-2021:** Strategy 4 : The Strategy for Environmentally-Friendly Growth for Sustainable Development aims to conserve and restore natural resources, and create a balance between conservation and sustainable utilization. Natural capital must be used within the limits of its carrying capacity and resilience while securing the natural resource base. An economic evaluation of ecosystems should be used as well as the generation of revenue from the conservation in order to improve the efficiency of management (Development Guidelines 3.1). The plan also aims to encourage sustainable consumption as well as production (SCP). The plan places emphasis on managing resources efficiently and sustainability while adopting the Philosophy of the Sufficiency Economy as the guiding principle and applying the life cycle concept (Development Guidelines 3.4).
- **Biodiversity Action Plan, 2015-2021:** Strategies for Integrated Biodiversity Management focuses on promoting and imposing incentive measures for the conservation, restoration, and sustainable utilization of biodiversity as well as eliminate negative incentives that have adverse effects on biodiversity at all levels.
- **Thailand 20-year National Strategy (2018-2037)** has one of its visions of “Production and consumption that is friendly to the environment and is linked to the regulations accepted by the world community of the abundance of natural resources and the improvement of the environment. For people to have responsibility to the environment, have compassion to one another and show sacrifice for the greater benefit”.
- **The 20-year Strategic Plan for the Ministry of Natural Resources and Environment, 2017-2036,** has its strategy to conserve, restore, enhance and develop natural resources and the environment sustainably, especially the Fourth Strategy Enhancement of Eco-Friendly Production and Consumption.

Case Studies on the application of incentives measures for biodiversity conservation and sustainable use: Thailand does not have ongoing PES projects; some are at the design stage of development. The significance of these projects is that they will be the first PES projects to be implemented in Thailand. Altogether, 16 projects can be said to be at the initial stages. These include four Payment for Ecosystem Services in Thailand and Lao PDR, four pilot projects under the Community-Based Forestry and Catchment Management (CBFCM) program, which is funded by Global Environment Fund (GEF), and five projects under the Catalyzing Sustainability of Thailand's Protected Area System (CATSPA), which also receive financial and technical support from the UNDP-GEF. Three public agencies organized within MONRE will be closely involved in the design and implementation of these projects. Thailand operates the Green Label since 1994, which is an environmental certification awarded to specific products that are shown to have a minimum detrimental impact on the environment, in comparison with other products serving the same function. The Thai Green Label Scheme applies to products and services, excluding foods, drinks, and pharmaceuticals.

The government is going ahead with its move to amend the country's goal to increase national forests. One of the measures is to amend the law to encourage people to plant economically valuable trees and to encourage the cabinet resolution to rewrite the Forestry Act, which currently requires people to ask permission to sell precious trees even if they are grown on private property. Another direct incentive is applied to achieve specific objectives to improve the Organic Agriculture Development Policy. The five-year strategy on organic agriculture is set up to increase organic agricultural productivity and develop Thailand's organic products so that they will be recognized more widely among both local and international consumers.

The Implementation under this Aichi Target on harmful factors to biodiversity is eliminated, phased out or reformed in order to minimize or avoid negative impacts. Positive incentives for the conservation and sustainable use of biodiversity are developed and applied, which are consistent and in harmony with the Convention and other relevant international obligations, which take national socio economic conditions into account.

Financial measures were implemented to promote the energy conservation in accordance with the Energy Conservation Plan (2015-2036). These included enabling financial institutes to provide working capital for energy conservation with the view to create incentives for energy saving investments such as the replacement of pre-existing machinery with more efficient machines. Approximately 2,957.96 million baths of low-interest loans were approved for this end.

Related website and other documents:

- Economic Incentives for Conserving Biological Diversity in Thailand Jeffrey A. McNeely and Robert J. Dobias *Ambio* Vol. 20, No. 2, Environmental Economics (Apr., 1991), pp. 86-90
- <http://www.tei.or.th/greenlabel/labs.htm>

Aichi Target A4 By 2020, at the latest, Governments, businesses and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production as well as consumption and have kept the impacts of the use of natural resources well within safe ecological limits.

Thailand's implementation that contributes to the Aichi Target

Production and sustainable consumption has been conducted holistically in all aspects to minimize the negative impact on the environment caused by the production and consumption process. The development of “A plan to promote the sustainable consumption and production driven, B.E. 2560-2579” is a concept principle for the development of Thailand's 20-year sustainable consumption and production, which is in line with the international concept as well as Thailand's national sustainable development context. This plan focused on the effectively manage natural resources and simultaneously balance the carrying capacity of the existing natural resources, environmental management, pollution prevention, including reducing greenhouse gas emissions and adaptation to the impacts of climate change. Moreover, the plan also drives the measures to ensure healthy lives and promote well-being for all at all ages, and moving towards the society where natural resources are used efficiently, cost-effective and balanced with resource base of the country. The implementation of the principles of sustainable production and consumption has been implemented under the concept of The 12th National Social and Economic Development Plan, 2017-2021, and the Environmental Quality Management Plan, 2017-2021, which are as follows:

Consumption and production Sector: The Ministry of Industry has set a policy to promote and develop green industries (Green Industry) and to develop the country's economy in the industrial sector, resulting in environmentally friendly's industry growth that moves towards sustainable development. Assessment of the green industry has to be quick, neutral and accountable between the years 2011-2018. More than 33,757 plants have been certified each year, with an average annual increase of more than 20%. To adjust the consumption and production base to be environmentally friendly, promotion of the operating entities to obtain green industry certification has continuously developed the production process and environmental management. Along with the determination to corporate commitment to move towards sustainable development, the focus on the subject of entrepreneurship with social responsibility both internally and externally throughout the supply chain has become prominent. The assessment of the green industry has to be quick, neutral and accountable from the year 2011-2018; more than 33,757 plants have been certified each year, with an average annual increase of more than 20%.

The service sector, the principle of ecotourism is applied by adopting a management approach to sustainable tourism, green tourism or eco-tourism. Tourism has to be responsible for the conservation of the natural environment. In the past, a Designated Areas for Sustainable Tourism Administration Plan, 2017-2020, has been drafted for the coordinated management of the tourism administration between the government, state enterprise and local governments. The plan aims to integrate the management of sustainable tourism, support the development and environmental protection for sustainable tourism, and encourage individuals and communities to participate in sustainable tourism development. Developing the area that has high potential for the tourism industry generates employment and improves the better quality of life and well-being.

To strengthen efforts to achieve a low carbon society through sustainable production and consumption, a three year project entitled “Establish Low Carbon Consumption and Production in Thailand” was initiated supported by the German Federal Ministry for the

Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and implemented as a component of the International Climate Initiative (IKI) of the German government. The project was carried out by WWF-Thailand and focused on mobilizing efforts in agricultural and forestry sectors in order to enable the public sector, civil societies, agricultural producers, private sector and consumers. It aims to promote the practical adoption of sustainable production and consumption concepts as well as support the public sector to develop policies and measures for the reduction of greenhouse gas emissions in agricultural and forestry sectors. This plan consists with pre-existing frameworks for the implementation of national strategies and action plans on the reduction of greenhouse gas emissions and sustainable development.

The project also placed an emphasis on the supply chain of maize and other productions in agricultural and forestry sectors with the view to stimulate and support learning, experimentation, lesson-learned efforts and the development of models to address the loss of head watershed forests and the quality of life in associated communities. The project further aimed to integrate sustainable production and consumption concepts into relevant policies of both public and private sectors in order to provide solutions to ecosystem degradation and greenhouse gas emissions in agricultural and forestry sectors. In addition, the project also aimed to enable sustainable supply chains of food and build awareness among consumers on the importance of sustainable production and consumption and the need to choose products derived from sustainable production processes.

A report on "Sustainable Consumption and Production" was compiled by WWF-Thailand from a quantitative and qualitative survey of 240 Bangkok inhabitants in February 2018. The report indicated that the sample consumers had a relatively low awareness and understanding of the sustainable consumption and production (impacts of consumption on the environment) but had interest on the health and quality aspects of food. Nevertheless, the samples noted organic farming as a representative of both sustainable production and consumption. The report identified 4 main obstacles in promoting sustainable consumption and production in Thailand. These are; (1) the general lack of awareness and understanding on the importance of the issue (92%); (2) insufficient public relations and high cost of products derived from sustainable production process (88%); (3) the lack of diversity among organic products (81%) and (4) inadequate attention of the government to address the issue (78%).

Aichi Target B5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero. Degradation and fragmentation is significantly reduced.

Thailand's implementation that contributes to the Aichi Target

Thailand has set a target of increasing forest areas from 31.6% of land area to 40% through various forestation schemes and financial mechanisms. Authorities are also working with communities in forest areas by uplifting their well-being, providing alternative means of income and reducing the need to deforest or endanger biodiversity. The Elephant Ivory Tusks Act, B.E. 2558 (2015) has been proven to be effective in controlling illicit ivory trade and possession demonstration. During 2000-2017, the rate of forest loss in Thailand is 3.91%. However, the forest loss rate slowed down since 2014.

Thailand is determined to combat wildlife trafficking. Thailand's major ecosystems are peatlands, mountain landscapes, coastal cliffs and seas, and some of our woodland ecosystems are exceptional. However, degradation, losses and reduction of Thailand's native habitats have been and is caused by many pressures including land use intensification and modification,

habitat fragmentation, overexploitation, overgrazing, invasive non-native species (e.g.) and climate change. Climate change particularly affects montane, wetland and coastal habitats, and pollution has also impacted the natural habitats. Thailand's rapid economic growth has given rise to environmental challenges, including air and water pollution, loss of biodiversity, deforestation, watershed degradation and soil erosion, conversion of wetlands and loss of coastal habitats including mangroves, seagrasses and coral reefs.

All action aims to strengthen national efforts to increase community involvement in the biodiversity conservation, by changing production practices to mitigate threats to biodiversity from unsustainable harvesting and land conservation, particularly in areas of high ecological significance.

The government also has been changing the reforestation scheme, by moving towards the concept of "Changing Towards sustainable forest management scheme." This concept focuses on enhancing people's direct and indirect benefits from reforestation. Farmer groups will receive income from the Economic Forest Supporting Program. The farmer groups will also receive additional income from agricultural products they have planted in the economic forest area. The Degraded forest rehabilitation program will support the ecosystem restoration, and people may benefit from natural community forest products.

The Forest rehabilitation program may also support the ecosystem restoration. Local communities can obtain food from fertile forest in the future. People can collect forest products according to the agreement they will have already discussed among themselves. The fertility of the forest will be regained. This program is moving forward the people's participation concept in order to promote forest plantation and to systematically increase forest areas efficiently and sustainably.

In terms of the mangrove forest, there are mangrove forests along with the coastal areas which have numerous benefits for the local communities of the coastal areas. Therefore, they play an important role not only for humans but also for the biological systems. The Coastal reforestation programme in Thailand has resulted in a 5.24% increase of mangrove forest area during 2004-2014, returning to its former health. Currently, areas under different marine resources and ecological management regimes account for 15.68% of the total marine area, including 18,136 square kilometers of protected marine and coastal areas.

The Case study on the effective collaboration between private and public sectors and local communities' collaboration between government is the Project Urban for the People, which was initiated by the government policy. It is operated by the survey of suitable mangrove areas near the community. These areas will be developed in order to be the ecological forest for ecotourism activities, serve as a learning center and strengthen the participation of civil society. The project has incorporated the total collaboration from all sectors in the form of "Pracharat".

Another case study is the development of a program that complies with a policy against the deforestation invasion: prevent forestry land encroachment by following the Government's policy and plan on Thailand's National Master Plan on Forest Protection, and expedite the process of monitoring and manage the forest land reclaimed from the business operators who have illegally encroached forested area. This is to regain the fertile mangrove forest areas back to the country in the future. The community based natural resources management is a sustainable way in conserving the local natural resources. Moreover, it can also give the benefits to the local communities to get the ecosystem services satisfactorily. Also, the implementation of the community-based natural conservation can prevent the negative impacts on the ecosystem surrounding the affected areas caused by human activities and make a strong

authority to the local community. Regarding the main fundamental rule of community-based, local people who have the knowledge about the environment and ecological management are preferred to participate through the whole management process of problem identification, setting up the objectives to make the alternative plan, making planning decisions, implementation, and monitoring the outcome.

Aichi Target B6: By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably. Ecosystem based approaches are legally applied to avoid overfishing. Recovery plans and measures are in place for all depleted species. Fisheries have no significant adverse impact on threatened species and vulnerable ecosystems. The impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Thailand's implementation that contributes to the Aichi Target

Thailand has adopted the concept of the ecosystem-based approach for the sustainable use and management of marine and coastal resources. A number of measures and operational programs have been implemented in order to eliminate threats, reduce anthropogenic impacts as well as strengthen the ecological resilience of marine and coastal ecosystems. The programs or activities being defined in the 5-year plan (2016-2020) are as follows:

- Declaration of more conserved and reserved marine and coastal areas.
- Promotion of management effectiveness for the existing protected areas, which also includes strengthening strict law enforcement, monitoring and surveillance of illegal practices.
- Restoration of degraded marine and coastal habitats.
- Establishment and improvement of fishing measures to be in line with responsible fishery.
- Promotion of environmental- and ecological-friendly maritime activities.
- Application of marine spatial planning as an integral part of marine and coastal zone management.
- Stakeholder participation and partnerships are considered as a key to success and to be assigned for involvement, as appropriate, in the course of action for each implementing program.

Thailand has taken measures to manage water resources both aquatic animals and plants. In term of freshwater animal which the source of protein, nutritious food, including secure the food supply and generate income for households, measures have been set to the sustainable management of marine resources, freshwater animals, freshwater spawning, eggs and larvae. A ban on high performance freshwater fishing gear allows the number of freshwater animals to increase.

On 3 April 2018, the Thai Cabinet approved the roadmap for the development of Thailand's fisheries to be free from aquatic animals and fisheries products obtained from the illegal, unreported and unregulated (IUU) fishing. Furthermore, the establishment of the national committee on IUU aquatic animals and fisheries products-free fisheries as a preventive mechanism ensures that no IUU aquatic animals and fisheries products would enter Thailand's domestic market as well as the production chain for exportation.

During the past three years, in a continuous effort to combat the IUU fishing, the Royal Thai Government has set up systems and mechanisms which have been delivering concrete results in many areas, with the aim of pursuing the following roadmap towards becoming an IUU-free country.

- All Thai fishing vessels of all types, sizes and functions, must be registered into the system for effective control. All vessels' equipment and conditions must also comply with legal restrictions.
- The vessel's personnel must meet the qualification and minimum number of personnel as stipulated in the law. Migrant workers must be legally registered and are entitled to protection according to international standards.
- Fishing gear must comply with the law in terms of type and size, and must be verified prior to and during the fishing activities, especially for overseas fishing vessels. The fishing activities must be reported through the electronic reporting system for transparency and inspection.
- Fishing areas and fishing periods for both inside and outside territorial waters must be restricted as identified in the fishing licenses. All vessels must install the vessel monitoring system.
- Aquatic animals caught by Thai-flagged vessels and those imported from other countries must undergo the stringent traceability inspections according to regulations and systems, including the Port State Measures Agreement to which Thailand is a party to the agreement. Moreover, Thailand will develop the Thai Catch Certificate Scheme for other exporting countries to abide by in order for effective traceability of the catch.

The Thai government has set up a new division dedicated to tackling IUU fishing. A plan for the restructuring is also being formulated with the goal of improving its capacity to undertake fisheries oversight and combat IUU fishing. They are firmly committed to steering the next phase of the fisheries reform and strengthen the collaboration with all stakeholders and foreign partners in the fight against IUU fishing and forced labor.

For ensuring traceability of fishery products, Thailand is upgrading the catch certification scheme and strengthening the traceability documentation requirements, such as marine catch purchasing documents (MCPD), marine catch transshipment documents (MCTD) and processing statements. Validation of catch certificates is subject to strict criteria. Failure to fulfill any of the criteria will lead to the refusal of catch certificate issuance. Thai authorities have been strengthening inspections of fishery products during landing at port and offloading as well as enhancing traceability databases and information sharing among relevant agencies.

Thailand has started the Port State Measures (PSM) implementation since 1 September 2015. PSM are applied to all foreign fishing vessels and carriers above 30 gross tonnage landing at Thai ports. We have designated 27 ports for foreign vessels, including 15 ports for foreign fishing vessels and carriers and 12 ports for vessels from neighboring countries. Foreign-flagged vessels are required to notify the Thai authorities and present traceability-related documents in advance of porting in. If any incoming vessel fails to meet the PSM requirements or is listed as an IUU vessel, it will be denied entry into the port. All foreign vessels are also subject to the PSM inspection upon porting in. An inter-agency committee has been set up to expedite the process of Thailand's ratification of the FAO Port State Measures Agreement (PSMA). Upon the severe punishment and higher fine imposed by the new law, the agreement will bring about deterrence and elimination of labor/human trafficking in fishery

sector. The Government, thus, has executed the law strictly in order to achieve the objectives of the law and contribute to the sustainability of the Thai fishery sector.

In addition, the Royal Thai Government has also set up the National Committee on IUU Aquatic Animals and Fisheries Product-free Fisheries to monitor and mobilize the above-mentioned measures to engender concrete results as well as to promote Thailand as a regional leader in combatting IUU fishing.

Related website and other documents:

- <https://www.ryt9.com/s/prg/2826660>
- https://www4.fisheries.go.th/local/file_document/20180228101142_1_file.pdf
<https://www.cbd.int/sp/targets/>

Aichi Target B7: By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring the conservation of biodiversity.

Thailand's implementation that contributes to the Aichi Target

Sustainable Fishery:

Thailand's four major fisheries developments, which are consistent with the 20-year National Strategy, the agriculture and cooperatives policies include: 1) an aquaculture development, enhancing capacity of farmers by introducing the technology in aquaculture with higher yields, and enhancing smallholder farmers by effectively managing their obstacles and problems, 2) the production development and monitoring fishery products; there are standards to build the competitiveness of fishery products on the world market, including the promotion and development of standard and quality of manufacturing fishery products and security systems that will lead to a new market expansion 3) the management of fisheries and aquatic resources for sustainable and diverse resources, by promoting public participation in aquatic resources 4) the organization management that focuses on human resource management; personnel are promoted by introducing them to the knowledge and skills in the professional development of information technology systems as well as to big data including a focus on research, development, competitiveness and value of fishery products.

Thailand has undergone and continues to implement a comprehensive reform program to stamp out Illegal, Unreported and Unregulated (IUU) fishing and to ensure the protection of workers in the fishing and seafood processing sectors. While the success is closer than ever before, Thailand remains committed to the enforcement and reform efforts as well as the full utilization of the systems that the country has set up. This is to ensure Thailand's seafood supply chains meet the highest standards in addition to sending a clear message that IUU fishing, human trafficking and illegal labor practices are not acceptable and will not be tolerated. Ultimately, the IUU attains sustainability for the marine resources for generations to come.

In an important step toward responsible aquaculture in Thailand, Best Aquaculture Partners (BAP) has become the first Aquaculture Stewardship Council (ASC)-certified shrimp farm in the Kingdom. ASC is the most stringent international certification scheme for aquaculture, and BAP's certification reflects both its commitment to sustainability and the growing global demand for responsibly produced goods. To become ASC certified, a farm must meet strict standards for environmental and social responsibility, including fair labor practices. The standards benefit not only businesses, but also communities, consumers and the environment. By getting certified, aquaculture producers reduce their impacts on the

environment and the communities they work with. They are able to tap into the growing Thai and global markets for responsibly produced seafood.

Land Use:

Land resources and forestry: Thailand has a total land area of approximately 51.3 million hectares. As of 2015, 47% of the nation's total land area (or 24 million hectares) was categorized as agricultural land. Non-agricultural land and forested land accounted for 21 and 32%, respectively. About half of the agricultural land is for paddy use, which is equal to 11 million hectares or 22% of Thailand's total land area.

The Policy and Plan for land Management and Soil Resources of Thailand (2560-2579 B.E.) has been drafted, to tackle the problem of land management systems in Thailand where those units responsible for the land management are scattered and embodied in almost every natural resource agency responsible, resulting in the lack of unity. Existing tools for land management that can ensure efficiency and fairness in society are insufficient and ineffective. Conflicts from land use and land tenure are increasing. On 17 January 2017, the Cabinet approved to the proposed National Land Policy Committee Act, B.E. 2560 (2017) and the draft proposed amended Land Act as proposed by the Subcommittee on Integration of Land Management Law. However, (Draft) National Policy and Plan on Land Management consists of four strategic frameworks for managing land: a framework for policy and land management plans and soil resources of the country, which covers all fields, including, economic, social, environment and national security. The first phase focuses on the third strategy – allocation of land for the poor and landless.

On 11 April 2017, the Cabinet approved the National Organic Agriculture Development Strategy, 2017-2021. The five-year strategy seeks to increase organic agricultural productivity and develop Thailand's organic products, so that they will be recognized more widely among both local and international consumers. Another objective of the National Organic Agriculture Development Strategy is to turn Thailand into an international hub for organic agricultural products. The strategy also intends to develop innovation of organic agriculture to international standards.

Assessment of soil quality was conducted on 48,000 square kilometers of land. The study was followed by actions to address the problem of acid, acid sulfate and saline soil in 287.84 square kilometers of land, restoration of lands affected by soil erosion and prevention of further erosion through the use of vegetation in areas of 1668.332 square kilometers. The restoration maintains soil and water conservation systems for land improvement in areas of 2059.176 square kilometers and additionally enables planting of fast-growing trees, reducing open-field burning and promoting stubble plowing to mitigate climate change in the area of 20.544 square kilometers.

Forest:

The country's forest cover has fluctuated in the past five decades, from 53.5% of the national territory in 1961 down to 27.3% in 1990, then back up to 31.6% in 2018. The government has set a target of 40% forest cover (around 20.7 million ha) as per the National Forest Policy of 1985. In 2014, the government launched the Master Plan for Forest Resources Protection and Sustainable Management with the aim to “resolve the problems of forest destruction, trespassing of public land, and sustainable management of natural resources” within 10 years. This plan lays out how local communities should be involved in projects around forest protection, restoration, and rehabilitation.

The erosion of the forest cover and the quality is driven by several dynamics, not least by the large-scale infrastructure development that has followed the country's economic growth

in recent decades. Similarly, massive and uncontrolled agro-industrial expansion has contributed to a significant decline in forested areas, especially in the south. By contrast, in the north and northeast, controlled forest fires during the dry season continue to leave forests degraded and vulnerable. Unregulated logging was another major factor until commercial logging in natural forests was banned in 1989.

To address forest encroachment and destruction, a policy on enabling the sustainable development in forests was implemented with designation of a common scale (1:4000) for the mapping of state lands and revising relevant maps accordingly in order to provide compatible, clear and accurate information to every party involved in the forest protection. In addition, actions were taken to enable enforcement of relevant laws through action plans and measures against forest encroachment and for land reclamation, management of forest clearing in higher elevation areas and setting the target to maintain no less than 163,840 square kilometers of forestlands in the country. These were accompanied by efforts to ensure the sustainable management of agricultural land such as proactive actions to replace rice-farming in less productive lands with the cultivation of alternative crops, livestock farming and aquaculture as well as the development of Smart Farmers who are capable of producing, processing and marketing their own products.

Related website and other documents:

- <https://www.bangkokpost.com/news/general/1588342/thailand-leads-charge-to-protect-soil>.
- Thailand Board of Investment, 2017. Thailand 4.0 Means Opportunity Thailand
- National Economic and Social Development Board (NESDB), 2017. NESDB, 2017, The 12th National Economic and Social Development Plan, 2017-2021.
- Ministry of Natural Resources and Environment, 2014. Master Plan for Forest Resources Protection and Sustainable Management
- www.worldagroforestry.org/sites/default/.../Agroforestry-and-Aichi-Target7-TDD2014.
- www.doa.go.th/en/
- www.organic.moc.go.th/en/standard/mkt

Aichi Target B8 By 2020, pollution, including pollution from excess nutrients, has been brought to levels that are not detrimental to the ecosystem function and biodiversity.

Thailand's implementation that contributes to the Aichi Target

The National Environmental Quality Promotion and Preservation Act, B.E. 2535 (1992) requiring the declaration of pollution control areas as well as standards to control pollution from point sources. Additionally, the act determines the types and sources of pollution and controls air pollution emissions, wastewater and solid waste. The Act also addresses the establishment of the Pollution Control Board to develop policies and coordination programs to reduce pollution and proposed measures to prevent pollution. At the same time the long-term Policy and Plan for Promotion and Conservation of National Environmental Quality (20-year 2017-2036) was also established together with the 20-year Pollution Management Strategy, Pollution Management Plan, 2017-2021, and Master Plan on Waste Management, 2016-2021.

According to those plans and policies, related agencies have developed an Action Plan on Air and Noise Pollution in Bangkok and Metropolitan 2017-2021, to effectively prevent, control and reduce air and noise pollution, improve the pollution management system and

mechanism. This action plan also contained many projects to develop and enhance knowledge and personnel capability to effectively manage air and noise pollution, and enhance participation on the management of air and noise pollution by the year 2021.

Air and noise quality in Bangkok and Metropolitan areas are in regulatory standard; prevention measures and remedial action for particular matters in Bangkok are in place. The carbon dioxide emission standard has been improved. Action Plan to Prevent and Solving Haze Pollution in Northern Thailand 2017 has issued to solve the haze pollution problem in nine provinces of Northern Thailand.

In terms of water pollution, Thailand has set up the following aim: “By the year 2025, Thailand will have sufficient water of good quality for all users through an efficient management, organizational and legal system that would ensure equitable and sustainable utilization of its water resources with due consideration on the quality of life and the participation of all stakeholders”.

Currently, the surface water quality in most parts of Thailand can be considered to be in fair condition, while some rivers flowing through large communities are in poor condition. Water quality problems are affected by domestic and industrial wastewater discharges, agricultural point and non-point source discharges, deforestation, and development projects. In many parts of the country, surface water is severely polluted which has affected aquatic resources, water uses for various purposes as well as human health. The Thai government has launched many projects to resolve these problems, few of these attempted to take a basin wide approach. Most actions to date have been local in nature with the result that the water quality continues to deteriorate in the river. Currently, the most urgent water quality problems related to the dissolved oxygen depletion or excessive organic loads as well as to high loadings of ammonia and bacteria, primarily from agricultural and domestic sources. The government has put policies, plans and water quality standards in place in an effort to combat the problem and has embarked on an ambitious program for the management of water pollution generated from various sources, especially municipal sources. But a lack of an integrated approach combined with laws that are not enforced, a weak capacity of, insufficient investments, and poor operations and maintenance systems have exacerbated the problem. Limited community participation and low involvement of the private sector has further pushed the onus on the government.

In 2017, the coastal water quality is in a fairly good condition, improving since 2016 as a result of the proper management of land-based activities and the prevention and reduction pollution from land activities. The sea water quality has deteriorated due to the wastewater discharge from industrial sources, agriculture, and community aquaculture. In the past, responsible agencies have strictly followed government policies and the Ministry of natural resources and environmental regulations to resolve the problem of wastewater and solid waste. In order to resolve the problem, integrated collaboration between the relevant departments of the government (public and private sector) enable the support, including from the army.

Concerning the management of solid and hazardous wastes, public and private organizations as well as the general public were encouraged and supported to reduce waste. Notable efforts were made by local administrations where, of the total of 15.76 million tons of wastes generated, 9.75 million tons were properly disposed and 5.81 million tons were recycled (including 180,000 tons segregated as reusable). Roughly 5.67 million tons were left uncollected in the communities, however. How does it continue?

Participation in local networks of “earth protection volunteers” was promoted to encourage waste disposal at community and village level. Actions undertaken by the networks

included designating local collection sites for hazardous wastes and providing rubbish bins for organic wastes for 17.83 million households.

For marine pollution protection, especially from plastic debris, Thailand set up the Subcommittee on Plastic Waste Management under the National Environmental Committee with the public-private-partnership. Their mission is to develop fiscal and financial tools for plastic debris management, promote and encourage eco-packaging design and eco-friendly substitute for plastic materials, study a material flow of plastic containers and packaging inventory and lastly, to implement 3Rs of plastic material and its substitute. The immediate actions include: 1) removing the abandoned marine litters from coastal ecosystems through cleanup campaigns in the coastal provinces, 2) implementing plastic waste reduction measures in all coastal municipalities with selected target groups, including the artisanal fishing community, commercial fishing operators, coastal villages, eco-tourism operators and communities operating small-medium enterprise, 3) undertaking research for a better understanding on the situation and impacts of plastic debris in the marine environment and also for achieving sufficient evidence to support proper management intervention, and 4) establishing a national database of marine debris according to the International Coastal Cleanup format for future reference.

Related website and other documents:

- www.thainews.prd.go.th/website_th/news/news_detail/
- <http://aqicn.org/map/thailand/>
- <http://www.pcd.go.th/indexEng>
- <http://www.wepa-db.net/policies/state/thailand/thailand.htm>
- infofile.pcd.go.th/mgt/pollution2546_2water_en.pdf
- climate.org/archive/topics/international-action/thailand.htm
- <https://www.climatelinks.org/countries/thailand>
- <https://environmentalmigration.iom.int/climate-change-and-its-impact-thailand-short-o>
- factsanddetails.com > Southeast Asia > Thailand - Nature, Agriculture, Animals

Aichi Target B9 By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Thailand's implementation that contributes to the Aichi Target

In Thailand, there are more than 3,500 alien species and the new alien species are continuously imported into the country. Some alien species can survive well and provide the economic value. Some alien species can settle and expand so well that they can turn into invaders within existing habitats, which was a threat to biodiversity and will cause significant losses in the economy if Thailand does not have any managing systems to protect and control alien species in-time. At the meeting 20th February 2018, the cabinet had agreed to revise the former cabinet's resolution on 28th April 1999 and were aware of the urgent need to adjust the existing measures to protect, control and eradicate these bad alien species as well as to adjust the Thailand registered list of alien species that required protection, control and eradication; in 2018, there are 323 registered species in total which increased from 273 species in 1999. The list is categorized as follows:

- The alien species that have already invaded. The number is increasing from 81 to 138 species while 16 species are promoted for economic use. The specific measures shall be applied.

- The alien species that tend to invade. The number is increasing from 52 to 58 species while 15 species are promoted for economic use. The specific measures shall be applied.
- The alien species that have already invaded in other countries but still have not invaded Thailand. Due to the adjustment from this category to category (1) or (2), therefore, the number of species is decreasing (from 49 to 45 species). There are 4 species that are promoted for economic use and specific measures shall be applied.
- The alien species that have not been found in Thailand yet. The number is decreasing (from 91 to 82 species) due to the scientific proof that some species are actually the local species in Thailand. Therefore, those species are moved to category (1), (2) or (3). In addition, due to serious danger, there are 23 species that have been given priority to set up the guideline to specifically control and eradicate the pathways of invasion. The 23 species are Animal 12 species (such as Root Knot Nematode, African Giant Snail, Golden Apple snail, Common Sucker, Black Chin Tilapia, Pond Slider and Pipe Rat) and Plant 11 species (Black Mimosa, Water Hyacinth, Giant Water Lettuce, Acacia Soft Tail, Cattail, etc.)

The invasion of alien species is considered as a serious threat to world biodiversity. In 2017, various media has paid attention to the discovery of the Papua New Guinea Flatworm (*Platydemus manokwari*), first found in the Lum Luk Ka district in Bangkok, Thailand on 31 October 2017 and later found in 21 other provinces. The International Union for Conservation of Nature (IUCN) has listed this type of worm as 100 of the World's Worst Invasive Alien Species and it is also the carrier of the Rat's Lung Worm (*Anglostrongylus Cantonensis*).

In Thailand, the management of high priority invasive alien species and invasion pathways is active. On the 20th February 2018, the cabinet has approved to revise the former cabinet's approval on the 28th April 2009 (subject: The Draft Preventive Measures, Control and Destroy the Invasive Alien Species) to adjust the preventive measures, which control and destroy the invasive alien species as per the suggestion of the Ministry of Natural Resources and Environment (MONRE). Preventive measures have been expanded to control and destroy the invasive alien species (plant, animals, and microorganisms) that already invaded Thailand, where the existing measures did not cover the management of alien species and the species that have changed their status. In addition, there are revisions and adjustments of measures on establishing the policies, plans, laws and budgets to monitor and follow up on these alien species. Various researches on alien species have been supported and published to create awareness, to provide the knowledge of alien species, to set up the registered priority list of the alien species, to set up the measures to control, to destroy and/or utilize some alien species and to publish the knowledge of management of alien species. Additionally the capacity building up of the responsible agencies, local administrative officers and the locals to be able to competently giving the information, investigate, protect, stay alerted and control. In this regard, the MONRE and related agencies have prioritized to provide the public with facts to encourage the right attitude toward the preventive measures, control and destruction of the invasive alien species, especially the species that are the carrier of diseases that could impact the public health.

Aichi Target B10 By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Thailand's implementation that contributes to the Aichi Target

Climate change causes impact on both nature and human beings. Different species of plants and animals react to climate change differently both in terms of how and when. The first reaction is migration. The warmer climate effects the distribution of plants and animals. If any species cannot adapt to the change, they can become extinct. Thailand has started various development supports and actions on climate change policy projects in order to drive the climate change policy into effective actions in the affected areas. Between 2014-2017, the training prepared for the action plan to deal with climate change and also integrated the issues of climate change to set up the action plan in both local and provincial levels. This training was for the officers and relevant persons in the pilot areas with the main concern that the action plan shall consider the context and direction of development in each area. In addition, the lesson learned from the training had been discussed and summarized in the handbook for the preparation of the action plan for climate change in the local area. For the 2nd project (2018-2021), the pilot area will be expanded and also includes the attention on the issue of Coral Bleaching. Under The Promotion of Marine and Coastal Resources Management Act, B.E., 2558 (2015), there was an announcement on banning any activities that cause coral bleaching with the hopes of coral reef recovery.

In 2020, Thailand set the Nationally Appropriate Mitigation Actions: NAMAs target on Energy & Transportation sections at 7-20% compared with the base case of Business as Usual (BAU). This target shows the National standing point that Thailand is participating with the World Community in solving the climate change problems as well as to open the opportunity for Thailand to ask for the international support in terms of finance, technology and capacity building from the Developing Countries and International Fund Sources. The operation of NAMAs also consists of the framework for national policies of related agencies in order to use NAMAs to support the policy and action plan that benefit the reduction of GHG. In 2015, Thailand reduced the GHG at 40.14 million tons of CO₂ equivalent, which is 11% of the total GHG target reduction plan in 2020.

The DRAFT action plan of The National Adaptation Plan (NAP) is being prepared and it will be the framework for the activities of adaptation to climate change on a national level. At present, the Draft NAP is being trailing out in 4 Pilot Provinces. The issues of adaptation to climate change are integrated into the Local Development Plan. These issues are also integrated into the Policies, Plans and Strategies in the 3 Pilot Aspects

- 1) Public Health Aspect: collaborate with the Department of Health. The MOU has been signed in order to cooperate, integrate and drive actions on climate change in the public health setting.
- 2) Settlement and Human Security Aspect: collaborate with the Department of Public Works and Town & Country Planning. The MOU on the cooperation to support the planning and spatial development as per framework of adaptation to climate change has been signed, and
- 3) Tourism Aspect: collaborate with Department of Tourism. The lesson learned from the activities were analyzed and summarized for the preparation of the integration guidelines for climate change and are included in the (Draft) Adaptation Plan.

However, in 2035, Bangkok has set the ambitious target to be the “Metropolitan of Asia” under the Policy and Action Plan on the challenge for readiness to climate change. The preparation and action plan follows the master plan of Bangkok on Climate change year 2013-2023, which has covered 5 aspects such as 1) the sustainable and environmentally friendly transportation; 2) effective use of energy and use of alternative energy; 3) proper solid waste management and effective waste water treatment; 4) Green City and 5) Adaptation Guidelines for Climate Change. The activities in all above aspects leads Bangkok to be to the “Low Carbon City” that is ready for the change of climate, which gives direct benefits to the local residents. The target of GHG emission is 13.57% of the total estimate of GHG emissions in the year 2020.

Aichi Target C11 By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.

Thailand’s implementation that contributes to the Aichi Target

Protected Area Management Measures

Thailand declared 8 areas in 11 provinces as protected areas and announced the environment protection measures for them. Announcements were made with the intention to protect, conserve, maintain and take care of natural resources, environmental quality, natural sources and natural arts in the environment that are valuable to the livelihoods of the people, maintaining the natural balance and preserving the abundances into the future. The areas declared as Environmentally Protected Areas will be unique areas that can be tourist attractions, containing the important natural resources and environment for each of the provinces. Each area will have different environmental protection measures, depending on the management objectives and area based environmental conditions and problems.

Hence, the announcement of the environmental protected area is a legal tool that is used to protect the watershed areas and areas with an unique natural ecosystem. In general, the area may have a natural ecosystem that may be destroyed or may easily receive mal-impact from human activities. It may be of natural or artistic value that is worthwhile for the conservation that is still not under the protection through any pieces of legislation because there are no laws for the protection of the areas against destruction or human activities. There is no effective control or solution for severe environmental problems that are critical in some areas. The areas that already have legal protection measures must work on restoring the area to its natural conditions within the indicated time. The utilization of natural resources and the environment must be monitored so that they are executed in accordance with the conditions in the area and to protect its best interest.

Thailand took initiatives at many levels in terms of work in the terrestrial and marine protected areas. This includes the implementation through the Integrated Master Plan for National Parks 2017-2021, both by increasing protected areas and expanding the network in protected areas and by adjoining areas that are scattered around. Ever since the national parks were established, with Khao Yai National Park as the first one established in 1962, at 31 December 2018, there are 154 national parks nationwide (132 have been official announced and 22 are under preparation to be announced). Of these, 129 are terrestrial national parks and

25 marine national parks with the area of 65,355.97 km² or 12.64% of the country. The national parks are scattered throughout the country in every region and cover 6 biosphere reserves and all of the existing natural systems in Thailand. Each of the national parks in Thailand has an area of no less than 10 km², according to the international requirements for national park management.

The marine protected area includes national parks, coral reefs, sea grass, areas with specific measures for fishery, protected areas for underwater archaeology, wetlands, biosphere reserves, ASEAN heritage areas and environmentally protected areas. This totals to 84,444.48 km² of the marine protected area, which is 19.7% of the 426,616.86 km² of marine areas in the Thai borders.

Production landscape management in areas with habitats of near extinct species

The production landscapes (forests, fishery areas, agricultural areas) in Thailand are habitat areas of various plant and animal species with national and international significance and some of them are identified as near extinct or vulnerable species such as cranes, water onions and Gurney's Pitta. Initiatives have been taken in the area to manage the production landscapes, which are habitats for the important plant and animal species stated. This is carried out in form of the integrated forest landscape management with the cooperation and support both for academic and financial aspects from various sectors including government, private, civil society and national and international non-profit organizations. The management scheme uses both management and economic measures for natural resources and the environment, international legal measures and incentive measures. The result of the implementation is satisfactory as the species and the ecosystem are home to the species that are rehabilitated and the plants and animals that receive a legal protection status. The population of some are increasing through natural reproduction cycles.

In addition to what has already been stated above, Thailand is working on the management of the protected area in many other directions. For example,

The management of the forest corridors, macro-areas and relevant areas can be tied to the protected area scheme under the macro area management plan and other sectors in order to maintain the structure and role of the ecosystem. This is implemented using the ecosystem approach and based on the linkages of the ecology and the principals of the ecosystem networks. Some important implementation models are the ones applied in the Western Forest Complex, Dongpayayen-Khao Yai Forest Complex, Eastern Forest Complex which is the corridor of 5 provinces, Kang Kracharn Forest Complex, Mae Ping-Om Koi Forest Complex, Khao Sok-Klong Sang Forest Complex, and Phu Khieo- Nam Now Forest Complex.

The setting up of the transboundary protected area, the cooperation scheme between protected areas across borders and region network schemes to develop the conservation practices and sustainable utilization of the biodiversity enhances the implementation according to the ecosystem approach and also improves international cooperation in Dong Phayayen-Khao Yai Forest Complex and Tenasserim – Western Forest Complex.

The establishment of the ASEAN Heritage Parks (AHP) is under the ASEAN Social and Cultural Cooperation platform which was initiated by the ASEAN Declaration on Heritage Parks on 18th December 2003 in the ASEAN Meeting of Ministers of Environment in Yangon, Myanmar. In order for the AHP to be considered, it has to have a uniform characteristic, high biodiversity, uniqueness and is worthwhile for conservation. The area must be managed and maintained through an ecological maintenance process, an ecosystem that can support the survival of all living things, the conservation of biodiversity and also has to ensure that the Heritage Park will provide sustainable benefits to the plant species and the ecosystem. The

management? should also take care of the landscape scenery of the vacant land and endures the local culture for education and research purposes as well as to support innovations and value creation from tourist activities. Thailand's national parks and wildlife sanctuary have been established as ASEAN Heritage Parks including Khao Yai National Park, Kang Kracharn - Kuiburi Chalermprakiat Thaiprachan National Park, Lam Nam Pachi Wildlife Sanctuary, and Huay Kha Kang Wildlife Sanctuary for terrestrial heritage parks and Tarutao Island National Parks, Tarutao National Parks in Satun Province as the marine heritage park and Thailand's first marine AHP. Other marine AHP established are the Surin and Similan National Parks, Phang Nga Bay in Phang Nga, Had Chao Mai National Parks, Libong wildlife non-hunting area in Trang and Ang Thong Island National Park in Suratthani.

An example of the implementation in the part of cooperation for conservation and management of the forests in the Natural World Heritage area includes the cooperation between the Department of National Parks, Wildlife and Plant Conservation with the representatives from 5 international organizations who are the allies for the conservation of natural resources and forests in Thailand, including IUCN, WWF, WCS, Freeland and ZSL. There are 2 registered Natural World Heritages in Thailand, including Tung Yai-Huay Kha Kang (registered since 1991) and Dong Phrayayen-Khao Yai Forest (registered 2005). At the moment, the Kang Krachan Forest complex is now under preparation for the submission to UNESCO as another Natural World Heritage because it is a significant forest area on the global basis and is the habitat and rehabilitation area for important wildlife species, which has a high biodiversity and is abundant in plant species.

More recently, the geological park in the Satun Province was nominated as a member of the UNESCO Global Geoparks. It has a global level academic value and is the source of beautiful and unique geological formations, which are all appropriate traits for developing the area into a learning hub and geological tourist attraction. This can be considered as another successful implementation in Thailand with a global level impact.

Related website and other documents:

- www.park.dnp.go.th/visitor/nationparkshow.php?PTA_CODE=1013
- <http://park.dnp.go.th/visitor/indexnationpark.php>

Aichi Target C12 By 2020, the extinction of known threatened species will have been prevented and their conservation status, particularly of those most in decline, will have been improved and sustained.

Thailand's implementation that contributes to the Aichi Target

The current situation in Thailand for wildlife and wild plants indicates that there are still a number of wildlife populations in nature. However, at the same time, it was found that there are several types of wildlife with a continuously decreasing population. The biggest threat factor that impacts the wildlife and wild plant populations is the decreasing of forest area, which serves as their habitat. Other factors include poaching and illegal wildlife trade, which causes the decrease in the number of wild life and plant populations. Some species are nearly extinct in Thailand or nearly extinct from the natural habitats.

Previously, in 2016, Thailand implemented an ivory work plan and expanded the working timeframe to the 30th September 2017. A management system for ivory was developed for the domestic management to control, monitor and enforce the law by consistently monitoring the registered ivory shops on a monthly basis. From this implementation, the

numbers of the ivory shops in 2016 were less than 50% of registered shops in 2015. Training workshops for the control of ivory trade were held in Thailand for officers and law enforcement personnel to offer knowledge and create an understanding of how to control the ivory trade for tour operators, tour guides and campaigns, which consistently raise awareness and concerns to the Thai people and foreign tourists. Other than that, operators were invited to take part in MOUs to commit to being a partner and role model in protecting elephants and wildlife. Thailand's standpoint was presented to stop supporting ivory products and trade and also join in with the Ivory Free campaign by Wild Aid.

The event for the National Wildlife Protection Day 2017 was held under the concept of "Participatory Wildlife Conservation" to raise awareness and concerns on the importance of wildlife and their habitats. It is also to know about the implementation results of the work applied through the cooperation between the government sector, private sector and communities. Other than that, the organization can also be part of the team in promoting, supporting and campaigning for the participation in working for the wildlife conservation from every sector such as becoming the foster parents of wildlife in the nurseries at the wildlife sanctuaries of the Department of National Parks, Wildlife and Plant Conservation. The event showed the progress in the work on wildlife conservation in Thailand such as taking care of the conserved area for the wildlife, providing information and creating understanding for the people and youth, supporting research, aquaculture and animal propagation. These precautions prevent the illegal wildlife trade, use forensics to help in such cases and create networks to prevent illegal wildlife trafficking at the national level. These are all practices contributing to the all-round development of wildlife conservation in Thailand.

There is a management plan developed for wild elephants in the corridors adjoining 5 provinces between the financial years 2018-2027. The forests adjoining the 5 provinces are large forest complexes in the eastern area which cover areas from Chachoengsao, Chantaburi, Rayong, Choburi and Sakaew provinces. The work plan indicates management measures and the implementation both in protected forest areas and outside the protected areas. Wild elephants are monitored, controlled and their habitats are being managed. Barriers and obstacles are set up to prevent the elephants from coming out of the conserved forest areas and rehabilitation is implemented throughout the habitats of the wildlife and wild elephants. Additionally, enhancing community participation in solving the conflicts between the wild elephants and the communities is key to let wild elephants, the wildlife and mankind live together safely and harmoniously. The promotion of knowledge, the creation of a warning network for threats from wild elephants and the promotion of communities working on preventing and decreasing the negative impacts contribute to work towards the harmonious coexistence. The activities will be carried out under a research framework and the management will be implemented both in and outside of the protected forest areas where there will be continuous and efficient monitoring and evaluation for the implementation.

In linking the work implemented in Thailand to the global level practice, it can be said that the work in Thailand that contributes to the global level initiatives include the establishment of the ASEAN Wildlife Enforcement Network for taking care of and controlling the movement of the plant and animal species in and out of the country. Another activity is the implementation under CITES.

Related website and other documents:

- http://park.dnp.go.th/visitor/nationparkshow.php?PTA_CODE=1013

Aichi Target C13 By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Thailand's implementation that contributes to the Aichi Target

The biodiversity condition in Thailand is under a threatened situation stemming from various factors such as land use change, encroachment of alien species, utilization of resources beyond their natural capacity to recover, climate change and pollution. All of these events combined have a high rate of loss of biodiversity in terms of genetic, type and ecosystem perspectives. It was found that in the 50-year period more than 69 million rai of forests were destroyed, 7 species were lost and 3 species extinct from their natural habitats. The type that is vulnerable and under threat in Thailand includes vertebrates. There are 2,285 types of fish in Thailand with 208 being threatened accounting for 7% of the fish. Of the 1,009 types of birds in Thailand, 167 types or 17% are being threatened. 18 of 157 types of amphibians in Thailand are being threatened which accounts for 11% of the amphibians and 49 of the 369 types of reptiles (13%) are in a threatening situation. There are 344 types of mammals in Thailand and 120 types or 34% of them are in a threatening situation.

The previous implementation phase included the development of the National Master Plan for Developing Thai Herbs Version, 1 2017-2021. The plan covers the development of Thai herbs from the source all the way to the end of the chain by promoting the economic forest by the community and managing the utilization scheme of the herbs in the economic forest to protect the herbal plants and local knowledge in using the herbs from the forest in Thailand. It is also implemented to decrease the threat to the genetic biodiversity of the herbs in the forest. A genetic local knowledge database is set up to conserve the local gene pool for the plants in Thailand both in form of seeds and plants.

Improve and review the Animal Breeding Development Act, B.E. 2509 (1966) so that it can respond to the conservation and development of animal species according to the Convention on Biological Diversity. The preparation of the draft Animal Species Protection Act, to preserve the genetic diversity of local animals that are near extinct. Other than that, the conservation of genetic diversity and enhancement of the local genetic pool has been successful for 12 types of animals including local bull, White Lamphun Cattle, Northeastern and Southern region white cattle, Banteng, Balinese cattle, Bos gaurus, local goats, local boards, black and white Cairina moschata, local Pak Nam ducks, Nakhon Pathom ducks, the local goose and chickens. There was the study on the condition of the local animals in Thailand to support the sustainable utilization practices.

Aichi Target D14 By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and wellbeing, are restored and safeguarded, taking into account the needs of women, the indigenous, local communities, and the poor and vulnerable.

Thailand's implementation that contributes to the Aichi Target

The ecosystem is the structure that constructs the relationship between a living thing and the environment that they are living in. The change in the climate is another factor that

impacts the growth of the forest and may cause the forest ecosystem or the import tree species to die and decrease or become extinct. It may also include changing the forest into an ecosystem with a drastically decreased biodiversity level. Forest fires are one of the main causes of forest deterioration and also disturbs the balance of the ecosystem impacting the plant community, soil, water, animals and other life forms, including the life and assets of the people and the economic, social systems and tourism activities.

Forest fires are one of the factors impacting the decrease of the forest area. Forest fires may be initiated from natural causes or from human induced actions. It impacts the balance of the ecosystem and biodiversity, influencing the quality of life of humans. In 2017, 75,419 rai of land area was destroyed through forest fires. This was a 40.09% decrease from the 125,896 rai in the 2016 fire, meanwhile, the statistics of forest fires during 2013-2017 showed that the impacted area has also decreased along with the fire area. This is because of the cooperation between the government sector, private sector, communities and various volunteer groups who took part in solving the problem and truly cooperating on the work. This commitment also includes the fact that all the stakeholders understand the roles and working processes of each other to greater extent and can network and link the information at all levels, which in turn allows for a good flow of work in the risk areas and in critical conditions. These factors decrease the number of forest fires discernibly. The relevant agencies have worked according to the government priorities that gave importance to the increase of the forest areas to achieve the target of the policy set up in the National Forest Policy 1985, the 12th National Economic and Social Development Plan, 2017-2021 and the National Reform Plan for Natural Resources and Environment. There has been movement to implement the Master Plan for Rehabilitating and Conserving Forests and Ecosystems in 25 water basins, specifying the forest boundaries, surveying and setting up a database for forest areas so that it is uniform throughout the country and to develop the buffer area around the forest areas. The prevention measures for forest fires are to be specified and should cover the steps all the way to the process and practice of the Forest Protection Unites in order to link to the forest resources protection network.

The development of the coastal area created change in the mangrove areas because of the land use change for various purposes. This created mal-impact on the mangrove ecosystem in several ways. Moreover, the encroachment and destruction of the mangrove areas also caused coastal erosions that impact the lives and assets of the people and government agencies. This destruction caused the loss of potential in being a tourist attraction, impaired the social condition and local ecosystem change, which also impacts the livelihoods of the people living on the coastal area. Moreover, the coastal area has many economic values such as tourism, industry, agriculture, aquaculture, and coastal fishery practices, which creates jobs and income for the communities and the country in large amounts. Other than that, there are impacts on the ecosystem and natural sources such as the mangrove areas, coral reefs and seagrass beds as well.

The agencies involved have integrated the cooperation to solve the coastal erosion problems and focused on solutions that are in line with nature and do not create side effects on the neighboring areas. A work plan for protecting and solving the coastal erosion problems for both the muddy beach and sandy beach areas was developed. For example, bamboo poles were used to make walls to decrease the magnitude of the currents, rehabilitating mangrove forests, exchanging/moving the sand and disseminating knowledge on coastal erosion to all relevant agencies. These actions also help create awareness for the people living in the area; people are aware of the causes of the problem and the approach to the solution for coastal erosions. Additionally, the way to integrate the work between relevant agencies and the people who are stakeholders in the situation is apparent and allows them to come up with a systematic and sustainable solution for the problem.

Aichi Target D15 By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced through conservation and restoration, including the restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation, and to combating desertification.

Thailand's implementation that contributes to the Aichi Target

Thailand, by the agency in charge of related actions, has implemented the hinterland water ecosystem, agricultural ecosystem and forest ecosystem. These have been carried out in accordance with the international agreements, which include actions jointly carried out under state agencies, the private sector and the civil society, and integrated among the following related conventions: Wetland Conventions, Convention on Biological Diversity, and Convention on Climate Change. There are studies for some development projects like water source development projects, which may create changes in the ecosystem of the international wetlands. If it require preparedness to take action, it will plan to protect and solve the environmental impact and in the plans for strict and continual monitoring the environment impact.

The analyses of the environment impacts for projects which fall into the declaration of the MONRE, the cabinet's resolution on the conservation of forests, with the cabinet's resolution on the regulations on the name lists of wetlands and conservation measures and operations in accordance with the plans to prevent and solve the environmental impacts and continually monitor.

Apart from these, there are 2 measures for solving problems in the wetlands. These are 1) Non-construction measures: creating social measures, knowledge and understanding in the water source and wetland administration for related stakeholders living in the water source and wetlands, which create networks to concretely take care of water sources and wetlands, and 2) Construction-based measures: these are designated measures to be applied and act as guidelines for designs in terms of forms of dredging, construction of engineering structures to control, prevent and rehabilitate the conditions of water sources and wetlands, as well as other compositions, all of which must be consistent with the local ecosystem.

Actions to increase the flexibility and sustainability of Thailand's ecosystems, by the Department of Marine and Coastal Resources, are carried out to increase the ecosystems' flexibility and sustainability. There are action-plans formulated to prevent and reduce the impact from climate change. These are the evaluation of the phenomenon in which there is coral bleaching, diseases and immunity of the coral reefs as a negative effect of climate change. According to the study, it was found that coral bleaching took place when the sea water temperature regularly became higher in contrast to its normal conditions. There were studies and surveys on the coral reefs and other external factors on a continual basis. There were analyses of long-term data on how the coral reefs would adjust themselves to the climate changes. There were surveys on key factors that could be linked to its potential to adjust itself to the climate changes. These surveys included the areas covered by the living corals, the sizes of coral colonies, the number of predators, conducting studies on coral germs through tissue culture and infection tests.

As for the support for the biodiversity amidst the carbon reserves, an evaluation was conducted on carbon stocks in the mangrove forest ecosystems. An evaluation was conducted on the dynamics of the gas release and the absorption of the greenhouse gas through photosynthesis and the breathing process. The administration of mangrove forests wants to maintain or increase the carbon stock through the protection of the existing mangrove forests

BREAK and/or increase the carbon stock by protecting the existing mangrove forest and rehabilitating mud beach - newly grown land. There are following the natural process and methods by using natural materials to catch drifting seeds so as to plant them as leading trees planted behind the current and existing mangrove forest areas with high density. The seeds should be *Nypa* and *Pandanus* those varieties widely used by local people.

The Minister of the Natural Resources and Environment has set as a policy project name to create urban forests for the happiness of the Thai people. This is consistent with the Thailand 20-year National Strategy (2018-2037) and the 12th National Socio-economic Development Plan, 2017-2021. The socio-economic growth is friendly with sustainable environment. Sustainable and revived natural resources comply with the government policies in sustaining the security of resources and creating the balance among the conservation and the utilization.

The conservation and restoration of degraded or encroached mangrove forests of 2,660 rai were carried out in 2015 after the court verdict. There was an evaluation and ranking of the suitability of the mud beach (newly grown). The ranking is in 4 levels, from the best to the worst, imitating the natural process and methods. 100 trees were planted in each of the 6 provinces or 600 trees in 6 provinces.

The Department of Livestock Development follows the framework of the Convention on Climate Change. It monitors and surveys the environment conservation measures, which may affect the foreign trade and investment. The department has to prepare measures to accept the negative impact from foreign trades and agreement if changes in climate arise. It is preparing the water foot print.

The agency did not identify the area, which needs conservation and restoration, but in the near future it will have to do so.

The private sector has played significant roles in helping the agency to achieve its goals as follows:

- The Ban Pho Toyota Factory has been selected as one of the five Toyota factories in the world for the Eco-forest Project. In this factory, a forest of 30 rai was first planted. The forest can absorb 60 tons of carbon dioxide each year. Before starting this project, studies were conducted on the locations' original ecosystem conditions. Then, the plant VERB only the endemic trees or plants to renovate its original conditions to ensure that the new forests are suitable to grow in that same conditions or to ensure that the forests' ecosystem is suitable for their own habitat.
- Aura Plant Forests in the 5 Regions of Thailand were initiated by Tipco F&B Co.Ltd. The producer and seller of a natural mineral water products stands 100% under the brand "Aura," which conserves and rehabilitates upstream forests all over Thailand. The project has been carried out as one of its social activities. In 2018, it has helped increase the size of the upstream forests in collaboration with the Department of National Parks, Wildlife and Plant Conservation and the various local communities.
- Developing and rehabilitating upstream forests of Yom River, and the planting of Pracha-rat Forests was carried out with the support of the Electricity Generating Authority of Thailand (EGAT) to rehabilitate upstream forests in Payao Province in collaboration with the general public of this province. Since 1994 or 26 years ago, more than 466,000 rai of rehabilitated forests in 49 provinces all over Thailand, including mangrove forests, have been reached. The high rate is assured with the special seasonal care highlighted with the thought: "What counts most are those in the stomach, in the heart and in the forest".

The need for support in rehabilitating the ecosystems and the loss of the local natural habitat includes:

- Promotion, the implementation of the conviction in forest conservation and rehabilitation, the reduction of the loss of natural resources in each location, the consideration of the local traditions and cultures, as well as ways of life;
- Budgetary support – a must for each project;
- International cooperation projects, recruitment of experts and advisors for some specific areas, special activity organizers to raise convictions or awareness in protecting, conserving and rehabilitating local natural resources;
- Local communities are invited to supervise, control and stop forest encroachment.
- Technical assistance, data and information exchanges are needed as means for acquiring bodies of knowledge needed for formulating measures for controlling and administering existing resources for maximum uses in sustainable ways;
- Adequate and sufficient personnel support for the various types of activities – expert and expertise in some specific areas is required to increase the capacity of the local people protecting their local resources

Aichi Target D16 By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force, operational and consistent with national legislation.

Thailand's implementation that contributes to the Aichi Target

At present, Thailand has not yet ratified the Nagoya Protocol on the Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their utilization to the Convention on Biological Diversity. On 24th January 2012, after its approval for the signing in the Nagoya Protocol, the cabinet advised that there be reviews of rules and regulations, and related agencies or organizations if there should be any amendment to ensure their consistency with that protocol and the understanding of the protocol should also be assured among the various agencies and all sectors concerned.

The fact was that Thailand has continually acted in accordance with that resolution of the cabinet. During 2013-2016, there were reviews of the following acts and laws for their consistency with operations designated in the Nagoya Protocol: Plant Variety Protection Act, B.E., 2542 (1999) and Protection and Promotion of Knowledge on Thai Traditional Medicine Act, B.E. 2542 (1999). There was an application of the Regulations of the National Committee on Conservation and Sustainable use of the Biodiversity on the access and the sharing of benefits to ensure that all the state agencies, in charge of the various ecosystems and wisdom. There was subordinate laws, measures, and guidelines in accessing and sharing of benefits, building capacity and providing promotion for agencies with laws, sub-ordinate laws, measures, etc. to operate as an agency authorized to review the permission requests, to issue permission, and to agree on the sharing of benefits. The operation also wanted to create an understanding with agencies authorized as required by the Nagoya Protocol and support them to work as agencies that supervise the request to access and to profit sharing.

During 2017-2018, the Minister of the Natural Resources and Environment authorized the draft Biodiversity Act to be applied as an administration tool. This draft has sub-provisions for all dimensions in utilizing the conservation and rehabilitation for biodiversity, accessing

and sharing of benefits, communities' participation, biosafety, including mechanisms in monitoring biodiversity in Thailand's overall picture by providing education and reviewing laws on biodiversity and sub-ordinate laws, BREAK Consistent with Nagoya Protocol, the draft? increases the understanding of the related agencies that they can operate properly and to produce the study report to the sub-committee as well as the related committee to review Thailand's preparedness in ratifying Nagoya Protocol. After all the processes are ready, the draft laws will be proposed to the cabinet's scrutiny before submitting them to the parliament, and submit to Nagoya Protocol.

Other activities undertaken that support this Aichi Target

Thailand has supported the Nagoya Protocol by disseminating data and information related to creating a conviction in accordance with the 1st Aichi Target. The country has initiated the translation into Thai of the Nagoya Protocol, so that its readers understand how to access it and see how the benefits from biodiversity can be shared on national and international levels. The translation was financially supported by the building capacity for regionally harmonized national processes and for implementing the Convention on Biological Diversity provisions on access to genetic resources and sharing of benefits.

Thailand has included the access and the sharing of the benefits into the first Master Plan for Integrated Biodiversity Management to the latest one. This act ensures that all related agencies in Thailand create necessary mechanisms to support the access and the sharing of benefits by making use of biodiversity and that these various agencies can set up their own budget to support their own internal actions for their own preparedness.

Aichi Target E17 By 2015, each Party has developed into NOUN (action plan?), adopted NOUN as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Thailand's implementation that contributes to the Aichi Target

On the 4th September 2012, the cabinet authorized the Ministry of Natural Resources and Environment, the Budget Bureau, the Office of the National Economics and Social Development Council, the Natural Resources and Environmental Planning Office, and the Biodiversity-Based Economy Development Office, including other related agencies, committees, and sectors in order to consider, review and integrate the strategic long-term plan on biodiversity. The involvement of so many actors ensures that the action plan is clear, complete and well integrated. A good and clear strategic plan on biodiversity covers the access and usefulness of biodiversity. The conservation and development of the natural resources will receive the community right and a fair share of accrued benefits. The Office of Natural Resources and Environmental Policy and Planning has formulated the Master Plan for Integrated Biodiversity Management 2015-2021, to respond to the global goal set in accordance with the 2011- 2020 Strategic Plan on Biodiversity and the Aichi Target. The Master Plan's objectives are to address the root causes of the loss in biodiversity, which is regarded as mainstream in the state and the civil society sectors, reducing direct pressures of biodiversity and promote the sustainable utilization of the biodiversity, improve the biodiversity status by protecting the diversity of ecosystems, species and heredity, administration for the increased benefits from biodiversity received from the biodiversity and the ecosystem services. The plan is also intend to increase the efficiency in administration and actions as required by the obligations in biodiversity with participative action-planning, knowledge management and

capacity building, the master plan already scrutinized by the various related sectors as well as the formulating process.

In this context, the Office of Natural Resources and Environmental Policy and Planning (which is part of the Convention on Biological Diversity National Focal Point of the Convention on Biological Diversity) has formulated the action plans: the urgent plan for 2015-2016 and another one for 2017-2021. These action plans have already been approved by the cabinet. As a matter of fact, the Master Plan has been one that all sectors have joined to take part in its formulation and, in this connection, all have included inserts of their own projects and related activities from the very beginning of the plan formulation. It is also relevant for the government policies as well as for the National Economic and Social Development Plan.

Measures to evaluate the actions carried out in accordance with the strategic biodiversity plan:

The Office of Natural Resources and Environmental Policy and Planning has continually monitored the Biodiversity Action Plan's progress during 2015 – 2016, which was consistent with the Aichi Target, National Targets and has connected it with the indicators of the Environmental Quality Management Plan, 2017-2021.

Aichi Target E18 By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity and their customary use of biological resources are respected, subject to national legislation and relevant international obligations, BREAK NOUN are fully integrated and reflected in the implementation of the convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Thailand's implementation that contributes to the Aichi Target

Thailand has traditional wisdom and knowledge transferred and absorbed through cultural means and practices and filled with high values, which are well recognized and internationally widespread. Take, for instance, Thai massage and spa practices, which are currently regarded as means for health services. These traditional practices are well-known and popular all over the world and accepted by foreigners to such great extent that there has been the endeavor of pushing Thai massage as a world cultural heritage in the hopes of spreading the Thailand's reputation while increasing the value for Thai indigenous knowledge. Those various forms of traditional knowledge transferred down from ancestors and well accepted worldwide, have driven the Thai to take pride in their country and cherish their value, while becoming aware of the need to preserve the practice as a production base resource.

Thailand has provided support for making use of bodies of knowledge and traditional wisdom for the biological resources' replicating effects. The indigo cotton cloth of Sakhon Nakhon represents the cloth arts modeling with high exquisiteness from ancestors. Then, the brand name "THITHA" appeared with products which have warmly been welcomed in Hollywood. Several Thai herbal products have got a gold medal for its invention in a contest in Geneva. "Lesitin", made up of yolk with Aegle extract, is good for patients with Alzheimers and heart diseases. These innovations represent the clever combination of the Thai tradition and the present medicinal sciences acquired by Thai herbalist groups. The government sector is ready to support this group to scale up their medicinal sciences into a commercial world.

Measures for protection of indigenous knowledge in Thailand included the reform undertaken for management of Thai traditional medicine and utilization of herbal plants such

as development of legislations and guidance on appraisal of herbal species for official enlistment in the bills on herbal products and on protection and promotion of traditional medicine. Also the state sector supports the dissemination of bodies of knowledge and information, and sharing of local knowledge through Project: Knowledge and wisdom 4.0, which is a state website to disseminate and collect data and information to get to know more about the biodiversity: products – state and community – and product promotion from biodiversity resources at the community level.

In addition, Geographical Indication (GI) was adopted to promote agriculture and cultural identity to protect relevant indigenous knowledge. Efforts to increase market value of GI products and to develop guidance on the promotion of the products were made through the integrated cooperation between various sectors and included the following actions:

- 1) Ninety-nine GI products were registered while additional 64 products were being reviewed for official enlisting. With 7 applicants enlisting from 7 provinces in 2018, every province in Thailand has submitted the application for registering GI products and a quality control system was, therefore, established to ensure consumer confidence on these arrays of products. Furthermore, a GI product from Thailand (Lamphun Brocade Thai Silk) had been officially registered by the Republic of India and actions were taken to file for such an enlisting of 7 GI products in 4 countries.
- 2) The development of 10 GI products and their packaging was promoted and market opportunity was created for community enterprises and local operators in bringing their products to consumers. These included a cooperation made with major retailers such as Top Supermarket and Central Food Hall to provide for sections selling GI products and to organize annual in-store promotions of the products in 108 branches nationwide. GI products were found to generate over 162 million baths of revenue to farmers and the community. The market value is no less than 3.99 billion baths.

In terms of sharing of knowledge and experience in the ecosystem and biodiversity administration, a number of representatives from local communities have been providing data and information as well as experience in the conservation and the utilization of the biodiversity for the international forum on the Convention on Biological Diversity. One key occasion was in November 2011, when there was a meeting for the working committee, which was the Ad-hoc Open-ended Working Group on Article 8 (j) between the 31st October-4th November 2011 in Montreal, Canada. A representative from the Inter Mountain Peoples' Education and Culture in Thailand Association (IMPECT) was invited to present an interesting case of the Obluang National Park, where conflicts with local people were quite long. It was very interesting and can be re-occur anywhere. It was typical how the Thai government could solve a serious conflict with local people peacefully. And, after the conflict was dissolved, there was cooperation and a need for a legal framework to protect the rights of the local hill-tribes.

As for the side event, which was jointly organized by a private agency and the Ministry of Natural Resource and Environment, a presentation was held on a case about the conservation and utilization of traditional wisdom and knowledge observed through the cultural practice of the local people. The 12th meeting of the Conference of the Parties to the Convention on Biological Diversity in Pyeong Chang, the Republic of South Korea, is an example of this investigation. The side event organized by the Green Globe Foundation was a presentation on the conservation of community forests, forest resources and biodiversity by the Pakayo Hill tribe group of Thailand.

To address the lack of land ownership among farmers and the associated problem of encroachment of national reserves and state lands, guidance was developed to enable lower income farmers to gain access to lands without having the entitlement, which includes the operating as cooperatives or other appropriate groups in utilizing allocated lands. Such action was accompanied by efforts to promote jobs that are compatible to the capacity of allocated lands and to prevent further encroachment of state lands of any kind. The framework for the land allocation itself consisted of (1) the development and use of land based on available information, (2) the development of reservoirs and other basic infrastructure, (3) integrated promotions and the development of jobs, (4) the promotion of self-organization, (5) supporting access to funding sources and (6) promoting household accounting and inventory of landless inhabitants. In addition, citizens who found themselves possessing lands in any forest area were to be inspected; their possession was to be certified by the state in accordance with relevant laws and the cabinet decisions. Such laws and executive directives included provisions that prohibited the selling of land in their possession and the state provided booklets to specifically locate the possessions, which allowed for the inheritance of the land. This action was envisaged to encourage local efforts to maintain and expand forests areas in their possession and consequently, contribute to the prevention of soil erosion.

To enable participation in the maintenance of forest resources, 10,144 square kilometers of community forests were established in 12,248 villages nationwide. This resulted in the creation of networks of 211,261 natural resources and environmental protection volunteers at village level and an additional 10,796 volunteers for the protection of national parks, wildlife and plant species.

Related website and other documents:

- <http://www.scimath.org/lesson-biology/item/7051-2017-05-23-117114-19-46>
- <http://www.ipthailand.org/>

Aichi Target E19 By 2020, the science base and technologies relating to biodiversity, its value function, status and trends, and the consequences of its loss, are improved, widely shared, transferred and applied.

Thailand's implementation that contributes to the Aichi Target

Thailand has been supporting this Aichi Target by providing thoughts on the management of scientific knowledge that can be shared and applied for the improvement of the biodiversity status. This happens in many forms: providing support for the development projects in Thailand's neighboring countries (Myanmar, Cambodia, Laos PDR and Vietnam) and Thailand has provided the South-South cooperation for more than 30 years to other developing countries. Apart from these, Thailand has provided partnership development cooperation with other sources in terms of cooperation with various countries, which were jointly responsible for all expenditures. These collaborations occurred via Japan, France, Germany and international organizations under the UNDP, the UNFPA and UNICEF.

The South-South Cooperation Framework, in which Thailand has been the key player, has been carried out under the Association of Southeast Nations (ASEAN), especially under the supervision of the senior ASEAN officers in the environment, which stands under the ASEAN Working Group on Nature Conservation and Biodiversity (AWGNCB). The AWGNCB is directly in charge of biodiversity and has the Biodiversity ASEAN Center for its technical arms and other forms of assistance. The center's operations have largely helped increase regional capacity.

Thailand has not yet formed multi-year action plans for the South-South Cooperation, but indirectly cooperates within the Consortium of Scientific Partners on Biodiversity, an international biodiversity network of scientific friendship that supports operations in biodiversity and related protocols by signing an MOU with activities that support 3 objectives of the related convention and protocol. The South-South Cooperation has been working in the following scientific fields:

- Intellectual and scientific actions that support Aichi Target,
- Activities carried out in accordance with the convention and organizations as well as convention partners in the regional, sub-regional and world levels,
- State support to operate at the national level.

In this connection, Thailand has an agreement with the organization under the Consortium of Scientific Partners on Biodiversity or the Kew Royal Botanical Gardens. Thailand, as a member of the ASEAN Center on Biodiversity, has an agreement with the Singapore Botanical Gardens in organizing and developing actions under Project: Urban biodiversity indicator. In compliance with this, the Office of Natural Resources and Environmental Policy and Planning has collaborated with municipalities involved with Project: Low Carbon Cities and Sustainable Environment Cities to pressure for the application of Singapore's Biodiversity Index as a guideline in the conservation and rehabilitating of the urban and the municipal biodiversity. This is to ensure that the Municipal League and all the municipalities apply the urban tree development guidelines in Project: Low Carbon Cities and Sustainable Environment and achieve the highest efficiency in accordance with the target of the Convention on the Biodiversity.

Methods for creating preparedness and to access the local data as well as information on biodiversity

Thailand, by the Office of Natural Resources and Environmental Policy and Planning, has created mechanisms for disseminating data and information on biodiversity by linking data on biodiversity of other agencies. By doing this, Thailand is developing and expanding its biodiversity data bank, which will be applied in defining and formulating its policies and action plans, as well as the administration of Thailand's biodiversity action plans and strategies.

Apart from developing and improving its websites and mechanisms for disseminating data and information on biodiversity among its partners, it is also sharing its data with other countries under the ASEAN through the actions of the ASEAN center on biodiversity and the Convention on Biological Diversity. In the future, the sharing and the access to data and information will be more extensive, especially in terms of reports on the status and conditions of the biodiversity under the various parties' responsibilities. These actions will be carried out through online reporting tools developed by the mechanisms of the Convention on Biological Diversity.

With respect to the application of the data on the biodiversity conditions for the decision-making on the preparation process for the policy making and action-planning, these types of data and information are significant as they are the real foundation of the grass-roots of people's life. And the project activities are geared towards the improvement and the rehabilitation of the economy of these grass-roots people. The biodiversity data on the location is a must for the action-planning of the land use. The integrated plans for the renovation of all natural resources and the services from the ecosystem – including and covering the irrigation system as well as the tourism based on natural resources and bio-diversity – all have a strong inter-relationship on a local and global scale.

Apart from these, Thailand has also provided intellectual and scientific support for the Convention's international policy-making meetings. Besides hosting its meeting in Bangkok in Session 10, it has served as a member of the advisory board for science and technology for which it has worked for in Session 11 and 12. In the Session 10 of the Advisory Board meeting held in Bangkok, Thailand's representative was selected as one expert in the Multidisciplinary Expert Panel.

Aichi Target E20 By 2020 at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011-2020 should increase substantially from the current levels, including all sources in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization. This target will be subject to changes contingent to the needs assessments of resources, which is developed and reported by parties.

Thailand's implementation that contributes to the Aichi Target

Thailand has the following key financial mechanisms. There is the Environment Fund, established in accordance with the National Environmental Quality Promotion and Preservation Act, B.E. 2535 (1992). For the period 1992 – 1995, an amount of 8,968 million baht was received. Each year the fund's income came from the bank interests, interests earned on loan, and the amount the local administration returned by installments. As for the spending, the fund paid project funds as support for projects of the state agencies, development projects by local government administration and the private sector and NGOs involved with environment development projects. These are (1) projects that deal with pollution management and those carried out in the provincial level environment quality administration, (2) projects that support the private sector's loans to construct or improve the pollution treatment facilities, and (3) projects that support the promotion and the maintenance of the environment quality.

Thailand has produced financial reports in accordance with the Decision Point XII/3 from the 13th assembly of the Convention partners, which can be seen in the financial report documents that display figures on the expenditures detailed in the budget for the conservation, rehabilitation and the sustainable utilization of the biodiversity. These expenditures are given by Project: Biodiversity Finance Initiative (BIOFIN).

Apart from these, Thailand has started to identify strategies to mobilize financial resources for the implementation of the convention under Project: BIOFIN. It is expected that such will be completed in Phase 3 of the project implementation. At present the agencies that act in accordance with the stated strategies and the Biodiversity Action Plans are spending the national budget for the implementation of the convention allocated in the previous budgetary year. It is expected that the financial support for the next phase will be increased. This is to cover other areas of the national biodiversity activities.

To date, Thailand has been financially supported under the BIOFIN Project for Public Private and Civil Society Biodiversity Expenditure in Thailand. Part of Thailand's financial report was based on this one. Based on the results of the study of the BIOFIN Project, it can be said that Thailand can now have the updated information about its expenditures for the actions in the biodiversity, the budget needed for driving the Master Plan for integrated biodiversity management (costing the Biodiversity Action Plans), some themes on the status of the investment in biodiversity and environment. Besides, there are reports on the review of some policies and institutions in charge of biodiversity in the 2 key ecosystems. These are the wetlands areas and the marine and coastal resources. And finally, the report also formulates the

draft strategies for mobilizing resources to be adequately spent in the operations for the biodiversity and the investment in the biodiversity in the near future.

If the BIOFIN Project can be expanded and extended to cover all ecosystems in Thailand, there will be more updated data on all the current expenditure budgets in the biodiversity for an overall picture of all ecosystems as well as the budget needed for the drive and mobilization of the biodiversity administration.

As for the Bilateral Official Development Assistance support, most of it has been for the protection of wildlife, forested areas and the sustainable forested land administration and management. The major part of the budget has come through the financial mechanisms of the Global Environment Facility (GEF): Rounds 1 – 6. Thirty-five projects on a national level with a budget of 90,928,984 million US\$ from Thailand have sought financial support from the GEF's latest round. During this round, there were 37 regional and world-level projects with a budget of 242,339,885 million US\$ submitted for the financial support request. Details of the additional financial need for all actions in the biodiversity administration in Thailand will be available in the *Thailand Biodiversity Expenditure Review* and *Thailand Financial Needs Assessment Summary* under the BIOFIN Project.

As for the financial support for other CLMV countries, Thailand wants to financially support them in terms of the biodiversity. This is because such will have a strong impact on the biodiversity at the global level, if possible. Based on 60 years of friendship, Thailand has helped the Lao PDR to construct a botanical garden to serve as a learning centre for plants, especially those rare species.

A botanical garden was constructed at the Ban Kom Koh in Mueang District of Nongkhai. One botanical garden will be built in the Lao PDR which, at this moment, is looking for a site for the purpose. This will financially be funded by Thailand. In 2016, Thailand hosted the Regional Workshop on the CLMTV Forest Partnership Dialogue, which was an opinion-exchange forum for forestry executives from Cambodia, Lao PDR, Myanmar, Thailand and Vietnam. All these countries share borderlines and want to take care of and help increase the neighboring countries' forests in order to decrease the global warming effect. It is expected that these countries will also serve as a forum for exchanging experiences and lessons learnt from their success and failure in the biodiversity administration and the development of a strong biodiversity cooperation network for ASEAN's future.

Related website and other documents:

- <https://www.biodiversityfinance.net/knowledge-product/thailand-biodiversity-expenditure-review>
- https://www.biodiversityfinance.net/sites/default/files/content/knowledge_products/Thailand%20FNA%20summary_May%202017.pdf

Thailand's actions to support international efforts in achieving Aichi Biodiversity Targets

Actions carried by Thailand to support global efforts in meeting Aichi Biodiversity Targets included those described under selected Target headings. Most of the country's contributions to international community on this issue were made through regional mechanisms for consultation and cooperation including ASEAN, Mekong Region, Asia-Pacific and United Nations forums and consisted of technical and logistical supports and assistance for meetings and consultations, providing aids for natural disasters and enabling management of transboundary protected areas. Notable examples of these actions are as follow;

- To promote stability, peace and security in Asia-Pacific Region, Thailand played an important role in mitigating natural disaster with the country's appointment to co-chair the ASEAN Regional Forum's (ARF) Inter-Sessional Meeting on Disaster Management (ISM on DR). The meeting discussed adoption of smart technology to prevent and mitigate impacts from typhoon through exchange of experience and organizing field study on systems for mitigating natural disasters. Thailand gained tremendous knowledge and experiences and build partnerships and networks with ARF members for future cooperation through the meeting.
- Thailand supported linking ASEAN Vision 2025 with Sustainable Development Goals (SDGs) of the United Nations and was committed to pursue the role of a coordinator on such endeavor.
- Concerning Mekong-Japan Cooperation, Thailand and Japan were to co-organize the 6th Green Mekong Forum in 2019. The meeting was to commemorate 10-years anniversary of the cooperation and provide a venue for exchange of knowledge and experience on management of natural resources and the environment in the Mekong Region among member countries.
- The Joint Statement to Strengthen Data Management and Information Sharing in the Lower Mekong endorsed by Lower Mekong Initiative (LMI) was to provide direction and promote cooperation on exchange of information on water resources in the region.

In addition, Thailand cooperated with neighboring and other countries in address new security threats including border control. Attentions was paid to ensure effective management of border areas and meet compatible objectives on transboundary security and economy with the view to strengthen capacity of sectors in and enable mechanisms for dealing with various challenges derived from transportation networks as well as trafficking of timbers and wildlife in effective manner.

Thailand's actions to support efforts to meet the Aichi Biodiversity Targets also contributed to national implementation for achieving Goal 12 (responsible consumption and production) of Sustainable Development Goals (SDGs). Department of Environmental Quality Promotion of the Ministry of Natural Resources and Environment and the Asia Pacific Roundtable on Sustainable Consumption and Production (APRSCP) jointly organized a meeting to establish Thai SCP Network. In addition to creation of the Network, the meeting also discussed mobilization of efforts for sustainable consumption and production at regional and global level and reviewed the Network's draft framework for actions, including the Thai SCP Roadmap for 2017 – 2036

Actions undertaken by Thailand to meet Target 12 (*Strategic Goal C*) (By 2020, the extinction of known threatened species has been prevented) and Target 5 (*Strategic Goal B*) (By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero) were also consistency with national implementation of Goal 15 (sustainable use of terrestrial ecosystems) of the SDGs. The country hosted the “Bangkok Conference on Science, Technology and Innovation for Addressing Wildlife and Forest Crimes and Attaining SDGs” at Asian Institute of Technology, Bangkok. The meeting discussed implication of technologies, financial structures, innovative tools, technical measures, enhanced information gathering and analysis and improvement of quality of life at local level in addressing timber and wildlife trafficking through South-South cooperation between Africa and Asia. In addition, the meeting also deliberated on solving the problem of wildlife trade and trafficking, identifying providers of the technologies, funding and basic utility for actions and building a system to support countries in the Southern Hemisphere in Asia and Africa, as well as Latin America.

Roles of women in biodiversity protection

Actions carried by Thailand to support global efforts in meeting Aichi Biodiversity Targets included those described under selected Target headings. Most of the country’s contributions to international community on this issue were made through regional mechanisms for consultation and cooperation including ASEAN, Mekong Region, Asia-Pacific and United Nations forums and consisted of technical and logistical supports and assistance for meetings and consultations, providing aids for natural disasters and enabling management of transboundary protected areas. Notable examples of these actions are as follow;

Women in Thailand play important and active roles in the planning for and implementation of actions for biodiversity protection. To this end, public and private sectors as well as non-governmental organizations initiated programs to enhance the role of women in the natural resources and environmental management. A notable example of such programs is the Women Power for the Environment project initiated by Ratchaburi Electricity Generating Holding PCL. And the Thailand Environment Institute. The project aims to strengthen the roles and capacity of women in participating in the management of natural resources and the environment at community It also link to local and national levels with the aim to utilize environmentally sound activities to create economic and social opportunities for the enhancement of the quality of life and to publicize contributions of women to wider audience. The project focused on building the roles of women in enabling sustainable management of natural resources and the environment. This development ensures the biodiversity and resources security on a local level as well as develops good practices that can be replicated and used to enhance awareness on the capacity of women to a wider audience.

Thailand’s actions to support efforts to meet the Aichi Biodiversity Targets also contributed to national implementation for achieving Goal 12 (responsible consumption and production) of Sustainable Development Goals (SDGs). Department of Environmental Quality Promotion of the Ministry of Natural Resources and Environment and the Asia Pacific Roundtable on Sustainable Consumption and Production (APRSCP) jointly organized a meeting to establish Thai SCP Network. In addition to creation of the Network, the meeting also discussed mobilization of efforts for sustainable consumption and production at regional and global level and reviewed the Network’s draft framework for actions, including the Thai SCP Roadmap for 2017 – 2036

Actions undertaken by Thailand to meet Target 12 (*Strategic Goal C*) (By 2020, the extinction of known threatened species has been prevented) and Target 5 (*Strategic Goal B*) (By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero) were also consistent with national implementation of Goal 15 (sustainable use of terrestrial ecosystems) of the SDGs. The country hosted the “Bangkok Conference on Science, Technology and Innovation for Addressing Wildlife and Forest Crimes and Attaining SDGs” at Asian Institute of Technology, Bangkok. The meeting discussed implications of technologies, financial structures, innovative tools, technical measures, enhanced information gathering and analysis and improvement of quality of life at local level in addressing timber and wildlife trafficking through South-South cooperation between Africa and Asia. In addition, the meeting also deliberated on solving the problem of wildlife trade and trafficking, identifying providers of the technologies, funding and basic utility for actions and building a system to support countries in the Southern Hemisphere in Asia and Africa, as well as Latin America.



Section 5

Description of the national contribution to the achievement of the targets of the Global Strategy for Plant Conservation

Section V

Description of the national contribution to the achievement of the targets of the Global Strategy for Plant Conservation

Does your country have national targets related to the GSPC Targets?

Thailand's biodiversity targets are divided into three phases: 2016, 2020 and 2021. The three phrases cover 11 issues that are consistent with the targets of the Global Strategy for Plant Conservation (GSPC).

1) Raising awareness and education

- By 2016, national, provincial and local agencies understand and are aware of the values and the importance of biodiversity.
- By 2020, every sector of society, particularly the public and local communities, has basic knowledge on biodiversity and are aware of the importance of the conservation and sustainable use of biodiversity.
- By 2021, biodiversity is included in the curricula of the institutions for learning and education at all levels.

2) Integration and promotion of the participation in the management of biodiversity

- By 2016, every sector of society, particularly local communities and their networks, significantly increase their participation in the conservation, restoration and sustainable use of biodiversity.
- By 2016, guidelines are in place for the reduction and elimination of harmful incentives for biodiversity and for the promotion of positive incentives for the conservation and sustainable use of biodiversity in relevant sectors.
- By 2020, biodiversity is integrated into relevant policies or plans at all levels.
- By 2020, financial mechanisms are in place for mobilizing the conservation and sustainable use of biodiversity.
- By 2020, regulations and laws that obstruct participation in biodiversity management are revised.
- By 2021, biodiversity management is mobilized with participation at all levels.

3) Conservation restoration and protection of biodiversity

- By 2016, the rate of habitat loss, including forest and coastal ecosystems, is reduced.
- By 2016, protected areas and ecosystems are effectively managed to ensure their ecosystem services.
- By 2016, the conservation status of threatened species and endemic species as well as the management of these species is improved.

- By 2020, the rate of habitat loss, including forest and coastal ecosystems, is reduced by 50 percent.
- By 2020, the conservation status of threatened species and endemic species as well as the management of these species is improved with measures for the conservation and protection of their habitats.
- By 2021, protected areas are connected by networks, provide adequate ecological representation and have measures for managing critical habitats, biodiversity hotspots and areas of significant importance for ecosystem services.
- By 2021, mechanisms and measures are in place for the management as well as policy and legal actions for the conservation and protection of the national genetic resources.

4) Threat reduction and sustainable biodiversity utilization

- By 2016, the threats from anthropogenic activities related to species and habitats, particularly the coral reefs and other vulnerable ecosystems impacted by climate change, are minimized.
- By 2016, guidance is in place for mainstreaming biodiversity in relevant standards and criteria.
- By 2020, pollutants are kept at the levels that would minimize damage the functioning ecosystem and biodiversity.
- By 2020, tools/mechanisms/guidance for sustainable use of biodiversity are applied in every relevant sector.

5) Wetland management

- By 2016, effectiveness in managing wetlands is increased at all levels.
- By 2021, the loss of wetland ecosystems is significantly reduced in order to enable ecosystem services and facilitate ecosystem-based adaptation of climate change.

6) Management of alien species

- By 2016, invasive alien species and their major pathways are identified and registered.
- By 2020, measures for managing priority invasive alien species and major pathways of the species are in place.

7) Biosafety Management

- By 2016, laws and regulations for controlling modern biotechnologies and preventing their adverse impacts to biodiversity are enforced.
- By 2021, regulations based on the pre-cautionary principle for supervising biosafety are in place and adopted by relevant agencies for the improvement of rules and mechanisms for the transboundary movement of living modified organisms in accordance to the provisions of the Cartagena Protocol on Biosafety.

8) Protection of genetic resources

- By 2016, responsible agencies have mechanisms and regulations for the access and benefit-sharing of genetic resources in order to meet the obligations under the Nagoya Protocol.
- By 2016, laws related to access and benefit-sharing are developed for genetic resources and traditional knowledge of relevance.
- By 2020, a focal point for managing access, benefit-sharing and monitor usage from genetic resources is established.
- By 2020, research communities and local communities formulate their mechanisms and regulations for the access and benefit-sharing of genetic resources.

9) Bio economy research and development

- By 2016, biodiversity-based competitiveness is increased.
- By 2021, measures and mechanisms are in place for returning economic benefits from biological products to their origins in order to support the conservation and sustainable use of biodiversity.

10) Knowledge management and database

- By 2016, scientific knowledge is managed in the manner that contributes to the formulation of biodiversity policies and plans.
- By 2016, mechanisms are in place to integrate and link biodiversity databases and, therefore, enable the effective use of their resources.
- By 2016, a focal point for mobilizing and utilizing resources of the existing database for the conservation and sustainable use of biodiversity is identified or established.
- By 2020, mechanisms are in place to ensure the contribution of scientific knowledge to the formulation of biodiversity policies and plans.
- By 2021, specific databases are created for priority biodiversity issues.
- By 2021, clearing-house mechanisms of every relevant agency are connected in an ever expanding network.
- By 2021, every municipality systematically collected information on their urban biodiversity.

11) Preservation of local biodiversity wisdom

- By 2016, national records and registers on local knowledge and traditional wisdoms supportive to the conservation and sustainable use of biodiversity are established.
- By 2021, a specific database on local knowledge related to biodiversity is created to provide resources for the protection of the country's and the communities' right over the knowledge.

Please provide information on any active networks for plant conservation present in your country.

Based on a networking system to conserve plants, Thailand has undertaken the following initiatives:

- 1) The Flora of Thailand Project, under the DNP, researches the taxonomy of vascular plants in Thailand, estimated at 11,000 species. The project also publishes plants in Thailand in a book form, and it hosted a conference called 17th Flora of Thailand between 21 – 25 September 2017 in Krabi Province.
- 2) The Botanical Society, under the Royal Patronage of Her Majesty the Queen, is Thailand's national focal point on plant science and related fields. To be an excellent academic center, it promotes all forms of collaboration in research, survey, exchange of data and information, dissemination of knowledge and new findings to all stakeholders, within and outside Thailand. It hosts annual conferences and seminars on plant science.
- 3) The Conservation of Plant Genetics Project, of the Crowned Princess, aims to conserve and develop plant genetic resources. It hosts 8 activities: protection, survey and collection, propagation and replanting, conservation and sustainable use, data and information systems, planning, awareness raising and other special activities supporting the conservation of natural resources. These activities are conducted in close collaboration with other entities and networks, with a broad spectrum of stakeholders and learning institutes. It also established school-based botanical gardens to raise awareness of the conservation for students in 939 schools across Thailand.
- 4) The Thai Ornamental Plant Society functions as a medium for parties interested in ornamental plants so that the exchange of knowledge, experience, ideas and information could be shared and imparted through various activities on a regular basis.
- 5) A specific conservation group called Siamensis is a volunteer group of varied stakeholders who are interested in biodiversity and environmental conservation. It aims to be a forum of exchange to raise awareness and appreciation for natural resources and environment.
- 6) A network of taxonomists and students in the field of plant science has been voluntarily formed to provide a forum for exchange of information and knowledge, including name coding for plants.
- 7) The Save Some Seeds group is a formal grouping of individuals from various relevant organizations, which aim to collect domestic and wild seeds in order to send them to seed banks in Thailand (one managed by the National Science and Technology Development Agency) and abroad.

Please describe the major measures taken by your country for the implementation of the Global Strategy for Plant Conservation.

Thailand has given high priority the GSPC and other activities to conserve biodiversity through a national integrated master plan, already mentioned above. Each of them has specific targets and indicators, which place priority in awareness raising, biodiversity education, participation, conservation, rehabilitation and prevention of biodiversity loss. This awareness raising reducing the pressure of drivers and alien species. These NOUN also include the conservation of genetic resources, knowledge, information systems and local traditional knowledge. It also established a conservation and sustainable use committee to oversee and formulate policies related to the conservation and sustainable use of biodiversity resources. Similarly, biosafety and access and benefit sharing are important mechanisms to drive towards national goals.

At the national level, the 20-year National Strategic Plan (B.E. 2561 – 2580), which contains six principal strategies, also includes biodiversity as its 5th strategy. It aims to promote quality growth that is environmentally friendly, thereby, for instance, increasing the share of forests, reducing threats to biodiversity, enhancing ex situ as well as in situ conservation, conserving the habitats and promoting sustainable consumption. Green areas will be increased to 55 percent, composed of natural forest (35 percent), timber forests (15 percent) and urban green (5 percent).

Category of progress towards the target of the Global Strategy for Plant Conservation at the national level:

Objective 1 Plant diversity is well understood, documented and recognized

GSPC Target 1 :An online flora of all known plants

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

The Flora of Thailand Project, managed by the Department of National Parks, Wildlife and Plant Conservation (DNP), projected that Thailand is home to over 11,000 species of vascular plants. To be completed by 2024, the surveyed results are disseminated through online systems, indicating those with and without Thai names: 11,104 species 2,465 genera and 287 families (The Forest Herbarium, 2557). The Thailand Plant Encyclopedia also contains 1,612 species 807 genera and 208 families (Rachun Pooma, 2016) while the DNP manages its own herbarium, which has 280,000 of plant specimens, (website <http://web3.dnp.go.th/botany>). All of these sites are linked to the Plant List (www.theplantlist.org), International Plant Names Index: IPNI (<https://www.ipni.org>) and World Flora Online Consortium (www.worldfloraonline.org)

Furthermore, the Botanical Garden Organization has created and managed an internet-based data system that has specific details on collection methods and sources, which are compiled in a book that has a list and description of physiology, ecology and dissemination, with pictures, of 229 families 1,886 species. The Botanical Garden Organization hosts real plants in its Sirikit Garden showing 8,980 lists; it has 107,475 specimens in its herbarium. Its local plant data base has details of 944 plants. Moreover, the Department of Thai Traditional Medicine

and Alternative Medicine, DTAM, shows 3,874 lists in its database. Last, but not least, the Department of Agriculture is creating and working on its internet system.

GSPC Target 2: A thorough and extensive assessment of the conservation status of all known plant species to guide conservation action

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

In 2015, the Forest Herbarium of DNP assessed the status of the 11,000 known plants, 964 were threatened species of which 737 species were vulnerable, 207 endangered and 20 critically endangered. Additionally, 8.76 percent of all known plants, based on the International Union Conservation of Nature (IUCN) version 1994 for endemic and rare plant species, and version 2001 for vulnerable and endangered species. (Shown in Table 3)

In addition, the expert from the Botanic Garden Organization (one of the cooperation institutes in the Flora of Thailand project) had participated in the conference on the plant assessment by the IUCN and worked on plants in the following families: Maranthaceae, Orchidaceae, Ericaceae, Zingiberaceae, Violaceae, Balsaminaceae, Fagaceae, Arecaceae, Parnassiaceae, Juglandaceae, Moraceae, Asparagaceae, Amaryllidaceae and Fabaceae. The IUCN also considered the limestone habitats, which are threatened by illegal rock explosions in various provinces in Thailand, which includes the provinces of Phetchabun, Chiang Rai, Mae Hong Son, Sukhothai, Kanchanaburi and Prachuap Khiri Khan.

Table 3: An Assessment on the Threatened Plants of Thailand in 2014

No	status	Threatened Plants of Thailand (species)				
		Pteridophytes	Gymnosperm	Monocotyledonae	Dicotyledonae	Total
1	Critically endanger species	-	2	-	18	20
2	Endangered species			142	65	207
3	Vulnerable species	15	7	275	440	737
Total		15	9	417	523	964

Source: Department of National Parks, Wildlife and Conservation (2017)

Notes: Species, which are extinct in the wild: EW i.e. Fa Mui Noi *Vanda coerulescens* Griff. (Monocotyledonae) and Sok Raya *Amherstia nobilis* Wall. (Dicotyledonae)

Identifying priority plants for the conservation in Thailand uses this data above, including the ex situ conservation, seedbank collection at Kew Royal Botanic Gardens in the UK, based on its Memorandum of Collaboration with the DNP, Science and Technology Research Institute and the Forest Restoration Research Unit: FORRU of Chiang Mai University, Northern Thailand.

SPC Target 3: Information, research, associated outputs and methods necessary to implement the Strategy are developed and shared

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Thailand has seven floristic regions, which all have been surveyed, including forests within and outside protected area systems. Results of the plant species have been published in the Flora of Thailand. The database could be freely accessed from the DNP's database. In addition, there are projects on the status of threatened plants and the status of the use for local plants and herbs.

Since 1970, Thailand has revised its plant data contained in Tem Smithinan on three occasions, namely in 1980, 2001 and 2014. The revisions added, corrected and created new systems of arrangements. In addition, the DNP succeeds in using the tissue culture technique for the plant conservation and returned water onion (*Crinum thainum*) into nature for one of the vulnerable species. The Department of Agriculture disseminates a handbook on sustainable harvest, including those of medicinal plants, e.g. Buk, Thao Yai Mom, Kwao Khrua Khao etc.

Other parties, including offices of the state, private sector and educational institutions, also play an active role in disseminating data and information obtained from research to individuals, agencies and researchers so that added knowledge fulfils the GSPC goals, which are promoted. Here are a few examples:

- The **DNP** disseminates such documents as the Flora of Thailand vol. 13 and Thai Forest Bulletin (Botany) vol. 46 (1) reporting on plant varieties in limestone ecosystems of Phu Khiao- Nam Nao. The DNP also documents new discoveries in Thailand, the tissue culture, the rehabilitation of Plup Phlueng Than and others.

- The **Botanical Garden Organization** produces and disseminates easy reading documents such as pamphlets on Magnoliaceae, Orchids and Ericaceae. Moreover, the Romkroo Botanic Garden publishes documents on plants in protected areas of the North, the uses on Zingiberaceae in Thailand, Thai Orchidaceae and Ethnobotany. The Romkroo Botanic Garden also hosts a website on academic papers (http://www.qsbg.org/Database/Article/index_exp.asp).

- Through its Herbal Museum Development Project, the **Department of Thai Traditional and Alternative Medicine** disseminates knowledge on traditional and alternative medicine. It publishes three volumes of herbal references, herbal properties, Volumes 1 and 2, and Herbs in ASEAN Basic Health.

- The **Department of Marine and Coastal Resources** produces manuals on seagrass rehabilitation and others, and disseminates them through websites such as www.dmor.go.th and also includes research papers.

- The **Biodiversity-based Economy Development Public Organization (BEDO)** publishes encyclopedia on biodiversity knowledge, bio-accounting, and other forms of publications, including multimedia disseminated through its website.

- The **PTT Public Company** promotes the use of vetiva grass based on His Majesty the King, Rama 9 Initiative.

- The **Faculty of Science, Silpakorn University** hosts a database on five species of Fabaceae and four species of Annonaceae, which is published in the Flora of Thailand.

Objective 2 Plant diversity is urgently and effectively conserved

GSPC Target 4: At least 15 percent of each ecological region or vegetation type is secured through the effective management and/or restoration

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Most of Thailand's geocology of plants fall under protected areas systems, using specific laws and regulations. As a result, forests are well maintained and protected. In 2017, forest statistics report, for example, that 31.58 percent of the country was covered by forest areas. Protected areas maintained 64.89% of the forest areas in the same year. These are national parks, forest parks, wildlife sanctuaries, no-hunting areas, botanical parks and gardens.

Plants living outside protected areas are dispersed in national parks, community forests, coastal forests and seagrass patches. Obviously, they come under severe pressures and have been systematically handled through such measures such as environmental and health impact assessments for projects that may have severe impacts on them.

Protection is an approach but rehabilitation is also prescribed to areas already impacted by development. For instance, since 2017, the Department of Basic Industry and Mining started its rehabilitation projects for ten sites that were mined. This is to reforest and turn the project areas into alternative new use such as public parks, viewpoints and recreation areas. One of the major moves is the current government's initiative to recall encroached forests to revive them to their previous natural state.

GSPC Target 5: At least 75 percent of the most important areas for plant diversity of each ecological region protected by the effective management will be in place in order to conserve plants and their genetic diversity

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Out of its total 102 protected areas for plants, 52 fall into national park systems: 19 wildlife sanctuaries, 5 national parks, 5 no-hunting areas, and 4 botanical gardens. Five are managed by local governments and only one awaits some form of protection, see **Table 4**. From that table, an average of 83.34 percent of the forests are adequately protected, each by different laws and regulations: for example, 50.98 percent of the areas are protected by forest laws, national park law of B.E. 2507 as well as wildlife conservation and the protection law of B.E. 2535.

Table 4 Status of IPAs classified by types of protected area

Type of protected area	National Parks	Wildlife Sanctuary	Forest Park	Non-hunting area	National Forest	Local Administration	Unprotected area
Area of IPAs (no.)	52	19	4	5	5	5	1

Source: The Forest Herbarium, Department of National Parks, Wildlife and Plant Conservation (2011)

Note: Unidentified type of IPAs 11 no.

Despite the institutional arrangement, threats remain visible. 73 forests arise from stress caused by tourism, 51 from development, 50 from agriculture, 71 from over extraction and 4 from invasive alien species, summarized in **Table 5**.

Table 5 Number of IPAs classified by threat

Types of Threat	Decrease of Forest Area	Tourism activities	Different types of Area Development	Alien Species	Agricultural area	Over Harvesting
Area of IPAs	73	59	51	4	50	71

Source: The Forest Herbarum, Department of National Parks, Wildlife and Plant Conservation (2011)

The Division of Forest and Plants Conservation, Department of National Park, Wildlife and Plant Conservation (DNP) conducts research on plant diversity in key protected areas through such projects such as:

- Status of threatened plant species in Phu Wao- Phu Lanka Forests
- Assessing status of threatened plant species in limestone ecology
- Research on plant biodiversity in major areas of the northeastern Thailand, to be completed by 2019

These important conservation areas have been under the management of the DNP, which aims to step up its surveillance, which aims to enhance the reconnecting of forest complexes.

GSPC Target 6: At least 75 percent of production lands in each sector should be managed sustainably, consistent with the conservation of plant diversity

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Cropping systems of Thailand have been dominated by monoculture, sometimes encroaching into highlands such as the case of corn in the north, rice intensive farming in central plain and pararubber as well as oil palm in the south. Such patterns have long-term negative impacts on the ecosystems and biodiversity. Today, the government has shifted its support for sustainable agriculture, which is more environmentally friendly and better for livelihoods. Specifically, this system contains five subsystems, namely, agroforestry, integrated farming, net theory agriculture, organic agriculture and natural farming systems. However, these new emerging forms remain limited and confined to certain areas; in the past, these forms have increased to 284,918.45 rai in 2015 from 235,523.35 rai in 2014, or 20.97 percent. Most of the increases are found in rice (27.99 percent) and vegetables (187.31 percent) (Earth Net Foundation, 2016). Organic farming areas are very low with only 0.19 percent of the total agricultural land of 149,242,393 rai (Office of Agricultural Economics, 2560). The 12th National Economic and Social Development Plan (B.E. 2560–2564) wants to ambitiously increase the area to 5.0 million rai by 2021, while the national organic agricultural development 2017-2021 sets its target to no less than 600,000 rai by 2021.

A recent monumental change in government policy enables the enhanced role of the private sector in increasing forest cover. Any interest party can now register its land for forest growing activities with the aim to increase timber and non-timber products and services, including growing protected species, timber processing and licence for trade and export.

A quantitative assessment for this goal is not yet possible due to both data availability and assessment processes.

GSPC Target 7: At least 75 percent of known threatened plant species should be conserved *in situ*

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Over 90 percent of threatened plant species are in protected area systems with 964 species in 2015 (Department of National Parks, Wildlife and Conservation, 2017). To a large extent, these are well protected but some species are also distributed outside the protected area systems, thus coming under great pressures – the estimated impacts of which need systematic and well-designed assessment. There is a question of capacity, human action, finances and time to properly conduct reliable assessments. Examples of such scattered species outside the former protected systems exist many not be limited to:

- Water onion (*Crinum thaianum* J.Schulze), which occurred outside the protected area of Khlong Nakha Wildlife Sanctuary, has been conserved by private sectors in the community, government sectors and educational institutions. They propagated the plant in various ways and returned it into nature.

- Sirinthorn Walli (*Phanera sirindhorniae* (K.Larsen & S.S.Larsen) Mackinder & R.Clark): the DNP initiated the project of the Upper Northeastern Forest Plants Conservation in the Bueng Kan province for conserving and propagating rare plant species, which Sirinthorn Valli is one of those.

- Tropical pitcher plants (*Nepenthes mirabilis* (Lour.) Druce) grows in moist lowland or swamp forests, close to the village or in governmental area. During the constructions in such areas, the plants were moved to grow or conserve in nearby habitats, for example, during the construction of the new prison in Surat Thani province.

- The Pha Daeng Project, Mae Sot, Tak Province: the concession mine area of Pha Daeng mine expired. The Forest Department and other departments are developing the area to establish the botanical garden by using the model of Eden Garden in UK. There will be many different species of plants, including rare wild plants in the western region, and also threatened species planted in the forest area. There is also a recreation area for tourism.

In addition, the Royal Forest Department plans to designate another 4.3 million rai of recovered forests for the protection, thus increasing the conservation forest cover by another 7.35 percent. The DNP also steps up other measures to ensure the management of sustainability such as seasoning tourism and the use of forest resources in Phu Kradueng and Kaeng Krachan National Parks. Zoning of use has been made for forest recovery, especially during rainy season. Zoning in certain areas, such as Doi Hua Suea of Inthanon National Park and Phu King in Phu Khiao Wildlife Sanctuary requires a special permit to access the areas. Designated paths have been used to ensure tourists' off-limit; such is the case of Curcuma plantation in Hin Ngam National Park, Doi Hua Suea and Doi Ang Ka in Doi Inthanon National Park and the nature trail in Kok Nok Kraba in Phu Luang Wildlife Sanctuary.

GSPC Target 8: At least 75 percent of threatened plant species in *ex situ* collections should be WHAT, preferably in the country of origin, and at least 20 percent should be available for recovery and restoration programmes

- On track to achieve target at national level
 Progress towards target at national level but at an insufficient rate
 No significant change at national level

Operations

At this moment, there has been no initiative to estimate the *ex situ* collection of threatened species. All of the 964 identified threatened species (Department of National Parks, Wildlife and Conservation, 2017) are a live collection dispersed *ex situ* in various sites all over the country. The Botanical Gardens collects more than 450 plant species and have long-term plans to continue the collection. It is estimated that this together with the research collected by the DNP, the *ex situ* collect could be half of all the threatened species in Thailand.

It should be mentioned that Thailand has had a Memorandum of Cooperation (MoC) with the Kew Royal Botanical Gardens, UK, to collect seeds of trees. This is a five-year project (2015-2020) that collaborates with the DNP, Thailand Science and Technology Institute and the Forest Restoration Research Unit. FORRU of Chiang Mai University from the Thai side, aims to support the seedbank, starting with economically significant and rare species, such as Siamese rosewood and teak. The National Biotechnology and Genetic Engineering Center started a seedbank project, which starts its operation in 2019. Thailand *ex situ* conservation selects critically threatened species and reintroduces them into natural habitats *in situ* later on. Examples are numerous:

- The DNP collected wild seeds, propagated 85,000 rare orchids and reintroduced them through a high-profile project during 2011- 2017.
- Water onion (*Crinum thaianum* J.Schulze). Seed germination, tubers segregation, and tissue culture research are done by the DNP and the private sector in the local administration in the Ranong and Phangnga province.
- Mok Rachini (*Wrightia sirikittiae* D.J.Middleton & T.Santisuk) and Kanchanika (*Santisukia pagetii* (Craib) Brummitt). Seed germination, grafting and budding are done by the Phu Khae Botanic Garden.
- Maha Phrom Rachini (*Mitrephora sirikitiae* & Chalermglin) Maha Phrom (*M. winitii* Craib) and Krai (*M. keithii* Ridl.). Seed germination, grafting and budding are done by the Thailand Institute of Scientific and Technological Research (TISTR).
- Champi Sirinthorn (*Magnolia sirindhorniae* Noot. & Chalermglin). Seed germination is done by TISTR, distributed to different institutions and returned to nature.
- Ueang Fa Mui (*Vanda coerulea* Griff. ex Lindl.). Seed germination and tissue culture are done by Suranaree Technology University for both community income and return to nature.
- Ruang Phueng (*Schoutenia glomerata* King subsp.*peregrina* (Craib) Roekm.). The propagation of the plants is done by volunteers of the Pracharat government project.
- The Department of Plant Science, Faculty of Science, Mahidol University is working on the conservation and reproduction of Daeng Dara (*Gymnocladus burmanicus* C.E.Parkinson), Nuat Suea (*Tacca plantaginea* (Hance) Drenth), Dok Din Muaeng Kan (*Curcuma candida* (Wall.) Techaprasan. & Skornick.) and other two species are incooperated in the Rama 9 Botanic Gardens, i.e. Thanon Chai (*Buchanania siamensis* Miq.) and Makak (*Spondias bipinnata* Airy Shaw & Forman).

- Back to the forest Project, orchids are considered Aueng Sae (*Dendrobium scabrilingue* Lindl.) and Fa Mui (*Vanda coerulea* Griff. ex Lindl.). The communities in Doi Po Koe Si Cho, Muaeng district and Mae Hong Son are under the Highland Reaearch Organization and they work together to preserve the species.

- The compilation of the research study on 14 rare plants propagation and rehabilitation in the local community e.g. Tin Hung Doi (*Paris polyphylla* Sm.), Hong Pha Kham (*Rhynchanthus beesianus* W.W.Sm.), Noi Na Khreua (*Kadsura* sp.) and Dok Trae Wong (*Lilium primulinum* Baker var. *burmanicum* (W.W.Sm.) Stearn) are under the Highland Reaearch Organization.

In 2017, the DNP continued its rare orchid project with an additional 26 species, shown in **Table 6**, for the reintroduction into the wild. At the same time, it collects and disseminates associated knowledge and raises awareness and interests of stakeholders in this initiative, ensuring its sustainability. (Department of National Parks, Wildlife and Plant Conservation, 2017).

Table 6: List of rare plant species for the living Collections Project of the DNP

No.	Thai name	Scientific name
1	Maha Phrom	<i>Mitrephora winitii</i> Craib
2	Bu rong phu luang	<i>Dasymaschalon echinatum</i> Jing Wang & R.M.K.Saunders
3	Bu rong kan yao	<i>Dasymaschalon filipes</i> (Ridl.) Bân
4	Panan chang	<i>Goniothalamus giganteus</i> Wall. ex Hook.f. & Thomson
5	Saet sayam	<i>Goniothalamus repevensis</i> Pierre ex Finet
6	Tamyao khon tum	<i>Alphonsea cylindrica</i> King
7	Priknok mo kha	<i>Orophea kerrii</i> Kessler
8	Cham pa yala	<i>Polyalthia lateritia</i> J.Sinclair
9	Mok rachini	<i>Wrightia sirikittiae</i> D.J.Middleton & T.Santisuk
10	Mok luaeng	<i>Wrightia viridiflora</i> Kerr
11	Kanchanika	<i>Santisukia pagetii</i> (Craib) Brummitt
12	Rakhang thong	<i>Pauldopia ghorta</i> (Buch.-Ham. ex G.Don) Steenis
13	Khae than bok	<i>Radermachera peninsularis</i> Steenis
14	Pheka phru	<i>Radermachera pinnata</i> (Blanco) Seem.
15	Yang khuan	<i>Dipterocarpus retusus</i> Blume
16	Krabok krang	<i>Hopea helferi</i> (Dyer) Brandis
17	Kuam daeng	<i>Acer calcaratum</i> Gagnep.
18	Kuam chiang dao	<i>Acer chiangdaoense</i> Santisuk
19	Kuam phu kha	<i>Acer pseudowilsonii</i> Y.S.Chen
20	Plup yot dam	<i>Diospyros collinsiae</i> Craib
21	Llam bit dong	<i>Diospyros filipendula</i> Pierre ex Lecomte
22	Maplup chao khun	<i>Diospyros winitii</i> H.R.Fletcher
23	Mahat thai	<i>Artocarpus thailandicus</i> C.C.Berg
24	Plao ngoen	<i>Croton sepalinus</i> Airy Shaw
25	Prong khao chamao	<i>Cycas chamaoensis</i> K.D.Hill
26	Phya mai bai san	<i>Podocarpus pilgeri</i> Foxw.

Source: Department of National Parks, Wildlife and Plant Conservation (2017)

In addition, the Botanic Garden Organization was established by the Queen Sirikit Botanic Garden and 5 branches in many regions of Thailand. Moreover, two botanic gardens are being prepared for the establishment. The goals of all botanic gardens are to improve the

habitats of plants for the living collections and the conservation of threatened plant species. Today, at least 450 species are conserved. Additional species are in the continuous plan for the conservation to reach the target of the protection of at least 50 percent of threatened species. The propagation of 53 species are being prepared to return to their habitats. Eight species have already been returned to their habitats for rehabilitation and at least 47 species are further planned. The return of 21 threatened species are planned between 2018-2021 to increase their population in nature.

GSPC Target 9: 70 percent of the genetic diversity of crops, including their wild relatives, and other socio-economically valuable plant species are conserved, while respecting, preserving and maintaining associated indigenous and local knowledge

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Thailand has accumulated and registered the agricultural plant species, wild species and economic species. The ex-situ conservation is done in many different ways such as through the seed bank, planting crop, the glass tube, freezing and GeneBank. All of these conservations are implemented by the following:

The Rice Department established an operation center for the collection of the good breed of rice seed in National Rice research in Prathum Thani. There are now more than 24,000 collections divided into native rice of 17,000 collections, good variety rice more than 1,300 collections, introduced rice more than 3,000 collections and wild rice more than 1,000 collections. Moreover, their wild variety is preserved in the in-situ conservation in the plantation in Ban Sang subdistrict, Prachin Buri, in the area of 87 Rai and in Po Daeng subdistrict, Sakon Nakhon, in the area of 25 Rai.

Department of Agriculture implements the work by:

- **GeneBank of Biotechnology Research and Development Office.** This conserves gene plants as seed bank. Today, 161 genes are conserved and 32,866 specimens are collected, of which are seeds of rice, corn, wheat, barley, different kinds of beans, sesame, saffron, cotton, castor bean, Job's tear, rape seed, commelina seeds, including seeds of flowering plants, trees, vegetables, etc. The office has the control room at the moderate temperature of 5 degree celsius, the room height is a 4-storied building (86 by 24 square meter), which is controlled by an automatic bullet crane system with a high capacity of 150,000 collections and the long-termed conservation room of minus 10 degree Celsius, which has conserved genes for more than 50 years. The area is 76 square meters and stores about 400,000 gene collections.

- **Cassava gene bank,** International Center for Tropical Agriculture. Thailand was selected to establish the Cassava gene bank in 2000, by Columbia, which is the second world Cassava gene bank. Currently, 859 varieties of cassava are conserved in the experimental field for observing the morphological and physiological characters. 800 varieties are in tissue cultures in laboratory.

- The **Bangkok Herbarium, Sirindhorn building, Department of Agriculture** is the herbarium for keeping the historical collections, including dried plant specimens, spirit collections, carpological and seed collections. It is one of the most important herbaria in Thailand for historical references on genetic resources and useful information. In 2017, 887 dried specimens

and 195 spirit collections were prepared, leading to a curation of well preserved 103 carpological and seeds.

▪ **The conservation in the field collection** are implemented in various centers of Department of Agriculture; 19,219 accession were planted in the field of 69 centers of the department all over Thailand. These collections are used for researches and genetic resources conservation. The department is divided into 3 main groups:

1) Field and Renewable Energy Crops Reserch Institute, with 9 centers, preserving 6,205 accessions, including the bean family, sugar cane, kenaf, Chinese grass cloth, oil palm, asiatic bitter yam and medicinal plants.

2) The Horticulture Research Institute with 10 centers, preserving 8,081 of plant genetic resources, including the red roselle, banana, coffee, roses, cacao, orchids, torch ginger, durian, lotus, macademia, citrus, mango, vegetables, bamboo, curcuma, chili and solanum, medicinal plants, fruit trees and fragrant/flowering ornamental plants.

3) The Office of Agricultural Research and Development with 50 regional centers, preserving 4,933 of plant genetic resourcese. These mostly include tea, durian, taro, bamboo, macademia, plum mango, cassava, rubber plant, physic nut, pineapple, medicinal plants, fruit tree, fragrant/ ornamental plant and vegetables.

List of germ plasm, which are conserved in the field collection of the Department of Agriculture Region (**Shown in Table 7**).

Table 7 Germ plasm conserved in field collection in regional centers of the Department of Agriculture

No.	Plant species	Scientific names	No. of collections	Office of Conservation ¹
1	Kra Chiap Daeng	<i>Hibiscus sabdariffa</i> L.	40	Si Saket Horticulture Reserch Center
2	Kluai	<i>Musa</i> spp.	133	Yala Horticulture Reserch Center
3	Ma wing	<i>Doritis</i> spp.	126	Si Saket Horticulture Reserch Center
4	Wai	<i>Dendrobium</i> spp.	2,666	Si Saket Horticulture Reserch Center
5	Kluai mai	Family Orchidaceae	210	Chumphon Horticulture Reserch Center
6	Ka Fae	<i>Coffea</i> spp.	336	Chiang Mai and Yala Horticulture Reserch Center
7	Kulap	<i>Rosa</i> spp.	100	Loei Horticulture Reserch Center
8	Koko	<i>Theobroma cacao</i> L.	106	Yala Horticulture Reserch Center
9	Cha	<i>Camellia sinensis</i> (L.) Kurz var. <i>assamica</i> (J.W.Mast.) Kitam.	64	Chiang Mai Horticulture Reserch Center
10	Kala	<i>Etilingera elatior</i> (Jack) R.M.Smith.	213	Loei and Yala Horticulture Reserch Center
11	Durian	<i>Durio</i> spp.	118	Uttaradit and Chanthaburi Horticulture Reserch Center
12	Lotus	Nelumbonaceae and Nymphaeaceae family	197	Si Saket Horticulture Reserch Center

No.	Plant species	Scientific names	No. of collections	Office of Conservation ¹
13	Po	<i>Corchorus</i> spp.	50	Khon Kaen Horticulture Reserch Center
14	Po Kaeo	<i>Hibiscus sabdariffa</i> L.	50	Khon Kaen Horticulture Reserch Center
15	Po Cuba	<i>Hibiscus cannabinus</i> L.	50	Khon Kaen Horticulture Reserch Center
16	Po sa	<i>Broussonetia papyrifera</i> L.	200	Chiang Mai Horticulture Reserch Center
17	Pan Rami	<i>Boehmeria nivea</i> (L.) Gaudiich.	40	Khon Kaen Horticulture Reserch Center
18	Palm nam man	<i>Elaeis guineensis</i> Jacq.	3,868	Krabi Horticulture Reserch Center
19	Phak	Many families	411	Chumphon, Phrae and Uthai Thani Horticulture Reserch Center
20	Phuaek	<i>Colocasia esculenta</i> (L.)Schott.	310	Pichit Horticulture Reserch Center
21	Phai	Bambusoideae subfamily	129	Sukhothai Center Pichit Center Nakhon Sawan Center
22	Thua	Fabaceae family	35	Khon Kaen Center
23	Prik & Makhuea	Solanaceae family	112	Si Sa Ket Center
24	Krachieo	<i>Curcuma</i> spp.	82	Chiang Rai Horticulture Reserch Center
25	Kloi	Horticulture Reserch spp.	22	Khon Kaen Center
26	Samun Phrai	many families	3,313	Chumphon, Trang, Si Sa Ket, Ratchaburi, and Suphan Buri Horticulture Reserch Center
27	Macademia	<i>Macadamia</i> spp.	76	Chiang Mai Horticulture Reserch Center
28	Ma nao	<i>Citrus aurantiifolia</i> (Christm.) Swing.	129	Yala Horticulture Reserch Center
29	Ma prang	<i>Bouea macrophylla</i> Gritt.	50	Pichit Horticulture Reserch Center
30	Mango	<i>Mangifera indica</i> L.	288	Pichit, Lampang and Si Sa Ket Horticulture Reserch Center
31	Man farang	<i>Manihot esculenta</i> (L.) Crantz	180 ²	Nakhon Si Thammarat, Yala and Roi Et Horticulture Reserch Center
32	Fruit trees	many families	994	Pichit, Si Sa Ket, Ranong and Phangnga Horticulture Reserch Center
33	Fragrant/ Ornamental plants	many famillies	1,143	Chumphon, Chanthaburi, Si Sa Ket, Sukhothai and Nakhon Phanom Horticulture Reserch Center
34	Yang para	<i>Hevea brasiliensis</i> L.	605	Chanthaburi, Yala and Surat Thani Horticulture Reserch Center

No.	Plant species	Scientific names	No. of collections	Office of Conservation ¹
35	La hung	<i>Jatropha curcas</i> L.	100	Nakhon Ratchasima Horticulture Reserch Center
36	Supparot	<i>Ananas comosus</i> (L.) Merr.	44	Phetchaburi Horticulture Reserch Center
37	Oi	<i>Saccharum</i> spp.	1,231	Khon Kaen and Suphan Buri Horticulture Reserch Center
38	Oi pa	<i>Saccharum spontaneum</i> L.	300	Khon Kaen Horticulture Reserch Center
39	Ya dok lao	<i>Erianthus</i> spp.	150	Khon Kaen Horticulture Reserch Center
40	Other plants	many families	948	Distributrd in many Horticulture Reserch centers
total			19,219	

Note: ¹ An Office, which has samples of collections more than any other offices

² A number of the cassava collection, which stands apart from the number of collections in the cassava germ plasm bank, Horticulture Reserch Center, Rayong.

Source: Adopted from the Agricultural plant research and technology, Biodiversity Management, Group of monitoring and assessment, Department of Policy Planning and Agricultural Research, and the Department of Agriculture (Latest in November 2018)

The conservation of plant genetics in Thailand is very inclusive; many parties are involved, sometimes for various objectives. The Plant Genetic Conservation, under the Patronage of the Crowned Princes, uses the seedbank to store seeds, DNA and cultured plant tissues to conseve as well as develop genetic resources. BEDO established a Community BioBank to conseve both the bioresources and local knowledge by using a participatory approach. With multiple goals and objectives, the project conserves and propagates knowledge by being a biodiversity learning and research center, which leads to protection, conservation and sustainable use. An inventory for some plants include bananas, orchids, ferns, local flowers, and wild gingers. Moreover, the Institute of the Highland Development further enhances the participation of upland and highland communities for the plant conservation for local the food bank by building and maintaining plant nurseries. Selected plants are propagated and reintroduce into the wild. Already, 88 communities have collected 950 species, which were planted by 5,170 households on 135 rai and on 2,188 rai of the community forests.

GSPC Target 10: Effective management plans will be in place to prevent new biological invasions and to manage important areas for plant diversity that are invaded

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Thailand has had management plans for invasive alien species. In the process, there are revisions and updates on alien species, together with the control and surveillance, to reduce the impacts on local plants and ecosystems. In 2017, the OEPP drafted Thailand's priority alien species, thereby selecting high-priority alien species, using indices developed for the purpose. It identified 11 species shown in **Table 8**.

Table 8: Important alien species in Thailand

No.	Thai names	Scientific names	Area of distribution	Status of distribution
1	Maiyarap Yak	<i>Mimosa pigra</i> L.	<ul style="list-style-type: none"> • Protected areas • wetland • lowland 	<ul style="list-style-type: none"> • Increasing distribution • Implementation plan but not successful
2	Ya khachon chop dok lek	<i>Pennisetum polystachion</i> (L.) Schuit.	<ul style="list-style-type: none"> • All nature areas • Protected areas • Agricultural areas • Urban areas 	<ul style="list-style-type: none"> • Constant distribution • No implementation plan
3	Ya khachon chop dok yai	<i>Pennisetum pedicellatum</i> Trin.	<ul style="list-style-type: none"> • Nature areas • Protected areas • Agricultural areas • Urban areas 	<ul style="list-style-type: none"> • Constant distribution • No implementation plan
4	Ya khachon chop dok lueang	<i>Pennisetum setosum</i> (Sw.) Rich.	<ul style="list-style-type: none"> • Nature areas • Protected areas • Agricultural areas • Urban areas 	<ul style="list-style-type: none"> • Constant distribution • No implementation plan
5	Phak Top Chawa	<i>Eichhornia crassipes</i> (Mart.) Solms	<ul style="list-style-type: none"> • Nature areas • Protected areas • Important wetlands 	<ul style="list-style-type: none"> • Constant distribution • Implementation plan but not successful • Phak Top Chawa act in 1913
6	Sap Ma	<i>Ageratina adenophora</i> (Spreng.) R.M.King & Hob.	<ul style="list-style-type: none"> • Natural areas from 500 m onwards. 	<ul style="list-style-type: none"> • Constant distribution
7	Khi Kai Yan	<i>Mikania cordata</i> (Burm.f.) B.L.Rob.	<ul style="list-style-type: none"> • In northern, central, and eastern regions • Peninsular 	<ul style="list-style-type: none"> • Constant distribution
8	Krathin hang krarok	<i>Prosopis juliflora</i> (Sw.) DC.	<ul style="list-style-type: none"> • Petchaburi • Prachuap Khiri khan 	<ul style="list-style-type: none"> • Continuously increasing distribution • Along the coast in the western part of the Thai gulf • Distributed in Kaeng Krachandam
9	Tup Ruesi	<i>Typha latifolia</i> L.	<ul style="list-style-type: none"> • Wetlands • Protected areas 	<ul style="list-style-type: none"> • Continuously increasing distribution • No implementation plan
10	Kok elephant	<i>Typha angustifolia</i> L.	<ul style="list-style-type: none"> • Wetlands • Protected areas 	<ul style="list-style-type: none"> • increasing distribution • No implementation plan
11	Chol Hu Nu Yak	<i>Salvinia molesta</i> D.Mitch.	<ul style="list-style-type: none"> • Wetlands • Protected areas 	<ul style="list-style-type: none"> • Increasing distribution • No implementation plan • Monitoring the distribution

Source: Office of Natural Resources and Environmental Policy and Planning (2018)

Moreover, there are additional critical list that requires close surveillance and additional research to gain a better understanding, shown in **Table 9** below.

Table 9: List of potential threatened species in the future ecosystem

No.	Thai names	Scientific names
1	Phak Krachut	<i>Neptunia javanica</i> Miq.
2	Krathin thet, Dok kham tai	<i>Acacia farnesiana</i> (L.) Willd.
3	Sap Suea	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.

Source: Office of Natural Resources and Environmental Policy and Planning (2018)

The project came up with four approaches to prevent, control and get rid of invasive species: 1. Create an inventory of the significant impacts in biodiversity hotspots. 2. Study, trace and analyze potential impacts of alien species into the country, gauging its risks and prescribe measures to manage those risks. 3. Promote research on the optional use of invasive species. 4. Disseminate knowledge on invasive alien species and build a capacity of related government agencies, local governments and people to participate actively and efficiently in the data use by being an active surveillance agent in control and eliminate invasive alien species. This effort also includes illegal trade and imports of alien species.

In addition, the Department of Plant Science of the Faculty of Science, Mahidol University in collaboration with the Rama 9 Public Park, revised the 3,500 list of plants imported into Thailand with an aim to manage risks from invasive alien species. The DNP, in this regard, also continues to support its inhouse research with a focus on the crucially protected areas such as the Kangkachan forest complex, Thai Prachan National Park and Phukiew-Namnaw forest complex. The ultimate goals are to equip on-site officials with information in monitoring and controlling invasive species in their areas of responsibility and perhaps eventually to eradicate them. Here are some relevant examples:

- Activity on taking off Sap Suea from grassland in Nong Phak Chi, Khao Yai National Park. Sap Suea (*Chromolaena odorata* (L.) R.M. King & H.Rob.) is the tenth most harmful alien species, which totally destroys the ecosystem investigated by the Global Invasive Species Database (GISD) and the IUCN (International Union for Conservation of Nature). Sap Suea is the herb, which grows in large straggling shrubs and controls other plant growth, and releases chemical substances, which stop nearby plants to grow.

- The study on the biological control plan for Krathin Hang Kra Rok (*Prosopis juliflora* (Sw.) DC.) in the Hat Wanakon National Park, Prachuap Khiri Khan by the Office of Forest Research and Plant Conservation, Department of National Parks, Wildlife and Plant Conservation.

The study has provided the dissemination and developed effective communication for the public relation with pictures and data of the violence of Krathin Hang Kra Rok in the ecosystem. The people will be aware and stay alert to get rid of the seedlings of this plants before they produce the stiff spine, preventing the wide distribution.

Objective 3 Plant diversity is used in a sustainable and equitable manner

GSPC Target 11: No species of wild flora endangered by international trade

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Thailand became a member of CITES and has actively been participating in implementing measures and commitments called for by the convention. The Department of Agriculture is the focal point, undertaking the following measures and activities:

- 1) Establish a committee on plant varieties and plant conservation, empowered by the Plant Variety Act, B.E. 2518 (1975), to establish criteria, approaches and conditions for the control of conserved plants.
- 2) Establish measures to implement the Plant Variety Act, B.E. 2518 (1975), later revised in 1992.
- 3) Establish plant quarantine checkpoints all over Thailand.
- 4) Take strict control measures to regulate import, export and reexport of Siamese rosewood and its families, and orchids, appearing in the 2nd list.
- 5) Compile and publish annual reports on trade statistics for wildlife and plants, also send annual reports to the CITES Secretariat.
- 6) A CITES research group is established in the Department of Agriculture to analyze risks associated with non-detriment findings.
- 7) Register growers of conserved plants, listed in CITES.

On the international front, Thailand actively collaborates with the international community in controlling and preventing all forms of illegal trade, especially, the Siamese rosewood. Cross-border cooperation is promoted, which is the case in Thailand and Malaysia.

GSPC Target 12: All wild harvested plant-based products will be sourced sustainably

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Thailand has harvested non-timber products from its forests for food, ornamental and medicinal use. The Thai Medicine Act, B.E. 2542 designates areas under the protection based on origin and biodiversity richnesses. This is to reduce and mitigate risks associated with human interference into those habitats as well as to ensure species survival in the wild. Most of these areas are already protected under different legal regimes. Examples are the Phulanka National Park in Nakhon Phanom province and the Pangsida National Park in Sakaeo province. The Department of Thai and Alternative Medicine designated 60 community forests to be in situ sites for the production, conservation and sustainable use of herbs, and has started an Herbal City project to steward the initiative.

Existing laws strictly prohibit the extraction of plants from the wild, except for research and academic purposes, which requires official permits, as necessary. On 22 May 2018, the Cabinet passed a resolution to approve a draft Community Forest Act, proposed by the Ministry of Natural Resources and Environment. Consequently, this law will open an opportunity for local

communities to participate in the conservation and sustainable use of forest resources, both for home consumption and limited commerce as mutually agreed by members of the said communities. It is expected that all of the 21,850 villages covering an estimated area of 19.1 million rai will join the already practiced 10,795 villages covering 5.98 million rai, under the previous law.

Harvest of orchids from the wild is allowed by the Forests Act, B.E. 2484 (1941), limited to 20 plants maximum. Commercialization of the orchids, however, is only for those from farms. During 2020-2024, the Botanical Gardens Organization wishes to work with the local community in the Mae Hong Son province in northern Thailand to reproduce and use wild orchids in sustainable ways through sustainable tourism and various forms of product development.

GSPC Target 13: Indigenous and local knowledge innovations and practices associated with plant resources will be maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Recognizing the importance of biodiversity-related wisdom and traditional knowledge, Thailand undertook an initiative to collect and collate them into a series of encyclopedias. These are the following: four regional themes around food, use of herbs, local Thai wisdom local Thai rice, local health wisdom, local beauty wisdom and a manual for wisdom collection. Moreover, a “family forest” project was initiated to convert a monocrop plot to be integrated in the forest as a food and medicine sanctuary for family use. This organic forest suffices family demand. Excess supply could be commercialized based on the Sufficiency Economy Philosophy of Rama IX. A certification scheme, called BIO Economy, has also been promoted.

The Highland Research and Development Institute, an independent body also collects and collates wisdom and traditional knowledge of local plant use. Five series have been produced for five highland communities in Chiangmai, Nan and Tak provinces.

The Royal Project Foundation also collates knowledge from local upland and ethnic groups on the use of 1,489 wild plants in northern Thailand. The inventory registers local names, botanical names, physiology, site and alternative usages, including food and fiber.

Traditional medicine in Thailand has been recently revived in order to make it part of the main-stream health care approach. Thailand has an extensive list of herbs in its main official lists in its universal health care system. Of note, the Chaophraya Phubhate hospital plays a pivotal role in this regard, managing the full cycle of supply chain and health services using herbs and Thai alternative treatments. Its operations have consequential positive impacts on the society and on a global scale in terms of the generation; new and revived knowledge raises awareness, which in turn raises product and emphasizes health practice standards that increase added values for biodiversity resources.

Last but not least, the Thai governments and agencies are developing the promotion of Thai herbs, wisdom and traditional knowledge. Hence, it conceived Thailand’s first Thai Herbal Development Master Plan, B.E. 2560-2564. The aim is to conserve and promote valuable knowledge and wisdom of Thai herbs with an estimated variety of 11,625. Only a fraction (15.5 percent) of this are fully and efficiently used. (Ministry of Public Health, 2017)

Objective 4 Education and awareness on plant diversity, its role in sustainable livelihoods and importance to all life on earth is promoted

GSPC Target 14: The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

Thailand has given a very high priority to education and awareness raising. It aims to use activities to lay a solid foundation for plant conservation among the youth. Specifically, for example, the Promotion of Science and Technology Institute of the Ministry of Education created the 2008 core basic biodiversity curriculum together with learning standards and indicators. Within this, plants are an integral part. The knowledge on plant diversity and conservation gradually progresses to a higher level of education in biology. Moreover, 12 agencies collaborate in extra-curricula activities and summer camps, aiming to enhance awareness. Many other agencies work with at least 939 schools across the country in teaching, curriculum development and botanical garden projects—all to increase awareness, implant bioethics and appreciation for local wisdom.

The private sector also has an important role to play in this regard. The TV channel called Now 26 collaborates with a private company to continue to produce quality documentaries in four series. These contain subject matters on biodiversity and plants. There are other programs, such as Wetlands and Forest Citizen, all of which aim to provide entertainment and the essence of biodiversity conservation, use and benefits.

The Botanic Garden Organization established the Natural History Museum for the main purpose of emphasizing the importance of plant biodiversity for humans. The botanical garden grew plants into groups in the greenhouse and natural area for the public awareness on plants. The nature trails in the garden were also built, not only for the knowledge on plants but also for information on the wildlife and ecosystem. In every year, huge amounts of students and people come to visit to inform themselves on the national resource conservation and environment.

The ONEP has been proactive in the public communication for biodiversity, using short documentaries and direct communication to be disseminated through TV channels and public transports, including mass transit systems and organizations of summer camps for the youth.

Additionally, annual meetings and conferences have been organized to exchange information and knowledge on biodiversity and conservation. For instance, meetings on biodiversity management, plants science, plant expos and annual pomology conferences are organized to enhance broad stakeholders' collaboration.

Objective 5 The capacities and public engagement necessary to implement the Strategy will have been developed

GSPC Target 15: The number of trained people working with appropriate facilities in plant conservation will have increased, according to national needs, to achieve the targets of this strategy

- On track to achieve target at national level
- Progress towards target at national level but at an insufficient rate
- No significant change at national level

Operations

All 156 state-owned universities in Thailand have actively been researching on various aspects of plants, forest resources and environment. Some of these are parts of the ‘normal’ education, by various relevant subjects of studies such as field crops, biology, pomology and so on. Specifically, the efforts in this human resource development have been fruitful to ensure sound policy making and sustainable development for Thailand.

Between 2016-2018, relevant agencies focused on building capacity of those who are involved and invested in equipments and instruments necessary to facilitate learning, research and experiments in laboratories as well as experiment plots. Despite challenges in human development, indicated in Table 10, the efforts are strived to fulfill set goals.

Table 10 Example of the Training course for raising the forest officer ability

No.	Organization	activities/target group	course
1	Botanical Garden Organization	Priliminary Training on Plant Taxonomy	- The 9 th Plant Taxonomy Course, 32 participants
			- The 10 th Plant Taxonomy Course, 39 participants
			- The 11 th Plant Taxonomy Course, 30 participants
		Advanced Plant Taxonomy Course	- The 5 th Advanced Plant Taxonomy Course, 31 participants
			- The 6 th Advanced Plant Taxonomy Course, 35 participants
			- The 7 th Advanced Plant Taxonomy Course, 30 participants
Presentation on “Botanical garden and plant conservation”	- 108 participants		
Training on living plants and botanical garden management	- 2 Botanical officers from Seychelles		
2	DNP	Dendrology Course	- The 1 st Dendrology Course
			- The 2 nd Dendrology Course
		Dendrology in protected area course	- The 1 st Dendrology in protected area course, 30 participants

No.	Organization	activities/target group	course
		Training course on biodiversity survey in protected areas for forest officers	- 70 participants
3	Royal Forest Department	Arborist course	-The 1 st Arborist Course, 100 participants
			-The 2 nd Arborist Course, No specific number of participants
			-The 3 rd Arborist Course, 47 participants
			-The 4 st Arborist Course, 49 participants
		Professional Arborist course 1	-The 1 st Professional Arborist course, 41 participants
			-The 2 nd Professional Arborist course, 39 participants

GSPC Target 16: Institutions, networks and partnerships for plant conservation will be established or strengthened at national, regional and international levels to achieve the targets of this strategy

- On track to achieve target at national level
 Progress towards target at national level but at an insufficient rate
 No significant change at national level

Operations

Thailand has a botanical network that the government and private sectors fully participate in. There is at least one annual national plant conference. The conservation network also includes school botanical gardens, Thailand Ornamental Plants Association, biodiversity and environment conservation group (Siamensis), network of plant inventory experts and the independent Save Some Seeds group. There is no formal group that supports the GSPC. Between 2016-2018, Thailand has a project to enhance the capacity of networks of institutions and partners at various levels:

▪ **National level**

- BEDO innovates a smart media projects to improve access of youth to biodiversity resources data and information called “BIOGANG” to raise awareness and recognition of biodiversity resources consistent with the Integrated Biodiversity Master Plan, 2015-2021. The school educational network will play an important role in engaging students in surveys, conducting an inventory of bioresources, also to increase learning, research skills and ‘buy in’ to biodiversity conservation, development as well as cherish local wisdom and knowledge.
- The Thailand Biotanic Gardens hosts an academic conference on collaboration in order to create and raise the level of collaboration in Thailand. 26 participants from 11 multi-stakeholder agencies are involved in this initiative.
- The Department of Marine and Coastal Resources created a database on relevant stakeholder networks. Presently, 508 groups with 10,765 members are on the list, including activities to enhance their capacity and link them with 200 members of voluntary groups and networks supported by the Department.

- The Thailand Plant Science Association supports research, education and disseminates academic and professional works in collaboration with other relevant entities in and outside Thailand.
 - The Flora Association coordinates and disseminates data as well as information among members and networks of growers, traders and the relevant public sector.
 - The various voluntary networks of the DNP, such as national networks, forest fire networks and citizen networks for forest protection continue to function effectively.
 - The Highland Research and Development is an independent entity that also supports local community networks in the collection of local seeds and tubers. Five local community seedbanks are created for local vegetables and high-land rice.
 - The Plant Genetic Conservation Project, under that patronage of the Crowned Prince, has been working closely with all stakeholders to promote school botanic gardens and the conservation of other local plant genetics.
- **Regional level**
 - BEDO creates partnerships and collaborations with other agencies in the region on the economic benefits from biodiversity. For instance, BEDO has a partnership with Vietnam, on herbs, and specifically with its National Institute of Medicinal Material (NIMM) on the development and production of herbs.
 - In 2018, a research project on Payung Trees in Mekong subregion was initiated. Researchers from China, Laos PDR., Cambodia, and Vietnam collaborate on the conservation of Payung genetics in natural forests and plantations.
 - The Mekong WET: Building Resilience of Wetlands in the Lower Mekong Region project enhances the adaptive potential of wetlands, especially the Ramsar designated entries in Cambodia, Laos PDR., Thailand and Vietnam.
 - **International level**
 - The BEDO conducted a workshop with China, Belgium and South Korea to establish a BioBank. This initiative will enhance international collaboration in the conservation and sustainable use, participation and raising awareness. The Payment for Ecosystem Service (PES) was also promoted in collaboration with offices in Japan and Sophia University.
 - Besides its regular active functions, the National Science and Technology Development Agency (NSTDA) is set for its 2019 international conference in May to enhance mutual learning, relations and collaboration in biodiversity conservation, which all international botanical gardens representatives will participate in.
 - The Department of Thai and Alternative Medicine enhances its collaboration with similar agencies from Myanmar, Bhutan, India and China.

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description:

The ONEP is Thailand's national focal point for the GSPC and the CBD. Its functions include but are not limited to coordinating, drafting the master and action plans, ensuring implementation, monitoring and evaluation, collating data and information, and reporting. ONEP works through committees, subcommittees and taskforces in collaboration with other related and relevant agencies and entities. It expects a reporting system that is thorough and efficient in order to report its implementation of the biodiversity conservation to the CBD Secretariat.



Section 6

Additional information on
the contribution of indigenous peoples
and local communities

Section VI

Information on Participation of Local Communities

This section is a voluntary report on the participation of indigenous people and local communities regarding the implementation of biodiversity activities that are consistent with the Aichi Biodiversity Targets as well as other relevant context in this report

Thailand has committed to enabling cross-sectoral participation, particularly by local communities, for management of biodiversity. Such emphasis was legitimized by Article 43 of the current 2017 constitution, which reaffirms the right of citizens and communities to manage, maintain and utilize natural resources while. NEW SENTENCE Meanwhile, the balance between environment and biodiversity as stipulated by relevant legislations. In addition, Article 57 of the constitution further indicates that the state is obligated to conserve, protect, maintain, restore, manage and utilize (or arrange for utilization of) natural resources, the environment and biodiversity in balanced and sustainable manner by ensuring that relevant citizens and local communities participate in and benefit from such actions in accordance to provisions of relevant legislations.

Participation of local communities in mobilizing the biodiversity management in Thailand has contributed to the efforts to achieve the following 3 Aichi Targets;

Target 5 (Strategic Goal B): Maintenance of natural habitats.

Target 13 (Strategic Goal C): Safeguarding the genetic diversity of cultivated plants, farmed and domesticated animals as well as of wild relatives.

Target 18 (Strategic Goal E): the traditional knowledge, innovations and practices of indigenous and local communities.

☑ Target 5 (Strategic Goal B)

Notable contributions of direct and indirect participation of local communities in maintaining and restoring natural habitats include the management of community forests, restoration of coastal resources, surveillance on the destruction of natural habitats and the development of local networks for conservation.

Community forest management: Local communities in several areas have maintained their community forests in accordance with both their traditional practices and the official guidance issued by the Royal Forest Department. This action included conducting surveys and delineations of the forests, formulating local committees to oversee activities, developing rules on forest utilization and maintaining as well as mapping forests areas. Local communities can file for an official registration of their community forests and have their registrations renewed every 5 years. The number of the filing and renewing of the registrations has increased gradually and the official registry of the community forest was found to have contained 2,757 sites in 2018, covering the total area of 3917 square kilometers nationwide.

Restoration of coastal resources: Coastal communities regularly participated with public and private organizations in activities on mangrove rehabilitation. As a result, mangrove forests were found to increase in size in several areas while a positive trend was observed in the rate of change in mangrove forests nationwide. In addition to the action on mangrove forests, local communities were reportedly taking part in building bamboo fences

as a measure against coastal erosion, working with public organizations in designating marine and coastal conservation areas, conducting surveillance on encroachment of mangrove forests and exploitation of coastal resources, restocking fishery resources and disposing solid waste in coastal areas.

Surveillance on destruction of natural habitats: Local communities were found to have played a vital role in conducting surveillance and report on encroachment and destruction of animal and plants habitats. Such destructive activities were reported to have included those derived from the quarry concession, the use of illegal fishing tools, discharge of untreated wastewater into natural reservoirs and dredging of waterways.

Development of local networks for conservation: The formal and informal organization of networks was undertaken by local communities with the aim of enabling the spatial management of habitats. Networks operated by the communities with support from public organizations and NGOs were found to include the Community Forests Network of Nan Province, the Network for the “Fish-Hook” Coastal Areas of the Gulf of Thailand, the Tha Chin Watershed Network, the Network of Community Forests in the Corridor of the 5 Eastern Provinces and the Western Forest Complex Network.

Target 13 (Strategic Goal C)

Participation of local communities in safeguarding genetic diversity mostly consisted of activities on the conservation of plants and other valuable species.

Plants inventory, specimen collection and re-propagation of plants species: Local communities, which largely consisted of farmers, were reported to have participated in the royal initiative of Her Royal Highness Princess Maha Chakri Sirindhorn on the conservation of plant genetic resources. The participation included volunteers who surveyed and documented plant species found outside the forest areas of their communities while they protected plant genetic resources of the forests. The initiative also consisted of activities to collect specimens and re-propagate native orchids, wild orchids and other native plant species.

Conservation of rice: Genetic diversity of rice is of tremendous importance to the country’s food security and contributes significantly to agricultural biodiversity as a whole. The conservation by local communities of the native varieties of rice and their genetic materials could be considered as an in-situ protection of biodiversity and was found to have included a collaborative collection of native rice seeds. The conservation maintained traditional farming practices and preserved local traditions related to rice as well as tourist promotion (i.e. visits to Sao Vi Tee Rice Breeding and Farming Center located in Muang District of Khon Kaen Province, Chuea Phloeng Rice Conservation Group at Chuea Phloeng Sub-district, of Prasat District in Surin Province, the native rice seed production facility of Phon Ngam Ta Village located in Ban Paen Sub-district of Phon Na Kaeo District in Sakon Nakhon Province, Praya Lerm Kang Rice Breeder Group located in Nam Nao District of Phetchabun Province). In addition, efforts were made in enabling the conservation of endemic rice varieties including Luem Pua Glutinous Rice of the Northern Region, Purple Rice of the Northeastern Region, Sao Hai Rice of Saraburi Province, Sung Yod Brown Rice of Phatthalung Province and Leuang Patew Rice of Chumphon Province.

Conservation of herbal plants: Herbal species have been interconnected with traditions, culture and beliefs of local communities since the ancient time. However, the intergenerational accumulation and transfer of knowledge on the species were often without any documentation, resulting in the loss of such knowledge and the decline in its application. With an aging demography and the increase in environmentally related illnesses, local

communities in several areas were reported to pay more attention to herbal and other edible plants known to provide effective remedies and cures, which is why they replanted and/or preserved these plants in local forests, public areas for their residents.

☑ Target 18 (Strategic Goal E)

Local knowledge for the conservation and sustainable use of biodiversity was found to be mostly conveyed through local practices, traditional culture, and oral interpretation. Existence of such knowledge would, therefore, depend on ensuring that local communities continue to carry out practices that contribute to the maintenance of biodiversity. Most of these practices were found to include activities that are not harmful to the biodiversity and/or are supportive of the maintenance of biodiversity and ecosystems, such as organic farming, applying the ecosystem approach to the exploitation of natural resources, enhancing soil fertility with manure as well as other organic fertilizers and protecting natural reservoirs. Local respect on the nature was found to derive from the deep-rooted belief that divinities reside in earth, water, forests and mountains and that the divinities would only grant permission to use natural resources in respectable and appropriate manners. Such beliefs were reflected in the local rituals relating to water, rice, forests, mountains, animals and households, and has provided an intrinsic foundation for living in harmony with nature as well as for meeting the long-term goals (2050) of the Aichi Targets.

Local knowledge on the conservation and sustainable use of biodiversity was reportedly recognized in a number of the following areas.

Knowledge on herbal plants: Better inventory and documentation of herbal species were reported with the identification of their local names, possible benefits and methods of usage. In addition, biotechnology was utilized to search, extract, purify and replicate active ingredients of herbal plants in order to conduct experiments on pharmaceuticals and other properties of the ingredients as seen for those derived from *Aloe Vera* and *Lakoocha* (*Artocarpus lacucha*). Such experiments would allow for further developments regarding cosmetics, medicine, food supplements and other products from herbal plants.

Knowledge on traditional farming and fishery: Traditional know-how on soil maintenance, breed selection, farmland management and farming practices were found to be of significant value in pursuing organic farming. While multi-cropping, management of water and other resources at farming level and adoption of the ecosystem approach were identified as contributors to the implementation of the natural policies to promote traditional based organic farming, reduce and remove the use of chemicals in agriculture and promote multi-cropping. In fishery, local knowledge was credited for the development of traditional fish traps (“Tsung”) and for local practices of building artificial shelters and spawning grounds for aquatic species with biodegradable materials such as coconut leaves and branches.

Knowledge on management of reservoirs: Local knowledge was found to play a prominent role in modifying weir systems to better accommodate traditional practices of the water allocation. Such action included the appointment of leaders and oversight committees to ensure that water resource were allocated in accordance to the need of each area, providing for an equitable sharing of the resource from upstream to downstream areas and ensuring peaceful co-existence among all users.

Community practices related to conservation and sustainable use of biodiversity: Practices found to contribute to the conservation and sustainable use of biodiversity included taking formal and informal steps to formulate local rules on forest harvests and re-plantation, deciding on the method for harvesting bamboo shoots, scheduling periods for harvests of

bamboo shoots and wild mushroom, designating a period when the use of local forests is prohibited, banning fishing during breeding seasons, prohibiting any catch below the allowed minimum size and designating a spawning ground for protection. In addition, several communities were found to individually or collectively initiate community-based ecotourism by organizing sight-seeing tours of local landscapes, notable plants, animal species such as the Water onion (*Crinum thaianum* J. Schulze.), migratory birds and offering local foods and products. These activities were noted to have a minimal impact on natural habitats and biological resources, while providing income to the communities and enhancing their livelihoods.

Local communities in Thailand were found to participate in the conservation of biodiversity by combining their own knowledge with technical know-how offered by public agencies and NGOs. Biodiversity management carried out by the public agencies had previously been noted for the constraint in both human and financial resources and for being inadequate in tackling the entire scope of the biodiversity conservation. By taking action, which is compatible with the setting, local communities could alleviate the above-mentioned short-comings while installing the sense of ownership and ensuring benefits to the communities themselves.

The public sector was reported to have taken action to support and encourage local communities in managing and building on their knowledge relevant for the conservation and sustainable use of biodiversity. These include the drafting of a bill on herbal products, developing databases on traditional knowledge, supporting the development of derivatives from local biological resources, enabling value added utilization of biodiversity as well as relevant traditional knowledge and utilizing the interdisciplinary approach to build bio-based businesses.

The Thailand Environment Institute believes that the role and responsibility of women in the biodiversity conservation and sustainable use is imperative because women seem to be closer to the natural resources and environment as they are biodiversity resources users and the protectors of these biodiversity resources. Their roles are highlighted as follows:

- In Thai society, women always play a role in childcare, therefore, women always have the chance to educate and transfer their local wisdom and traditional knowledge in natural resources protection.
- Traditionally, women farmers are the primary seed-keepers. They also play a key role in the household food security with environmentally friendly concerns and engage in the protection of the flora and fauna habitat.
- In the Thai society, women have play supporting roles and are actively involved in the processes to conserve and sustainably use biodiversity because they play critical roles in the forest /coastal resources management while some of these women step up and play the lead role in their communities and societies.
- Women have played key roles in forest product collectors and in the sustainable use of forest products.
- Women have a specific ability to interact with others to communicate and collaborate in the biodiversity conservation as well as establishing initiatives and forming groups in communities that have creative potential benefitting their societies.

Thailand has promoted and enhanced women's roles and opportunities regarding the leadership and the decision-making process. The supporting fund to promote the role of women in women's activities has been established. The presentation of awards embody the admiration for women who stand and embody a good model for the conservation of biodiversity and to honor women that performed outstandingly in the conservation activities on many special occasions. For example, the awards presentation on Mother's Day, Environmental Award, International Day for Women.

Her Majesty Queen Sirikit of Thailand has been recognized and has taken a deep interest in the conservation of biological diversity. With Her Majesty's tireless dedication in biodiversity conservation, there are a lot of supports and encourages local communities who live near the forest to live in harmony with the forest. She embedded them with the necessary skills in order to make their living sustainable. Her Majesty the Queen Sirikit of Thailand was entitled as the Mother of Thailand Biodiversity Protection.

Her Royal Highness Princess Maha Chakri Sirindhorn has a deep interest in the Plant Genetic Conservation since B.E. 2535. The gene bank for plant genetic resources was initiated. The Plant Genetic Conservation Project under The Royal Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn has been established by the Center with the involvement of related agencies and local communities to collect native plant species, conduct awareness in raising activities, create habitat management, and promote a sustainable use of plant genetic resources until present.

Related website and other documents:

- http://forestinfo.forest.go.th/fCom_Regis.aspx
- http://www.tei.or.th/file/publication/2018-gender-February-activities_54.pdf
- <https://en.mahidol.ac.th/greenmom/>
- <http://www.rspg.or.th/>



Section 7

Updated biodiversity
country profiles

Section VII

Updated biodiversity country profile

Biodiversity facts

Status and trends of biodiversity, including benefits from biodiversity and ecosystem services and functions:

Thailand, one of the richest biodiversity countries in Southeast Asia is located in two Biogeographies, namely the Indo-Chinese Region in the north and the Sundaic Region in the south. Based on the plant biodiversity studied and surveyed under the Flora of Thailand Project, (which is responsible for the Forest Herbarium, the Department of National Parks, the Wildlife and Plant Conservation,) it was reported that there were 11,000 plant species (being studied and surveyed with the expected completion date of 2024), equating to approximately 3% of the world plant species (**Table 1**). According to the International Union Conservation of Nature (IUCN), in 2015 the estimated number of endangered plant species in Thailand, in 1994 and 2001 for endemic species and endangered species respectively, There were 964 threatened plant species which divided into 737 vulnerable, 207 endangered and 20 critically endangered species (Department of National Parks, Wildlife and Conservation, 2017) or 8.76% of the total plant species classified in Thailand. There were two species that were extinct in the wild, namely Sky Blue Vanda (*Vanda coerulescens* Griff.), a monocotyledon, and Pride of Burma (*Amherstia nobilis* Wall.), a Dicotyledon (**Table 2**).

Table 4: Number of plant species in Thailand

Group	Family	Species	Remark
Pteridophytes	32	650	Flora of Thailand Website
Gymnosperms	6	27	Included new <i>Cycas</i> species
Monocotyledons	53	3,045	Did not include genus and new types since published over the past five years. Not included genus and new types that published in the last five years
Dicotyledons	201	6,798	Not included genus and new types that published in the last five years see above
Total	292	10,520	According to the former family

Source: Forest Herbarium, Department of National Parks, Wildlife and Plant Conservation (Data dated in November, 2018)

Table 5: Status assessment of plant species conservation in Thailand, 2015

No	Status	Status assessment of plant species conservation in Thailand (Type)				Total
		(pteridophyte)	(gymnosperm)	(monocotyledon)	(dicotyledon)	
1	critically endangered	-	2	-	18	20
2	endangered	-	-	142	65	207
3	vulnerable	15	7	275	440	737
	Total	15	9	417	523	964

Source: Department of National Parks, Wildlife and Plant Conservation (2017)

In addition, Thailand has continuously found new plant species, which have been published in scientific journals; between 2014-2018, there were 202 new plant species from 110 genus (plural?) and 55 families.

Fauna section: In 2016, there were 4,731 species of vertebrate, increasing 123 species since 2005 that recorded 4,608 species. They (who is “they”?) were 345 mammal species, 1,012 reptile species, 392 amphibian species and 2,825 fish species. The status assessments of the 2,276 vertebrate species in 2016 found that 569 species or 12.03% were under threat, including critically endangered, endangered and vulnerable. That percentage included 123 mammals, 171 bird, 49 reptiles, 18 amphibians and 208 fish species. The numbers increased by 20 species compared to 2005, which recorded 549 species (**Table 3 to Table 5**).

Table 6: Assessment of Threatened vertebrate species in Thailand

Vertebrate	Thai species (Types)	Status Assessment (Types)	Threatened Species (Types)	Threatened (%)	Threatened Assessment (%)
Mammal	345	345	123	35.65	35.65
Bird	1,012	1,012	171	16.90	16.90
Reptile	392	392	49	12.50	12.50
Amphibian	157	157	18	11.46	11.46
Fish	2,825	370	208	7.36	56.22
Total	4,731	2,276	569	12.03	25.00

Source: Office of Natural Resources and Environmental Policy and Planning (2017a)

Table 7: Status of threatened vertebrate species in Thailand

Vertebrate	EX	EW	Threatened species				NT	LC	DD	Total
			CR	EN	VU	Total				
Mammal	4	-	17	40	66	123	30	157	31	345
Bird	3	2	43	58	70	171	122	70-7	7	1,012
Reptile	-	1	16	17	16	49	62	265	15	392
Amphibian	-	-	-	4	14	18	19	103	17	157
Fish	1	1	26	66	116	208	59	-	101	370
Total	8	4	102	185	282	569	291	1,233	171	2,276

Source: Office of Natural Resources and Environmental Policy and Planning (2017a)

Remarks: Status includes Extinct: EX, Extinct in the Wild: EW, Critically Endangered: CR, Endangered: EN, Vulnerable: VU, Near Threatened: NT, Least Concern: LC and Data Deficient: DD

Table 8: Comparison of Thai threatened vertebrate species at world level

Vertebrate	World Species (Types)	Thai species (Types)	World Threatened Species (Types)	Thai Threatened Species (Types)	Thai Threatened Species at World level (percentage)	World threatened Species (percentage)
Mammal	5,560	345	1,194	123	2.21	10.30
Bird	11,121	1,012	1,460	171	1.53	11.71
Reptile	10,450	392	1,090	49	0.46	4.49
Amphibian	7,635	157	2,067	18	0.23	0.87
Fish	33,500	2,825	2,359	208	0.62	8.81
Total	68,266	4,731	8,170	569	0.83	6.96

Source: Office of Natural Resources and Environmental Policy and Planning (2017a)

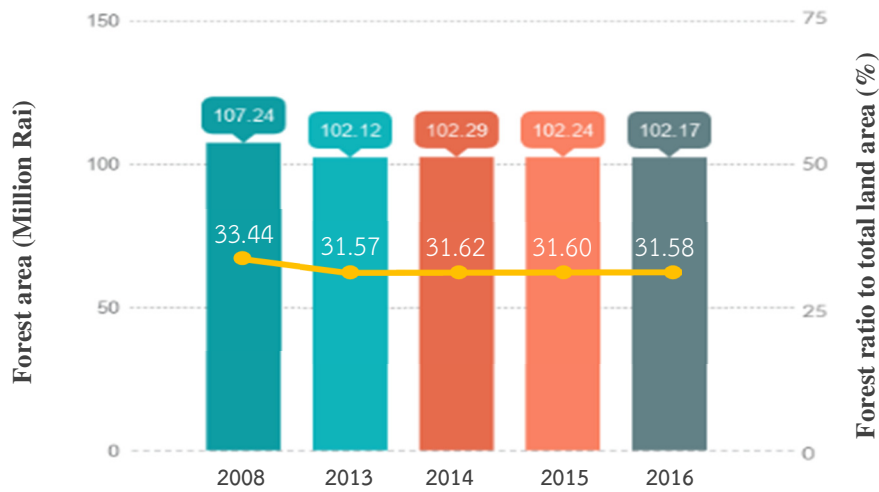
- (1) **Mammal:** There were 4 species under extinction, including Schomburgk's deer (*Rucervus schomburgki*), Kouprey (*Bos sauveli*), Sumatran Rhinoceros (*Dicerorhinus sumatrensis*) and Javan rhinoceros (*Rhinoceros sondaicus*). 17 species were critically endangered, 40 species were endangered, 66 species were vulnerable, 30 species were near threatened, 157 species were least concerned and 31 species were data deficient.
- (2) **Bird:** There were 3 species under extinction, namely Yellow-Crowned Woodpecker (*Dendrocopos mahrattensis*), Chinese Grass-babbler (*Graminicolas striatus*) and Giant ibis (*Pseudibis gigantea*). There were 2 species extinct in the wild, namely Black-necked Stork (*Ephippiorhynchus asiaticus*) and White-shouldered Ibis (*Pseudibis davisoni*). There were 43 species categorized as critically endangered, 58 species were endangered, 70 species were vulnerable, 121 species were near threatened, 707 species were least concern and 7 species were data deficient.
- (3) **Reptile:** There was 1 species extinct in the wild, namely False Gharial (*Tomistoma schlegelii*), 16 species were critically endangered, 17 species were vulnerable, 62 species were near threatened, 265 species were least concern and 15 species were data deficient.
- (4) **Amphibian:** There were 4 species endangered, namely Mahogany Frog (*Abavorana luctuosa*) Highland swampy frog (*Babina lini*), Malesian Frog (*Limnonectes malesianus*) and John's Frog (*Rana johnsi*). 14 species were vulnerable, 19 species were near threatened, 103 species were least concern and 17 species were data deficient.
- (5) **Fish:** There was 1 species under extinction, namely the Siamese flat-barbelled catfish (*Platytrapius siamensis*), 1 species extinct in the wild, namely Siamese Tiger Perch (*Datnioides pulcher*), 26 species were critically endangered, 66 species were endangered, 116 species were vulnerable, 59 species were near threatened and 101 species were data deficient.

In 2017, the Office of Natural Resources and Environmental Policy and Planning selected the vertebrate, in particular regarding endangered species for their prepared protection plans. These contained 181 species including 33 mammals, 33 bird, 25 reptiles, 17 amphibians and 73 fish species. (Office of Natural Resources and Environmental Policy and Planning, 2017a).

Ecosystem: There are 7 ecosystems according to the Convention. For the forest ecosystem, forest areas in Thailand were gradually decreasing. In 1973 the forest areas were 43.21% of the country area, which decreased to 31.58% in 2017 (Royal Forest Department, 2018). The early decrease was at a high rate, but during the last five years the decreasing rates were slow down due to the government policy on forest plantation (**Figure 7**). The forest ecosystem relates to the mountain ecosystem, where high biodiversity is fragile and degradable, especially the cloud forest, which is easily disturbed by environmental changes. These two ecosystems showed their relationship to elevation, water and soil conditions. They also related to cultural diversity, especially to native and rural communities; their lifestyle stands in harmonizing to the conservation and utilization of biodiversity of the mountain ecosystem. In Thailand, the mountain areas, 29.3% of the country area is distributed in different regions. The high biodiversity mountain ecosystems are Doi Suthep, Doi Inthanon and Doi Chiang Dao, in Chiangmai province and Khao Luang in Nakhon Srithammarat province. These forest and mountain ecosystems are important regarding watershed, source of wild food, wood or fiber, biomass

fuel, genetic resource and chemical extract as well as climate control, weather, water equilibrium, soil erosion, pollination, disaster, cultural service, scenery and ecotourism.

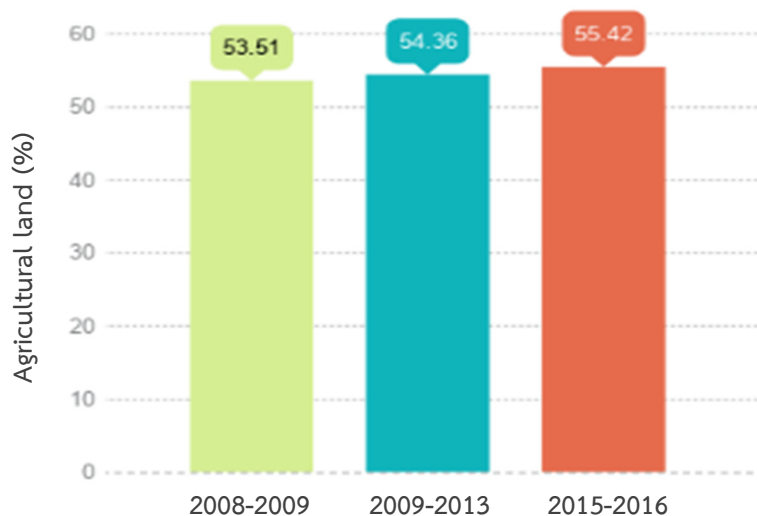
Figure 6: Amount and percentage of forested area covers in Thailand during 2008-2016



Source: Royal Forest Department (2017)

The agricultural ecosystem provides food security sources and income for the Thai population. In 2017, the Department of Land Development reported that the ratio of agricultural lands between 2015 and 2016 was 55.42% of the country area. In 2008-2016 (Figure 8), the agricultural areas showed an increasing trend due to the government policy, especially regarding the increase of 3 main economic crops, including para rubber, oil palm and eucalyptus (Office of Natural Resources and Environmental Policy and Planning, 2018). The increase of agricultural lands has a diverse effect on decreasing forest areas. The newly opened areas were planted monocrops that less of biodiversity and high chemicals utilization. They impact to ecosystem equilibrium and provide a threat to many other resources such as soil erosion, water scramble and plant disease as well as increasing chemical uses.

Figure 7: Agricultural land use trend during 2008-2016



Source: Department of Land Development (2015) and (2016)

At present, Thai's policy has promoted sustainable agriculture that relates and supports natural and environmental resources for a safe and sufficient production. The products are diversified and cover agricultural lifestyle, processing and all management for equilibrium of economic, social, environment and ecosystems. The agricultural ecosystems are agroforestry, integrated farming, new theory agriculture, organic agriculture and natural farming. These practices are limited and scattered. In 2015, the organic agriculture area was only 0.19% of the agricultural land (Office of Agricultural statistic, 2017). In addition, there is an organic agricultural standard, namely Participatory Guarantee Systems (PGS). This local standard is certified by producer, emphasizing the stakeholders that base NOUN on credit, social network and knowledge exchanges. There are 6 important components in PGS, including a shared vision among farmers, producers and consumers. Under the basis of the community certification, participation may differ according to the project, the participatory of interested consumers and consumption. Under this standard and participatory of all stakeholders (producer, consultant and consumer), this organic agriculture has credit and transparency from all concerned persons related to the mechanism and process of inspection but not in full detail. At the same time, personal information or trading secrets must be protected. Trust relating to the community certification is based on the belief that we can trust farmers and we can use social/cultural control mechanisms as tools for the organic agriculture certification. The learning process of the community certification is not only to certify products but also to symbolize learning development of organic agriculture communities and sharing responsibility horizontally, not only for few people. These components are important for sustainable agriculture in Thailand. Development of the grass root organization and the definition of a standard and requirement were good practices that arose through the participation of the smaller farms. The important targets were to raise living standards of farmer families and to promote organic agriculture. The standard would ensure product quality for consumers. The documents defining the standards were agreed among farmers. When all certification processes are completed, farmers can use logos to show the status of their organic agriculture.

Marine and coastal ecosystems of Thailand are in the East and South of the country and include the **mangrove forest**. In 2014, the Department of Marine and Coastal Resources reported that the mangrove forest areas decreased from 2,299,375 Rai in 1961 to 1,534,584 Rai in 2014. The total area lost was 764,790 Rai. In between 2004-2014, the decreasing areas have slowed down and the areas have increased due to the mangrove forest concession after the natural resources and environmental conservation policy has been implemented in 2003. **Beach forests** status at present were destroyed and converted into tourism sites. In addition, there was a misunderstanding by planting other crops such as coconut and oil palm into these areas. They were introduced due to their nice appearance, but the ecosystem has been severely converted. Thailand has implemented conservation and reclamation of beach forests in order to replace the degraded beach forests. The importance of beach forests were identified as benefitting directly and indirectly to the communities. The beach forests would recover their fertile areas that are suitable for turtles nesting. **Seagrass** has a total area of 159,829 Rai. In 2016, the new area of seagrass, 430 Rai were found. The seagrasses in good condition were greatly decreasing from 14.01% to 5.62%, the good condition were decreasing from 32.61 percent to 14.39 percentage, however, the moderate conditions were increasing from 20 percentage to 60 percentage. **The coral reef** has a total area of 148,954 Rai. From the recent survey, the coral reef in the Thai Gulf was in very good condition (32.5 percentage), good condition (12.5 percentage), damaged condition (15 percentage) and severe damaged condition (25 percentage). In the Andaman Sea, the good condition was 11.8 percentage, damage 5.9 percentage and severely damage 47.1 percentage respectively. In general, the coral reefs in the Andaman Sea were more damaged than the Thai Gulf.

Island ecosystem. There are 936 islands distributed along the Gulf of Thailand and Andaman Coast. The total length around the islands is 3,724.32 km and the total area is 1.7 million Rai. Most of the areas are covered by natural forests. The threats of these islands are environmental pollution from leaking of raw oil tunnels in the sea as well as marine debris and marine waste around the islands. Tourism development also has an impact on land use changes.

Inland water ecosystems, including swamps and seasonal flooded forests along the floodplain has 17,432 sq.km. or 10.9 million rais. These areas are important for wild food production, wood and fiber, biomass fuel, genetic resource and chemical extract, climate control, weather, water balance, filtration and treatment of waste, disease, insect pest and disaster. The ecosystem also provides cultural services, scenery and tourism and service for all sectors (what sectors??).

Dry and semi humid ecosystems are found in the Northeastern Thailand due to climate and soil property conditions. The area has 65 million Rai or 62 percentage of the Northeastern region. The area consists of sandstone and sandy soils that do not absorb water. In addition, the soils have low fertility and certain areas were saline.

Main pressures and drivers of biodiversity (direct and indirect):

Biodiversity in Thailand has been continuously under the threat for a long time by utilizing action without considering the limitations and potentials for recovery. The loss of natural habitat of native flora and fauna are due to the following factors: the expansion of urban areas, the ongoing development, unauthorized forest invasions (specially in protected areas), land use changes from degraded forest to arable land, illegal logging, deforestation, illegal wildlife hunting for consumption and trade, wetlands reclamation, spreading of invasive alien species and pollutions. These threats have been continuing to diminish Thailand's biodiversity. Thus, the population of plants and wildlife species decreased or has gone extinct.

The marine and coastal biodiversity is of national importance. The biodiversity has been threatened by illegal fishery such as off-season fishery and intrusion to commercial fishery in protected areas. Further impact where biodiversity conservation was overlooked stems from community settlements, developments of industry, tourism and infrastructure. Dumping plastic waste into the sea, mainly due to coastal activities and leisure, releases toxic substances into the water, affecting environment and health of marine animals by consumption, gastrointestinal blockage and toxins from those garbage, anchorage and the collection of shells and fish. In addition, there are natural factors i.e. coastal erosion leading to the damage to aquatic habitat and extinction of aquatic species, climate change including increase of the sea water temperature, drought affecting freshwater-saltwater balance and coastal erosions by storms and rising sea levels.

Measures to enhance the implementation of the Convention

Implementation of the NBSAP:

Thailand has set national targets for biodiversity. The directions and targets for the implementation are in line with the objectives of the Strategic Plan for Biodiversity 2011-2020 and Aichi targets. Thailand NBSAPS, 2015-2021 was developed with the vision that by B.E.?? 2564 people will live in harmony with nature. The government and all sectors have been promoting and supporting the protection, conservation, rehabilitation and utilization of sustainable biodiversity. There are 4 strategies and 11 measures:

- 1) Integrate values and management of biodiversity with all-level participation.
- 2) Conserve and restore biodiversity.
- 3) Protect the country's rights and manage to increase and share benefits from biodiversity based on the green economy
- 4) Develop knowledge and leverage the database system on biodiversity to international standards.

In B.E. 2560, the action plan on biodiversity management B.E. 2560-2564 was established to transfer the strategies and measures under the master plan to practice. Targets and indicators were determined and align with national goals by integrating the joint operations of associated sectors. The National Committee on Conservation and Utilization of Biodiversity (NCCUB) as a mechanism has also been established to maintain and set policies for the conservation and utilization of biodiversity, including Thailand's biosafety operations and implementation of access as well as the benefit sharing from the utilization of genetic resources. It is also a mechanism to drive operations that meet the objectives of the Convention on Biological Diversity (CBD).

Thailand also attributes great importance to the implementation of the Convention. Biodiversity issues have been identified in the Thailand 20-Year National Strategy (2018-2037) to determine the solution of natural resources and the environment problem in Thailand as well as the decreased proportion of forest area, soil depletion and threatened biodiversity. The goals are:

- 1) to conserve and preserve natural resources, environment and culture for the next generations to use sustainably and equitably
- 2) to restore and renew natural resources and the environment to reduce the negative impact of national economic development
- 3) to utilize and create a balanced growth on the basis of natural resources and environment within the capacity of the ecosystem
- 4) to raise the paradigm to define the country's future of natural resources, environment and culture on the basis of participation and good governance

Overall actions taken to contribute to the implementation of the Strategic Plan for Biodiversity 2011-2020:

So far, Thailand has been working in a comprehensive manner to support the implementation of the NBSAPS, 2015-2021 via the protected area systems with moderately satisfying results. The achievement was limited due to the lack of sufficient human resources, technology, finance and an insufficient penalties system. Thus, protected areas continue to fall under risk, directly affecting the biodiversity and ecosystem. New policies such as the Recall

of wilderness, the Reduction of subsidies mainly due to political reasons, and the Expansion of green areas according to the national policy are examples of increasing the concentration of operations with clear objectives to explicitly achieve the operational plan.

In addition, the intensification of enforcement in the case of plant and wildlife trade provide Thailand opportunities for better controlling illegal hunt and trade. However, it may not be enough to solve all the problems. Difficulties in controlling remote areas, poverty, and the motivation of resources demanded by foreign markets are reasons for the continuity of illegal entry of for seeking wild plant and animals.. Thailand is well aware of the need of extra measures to urgently increase its efforts in law enforcement, for instance, increasing the capacity of relevant agencies and supporting the participation of the community and civil society.

The 20-year national strategy and every national development plans indicated the importance of natural resources utilization based on the sustainable development under the sufficiency economy. There are to direct the development which is conducive to raising public awareness and consciousness. This is a guarantee of Thailand's commitment to the biodiversity conservation. Private and public sectors have also actively and continuously participated in the campaign to raise awareness and develop projects through various mechanisms, such as Corporate Social Responsibility (CSR) to restore forest ecosystems, and to preserve traditions for the upstream forest conservation as well as basin traditions. New phenomena can also be found, for instance, in the Bangpakong downstream basin community where representatives visited the Phetchabun upstream community and offered sea salt as a gift of appreciation and connection. This emerging concrete evidence reflects the value of conservation which creates ecological benefits through the watersheds. This kind of examples should be further developed and promoted by measures of the formal sector.

Thailand relies on a market-driven development. Therefore, the strictest policy measures cannot be implemented in practice. At the same time, incentives to promote resource conservation and biodiversity are important to balance. The measures taken for the diversity in regulation with the state and community levels are too complicated to describe. For example, the determination of the green areas proportion in the large-plot agricultural policy; the reforestation (similar to the debt-swap for nature); the wild plant species designation to convert into capital is to promote the participation of private and public sectors for the species conservation; government-owned private land use regulation; land allocation with principles, the promotion of Crab Bank and the nursery of sea turtles; donation project for the sea turtle conservation; support for green markets and community markets, etc. INSTEAD OF SEMI COLONS MAYBE MAKE BULLET POINTS? These examples drive the resources and biodiversity conservation by combining bottom-up efforts and top-down policy measures.

Support mechanisms for national implementation (legislation, funding, capacity-building, coordination, mainstreaming, etc.):

Thailand has focused on operations to conserve the country's natural resources, environment and biodiversity along with balance and Utilization. According to the Constitution of the Kingdom of Thailand B.E. 2560, Section 57 (2), the state must preserve, protect, rehabilitate, manage and use or make use of natural resources, the environment and biodiversity in a sustainable and balanced manner. Citizens and local communities are involved in the operation and benefit from such actions as required by law. Examples of laws related to biodiversity are National Park Act, B.E. 2504, National Reserved Forest Act, B.E. 2507, Wildlife Conservation and Protection Act, B.E. 2535, Plants Act, B.E. 2518 and B.E. 2535, including Science and Technology Development Act, B.E. 2534 and National Environmental

Quality Promotion and Preservation Act, B.E. 2535. They cover and facilitate the operation of Thailand's biodiversity. The Office of Natural Resources and Environmental Policy and Planning (ONEP) is on the public hearing process for the Draft Biodiversity Act from related sectors for the main law of the country's biodiversity.

There are the financial mechanisms to drive the protection, conservation, rehabilitation and utilization of sustainable biodiversity. In addition to the budget of each relevant agency, there are financial mechanisms from the Thai Environment Fund and the Office of the Environment Fund, which provide the opportunities for the formal sector, the private sector and the community involved in biodiversity conservation. The Biodiversity Finance Initiative (BIOFIN) Thailand has supported the Thai government in transforming the National Economic and Social Development Plan, in particular the utilization of natural resources into the foundation of sustainable growth and development, including serious financial strategies related to the National Biodiversity Integration Plan. The Global Environment Facility (GEF) has supported environmentally responsible conservation projects and plans for the utilization of biodiversity in developing countries and countries with transition economies. Currently, large and small projects are being implemented nationwide. More than 300 small projects were funded. There are also funds from private sectors, supporting the Corporate Social Responsibility (CSR) activities of various agencies.

Currently, many agencies, institutions and organizations in Thailand focus on community involvement and strengthening the biodiversity operations. For instance, the Economy Development Office (Public Organization) has supported the implementation of the Community Bio-Bank and the prototype for empowerment of local government organizations to protect and utilize sustainable biodiversity in the ecology of Thailand under the cooperation with the Ministry of Natural Resources and Environment; the United Nations Development Program (UNDP) has been supported by GEF; the Department of Marine and Coastal Resources undertakes reforestation activities that are degraded by the community participation to raise awareness of the seagrass habitat conservation; the Highland Research and Development Institute (Public Organization) has taken action to form and maintain local wisdom, to transfer knowledge from royal projects and integrate with local wisdom. Strengthening local communities through community support programs to collect seeds and local plants, which includes local vegetables and highland rice varieties for the highland community Seed Bank. The project supports the highland communities in operations to declare a native protected area for herbs and habitats under the Protection and Promotion of Knowledge on NOUN. The Thai Traditional Medicine Act of B.E. 2542 THIS SENTENCE IS NOT COMPLETE; the Plant Genetic Conservation Project Under the Royal initiative of Her Royal Highness Princess Maha Chakri Sirindhorn has given the opportunity to local administrative organizations to join as members to operate the local resource base through the local resource base operation committee. The operation makes people aware of physical and biological characteristics, economic and social conditions, community potential and local wisdom that can develop the wisdom into various products as an international standard. In addition, it also leads to the confirmation of the right to own resources and prepare for access and sharing benefits from using that resource in the area according to the Nagoya Protocol.

Thailand was also concerned that biodiversity operations would not achieve this without integrating the co-operation of the relevant agencies. The Office of Natural Resources and the Environmental Policy and Planning (ONEP), the Ministry of Natural Resources and Environment act as the national focal point on biodiversity operations by integrating various related agencies via the Master Plan for Integrated Biodiversity Management, 2015-2021, and the Biodiversity Action Plan, 2017-2021, which is the main plan for the country's biodiversity. There is linkage and compliance with the obligations of the Convention on Biological Diversity,

Sustainable Development Goals (SDGs) and Aichi Targets. Agencies and related sectors include 30 central agencies from 8 ministries and local authorities, informal sectors, private sectors, non-governmental organizations, research/academic institutes and local communities.

Mechanisms for monitoring and reviewing implementation:

The implementation of the NBSAPS, 2015-2021, in Thailand has been monitored and evaluated, National Biodiversity Action Plan, 2017-2021, which is the main plan for the country's biodiversity. The directions and targets for the implementation are in line with the objectives of the Strategic Plan for Biodiversity 2011-2020 and the Aichi targets. Progress monitoring, performance evaluation and impact of ongoing operations are focused on the key points of the overall plan and the strategies. Monitoring and evaluation is a tool to manage and improve the planned approach to the current situation and presents the way forward. Monitoring and evaluation during the implementation of the plan is to review the measures and operational priorities. The guidelines are as follows.

1) National Committee on Conservation and Utilization of Biodiversity (NCCUB) is responsible for defining guidelines for monitoring the progress of plan management, improving the success of plan conversion by applying appropriate monitoring methods, conducting an overall impact assessment and preparing the annual performance report for the Cabinet.

2) The report in the relevant section from relevant agencies and sectors under the plan was required to describe their planned performance, problems, obstacles, comments and suggestions to the NCCUB for analysis and recommendations for the future management and improvement of the planned operational guideline in the next phase.

In addition, there is a regulation of the National Committee on Conservation and the Utilization of Biodiversity regarding the guidelines and procedures for accessing biological resources and benefits of BE 2554 to define the criteria and methods for the access and sharing of benefits from biological resources in the same direction. And in accordance with the Convention on Biological Diversity, relevant governmental agencies will act or issue the secondary legislation to authorize according to the regulation.



Recommendations

for biodiversity management
in Thailand

Recommendations

for biodiversity management in Thailand

According to an obligation of Contracting Parties to the Convention on Biological Diversity (CBD), the Parties are required to present to the Conference of the Parties, reports on measures which they have taken for the implementation of the provisions of the Convention and their effectiveness in meeting the objectives of the Convention. The reports are submitted through the Secretariat of the Convention every 4 years with the first reports being presented in 1998 and the most recent ones, the 6th reports, being scheduled for submission by the end of 2018.

For Thailand's sixth national report, the Cabinet decided, at the meeting on March 26, 2017, to assign the Office of Natural Resources and Environmental Policy and Planning (ONEP) to cooperate with relevant agencies for the report's preparation. With cooperation from Thailand Environment Institute (TEI) and supports from the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF), the reporting process included gathering of information and formulation of a steering committee to oversee drafting and revision of the report. The final draft report was eventually submitted to National Committee on Conservation and Utilization of Biodiversity (NCB) for final revision and approvals before transmitted to the Secretariat of the Convention on Biological Diversity.

Conclusions

The sixth national report focuses on elaboration and assessment of actions undertaken in accordance with the Action Plan on Biodiversity Management (2017-2021). The report's findings can be summarized as follows;

1. Effectiveness in meeting national targets

Success in implementing 11 measures of the Action Plan on Biodiversity Management (2017-2021) is as follows;

28 % of measures	Effective
72 % of measures	Partially effective
0 % of measures	Ineffective
0 % of measures	Unknown

The 4 measures found to be effective are strengthening awareness and education on biodiversity, protection of genetic resources, research and development of biodiversity-based economy and preservation of local knowledge associated with biodiversity. The assessment also noted the need for increase roles of actors and expansion of scope in implementing these measures

Besides, the 7 measures noted for being partially effective are integration of efforts and participation; conservation, restoration and protection of biodiversity; reducing threats and enabling sustainable use; wetland management; management of invasive alien species; biosafety management; and information and database management. Obstacles in enabling effective implementation of these measures were found to include the lack of efforts, insufficient application of technical knowledge and tools and inadequate integration of information and planning between relevant agencies in addition to the lack of information availability and accessibility.

However, Thailand’s actions to achieve 20 Aichi Biodiversity Targets were found to consist of development of policies, plans and measures and identification of agencies to be responsible for their implementation. But several of these policies, plans and measures had limited data.

2. Progress of the national targets

Progress of 25 national targets identified by the Action Plan on Biodiversity Management (2017-2021) can be summarized as follows;

12% of the targets	On track to exceed target
52% of the targets	On track to achieve target
36% of the targets	Progress towards target but at an insufficient rate
0% of the targets	No significant change
0% of the targets	Moving away from target

The 3 targets were found to be met ahead of schedule while 13 targets were noted to be on track for achievement by their 2020 and 2021 deadlines. Efforts undertaken to meet 9 targets were found to remain insufficient to ensure their achievement on schedule in absence of additional measures and efforts to accelerate their rate of delivery. These targets consist of enabling cross-sectional knowledge, understanding and awareness on importance of biodiversity, enabling financial mechanisms, eliminating rules and regulations that hinder participation, enable interconnection between protected area networks and other important areas for conservation, pollution control, enabling application of tools/mechanisms and guidance for sustainable use, wetland management and ensuring integration and interoperability of biodiversity databases. (See figure in page 175)

It should be noted, however, that validity in some parts of the assessment was hindered by insufficient information due to absence of inventory on target groups, inadequate baseline data for temporal evaluation and the lack of systematic monitoring scheme.

3. Thailand’s implementation of Global Strategy for Plant Conservation (GSPC)

The implementation of GSPC in Thailand was noted for being able to achieve most of the GSPC 16 targets on schedule.

81% of the targets	On track to achieve target
19% of the targets	Progress towards target but at an insufficient rate
0% of the targets	No significant change

Progress towards 3 targets at national level was found to be at an insufficient rate. These targets are Target 6 (at least 75 per cent of production lands in each sector managed sustainably, consistent with the conservation of plant diversity), Target 8 (at least 75 per cent of threatened plant species in ex-situ collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programs) and Target 12 (All wild harvested plant-based products sourced sustainably).

Most efforts for plant conservation were found in protected areas and wild plant species continued to be under threat from tourism and illegal trafficking. Insufficient information was noted for hindering assessment on plant conservation in agricultural sector while reintroduction of threatened plant species was found to be obstructed by the lack of information on ex-situ collection of the species.



Incentives



Identify alien species



Manage alien species



Curriculums



Policies



Participation



Habitats



Threatened species



Protect genetics



Biosafety



Assess benefits



Manage benefits



Local community



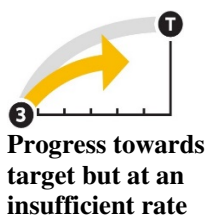
Bring back benefit



Priority databases



Municipality data



Awareness



Financial mechanism



Regulations



Importance areas



Pollution



Sustainable use



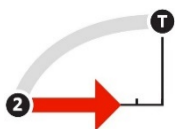
Wetland management



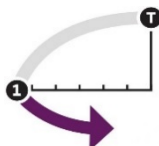
Loss of wetlands



Scientific knowledge



No significant change



Moving away target

Progress of National Biodiversity Targets

4. State of Thailand's biodiversity

Of approximately 11,000 plant species, 8.76 percent were classified as being under threat and 2 species, Sky Blue Vanda (*Vanda coerulescens* Griff.) and Amherstia (*Amherstia nobilis* Wall.) were noted for being extinct in the wild. Of the 4,731 vertebrate species found in Thailand, 12.03 percent were categorized as being threatened.

The rate of forest loss was found to be declining with slight increase in forestlands in 2018. More agricultural lands were noted for being used for commercial mono-cropping. The challenges in conservation and protection of marine and coastal ecosystem were found to include controlling illegal fishing, regulating land-use, mitigating coastal erosion and minimizing impacts from tourism. Implementation of the national strategy and efforts made community networks and cooperate social responsibility (CSR) programs were noted for their positive contributions in meeting these and other biodiversity challenges.

Recommendations

As a result of the 6NR preparation, the following recommendations can be made 2 immediate phase by 2021 and long term by 2030 as follow;

- **Immediate phase** (by 2021)

- 1) **Focus on required urgent actions which insufficient rate to achieve its target.**

As the report found some insufficient to ensure their achievement on schedule, Thailand should take additional measures and efforts to accelerate their implementations. The database systems which being developed require urgent actions including building cross-sectional knowledge and awareness, development of financial mechanisms and legislative measures for mobilizing efforts for conservation and sustainable use and enabling interconnection of networks for management of protected areas and wetlands. Ensuring integration and interoperability of biodiversity databased is also recommended.

- 2) **Build an understanding and coordinating efforts of agencies responsible for education and communication**

For the view to enhance public knowledge and awareness, action should first focus on the most relatable issues and be accompanied by identification and prioritization of critical and other important areas for biodiversity and ecosystem in order to develop appropriate measures or their management.

- 3) **Emphasize mechanisms for policy adoption**

Efforts should be made to enable linkage or mechanisms for undertaking actions through development plans of provinces and provincial groups by ensuring effective communication with local officials in taking actions under their pre-existing roles and responsibility stipulated by laws and regulations of local administrations.

- 4) **Develop mechanisms for enabling interoperability of biodiversity databases**

Interoperability of biodiversity databases is necessary for ensuring informed management of biodiversity at national level as well as for enhancement of information resources, expanding application of such resources and building on local knowledge associated with biodiversity.

5) Develop a monitoring and evaluation system

Identification of a common set of indicators is recommended as a means to ensure common definition and interpretation of information and enable interoperability of databases developed by relevant agencies. Identification of indicators at the field level is also important and recommended for areas of particular importance for biodiversity and with sensitive ecosystems.

Long term (by 2030)

1) Enhance integration of biodiversity issues in supply chains of various sectors

Biodiversity issues should be integrated in plans for promotion of sustainable production and consumption in the agricultural, fishery, energy, mining, tourist, and infrastructure sectors. The actions can be made in term of the strategic environmental assessment (SEA) for major plans and projects of the state. Biodiversity issues could be integrated into signing of interagency memorandums of cooperation and development of joint planning and projects between public and private sectors.

2) Pursue law enforcement and policy adoption

Efforts should be made to pursue effective adoption and enforcement of recent laws and policies including the laws on forests, fishery and waste and wastewater management, biosafety guidelines and the policy on revoking the ban on growing and earning income from valuable timber species. Information systems should be developed to monitor actions and enable communication of feedbacks so that shortcomings could be addressed in revision of these laws and policies.

3) Monitor and supervise management of unprotected areas

Effective monitoring and supervision of protected area management should be accompanied by development and strict enforcement of land-use planning for unprotected areas and adoption of specific measures for priority areas such as community wetlands and habitats of endemic plants and migratory birds.

4) Build capacity of local activities

Emphasis should be placed on employing capacity of local government administrates in protection of biodiversity for closing the gap and limitations of the central governments' implementation. The enhancing of understanding and capacity of concerned agencies at the provincial and local levels should be focused in term of planning and formulating projects to support the national policies and targets, designing operations in line with local context, and formulating the local regulations to strengthen community participation in the protection and sustainable use of natural resources.

5) Promote the roles and participation of youths, urban society and business

Biodiversity should be presented in association with the sustainable development agenda adopted by various partnerships. Young generation and urban society are the major consumer should be change into the sustainable consumption ways. Besides that, business sector should be encouraged to participate in conservation and sustainable use of biodiversity through CSR programs in addition to efforts to enable involvement of civil society on these issues.

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