

THE BIODIVERSITY FINANCE INITIATIVE (BIOFIN)

SYNTHESIS REPORT FOR THAILAND

2019

FOR

THE UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)
THAILAND

This project is
co-funded by the
European Union



Federal Ministry for the
Environment, Nature Conservation,
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ABBREVIATIONS

ABS	Access and Benefit Sharing
AWGESC	ASEAN Working Group on Environmentally Sustainable City
BAAC	Bank for Agriculture and Agricultural Cooperatives
BAU	Business As Usual
BB	Bureau of the Budget
BEDO	Biodiversity-Based Economy Development Office
BER	Budget and Expenditure Review
BGO	Botanical Garden Organization
BIOFIN	Biodiversity Finance Initiative
BIOTEC	National Center for Genetic Engineering and Biotechnology
BMA	Bangkok Metropolitan Administration
BMR	Bangkok Metropolitan Region
CBD	Convention on Biological Diversity
CBI	City Biodiversity Index
CCCIF	Command Center for Combating Illegal Fishing
DEQP	Department of Environmental Quality Promotion
DMCR	Department of Marine and Coastal Resources
DNP	Department of National Parks, Wildlife, and Plant Conservation
DTAM	Department of Thai Traditional and Complementary Medicine
DWR	Department of Water Resources
EIA	Environmental Impact Assessment
ESC	Environmentally Sustainable City
FIO	Forest Industry Organization
FNA	Financial Needs Assessment
GEF	Global Environment Facility
IUU	Illegal, Unreported and Unregulated fishing and over-fishing practices
MCS	Monitoring, Control, and Surveillance
MOAC	Ministry of Agriculture and Cooperatives
MOC	Ministry of Commerce
MOD	Ministry of Defense
MOF	Ministry of Finance
MONRE	Ministry of Natural Resources and Environment
MOPH	Ministry of Public Health
MOTS	Ministry of Tourism and Sports
MSY	Maximum Sustainable Yield
NAP	National Administration Plan
NBSAP	National Biodiversity Strategy and Action Plan
NESDC	National Economic and Social Development Council (formerly National Economic and Social Development Board (NESDB))
NESDP	National Economic and Social Development Plan

NTB	Non-Tariff Barrier
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
ONEP	Office of Natural Resources and Environmental Policy and Planning
PCD	Pollution Control Department
PES	Payment for Ecosystem Services
PESAL	Payment for Ecosystem Services in Agricultural Landscapes
PIR	Policy and Institutional Review
PSC	Project Steering Committee
RDPB	Royal Development Project Board
RFD	Royal Forest Department
RSPG	Plant Genetic Conservation Project
SOY	Socially Optimum Yield
TBCSD	Thailand Business Council for Sustainable Development
TISTR	Thailand Institute of Scientific and Technological Research
UNDP	United Nations Development Programme
VMS	Vessel Monitoring System
ZPO	Zoological Park Organization

TABLE OF CONTENTS

Executive Summary	vii
1. Introduction.....	1
2. Policy And Institutional Review.....	2
2.1. Biodiversity Status and Trends in Thailand.....	3
2.2. Thailand’s Vision for Biodiversity.....	8
2.2.1. National-Level Vision And Strategies Related to Biodiversity.....	8
2.2.2. Biodiversity Strategic Plans Specific to Ecosystems	11
2.3. Key Sectoral Practices, Policies and Policy Factors, and Economic Drivers That Lead to Negative Biodiversity Trends	15
2.3.1. Terrestrial Ecosystem	15
2.3.2. Wetlands Ecosystem.....	17
2.3.3. Marine and Coastal Ecosystem.....	17
2.3.4. Urban Ecosystem.....	18
2.4. Key Sectoral Practices, Policies and Policy Factors, and Economic Drivers That Lead to Positive Biodiversity Trends	19
2.4.1. Terrestrial Ecosystem	20
2.4.2. Wetlands Ecosystem.....	20
2.4.3. Marine and Coastal Ecosystem.....	21
2.4.4. Urban Ecosystem.....	23
2.5. Institutions That Are Relevant to the Management, Utilization, and Conservation of Biodiversity Resources in Thailand.....	23
2.5.1. Institutional Actors By Function	23
2.5.2. Institutional Setup.....	25
2.5.3. Legal and Institutional Framework By Ecosystem.....	26
2.6. Key Policy Recommendations and Potential Finance Solutions	27
2.6.1. Terrestrial Ecosystem	27
2.6.2. Wetlands Ecosystem.....	28
2.6.3. Marine and Coastal Ecosystem.....	29
2.6.4. Urban Ecosystem.....	30
3. Budget and Expenditure Review	31
3.1. National Budgetary Process	31

3.2. Thailand’s Biodiversity Expenditure and Major Funding Sources	32
3.3. Biodiversity Expenditure Categories and Baseline Projection	39
3.4. Policy Recommendations	41
4. Financial Needs Assessment	42
4.1. Methodology	42
4.2. Thailand’s Biodiversity Vision and Strategy : A Recap	43
4.3. Financial Needs Assessment	44
4.4. Financial Needs Under Different Scenarios	53
4.5. Financing Gaps	56
4.6. Overall Results of the Financial Needs Assessment	58
5. Conclusion and Reflections on the BIOFIN Process	58
References	61
Appendix	63

TABLE OF FIGURES

Figure 1: National BIOFIN Process.....	1
Figure 2: Changes of Wetlands Over Two Time Periods in Thailand.....	5
Figure 3: Green Area in Bangkok.....	7
Figure 4: Ten Areas of Intervention in the DMCR Roadmap.	14
Figure 5: Map of Bang Kachao Area.....	15
Figure 6: Biodiversity-Related Expenditures by Core Environmental Agencies	34
Figure 7: Bilateral ODA Flows to Thailand 2011 – 2014	38
Figure 8: Multilateral ODA Flows to Thailand 2011 - 2014.....	39
Figure 9: Actual and Projected BAU Expenditures For Biodiversity (Total)	41
Figure 10: FNA Process.....	43

TABLE OF TABLES

Table 1: Thailand’s 4 th NBSAP Strategy and Estimated Budget (Unit: THB million)	9
Table 2: Agencies Included in the Expenditure Review.....	33
Table 3: Total Biodiversity Expenditure, FY2011 - 2015	37
Table 4: NBSAP Estimates for the Period Between 2015-2021.....	45
Table 5: MONRE’s Estimates for the Period Between 2016-2021	46
Table 6: Budget Estimation for RFD	47
Table 7: Budget Estimation for the DNP	49
Table 8: Costs of Mangrove Protection and Restoration	52
Table 9: Costs of Restoration of Coral Reefs and Seagrass.....	53
Table 10: Financial Needs Under the Business As Usual Scenario.....	54
Table 11: Financial Needs With the Unit Costs to Implement Selected Measures in the NBSAP	55
Table 12: Financial Needs Without NBSAP Budget Estimates	55
Table 13: Departments and Targets	56

EXECUTIVE SUMMARY

This report compiles the findings from three assessments conducted as part of the national Biodiversity Finance Initiative (BIOFIN) process. The three assessments discussed include the policy and institutional review (PIR), the budget and expenditure review (BER), and the financial needs assessment (FNA). The PIR analyzes the policy and institutional context, identifies the biodiversity targets to be achieved, and lays out the context for the intended change in financing. The BER analyzes public and private expenditures for biodiversity and establishes past and projected expenditures on biodiversity. The FNA provides an estimation of the financing required to achieve identified biodiversity targets. The FNA also assesses the financing gap between the *status quo* of projected expenses and the estimated budget to meet biodiversity goals. Findings from these three assessments feed into the formulation of the country's Biodiversity Finance Plan (BFP) and are used to develop prioritized finance solutions that are then taken into the implementation phase of the BIOFIN process.

BIOFIN Thailand assesses the policy and institutional context by classifying biodiversity resources into four ecological functions. The latter are terrestrial, marine and coastal, wetlands, and urban ecosystems. The PIR finds that the key document that sets national goals for biodiversity is the National Biodiversity Strategy and Action Plan (NBSAP). In addition to this, key policy documents include the Ministry of Natural Resources and Environment (MONRE)'s 20-Year Strategic Plan (2017 – 2036), and the strategic and action plans of important line agencies. These policy documents are set within the context of national development policies, which are the 20-Year National Strategy (2018 – 2037) and the five-year National Economic and Social Development Plan (NESDP).

For biodiversity, key implementing agencies are all within MONRE. Three agencies are especially important. They are the Royal Forest Department (RFD), the Department of National Parks, Wildlife, and Plant Conservation (DNP), and the Department of Marine and Coastal Resources (DMCR). Of these three, RFD and DNP are responsible for the terrestrial ecosystem while the DMCR's mandate is with regards to marine and coastal ecosystems. There are no designated agencies that are directly responsible for wetlands and urban ecosystems. Biodiversity in these two ecosystems are overseen by a wide range of agencies. Nonetheless, given the number of projects and activities related to wetlands in the NBSAP, it can be said that the wetlands ecosystem is given much importance. While the majority of institutions working on biodiversity in Thailand are government agencies, non-profit organizations and some from the private sector have also contributed to biodiversity efforts.

Each of the four ecosystems faces different threats. Loss of forest land from encroachment and land conversion threatens the terrestrial ecosystem. For wetlands, threats come from land use changes and wastewater discharge. Wetlands management also suffers from being site-specific with no effective mechanism for integrated management of wetlands. The lack of clear boundaries for wetlands, as well as the absence of a formal agency that oversees wetlands, further aggravates the problem. There are various threats for marine and coastal ecosystems. For example, overfishing, shrimp farming, tourism, coastal infrastructure development, maritime navigation and the energy sector contribute to negative trends in these resources. For urban biodiversity, pollution and urbanization are the main threats. While there are policies to increase green space in urban areas such as the Bangkok Metropolitan Region, increasing urban population, land use changes, and pollution threaten to reduce such areas. The lack of designated agency and specific policies for urban biodiversity further aggravate the situation, and limit funds allocated for urban biodiversity and ecosystems.

Positive factors combating negative trends include government policies aimed at stemming forest loss, and wetlands degradation. Marine and coastal ecosystems, being placed on the watch list of the international community regarding the Illegal, Unreported and Unregulated (IUU) fishing and over-fishing practices in 2015 spurred the use of various measures to remedy the situation including the registration of fishing vessels and fishing gear. For the urban ecosystem, there are policies to increase green space in urban areas. There is also a growing recognition of the importance of urban biodiversity and ecosystems at both the regional and local levels.

The BER identifies stakeholders related to biodiversity finance from all sectors. Data is collected on budget allocations and expenditures at the program, output/project, and activity level. This data is categorized into NBSAP strategies and BIOFIN categories of the Aichi biodiversity targets. Projection of the Business-As-Usual scenario is then estimated. The BER finds that the majority of funds for biodiversity in Thailand come from the public sector with the private sector, non-governmental organizations, and overseas development agencies playing some role. The BER also finds that the majority of public funds for biodiversity come from the usual budgetary channels. Thus, the country's national budget allocation process plays an important role in biodiversity financing. Annually, approximately THB 11 billion (USD 330 million) is spent by agencies on biodiversity. This accounts for 0.5 percent of the overall national budget, and roughly 0.1 percent of the nation's GDP. The budget shows an increasing trend in line with normal government budget increases, and the proportion of biodiversity funds is stable over the years.

The BER identifies three recommendations aimed at increasing mobilization of efforts and resources toward planning and implementation of biodiversity work in the country. The first is to include all stakeholders, that is, the public, private, and civil society-in the formulation and implementation of the NBSAP. Second, data on biodiversity and finance should be collected and utilized in making budget and investment decisions. This includes information such as green GDP, water management and watershed area restoration, industrial zone impact assessment, and ecotourism and sustainable forestry practices. Information on regulatory, reputational and political risks of activities that exert negative pressures on biodiversity should also be made apparent. Such information could be used to inform the budget formulation process in government agencies and utilized by stakeholders in making decisions. Finally, decision-makers in the budget formulation process and in mainstreaming economic agencies should be well-informed of the significance of biodiversity. Sustainable policy alternatives in the budget formulation and realignment process should also be sought.

The FNA assesses financial needs by identifying actions linked to national biodiversity targets that can be costed (i.e., costable actions), producing a detailed budget for each costable item by defining unit costs and quantities over the target time period, and linking the costs to the national budget process. The financing gap is calculated as the difference between BAU expenditures based on data from the BER, and the estimated financial needs in the FNA. In conducting the FNA, BIOFIN Thailand utilizes a bottom-up approach whereby key line agencies are identified, and their strategies and planned activities included in the FNA calculation. Thus, biodiversity goals are those identified in the NBSAP, the Ministry of Natural Resources and the Environment's 20-Year Strategic Plan, and items in the key line agencies' strategies and plans that are not included in the NBSAP budget (NBSAP plus activities). The latter items are identified and costed in close consultation with key line agencies. **The financing gap is estimated to be THB 31,978 million (USD 942 million) for the 2019 – 2021 period.** This is more than twice the estimated biodiversity budget in the BER. As such, substantial investment is needed in order to achieve national biodiversity targets.

With a large financing gap to be filled, efforts towards achieving national biodiversity goals need to be stepped up. Prioritized finance solutions need to be identified, explored, and implemented. Findings from the PIR, BER, and FNA pave the way for informed formulation of Thailand's biodiversity finance plan (BFP). Potential finance solutions identified in the PIR reports should be studied and explored. These include the use of payment for ecosystem service schemes, island visit fees, biodiversity offsets, conservation license plates, social impact investment, and crowdfunding. Solutions specific to ecosystem are also identified as part of the PIR process for BIOFIN Thailand. Prioritized finance solutions could be formulated on this mix of finance solutions and chosen for implementation.

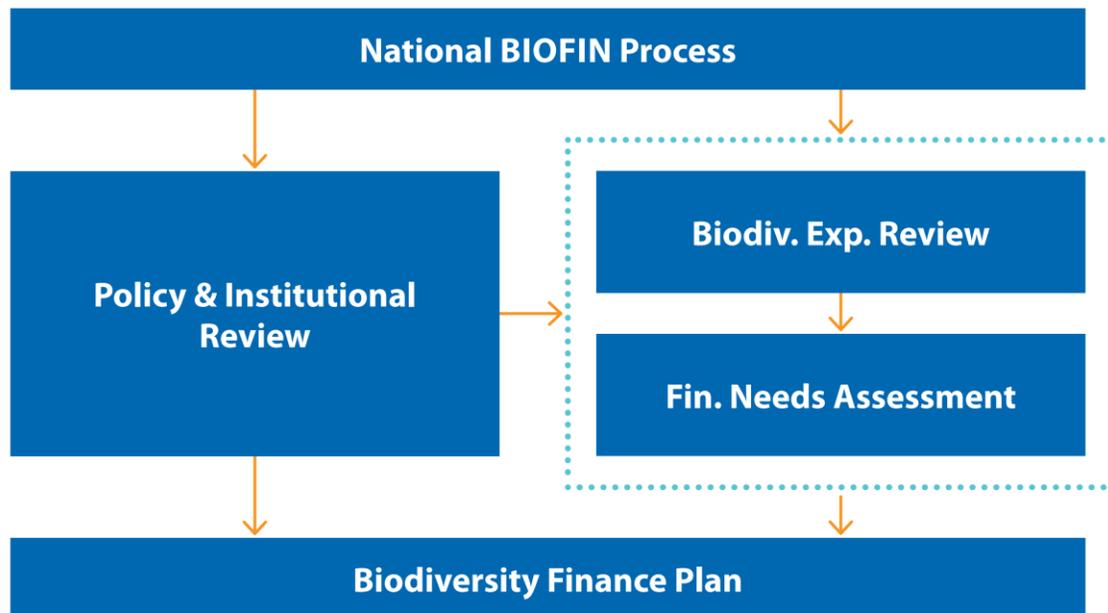
As the first phase of the national BIOFIN process draws to a close, several lessons can be drawn. First, the large financing gap required to achieve national biodiversity targets requires increased contributions from all stakeholders including the private sector and citizens. Second, efforts to conserve and enhance biodiversity resources require the participation of all stakeholders, especially local governments and communities. The ideas embodied in the BIOFIN process could be utilized at the local level in order to have informed decision-making regarding budgeting for biodiversity. Third, data on biodiversity should be collected and a holistic database for biodiversity created. Data could be gathered by different agencies, with one central agency responsible for gathering all data into a single database. Finally, increasing the awareness of the importance of biodiversity in the younger generation is crucial to sustaining biodiversity resources into the future. Thus, activities towards this end should be encouraged.

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1. INTRODUCTION

The national BIOFIN process comprises of three assessments that lead to the formulation of the country's biodiversity finance plan (BFP), as shown in Figure 1. This report brings together the findings from the three assessments, namely the Policy and Institutional Review (PIR), the Budget and Expenditure Review (BER), and the Financial Needs Assessment (FNA) of BIOFIN Thailand. The aim of this report is to determine key agencies and institutions related to biodiversity initiatives in the country, assess the current and projected levels of biodiversity-related budget and expenditures, and estimate the financing gap required in order to meet national biodiversity goals.

Figure 1: National BIOFIN Process



Source: BIOFIN (2016)

Recognizing the importance of stakeholder involvement, BIOFIN Thailand has included the inputs of key stakeholders from the very beginning. Prominent members of core public agencies related to biodiversity and finance are appointed as members of the Project Steering Committee (PSC) and to the BIOFIN Working Group. The assessments in the national BIOFIN process are conducted through close consultation with these key stakeholders. This close relationship has allowed the assessments to benefit from data, comments, interviews, and focus group discussions with core agencies. This helps the technical team in obtaining valuable insights, as well as to verify findings from the assessments. Thus, the final outputs are very much a product of joint efforts between key

stakeholders and the technical team.

In conducting the assessments, BIOFIN Thailand defines biodiversity according to its ecological functions. Four main ecosystems important to the country are identified as terrestrial, marine and coastal, wetlands and urban respectively. Key policies and agencies with respect to the different ecosystems are identified, and financing needs are assessed using this framework. Dividing biodiversity into core ecological functions in this manner allows for the policy analysis and subsequent financing needs assessment to be determined in a holistic manner. This method also helps prevent any possible overlaps in the allocation of public funds for biodiversity purposes.

Using the framework of dividing biodiversity into four core functions, PIR provides an overview of the biodiversity-related policies and institutions. BER analyzes biodiversity budgets and expenditures and establishes past and projected expenditures on biodiversity. FNA brings together findings from the PIR and the BER to estimate the gap between the budget needed to achieve biodiversity goals and the budget allocated under the *status quo* scenario. This synthesis report brings together these components to provide an integrated perspective to the findings of the first phase of the BIOFIN process. Ultimately, these findings from the PIR, BER, and FNA will feed into Thailand's biodiversity finance plan (BFP) where prioritized financing solutions will be identified to help close the financing gap on biodiversity.

This report is divided into 5 main sections. Section 2 provides a synthesis of the PIR. Section 3 is a summary of the BER. Section 4 deals with the FNA. This section brings together findings from the PIR and the BER in estimating the financing gap. Section 5 concludes the report by taking the findings from the PIR, BER, and FNA into consideration. Reflections on the BIOFIN process are offered, and policy recommendations are presented.

2. POLICY AND INSTITUTIONAL REVIEW

The Policy and Institutional Review (PIR) represents the first stage of the national BIOFIN process. The PIR provides an assessment of the policy and institutional context for biodiversity management in the country. It identifies key policies on biodiversity within Thailand. It then lays out the sectoral practices, policies and policy factors as well as economic drivers that exert positive and negative pressures on biodiversity trends. The legal and institutional frameworks are analyzed, and policy recommendations are formed. Potential finance solutions are also identified as part of the PIR. For Thailand, the policy and institutional review processes utilizes the BIOFIN Workbook 2014 to provide the overall guidelines in structuring the frameworks and approaches to preparing the PIR. With

the release of the BIOFIN Workbook 2016, the PIR methodology is revisited and the concept of institutionalization is incorporated.

UNDP Thailand and PSC members have identified four ecosystems as the entry points for the BIOFIN process in Thailand. Thus, four ecosystems important to the country have their own PIR. An integrated PIR then brings the findings from all ecosystems together. The four ecosystems are terrestrial, wetlands, marine and coastal, and urban ecosystems. This separation allows the key policies and institutions for each type of ecosystem to be identified and for policy recommendations and potential finance solutions to be formulated by ecosystem type.

By considering each ecosystem individually, and then synthesizing the findings across the four ecosystems, the PIR process in Thailand allows for both a big picture view of biodiversity in the country, as well as for a detailed view of the policy and institutional context by ecosystem type. The added advantages of this approach are that it ensures the coverage of all main ecosystems, and that it allows for the formulation of policy recommendations and finance solutions that address both overarching concerns across ecosystems and specific concerns for each ecosystem type.

With the work of BIOFIN Thailand beginning just after the endorsement of the fourth NBSAP by the cabinet, the PIR process consults this document extensively. In addition to this, information from the roadmap of agencies related to biodiversity and finance are incorporated in the PIR process when the said information is not fully covered by the NBSAP. This is done so as to ensure the PIR is as comprehensive as possible with regards to the planned work / projects / activities that relate to biodiversity and ecosystem in the country.

This section on the synthesis of PIR has six sub-sections. It begins with an overview of status and trends of biodiversity and ecosystems for all four types of ecosystems. Thailand's vision for biodiversity is then laid out, and key factors that negatively and positively affect biodiversity trends in the country are identified for each ecosystem. A sub-section on institutions that are relevant to the management, utilization, and conservation of biodiversity resources in Thailand follow. A summary of key policy recommendations and potential finance solutions by ecosystem concludes this section.

2.1. BIODIVERSITY STATUS AND TRENDS IN THAILAND

The PIR process reveals that Thailand enjoys a high level of biological diversity due to the country's varied ecosystems and its location in the tropics. This can be found in many hotspots throughout the country. However, these resources are still undervalued in the country, and their contributions to the country's socio-economic wellbeing has yet to become widely recognized. This has led to degradation of natural resources in the country,

and pressures from a variety of factors threaten biodiversity in Thailand.

Thailand's terrestrial ecosystem centers around forests. According to Thailand's fifth national report on biodiversity (ONEP, 2015b), forest cover in 2013 is at 31.57 percent of total land area¹. This is in contrast to the 53.33 percent forest coverage in 1961, and a low of 27.95 percent in 1989². This shows that deforestation is still a problem for the country, despite emphasis and efforts placed on reversing the trend. According to Baimai (2010), forests in Thailand are home to some 12,000 species of vascular plants, 15,000 known species of animals, and 10,000 known species of microorganisms. Baimai (2010) also states that some 100,000 species of living organisms are thought to be undiscovered in Thailand's forests. This makes Thailand one of the richest countries in the world in terms of biological resources. These figures also show that deforestation has important implications for biodiversity in the country.

Total wetlands in the country is 22.5 million rai³ as stated in Thailand's Cabinet Resolution on 3rd November 2009. This is equivalent to 7.5 percent of the country's total land area. Of this, 45 percent is inland wetlands and is classified into the following:

1. Wetlands of international importance (69 sites)
2. Wetlands of national importance (47 sites)
3. Wetlands of local level importance (19,295 sites)
4. Wetland areas registered as RAMSAR sites (14 sites)

These wetlands combine to provide both direct and indirect benefits to the country and its people.

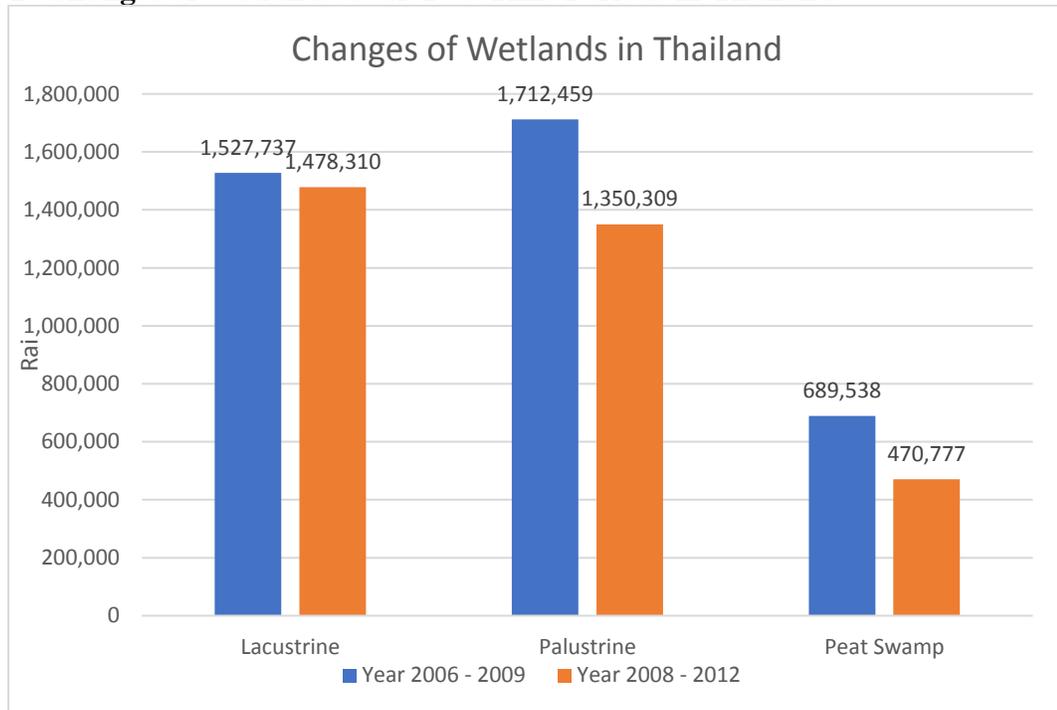
Despite their importance, wetlands in Thailand are in decline, both in terms of condition and coverage. Aerial photographs taken by the Department of Land Development provide estimates of different types of wetlands for the years 2006 – 2009. They show that the surface area of swamps and lakes are estimated to be around 1.5 million rai. River plains are estimated to be 1.7 million rai, and peat lands are estimated to be 0.7 million rai. These figures are compared with estimates from the Thailand Institute of Scientific and Technological Research (TISTR), which provide information for the years 2009 – 2012. They show a decline in all categories of wetlands as shown in Figure 2.

¹ Thailand's total land area is 513,120 square kilometers.

² The increase to 31.57 percent forest cover is due, in part, to a change in satellite image interpretation.

³ Land measurements in Thailand are commonly expressed in 'rai.' 1 rai is equivalent to 0.16 hectare.

Figure 2: Changes of Wetlands Over Two Time Periods in Thailand



Source: BIOFIN (2018b)

For marine and coastal ecosystems, Thailand has a coastline of 3,148 kilometers situated in 23 provinces. Of these provinces, 17 lie on the Gulf of Thailand to the East and the Southeast of the country. A further 7 provinces in the Southwest lie on the Andaman Sea. Marine and coastal ecosystems can be further divided into mangroves, seagrass, and coral reefs, which are the three main ecosystems in Thailand. There are also beach forest and island ecosystems, which are considered biodiversity hotspots.

Mangroves in Thailand have been declining over the years. In 1961, Thailand had 368,000 hectares of mangroves. In 2009, estimates by the Department of Marine and Coastal Resources (DMCR) put the figure at 252,751 hectares (Nabangchang, 2015). In the fourth national report on the implementation of the Convention on Biological Diversity, it was reported that there were 74 perennial plants from 53 families. Mangrove animals include around 15 species of prawns, 7 species of fish, 32 species of crabs, and 32 species of shells. Mangroves are also home to birds, monkeys, otters, wild cats, bats, snakes, turtles, and insects (ONEP, 2009). Every coastal province has mangroves, with Pang-nga, Krabi, Trang, Ranong, and Nakornsrihammarat being the provinces most abundant with mangroves.

Mangroves perform a number of important functions. These include producing oxygen and filtering pollutants, as well as carbon storage. These are in addition to the benefits of using resources within the mangroves and their function as a nursery for young aquatic

animals. Saengtien (2010) estimates the benefits of mangroves to be approximately THB 667,886 per rai. Carbon storage function alone, when converted into a monetary value would be worth US\$ 3,629 per hectare or THB 18,000 per rai. This amounts to 4.5 – 6 million tons of carbon stored per year, based on an estimate of 1.5 million rai of mangrove in Thailand.

Phillips and Menez (1988) estimate that there are 12 genera and 42 species of seagrass worldwide. Thailand is home to some 7 genera and 12 species of seagrass found both in the Gulf of Thailand, and the Andaman Sea. A survey by the Department of Marine and Coastal Resources (DMCR) reveal that the total seagrass area of Thailand is 159,829 rai, of which 62 percent is on the Andaman coast. (DMCR, 2015). Classification by the DMCR reveal that 9 percent of seagrass beds along the Andaman are in poor condition. Along the Gulf of Thailand, the figure is 14 percent. Human activities contribute to this state.

Coral reefs cover an area of 148,954 rai, with 280 out of the world's 600 types of corals being found in Thailand. A 2009 survey by the DMCR reveal that 50 percent of the country's coral reefs are classified as 'much damaged,' and 28.3 percent classified as 'damaged.' A further 16 percent is of average quality, and less than 6 percent are in 'good' or 'very good' conditions. Incidents of coral bleaching have also been recorded, with 2010 being especially bad. 30 – 40 percent of coral reefs in the Gulf of Thailand and 50 – 60 percent of the reefs in the Andaman Coast were affected.

Thailand is home to number of endangered marine species such as sea turtles (the green turtle, Hawksbill, Olive Ridley, Leatherbacks and Loggerheads), dugongs, dolphin (Indo-Pacific bottlenose, Finless porpoise, Indo-Pacific humpback dolphin, Irrawaddy dolphin), Bryde's whale and Omura whale. These species have been major attractions for tourists and promise to be significant source of revenues for some of the local communities. However, threats from human activities remain. These include plastic waste contaminating oceans and endangering wildlife, and unsustainable fishing and tourism practices.

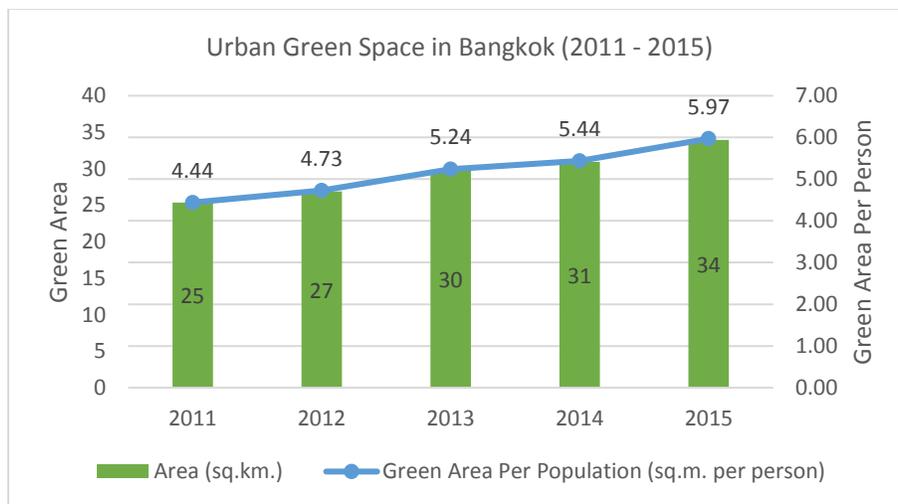
To ensure adequate protection of important marine and coastal resources, initiatives were taken to declare 'Protected Areas' status to many sites. Types of protection varies from being declared Marine National Parks (MNPs) (6,927.78 sq.km.), no hunting zone (1,054.17 sq.km.), environmental protection zone (9,499.27 sq.km.), area under regulated fishing (50,105.57 sq.km.), wetlands of international importance (1,213.85 sq.km.), ASEAN heritage site (2,154.73 sq.km.) and biosphere (304.13 sq.km.). Several agencies are responsible for these different types of marine protected areas.

Urban biodiversity and ecosystems are found mostly in green spaces, which are interspersed with the built environment throughout the city. The most common forms of urban green space are parks, gardens, trees that line streets and walkways, and pockets of wilderness areas that grow on abandoned or unused land. In certain cities, there are also

wetlands, grasslands, and agricultural land. Green spaces can be natural areas such as wetlands and grasslands, or they can be man-made such as parks and gardens.

For the Bangkok Metropolitan Area (BMA), which form the largest contiguous urban area in Thailand, biodiversity can be found in agricultural land (24.25 percent), aquaculture area (7.19 percent), meadows and groves (5.19 percent), and mangroves (0.16 percent). Surface water area covers approximately 3 percent of the city’s land area (Land Development Department, 2017), and there are 7,219 recreational parks in Bangkok at the end of 2016 (Bangkok Metropolitan Administration, 2017). These areas contain many species of flora and fauna. For example, a survey of species in Bang Khun Tien wetlands by Chaipakdi and Chanittawong (2005) finds 64 species of birds (32 local species, 20 migratory species, and 12 local and migratory species), monkeys, dolphins, bats, pythons, snakes, and water monitor. As shown in Figure 3, the green space per person in Bangkok has been increasing since 2011. This contributes to the creation of green pockets that serve as habitats for flora and fauna in the city.

Figure 3: Green Area in Bangkok



Source: Bangkok Metropolitan Administration (2017)

Urban biodiversity and ecosystem provide many ecosystem services. Provisioning services are provided by agricultural areas that produce food for local residents. Regulating services are provided in the form of positive contributions to local climates and air quality. Wetlands and mangroves help moderate the effects of climate change, and wetlands provide wastewater treatment services. Urban green space also provides habitats for many species and provide recreational benefits to the people in the city.

2.2. THAILAND'S VISION FOR BIODIVERSITY

2.2.1. National-Level Vision And Strategies Related to Biodiversity

Thailand's vision for biodiversity centers around the National Biodiversity Strategy and Action Plan (NBSAP). In addition to this, there is the Ministry of Natural Resources and Environment (MONRE)'s 20-Year Strategic Plan (2017 – 2036), which is directly relevant to biodiversity. These plans operate alongside two other key documents that set the direction of development in Thailand. The first such document is the 20-Year National Strategy (2018 – 2037), which was passed by the cabinet on 5 June 2018 and announced in the government gazette on 8 October 2018. The second document is the five-year National Economic and Social Development Plan (NESDP). While not specific to biodiversity, these latter documents contain some elements related to it. These parts are included in the PIR. Strategic plans and roadmaps of government agencies related to specific ecosystems are also reviewed as part of the PIR process. At the time of writing, the country is in its fourth NBSAP period (2015 – 2021), and the twelfth NESDP period (2017 – 2021).

It should be noted that natural resource and environmental concerns did not make their way into the NESDP until the sixth NESDP in the 1980s. Early public policy on biodiversity-related issues in Thailand focused on natural resources. This legacy carries on to the present day with public policies related to biodiversity resources still very much natural resource-oriented. Two items are especially worthy of note. First, the policy to conserve forests always places high on the agenda of policymakers. The goal is to increase forest cover from 31 percent to 40 percent of the total land area of the country. Second, the nation has already achieved the target mangrove area of 1.5 million rai (2,400 square kilometers). Nonetheless, it should be noted that the quality of marine and coastal ecosystem is still declining.

The NBSAP forms the core document that represents the country's vision for biodiversity. Designed after the adoption of the Convention for Biological Diversity (CBD)'s Strategic Plan for Biodiversity and the Aichi Biodiversity Targets, the fourth NBSAP is coherent with the CBD documents. In the fourth NBSAP, four strategies are identified. They are:

Strategy 1: Integrating the value and management of biodiversity resources involving stakeholders at all levels through participatory processes.

Strategy 2: Conservation and restoration of biodiversity resources.

Strategy 3: Protecting the national rights in terms of access and benefit sharing that is consistent with the concept of green economy.

Strategy 4: Developing the knowledge and standardized database on biodiversity resources so that it is consistent with international standards.

An NBSAP Action Plan covering the period 2015 – 2016 and 2017 – 2021 laid out the budget for implementing NBSAP activities. The estimated budget for 2015 – 2016 is THB 11,048.59 million and the estimated budget for 2017 – 2021 is THB 10,945 million. Strategic items and their budgets are provided in Table 1. Strategy 2, which determine the core biodiversity issues of the four important ecosystems in Thailand, is allocated the majority of the budget under both Action Plans.

Table 1: Thailand’s 4th NBSAP Strategy and Estimated Budget (Unit: THB million)

Strategy & Action plans	2015 – 2016 Estimated budget	2017 – 2021 Estimated budget
<p><u>Strategy 1</u>: Integrating the value and management of biodiversity resources involving stakeholders at all levels through participatory processes.</p> <p>(i) Action Plan 1.1 – Increasing awareness and providing knowledge about biodiversity resources</p> <p>(ii) Action Plan 1.2 – Integrating and promoting participation in the management of biodiversity resources</p>	890.23	745.24
<p><u>Strategy 2</u>: Conservation and restoration of biodiversity resources</p> <p>(i) <u>Action Plan 2.1</u> – Conservation, restoration and protection of biodiversity resources</p> <p>(ii) <u>Action Plan 2.2</u> – Reducing the pressure and ensuring sustainable use of biodiversity resources</p> <p>(iii) <u>Action Plan 2.3</u> – Management of Wetlands</p> <p>(iv) <u>Action Plan 2.4</u> – Management of alien invasive species</p> <p>(v) <u>Action Plan 2.5</u> – Biosafety</p>	7,538.46	8,353.28
<p><u>Strategy 3</u>: Protecting the national rights in terms of access and benefit sharing that is consistent with the concept of Green Economy</p> <p>(i) <u>Action Plan 3.1</u> – Protecting genetic resources (THB 51 million for 2017 - 2021)</p> <p>(ii) <u>Action Plan 3.2</u> – Research and Development for the purpose of creating market values for biodiversity resources (THB 265.7 million for 2014 - 2021)</p>	2,078.14	131.08
<p><u>Strategy 4</u>: Developing the knowledge and standardized</p>	541.76	1,715.83

Strategy & Action plans	2015 – 2016 Estimated budget	2017 – 2021 Estimated budget
database on biodiversity resources so that it is consistent with international standards. (i) <u>Action Plan 4.1</u> – Knowledge Management and Database (THB 541.76 million for 2017 - 2021) (ii) <u>Action Plan 4.2</u> – Protecting local/traditional knowledge about biodiversity resources		
Total	<u>11,048.59</u>	<u>10,945.43</u>

Thailand’s 20-Year National Strategy (2018 – 2037) is geared towards the achievement of the vision of “security, prosperity, and sustainability”. The document contains six core strategies, which are security, competitiveness enhancement, human capital development and empowerment, broadening opportunity and equality in society, environmentally friendly development and growth, and reforming and improving government administration. Strategy 5 (environmentally friendly development and growth) is the most relevant to biodiversity.

The twelfth NESDP (2017 – 2021) reflects the vision and goals of the 20-Year National Strategy. The vision of “security, prosperity, and sustainability” is used as the vision framework of the plan. Ten development strategies are identified. They are resilience enhancement, just and inclusive development, competitiveness building, environmentally friendly development, building the country’s security, good governance in the public sector, infrastructure and logistics development, science and technology research and innovation, spatial development, and international cooperation for development. Of these, Strategy 4 (environmentally friendly development) is the most relevant to BIOFIN Thailand.

With the NBSAP, MONRE’s 20-Year Strategic Plan, the 20-Year National Strategy, and the NESDP forming the core documents determining policies pertaining to biodiversity of the country, they provide the background to the formulation of action plans and roadmaps of the different line agencies on matters related to biodiversity. For example, key government agencies have formulated their own strategic plans with prioritized activities in line with NBSAP measures and strategies. However, it should be noted that the line agencies have leeway in formulating their plans and roadmaps. As such, the plans and roadmaps do not have to incorporate all aspects of the NBSAP, the MONRE’s 20-Year Strategic Plan, the 20-Year National Strategy, and the NESDP. For example, line agencies can expand the scope of their work beyond those outlined in the core development documents. Thus, the PIRs also review line agencies’ plans and roadmaps in order to capture all information that pertain to or could impact biodiversity found in these

documents.

2.2.2. Biodiversity Strategic Plans Specific to Ecosystems

2.2.2.1. Terrestrial Ecosystem .

Three 20-year plans covering the period from 2017 – 2036 provide long-term strategies for terrestrial ecosystems. These are the 20-Year National Strategy, the 20-Year Strategic Plan of the Ministry of Natural Resources and the Environment (MONRE), and the Royal Forest Department’s 20-Year Strategic Plan. These plans are very much oriented towards the restoration, protection and conservation of natural resources, especially forests. The plans also aim to pave the way for sustainable use of forest resources, and to solve the problem of public land encroachment, as well as to provide the poor with common rights to use land. In the long-term plans for terrestrial ecosystem, stemming biodiversity loss through the sustainable management of forests is key.

In the twelfth NESDP, targets and indicators that pertain to biodiversity are identified. The most relevant strategy is Strategy 4 (environmentally friendly development). In the NESDP, the target of 40 percent forest cover to total land area is spelled out, along with the goal of reducing the number of species and living organisms with threatened status. Another relevant indicator is the creation of a complete demarcation map of public land, with the number of land plots being allocated to communities for common use (the One Map Project). This information should be made publicly available. This project, if successfully implemented, would alleviate the problem of land conflicts and unknowing encroachment of natural forests. Specific targets in the NESDP and in each of the 20-year plans pertaining to terrestrial ecosystems can be found in Table A.1.

One flagship project identified in the twelfth NESDP that pertains to biodiversity is the ‘Project for Promoting the Cultivation of Long-Term Economic Value Trees’. The project aims to promote the growing of trees with long-term economic value. The role envisioned for the government is to develop supporting infrastructure and set incentive measures. Three are of particular relevance to BIOFIN. First is the development of afforestation procedures and the sustainable management of forest plantations. Second is the measure to introduce new financial mechanisms such as forest bonds, tree banks, and forestation bonds. Third is the support of studies and research into genetic improvement of tree varieties. The project aims to increase the economic forest to 15 percent of the country’s total land area, while the goal for forest conservation is 25 percent.

In the fourth NBSAP, a number of strategies and measures pertain to the terrestrial ecosystem. With the NBSAP Action Plan completed, the strategies and measures envisioned in the NBSAP are translated into action plans and activities. Specific targets are set, and budget estimates specified for each activity in the Action Plan. In the NBSAP and

its associated Action Plan, strategies 1, 2, and 4 are especially relevant to the terrestrial ecosystem. Strategy 1 aims to integrate biodiversity values and management with participation at all levels. Strategy 2 aims to conserve and restore biodiversity. Strategy 4 aims to develop biodiversity knowledge and database management systems to be consistent with international standards. A summary of the relevant plans and activities appear below. A list of plans and activities in the NBSAP and NBSAP Action Plan appear in Table A.2 in the appendix.

Under Strategy 1, Plan 1.2 aims to achieve integrated action and to promote participation in biodiversity management. Under the plan, the development of tools and conducting a study on the economic value of forestry biodiversity is envisioned. Plan 1.2 also targets the establishment of biodiversity conservation and utilization networks, as well as cooperation networks for forest fire control. Research and development of forestry bond or marine and coastal resources bond system are also envisioned, along with the promotion of reforestation.

Strategy 2 aims to conserve and restore biodiversity with Plans 2.1 and 2.2 being especially relevant to the terrestrial ecosystem. Plan 2.1 is an action plan on conservation, restoration and protection of biodiversity. Under this plan, the parts pertaining to the terrestrial ecosystem aim to accomplish the goal of the plan by (i) strengthening and increasing the efficiency in the management of protected areas, conservation areas, and important biodiversity areas, (ii) encouraging the establishment of protected network of conservation areas and habitats management at local levels, and (iii) restoring ecosystems, especially degraded ecosystems.

Strategy 4 aims to develop biodiversity knowledge and database management systems to be consistent with international standards. Items in Plan 4.1 pertain to the terrestrial ecosystem. Plan 4.1 is the action plan on knowledge management and database. Relevant items include activities to (i) study, survey biodiversity status, collect and improve database systems of biodiversity, protected areas and Thailand's Red Data, to serve as the necessary background information for policy formulation, (ii) promote knowledge development and research on biodiversity and taxonomy, and (iii) promote research develop knowledge for adaption and mitigation impacts from climate change.

2.2.2.2. Wetlands, and Marine and Coastal Ecosystems .

Judging from the number of projects and activities related to wetlands, as well as budget estimates, the wetlands ecosystems are accorded significant importance by the NBSAP. Activities in the NBSAP related to wetlands management, conservation and restoration total THB 1,275.1 million in the NBSAP Action Plan for 2015 – 2016. Relevant plans include Plan 2.1, the conservation and restoration plan, and Plan 2.3 on improving wetlands management. An extensive list of activities falls under Plan 2.3. The plans, the associated

activities and the budget related to the wetlands for the 2015 – 2016 NBSAP Action Plan is found in Table A.3 in the appendix. In the 2017 – 2020 NBSAP Action Plan period, the estimated budget for wetlands ecosystems is THB 49.5 million. The plans and activities for this period is found in Table A.4 in the appendix.

For the marine and coastal ecosystems, the policy direction is laid out in the NBSAP, and in the Department of Marine and Coastal Resources (DMCR) Roadmap. As the core line agency regarding marine coastal resources, the DMCR Roadmap provides greater details of the activities to be implemented pertaining to these resources. The DMCR Roadmap identifies ten areas of intervention. These are shown in

Figure 4. Mangroves, seagrass, and coral reefs form three of the ten core intervention areas. Marine endangered species, and establishing marine protected areas form two other core areas for intervention.

It should be noted that while some of the activities in the DMCR Roadmap can be said to have already been included in the NBSAP, most are not. As such, they are treated as NBSAP plus activities. Since these activities have not been costed as part of the NBSAP, additional estimates of the costs of these activities need to be undertaken and included in the analysis of financing gaps. Some of these activities appear in Table A.5 in the appendix. The activities in Table A.5 are categorized into five broad categories, and legal aspects identified where relevant.

Figure 4: Ten Areas of Intervention in the DMCR Roadmap.



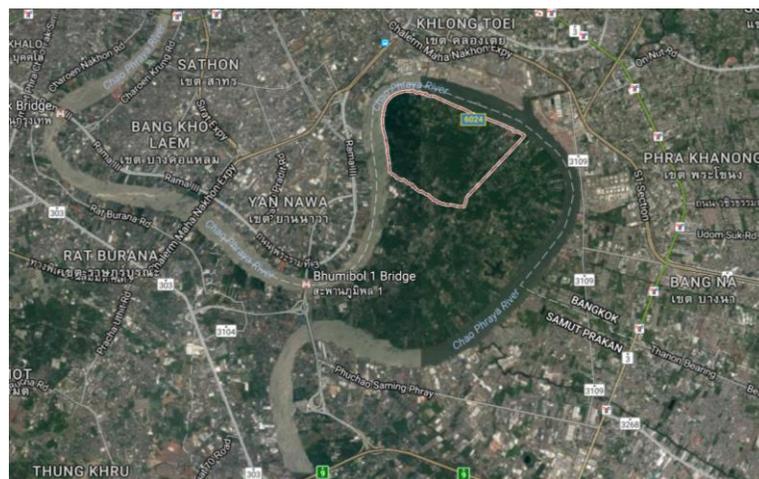
2.2.2.3. Urban Biodiversity and Ecosystem

For urban biodiversity and ecosystems, two documents serve as the main policy frameworks to conserve, develop, and enhance the quality of urban biodiversity and ecosystems. In addition to the NBSAP, there is the Ministry of Natural Resources and the Environment's Strategic Plan (2016 – 2021). While both plans have aspects that pertain to urban biodiversity and ecosystems, it can be seen from the estimated budget for the relevant measures that urban biodiversity is not given its own category. As such, such activities must compete for funds with other activities not specific to urban biodiversity and ecosystems.

With hotspots for biodiversity in cities located in man-made and natural green space, preserving, developing, and expanding urban green space are especially important. For Bangkok, Thailand's capital and a large urban center, the local governing body, the Bangkok Metropolitan Administration (BMA), has plans to increase green space in the city. The BMA aims to achieve 9 square meters of green space per person by 2027 (Thailand Research Fund, 2017). This is compared with the figure of 5.97 square meters in 2015 (Bangkok Metropolitan Administration, 2017). This is to be achieved mostly through increasing parklands in the city.

In the Bangkok Metropolitan Region (BMR), which comprises of Bangkok and five adjacent provinces, the green area of Bang Kachao in Samut Prakarn province is especially worthy of note. An urban oasis formed from bends in the Chao Phraya River, Bang Kachao is a designated green space conservation area (see **Error! Reference source not found.**). Due to its close proximity to Bangkok city and its location within the BMR, Bang Kachao provides recreational and ecosystem services to citizens of the largest contiguous urban area in Thailand.

Figure 5: Map of Bang Kachao Area



Source of Map: Google Earth

2.3. KEY SECTORAL PRACTICES, POLICIES AND POLICY FACTORS, AND ECONOMIC DRIVERS THAT LEAD TO NEGATIVE BIODIVERSITY TRENDS

Biodiversity in Thailand is faced with threats from a variety of factors. Some factors are specific to ecosystems, while others are cross-cutting. Common drivers of negative biodiversity trends that cut across ecosystems include the pollution problem, and land-use changes. In some sectors, well-intentioned government policy could have byproducts that adversely affect biodiversity. The PIR review process identifies key sectoral practices, policies, and economic drivers that lead to negative biodiversity trends specific to the four main ecosystems are identified.

2.3.1. TERRESTRIAL ECOSYSTEM

For the terrestrial ecosystem, major threats to biodiversity come as unintended consequence of some government policies. Certain agricultural policies, poverty-reduction policies, and sometimes even conservation policies inadvertently exert negative pressures on biological diversity. Agriculture is the target of many government interventions, with some agricultural initiatives also aimed at addressing poverty. As such, poverty-reduction policies are sometimes embedded into agricultural policies.

Corn and rubber plantations that encroach on forest land are examples of unintended consequences of agricultural policies. Commercial corn plantation is pervasive in the Northern provinces, while rubber plantations are prevalent in the South. In both areas, illegal plantations of these crops in highland forest reserve is a big problem. Loss of forest areas to agriculture lead is equivalent to loss of habitats for flora and fauna, resulting in overall losses to biological diversity in the country. The causes of these illegal plantations in forest reserve are complex and manifold, with certain government policies providing added incentives for continuing with and expanding illegal production of corn and rubber.

For corn, ineffective law enforcement fails to keep farmers out of the forest reserve. The government has also been unable to prevent agribusinesses from expanding their contract farming networks into areas with illegal corn plantations. Furthermore, the Non-Tariff Barrier (NTB) for corn during the harvest season in Thailand adopted by the Ministry of Commerce has led to a ban on corn imports from neighboring countries during harvest time. This means a higher domestic price for corn and provides incentives for growing corn. Thailand has also pushed its trading partners to lower NTBs for Thai exports. This further expands the market for corn, providing further incentives for growing corn.

For rubber, encroachment of forest reserve is less noticeable than corn. Nonetheless, the terrestrial ecosystem PIR finds evidence that much of the forest reserve in the Southern

part of Thailand is occupied by commercial rubber plantation. Market forces combined with agricultural policies have led to this problem. Promotion of rubber plantation and rubber price support program provide incentives for expanding rubber plantation. There is also the Rubber Replanting Aid Fund Scheme, which encourages rubber plantation and, as such, is partly responsible for illegal rubber plantation.

Poverty reduction policies regarding land rights and forest encroachment have also contributed to negative pressures on terrestrial biodiversity in Thailand. Free land titles issued to landless farmers and cabinet resolution on 30 June 1998 to exempt civil action against forest encroachment have direct implications for biodiversity. To solve the landlessness problem, the government issues land titles from degraded forest lands to these farmers under the Self-Enhancing Estate (*Sor-Por-Kor*) program. However, this practice results in a moral hazard problem because those who encroached on forest reserves and make the forest degraded will eventually be permitted to occupy the encroached land under the program.

Cabinet resolution on 30 June 1998 withholds civil action against forest encroachers until further court ruling. This is a result of a lack of clarity in land titles, with some communities living in forest land before the land was declared forest reserve area. The cabinet resolution therefore attempts to protect these people. However, this resolution means that those who encroach on forest reserve land go unpunished. Coupled with the *Sor-Por-Kor* program, this resolution provides incentives for forest encroachment.

Conservation policy could also lead to biodiversity loss. This is especially true of the listing of endangered species. Teak is a case-in-point. To prevent forest encroachment for harvesting teak, the Thai government has listed teak as a prohibited plant. This prohibition applied to teak plantation, processing, and transportation. This led to a limited supply of teak by the private sector, with continued demand for the wood. This excess demand encourages illegal teak harvesting from forest reserves.

2.3.2. WETLANDS ECOSYSTEM

Expansion of built-up areas and physical infrastructure have led to the conversion and degradation of wetlands. Partly a result of a lack of clear demarcation of ‘wetlands’ boundary, the conversion of wetlands into built-up areas lead to changes in the natural drainage system, and, sometimes, changes in water channels. Examples include the industrial estates and residential areas in Ayutthaya province in the lower central region of Thailand, and the construction of school buildings in Uttaradit province in the northern central region.

Poor understanding of wetlands hydrology leads to the treatment of natural seasonal flooding as a natural disaster that must be controlled by constructing dykes or by other

engineering methods. These projects further interfere with the normal functions of wetlands, leading to negative pressures on the ecosystem. Furthermore, the open access nature of wetlands often leads to the use of wetland soil for landfills in construction sites. This further aggravates the threats to wetlands.

Like the terrestrial ecosystem, agricultural policies can negatively impact wetlands. The promotion of oil palm production in targeted peat lands in the Southern provinces of Thailand and the Pak Panang river basin would adversely impact wetlands biodiversity. Thus, the energy supply benefits need to be weighed against this loss. Agricultural practices such as the use of chemicals in the production process could contaminate runoffs from the fields and endanger wetlands. Further threats include pumping in salt water for aquaculture and wastewater discharge from shrimp farms. Invasive species such as water hyacinth and snails, and the discharge of wastewater from industries and households provide further threats to wetlands biodiversity.

2.3.3. MARINE AND COASTAL ECOSYSTEM

A number of factors threaten the biodiversity of marine and coastal ecosystem. Threats stem from the fishery sector, tourism activities, maritime navigation, land-based pollution, marine debris, coastal erosion, and oil spills. In the fishery sector, coastal and deep-sea fishing put pressures on natural resources. Thailand is faced with overfishing beyond both the Maximum Sustainable Yield (MSY) and the Socially Optimum Yield (SOY). There is uncontrolled expansion of the number of fishing trawlers and use of destructive fishing gears such as trawlers and dynamite fishing in Marine Protected Areas, seagrass beds, and coral reefs. Large fishing vessels often violate the 3,000 meters coastline limit put in place to protect small artisanal fishers. Fishing equipment such as drift nets also pose risks to marine turtles, dugongs, and dolphins. Thailand has been placed on the watch list of the international community regarding the Illegal, Unreported and Unregulated (IUU) fishing and over-fishing practices.

Tourism, while an important revenue generator, exerts negative pressures on coastal and marine resources and the environment. There have been an increasing number of hotels and accommodation built on coastal areas, a result of the increasing demand and malpractice by tourism operators. Diving and snorkelling activities have also contributed to damage of corals and seabed. Increased tourism has put pressures on coral reefs and reduced the quality of coastal waters in popular island destinations. Furthermore, infrastructure development projects that could harm the local environment have been approved. These include the expansion of Phuket international airport and the construction of tourist boat piers in Trang province. In light of the increasing negative pressures on natural resources and the environment from tourism, it is important that the government policy to attract international tourists needs to have more emphasis on sustainability and value-creation.

Maritime navigation, land-based pollution, marine debris, coastal erosion, and oil spills are important sources of negative pressures. Projected expansion of maritime navigation in terms of volume and infrastructure development poses threats to marine biodiversity, especially in light of the knowledge gap on the economic value of coastal and marine biodiversity. Land-based pollution that result in runoffs, and wastewater discharge affect water quality and, as a result, biodiversity. Occurrences of red tide and harmful algal bloom, and invasive species are also problems. Marine debris causes mortality in endangered species such as marine turtles. Coastal erosion harms the health of coastal and marine ecosystem and affects some 830 kilometers of coastline in Thailand (26 percent) (DMCR 2015). However, conclusive evidence on the root causes of the phenomenon is lacking. Finally, oil spills, of which there have been 10 incidents since 2000, have occurred in fragile areas and have caused damage to mangroves and coral reefs. The problem of ballast water is an on-going occurrence but is hardly noticed by the public.

2.3.4. URBAN ECOSYSTEM

In urban areas, major threats to biodiversity resources are urbanization and pollution. Urban population in 2010 was 11.8 million, an increase from 9.3 million in 2000 (World Bank, 2015). Built area grew by 21 percent from 2006 (Land Development Department, 2017; World Bank, 2017). With urban population growing annually and urban areas expanding, conversion of green spaces to make way for built-up areas result in the loss of natural habitats of flora and fauna. This, in turn, leads to biodiversity loss. ONEP (2015a) indicates that urbanization is one of the culprits behind the loss of rice varieties as farmlands are converted to urban areas. The report also cites urbanization and industrialization as some of the factors responsible for loss of native cultivated species from their habitat sites.

In addition to urbanization, pollution is a major threat to urban biodiversity and ecosystem. Air pollution commonly found in urban areas such as ground-level ozone, nitrogen oxides, and sulphur dioxide harm species and ecosystems. Ground-level ozone hampers organism growth (Mills, Wagg, & Harmens, 2013; UNECE, 2017). Nitrogen oxides and sulphur dioxide create acid rain, which harms flora and fauna. Particulate matter deposit on plants can impair normal functioning of certain species (Rai, 2016). In addition to the direct impact on urban biodiversity, air pollution damages suffered by plants and animals ultimately affect the ability to provide ecosystem services. (Rai, 2016; Sutton et al., 2014; UNECE, 2017). In Bangkok and its vicinity, three provinces rank in the nation's Top 5 worst air quality area in 2015. These are Samut Prakarn with 97 days with air pollution level exceeding the standard, Bangkok with 85 days, and Ayutthaya with 74 days accordingly (Pollution Control Department, 2017). Thus, air pollution is an important problem in urban areas in Thailand.

Rivers and canals run through many big cities in Thailand. This blue environment is home to a diverse array of flora and fauna and represents important ecosystems within city areas. However, poor water quality is a problem in urban centers and industrial regions. Classification using the Water Quality Index (WQI)⁴ finds water degradation in many major rivers that run through city areas. This is true in all regions in the country. Furthermore, seawater quality is considered to be low in the upper Gulf of Thailand, which is adjacent to the Bangkok Metropolitan Region. (Pollution Control Department, 2017).

2.4. KEY SECTORAL PRACTICES, POLICIES AND POLICY FACTORS, AND ECONOMIC DRIVERS THAT LEAD TO POSITIVE BIODIVERSITY TRENDS

Factors driving positive biodiversity trends in all the four major ecosystems are highlighted in this section. In terms of the terrestrial and wetlands ecosystems, the key strategy underlying positive trends are designation of areas as protected areas of various forms, such as the designation as National Parks, Wildlife Sanctuaries, Non-Hunting Zones, and Ramsar sites. For the marine and coastal ecosystem, a major overhaul of fishery management prompted by the formal warning regarding Illegal, Unreported, and Unregulated (IUU) fishing issued in February 2015 paved the way for many positive biodiversity trends. The Department of Marine and Coastal Resources (DMCR) Act also provided the DMCR with power to lead and coordinate efforts from all sectors. For the urban ecosystem, growing recognition of the importance of urban biodiversity and ecosystems at the local, regional, and global levels have led to a variety of initiatives that bring positive changes at the local levels. These are important factors underlying positive biodiversity trends in the four key ecosystems in Thailand.

2.4.1. TERRESTRIAL ECOSYSTEM

Decline in terrestrial resources in the form of drastic forest loss has prompted several initiatives by both the public and the private sectors to better manage existing forests, and to increase forest cover. One strategy employed by the public sector is to convert forest reserve areas into National Parks. Such move allows tougher regulations to be imposed and enables access to more public funds. Establishment of R&D activities allows the safeguarding of bio-resources, as well as the enhancement of economic values. Establishment of bio-banks allow for documentation of genetics, which will be valuable for future research and development.

Private sector initiatives center around tree replanting in encroached forest reserves and mangrove areas by volunteers. Companies have also taken up tree replanting as part of

⁴ WQI is calculated based on 5 water quality parameters; which are Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Total Coliform Bacteria (TCB), Fecal Coliform Bacteria (FCB), and Ammonia and Nitrogen (NH₃-N).

their CSR activities. For example, PTT Public Company Ltd has reforested some 400,000 acres of land in 416 forest plantation areas under the Royal Golden Jubilee Restoration program in 48 provinces in the country with a total budget of 3,500 million THB (97.34 million USD). In addition to tree replanting, a more innovative strategy to increase trees is the Tree Bank Program operated by the Bank for Agriculture and Agricultural Cooperatives (BAAC). The program encourages villagers to plant trees on their farms and to use the trees as bank collateral.

2.4.2. WETLANDS ECOSYSTEM

While full recognition of the importance of wetlands at the policy level is still lacking, some concrete actions have been undertaken. Of particular note is the registration of wetlands as sites of ecological importance of various kinds and includes designation of Ramsar sites. The effort began in 2000, and the list was revised in 2009. This marks the first step towards the identification of conservation measures and the involvement of leading and supporting agencies responsible for wetlands. Ramsar site status allows for protective measures for wetlands to be implemented, such as designation as a Non-Hunting Zone, ban on landfilling, and restriction on construction activities⁵. Restoration measures will also have to be identified for Ramsar sites.

Cabinet resolution in 2009 approved key areas of wetland conservation policy. These include;

1. Creating awareness of the importance of wetlands
2. Management and coordination in conservation
3. Capacity building of concerned agencies
4. Promotion of basic research with the goal of establishing a database
5. Setting conditions for land use and obtaining and rights
6. Promoting active and effective enforcement of the law
7. Promoting cooperation in conservation of transboundary wetlands.

Designating wetlands as sites of ecological importance allow wetlands to benefit from increased protection granted under the relevant laws. Areas designated as National Parks benefit from the provisions in the National Park Act of 1961. The Act allows entry for educational and recreational purposes but prohibits occupation in national park area, clearance of areas, collection of forest products, hunting wild animals, and collection of any rocks, sand, or stones. Designation as Wildlife Sanctuaries and Non-Hunting Zone invokes the Wildlife Preservation and Protection Act of 1992, which supports breeding of, as well as helps protect and conserve wildlife species. The National Wildlife Preservation and Protection Committee is responsible for approving any determination of Wildlife

⁵ Construction activities will only be allowed if there is no negative impact.

Sanctuaries, Non-Hunting Areas, and to determine the kind of wildlife hunting that are prohibited in such areas. Outside of protected areas, the Strategic Plan for Water Resources Management recognizes the need to protect natural water resources within wetlands, while the NBSAP has reiterated the importance of wetland ecosystem in terms

2.4.3. MARINE AND COASTAL ECOSYSTEM

Two main factors contribute significantly to positive trends in marine and coastal ecosystems in Thailand. The first is an opportunity that arises out of a crisis. Thailand was issued a formal warning regarding the Illegal, Unreported, and Unregulated (IUU) fishing in February 2015. This resulted in an overhaul of the management of Thailand's fishery sector. This included the IUU Fishing Roadmap, which included much needed measures to control illegal fishing and overharvesting of marine resources among its 6 action plans. Improved traceability from fishing vessel registration and fishing licensing; Monitoring, Control and Surveillance (MCS) and Vessel Monitoring System (VMS) is initiated. The outdated Fisheries Act is replaced with the Royal Fisheries Ordinance of 2015. This provided continuity of these measures. On the whole, the Command Center for Combating Illegal Fishing (CCCIF) reported progress in restructuring the legal framework, developing key systems, enforcing the law, enhancing international cooperation, and assisting victims of illegal fishing.

On the private sector side, a 'Task Force' industry alliance has also been set up. Part of the task force's purpose is to ensure the fishing industry's supply chain is free from illegal and forced labor. Members include leading national and international retailers, manufacturers, government bodies, and NGOs. For example, members include Costco, WM Morrison Supermarkets, Sodexo, Charoen Pokphand Foods (CPF), Thai Union Frozen (TUF), Oxfam, and the Environmental Justice Foundation. On the demand side, manufacturers announced that they will not buy products from and will terminate contract with suppliers who violate human rights or the Royal Ordinance on Fisheries. One action includes 'Shrimp Task Force' policy aimed at reducing the use of fishmeal and enhancing the use of by-products from tuna and surimi processing instead.

The second factor is the Department of Marine and Coastal Resources (DMCR) Act. The Act grants the DMCR the power to lead in many crosscutting issues and to serve as the focal point when coordination among institutions is necessary. The DMCR Act, and the Road Map for the Development of Coastal and Marine Resources are key policy features contributing to positive trends in the marine and coastal sector in Thailand. The DMCR Act allows the DMCR to take the lead in addressing coastal and marine issues that have traditionally involved many government agencies at similar levels. These include mangroves management and coastal erosion. Under the Wildlife Protection Act of 1992, DMCR officials can be appointed as people responsible for arresting violators. While the DMCR Act allows the DMCR to better conserve, protect, and restore marine and coastal

resources, it should be mentioned that limitations still exist in terms of the DMCR's ability in law enforcement to protect coral reefs and marine endangered species.

With the authority of the DMCR in matters regarding marine and coastal resources, the DMCR Road Map for the Development of Coastal and Marine Resources provide important information on the actions to be undertaken with regards to marine and coastal resources. Under the Road Map, ongoing and planned restoration and protection measures include investment in artificial reefs, and restoration of mangroves and sea grass beds; elevating selected marine species to protected status; undertaking preparatory measures to declare additional marine protected areas, and involvement of the DMCR at the international level. Efforts to create artificial reefs has been carried out since 2010 through joint efforts by the DMCR, the Royal Forest Department, the Royal Thai Navy, and the Marine Department. Risks of extinction of iconic marine species have been recognized and granted protected status. Initiatives have been undertaken to declare unprotected environmental hotspots as Marine Protected Areas. This must be carefully done as not all local communities and stakeholders who currently benefit from the areas will welcome the idea. As such, more work still needs to be done to weigh the tradeoffs of the measure.

2.4.4. URBAN ECOSYSTEM

Underlying the positive trends in biodiversity resources in urban areas is the growing awareness of their importance to city dwellers. Spurred by national, regional, and global initiatives, local city governments are implementing various projects related to urban biodiversity and ecosystem. At the national level, the NBSAP (2015 – 2021) and MONRE's Strategic Plan (2016 – 2021) provide a guideline on the vision to be achieved as well as the strategies and measures to adopt. At the local level, initiatives such as the policy to increase green space in urban areas adopted by the Bangkok Metropolitan Administration is implemented. Other initiatives at the local city government level include the activities related to the City Biodiversity Index (CBI) or the Singapore Index on Cities' Biodiversity. Many municipalities in Thailand are voluntarily adopting the CBI, which is a self-assessment tool developed by international experts in the form of an index that can help cities to benchmark and monitor conservation efforts undertaken.

At the regional level, there is the ASEAN⁶ Working Group on Environmentally Sustainable City (AWGESC), of which the ASEAN Initiative on Environmentally Sustainable City (AIESC) forms a part. The AWGESC sponsors the ASEAN Environmentally Sustainable City (ESC) Award and implements the ASEAN ESC Model City program that promotes environmental sustainability in member countries. Furthermore, the AWGESC is also responsible for pilot testing the revised ESC key indicators for clean air, clean land, and clean water. (ASEAN Cooperation on Environment,

⁶ ASEAN stands for Association of Southeast Asian Nations.

2017). Several cities in Thailand have been selected to receive the ASEAN ESC Award in many categories. This includes Bangkok, Chiangmai, Krabi, and Phuket. Smaller cities such as Phitsanulok, and Roi-et have also won ESC certificates for small cities. Under the Model City Initiative, many cities in Thailand have been nominated as model cities. Special training has been provided to these cities, and various initiatives have been implemented. For example, 4 public ESC Learning Centers have been established in Chiang Rai. In Muangklang, training on implementation of low-carbon city projects has been provided to local communities. (ASEAN Model Cities, 2017).

2.5. INSTITUTIONS THAT ARE RELEVANT TO THE MANAGEMENT, UTILIZATION, AND CONSERVATION OF BIODIVERSITY RESOURCES IN THAILAND

2.5.1. INSTITUTIONAL ACTORS BY FUNCTION

More than 60 agencies in Thailand have mandates and functions directly and indirectly related to biodiversity resources utilization and conservation. The majority of these agencies are government agencies. However, several non-governmental agencies, academic institutions, and private companies also have work related to biodiversity resources. Agencies can be grouped into seven categories based on their roles as follows (for a full list of departments and offices within ministries, see Table A.6. in the Appendix);

A. Core government agencies. This comprises of 14 agencies within the MONRE.

B. Agencies with mandates related to sustainable use, as well as Access and Benefit Sharing agencies. These are agencies within the MOAC, the Ministry of Science and Technology, and the Ministry of Public Health.

C. Mainstreaming agencies / Economic sectors. These comprise of ministries and agencies related to the economy. These are the Ministry of Commerce, Ministry of Industry, Ministry of Tourism and Sports, and 3 agencies within the Ministry of Foreign Affairs.

D. Implementation agencies and research institutes. These include 4 agencies within the Office of the Prime Minister, and 3 agencies within the Ministry of Education.

E. Local authorities and communities. These comprise of 4 agencies within the Ministry of Interior that work on community development, public works, town and country planning, provincial administration, and local administration.

F. Cross-cutting agencies involved in sustainable use, and Access and Benefit Sharing (Group B), Implementation agencies and research institutes (Group D), and local authorities and communities (Group E). These are the National Research Council of Thailand, the Office of the Royal Development Projects Board, research and educational

institutions such as universities and the National Biological Control Research Center. Implementing agencies that fall into this category include the Ministry of Industry, the Ministry of Finance, the Ministry of Tourism and Sports, the Tourism Authority of Thailand, the Ministry of Transportation, the Ministry of Defense, the Ministry of Commerce, and the Ministry of Culture.

G. Private sector and civil society organization. Key actors in the private sector include the Electricity Generating Authority of Thailand, PTT (Public Company Limited), Charoen Pokphand Foods Public Company Limited, and Chevron Thailand. Non-governmental Organizations include the Thai Wetlands Foundation and the Thai Water Partnership.

Three ministries in the above list play major roles in governing biodiversity resources in Thailand. These are MONRE, the Ministry of Science and Technology, and the MOAC. However, ministries related to economic activities that put pressures on biodiversity resources are also indirectly affecting such resources in Thailand. These are the Ministry of Commerce, the Ministry of Industry, the Department of Public Works and Town and Country Planning, the Department of Lands, the Ministry of Tourism and Sports, and local governments such as municipalities.

2.5.2. INSTITUTIONAL SETUP

The current setup of government agencies that pertain to natural resources today originated from a reform in the Thai ministerial structure in the 2000s. This includes the establishment of MONRE in 2002. Improving on a structure that was focused on resource utilization to generate income, the reform adopted the philosophy of building in checks and balances between resource utilization and conservation agencies. As such, such agencies are separate entities and are under different ministries. For example, the Department of Water Resources, which aims to oversee the sustainability of water utilization, is under MONRE while the Royal Irrigation Department, which oversees water utilization in agriculture, is under the MOAC. Likewise, the Department of Mineral Resources, which oversees mineral resource conservation, is under MONRE, while the Department of Primary Industries and Mines, which utilizes mineral resources, is under the Ministry of Industry. Agencies with biodiversity research and conservation responsibilities are mostly under the Ministry of Science and Technology.

In addition to central government agencies, local governments have an important role to play in managing biodiversity resources. Decentralization carried out just before 2000 allowed local governments to be responsible for many aspects of government service that used to be centrally decided. These include public services such as local roads, recreational areas, garbage collection, sanitation, wastewater management, public health, and coastal protection. While this empowered local governments and allowed varied policies to be put in place in different municipalities, it also led to a narrower focus of conservation efforts.

In the case of coastal erosion, it has been found that actions taken in one municipality protects the coastal area of that city but passes on coastal erosion to adjacent areas. Varying views on development and conservation among local governments also present challenges for the management of resources that cross political boundaries such as watersheds, and ecosystems. Given this, perhaps the central government should play a larger role in conservation, especially for natural resources that span the boundary of many municipalities.

In the current setting, the private sector and non-government agencies do not have formal roles and responsibilities in resource conservation. Nonetheless, involvement of the private sector and local communities have been apparent in many ecosystems. Such initiatives are reported in the forestry sector, commercial teak plantation, community fishery, and community forest. Given the success of these efforts, it is worth considering how the roles of the private sector and local communities could be broadened and institutionalized. This move would greatly help support existing government agencies in their conservation efforts, especially in light of the difficulties faced by government agencies in ensuring resource conservation in the country.

2.5.3. LEGAL AND INSTITUTIONAL FRAMEWORK BY ECOSYSTEM

For the terrestrial ecosystem, the institutional setting follows the idea of separation between utilization and conservation agencies. One exception is that both agencies are located within the same ministry – MONRE. The key agency overseeing resource utilization is the Royal Forest Department (RFD). Resource conservation is overseen by the Department of National Park, Wildlife and Plant Conservation (DNP). A number of other public agencies and private sectors are also actors involved in the management, utilization, and conservation of terrestrial resources in Thailand. Public agencies operate under different pieces of legislation. Key legislations related to the terrestrial ecosystems are the National Park Act (1961), the National Forest Reserve Act (1963), the Wildlife Preservation and Protection Act (1992), the Land Development Act (2008), and the Enhancement and Conservation of National Environmental Quality Act (1992). Details of these laws can be found in Table A.7 in the Appendix Section.

For the wetlands ecosystem, the institutional framework is complicated by the fact that wetlands often lack clear boundaries, and are often under the responsibility of many agencies. To determine the agencies responsible, the legal framework pertaining to wetlands is first identified. The agencies with mandates relevant to those laws are the agencies with key responsibilities related to the wetlands. The main laws are the National Park Act (1961), the National Forest Reserve Act (1963), the Fisheries Act (1948, amended 1985), and the Environmental Quality Promotion Act (1992). Implementation agencies are the Department of National Parks, Wildlife and Plant Conservation (DNP), the Royal Forest Department, the Department of Fisheries, and the Pollution Control Department.

(See Table A.8 of the Appendix for details). Other pieces of legislations with potential impacts on wetlands include the Town Planning Act (1975), the Royal Irrigation Act (1942), the Royal Decree prohibiting the import of aquatic species, and the Navigation in Thai Waters Act (1913). Additional agencies with mandates related to wetlands appear in Table A.9 in the Appendix.

For the coastal and marine ecosystem, the philosophy of checks and balances is present in the institutional framework. Key agencies involved in the conservation of natural resources are the Department of Marine and Coastal Resources (DMCR) and the DNP. Agencies overseeing resource utilization are the Department of Fisheries, and the Ministry of Tourism and Sports. The relevant legal framework includes Promoting Management of Marine and Coastal Resources Act (2015), the DNP Act, and the Royal Ordinance of Fisheries (2015). Several other agencies also have responsibilities that directly affect the coastal and marine ecosystem. These are the Pollution Control Department, the Biodiversity-Based Economy Development Office (BEDO), the Marine Department, and the Royal Thai Navy. The roles played by these agencies are summarized in Table A.10 in the Appendix.

For urban biodiversity and ecosystem, key policy frameworks in addition to the NBSAP is MONRE's Strategic Plan (2015 – 2021). Of the 5 core strategies under MONRE's Plan, strategies 1 and 3 are particularly relevant. Strategy 1 sets out to preserve, conserve, restore, and manage natural resources through an integrated approach that allows for development, and sustainable and equitable resource use. Strategy 3 aims to maintain and restore environmental quality through a participatory approach. Strategy 1 is directly related to the conservation of green areas in urban centers, which serve as biodiversity hotspots in city areas. Strategy 3, which deals with environmental quality, is directly linked to the pollution problem that endangers urban biodiversity and ecosystems. In addition to MONRE, local city governments have a strong role to play in the management of urban biodiversity and ecosystem as they are those closest to the resource.

2.6. KEY POLICY RECOMMENDATIONS AND POTENTIAL FINANCE SOLUTIONS

On the whole, the PIR finds that the majority of biodiversity efforts in Thailand are led by the public sector but with increasing participation by the private sector, local communities, and non-governmental organizations. For the public sector, the existing *status quo* is that of underfunding and oftentimes uncoordinated approaches taken by responsible government agencies. This section summarizes key problems related to biodiversity in Thailand, as well as identifies potential finance solutions. This is done by ecosystem. Finance solutions pertain to securing additional funds for biodiversity, delivering biodiversity management more effectively (cost efficiency), as well as anticipating and avoiding future expenditures.

2.6.1. TERRESTRIAL ECOSYSTEM

One key problem affecting the terrestrial ecosystem in Thailand is the continued encroachment and threat of conversion of forests to make way for alternative land uses, which happens despite efforts otherwise by both the public and private sectors. One initiative by the government to address this trend is the One Map policy. The policy aims to synchronize forest reserve boundary lines of various government agencies. This is to prevent intentional or unintentional forest intrusion and unlawful land title issuance. As such, continued support should be given to the policy. On the flip side, well-intentioned policies that have unintended negative impacts on biodiversity should be thoroughly reviewed. These include agricultural price support programs, poverty reduction policies that exert negative pressure on forest conservation, and the government's land title issuance program to help landless farmers. Alternative approaches such as providing the know-how to farmers and equal opportunity to the poor should be explored as potential means to end poverty.

In addition to government policies, addressing the forest encroachment problem requires that economic returns to keeping the land forested generates higher net welfare gains compared to alternative land use options. One measure that has long been discussed in Thailand is the creation of 'buffer zones' around Protected Areas. If local communities in the buffer zones can make an adequate living out of the resources within the zones, they could serve as human buffers against encroachment. To achieve this, economic incentives are needed to ensure sufficient revenue can be generated from the resources. Potential financing mechanisms to achieve these goals are payment for ecosystem services (PES), voluntary carbon offsets, ecotourism, conservation license plates, and biodiversity offsets. Details of the proposed plans and the groundwork that needs to be covered appear in Table A.10 in the Appendix.

In the agricultural sector, heavy use of chemicals has generated negative impacts on biodiversity. Solutions to this problem should target the subsidies in place that encourages chemical use and demonstrate that net returns from sustainable land management is higher, especially in the medium and long term. Financing instruments associated with these goals include Payment for Ecosystem Services in Agricultural Landscapes (PESAL), and bio-banking. The former aims to provide subsidies to farmers adopting sustainable land management practices, while the latter is a means for providing incentives to protect native species of flora and fauna. Bio-banks translates species protection into biodiversity credits. The credits can be traded as compensation for residual impacts that cannot be avoided from investment projects in similar ecosystems. Details of the instruments and the groundwork needed appear in Table A.10 in the Appendix.

2.6.2. WETLANDS ECOSYSTEM

Wetlands ecosystems in Thailand are under threat from land use changes due mainly to increasing demand for farm land, increasing urbanization, and wastewater discharge from farming, factories, and households. The condition of wetlands ecosystems is further aggravated by a number of factors. First, with the last nationwide survey carried out in 1996, there is a lack of an updated database on wetlands. Currently, treatment of wetlands has been largely site-specific, and there is a lack of a clear definition of the boundaries of what constitutes an inland wetland ecosystem. This latter point may undermine the effectiveness of efforts to officially declare wetlands to be of national and international importance. Furthermore, institutional analysis suggests that there is no formal agency charged with championing for wetlands. Instead, there are many agencies with mandates related to wetlands with few coordinated efforts across agencies. As such, a central policy goal for wetlands would greatly benefit this important ecosystem.

One important obstacle to the preservation of wetlands is the lack of information on their ecological functions, and how these functions translate into monetary values. If the economic value of wetlands could be assessed, it could be used to compare trade-offs between alternative land uses. This information would also form the knowledge base for potential financing solutions for Thailand's wetlands ecosystem. The proposed financing solutions are biodiversity offsets and mitigation banks (i.e. wetland banking). Wetland banking aims to generate credits from wetlands that could be bought to compensate for adverse impacts from investments that negatively impact other similar ecosystems. Such a system would link the demand and supply of wetlands together, helping to preserve wetlands on the one hand without deterring development on the other.

Under wetland banking, three questions should first be posed regarding the wetland areas under pressure for conversion. These are

- (i) are there alternative approaches that would not create adverse impacts?
- (ii) can the adverse impacts be minimized?
- (iii) what is the residual that needs to be offset?

If it is established that offsets are still required even after (i) and (ii), then credits from mitigation banks can be bought as offsets. However, wetland banking requires the restoration of other areas that have the same ecosystems or biodiversity as the affected ecosystem. In order to establish an effective wetland banking system, groundwork is needed to develop a standard database of ecological functions of wetlands, and to gradually conduct valuation studies of the different types of economic uses.

2.6.3. MARINE AND COASTAL ECOSYSTEM

Despite the huge benefits it generates, marine and coastal ecosystem is under severe

pressure from overfishing, shrimp farming, tourism, and coastal infrastructure development. Maritime navigation and energy sector activities also pose risks to the marine and coastal ecosystem. Degradation of fish stock, corals, seagrass, seabed, shoreline, and mangrove is the result. Pro-growth government policies have also advertently and inadvertently generated negative pressures on these resources. With the warning on Illegal, Unreported and Unregulated (IUU) fishing issued in 2015, reform is implemented at a rapid pace. Positive factors include the registration of fishing vessels and fishing gear regulation. Newly imposed registration and licensing scheme will help to regulate fishing effort. However, these reforms do not address the negative impacts from coastal tourism.

Expansion of physical infrastructure without consideration of environmental impacts is a threat to marine and coastal resources. Past experience has demonstrated that the Environmental Impact Assessment (EIA) by itself does not provide adequate screening against such projects. A potential solution is to further require economic analysis to be conducted by professionals in the field on top of EIA requirements. Potential financial mechanism includes biodiversity offsets as a condition for approving investment. Performance bonds could also be used. Environmental risk insurance allows for timely payouts in the event of environmental disaster. However, for this to work, adequate groundwork needs to be covered. This includes the development of a standard database of ecological functions of wetlands, and the graduate conduct of valuation studies of different types of economic uses.

In addition to the reform already undertaken in the fishery sector, destructive fisheries can be further addressed through the withdrawal of adverse subsidies and the provision of positive incentives. Potential financing mechanisms include payment for ecosystem services (PES) to engage communities dependent on coastal fisheries and other stakeholders in conservation activities. Sustainability standards for fish harvest from non-destructive practices, and impact investments that target the seafood industries are also important tools. Groundwork that needs to be covered include conducting an economic analysis of habitat protection and conservation costs, as well as the monetary benefits of ecosystem services provided by these habitats; market research on consumer's willingness to pay a premium price, as well as cost benefit analysis of the investments to demonstrate net welfare gains to society.

Finally, lack of sustainable revenue flows has endangered marine national parks and island destinations resulting in degradation of these areas with increasing tourist numbers. In order to mitigate and alleviate negative impacts from tourism, introduction of visitation fees in island destinations outside marine national parks could serve as a source of revenue to these areas. Impact investment could serve as another tool. Innovative investments could be used to protect or reduce the pressure on natural resources. Groundwork needed in this case is to review the institutional and legal framework for collecting island visitation fees.

2.6.4. URBAN ECOSYSTEM

Urban biodiversity exists in pockets of natural and man-made ecosystems in city areas. Together they provide the core ecosystem services of provisioning, regulating, habitats, and recreation. While many ecosystem benefits are generated from this biodiversity, it is threatened by pollution discharge, and the expansion of built-up area due to increasing urbanization. While efforts have been made to conserve and enhance green space in cities, more still needs to be done to combat the threat of pollution and further increase green areas in cities. Financing solutions that would help these activities include earmarking funds in the NBSAP and MONRE strategies as well as the national budget allocated to local city governments for urban biodiversity and ecosystem activities. Funds could be collected from beneficiaries of biodiversity such as businesses and local residents. Negative externalities could be taxed or charged, and funds channeled to the conservation and development of urban biodiversity and ecosystems. Private sector contributions such as CSR funds could be redirected towards biodiversity-related projects, and novel funding channels such as crowdfunding should be explored.

3. BUDGET AND EXPENDITURE REVIEW

The Budget and Expenditure Review (BER) provides an assessment of biodiversity-related budget allocations and expenditures in Thailand of all stakeholders, be they located within the country or otherwise. In so doing, the BER identifies related stakeholders from all sectors, and collects data on budget allocation and expenditures from them. This is done at the program, output/project, and activity level. Data is then reviewed and categorized according to the NBSAP's strategies and BIOFIN's Workbook categories of the Aichi biodiversity targets. After this step, proportions of the total budget allocated to biodiversity are then assigned to each item using BIOFIN methodology. The Business-As-Usual scenario is then projected based on these BER findings. Finally, recommendations are made to improve the biodiversity financing process and allocation in Thailand.

On the whole, the BER finds that the majority of funds for supporting, sustaining, and restoring biodiversity in Thailand come from the public sector with the private sector and NGOs playing some role in biodiversity financing. This is in line with PIR findings that indicate that government agencies play key roles in biodiversity governance, as well as biodiversity-related programs, activities, and initiatives in the country. The BER further finds that a large proportion of biodiversity-related funds come from the national budget, as opposed to extra-budgetary channels. As such, the national budgetary process plays an important role in the allocation of funds for biodiversity in Thailand.

3.1. NATIONAL BUDGETARY PROCESS

The national budget cycle consists of four main stages; budget preparation, budget adoption, budget execution, and budget control and evaluation. In the budget preparation phase, the Bureau of the Budget (BB), the National Economic and Social Development Council (NESDC)⁷, the Ministry of Finance, and the Bank of Thailand draft the overall budget policy, total budget amount, annual budget structure, and budget allocation strategy. This done while taking into consideration consistency with existing economic and policy environments, and economic and fiscal conditions. Key documents that serve as the guideline for the budget planning agencies are the National Economic and Social Development Plan (NESDP), the National Administration Plan, and government agencies' four-year action plans. The NESDP is the country's five-year development plan, while the National Administration Plan contain government policies. Thus, the process ensures that the core strategies laid out at the national level are reflected in the budgetary process.

Once the budget policy, allocation strategy, and budget amount have been endorsed by the cabinet, the BB is charged with drafting detailed budget documents to be submitted to the Prime Minister and the cabinet, before being presented to parliament. In this budget preparation phase, government agencies submit budget requests to the BB. These budget requests are drafted based on the respective government agency's work plans, outputs and projects corresponding to each agency's action plan, ministry-level plans, national budget strategies, NESDP, and government policies and strategies. Since there is a finite amount of budget, agencies' budget requests are generally subjected to cuts according to their given budget ceilings. Requests for a larger amount than the ceiling will be ranked by parliament according to the strategies laid down in the National Administration Plan. This often results in a mismatch between the agencies' work plan and budget allocated. Furthermore, project approvals are usually given on an incremental basis. As such, projects related to pressing matters such as natural disasters, and those related to key government priorities such as poverty alleviation and infrastructure development are usually accorded higher priority than natural resources and environmental management projects.

In the budget adoption stage, both houses of parliament consider the Annual Expenditure Budget Act and accompanying budget documents. Once approved, the budget is disbursed to the various government agencies. In the final stage, government agencies report the disbursement of the allocated budget and the outcome of implementing their action plans. Agencies' expenses are monitored and reviewed by the Comptroller General's Department and the BB based on actual expenditure, performance, and/or details of any changes or transfers to between items. Completed items that are not in line with government strategies and policies will be reduced, as well as items with have increasing

⁷ Formerly National Economic and Social Development Board (NESDB). The name change to National Economic and Social Development Council occurred in January 2019.

shares of the budget for several years. Furthermore, budget requests that apply new technology, or operational procedures, or involving the private sector, communities, or volunteers that could reduce costs for implementing agencies face could be transferred to supporting agencies or have those items reduced in future budget allocations. This shows that biodiversity-related budget allocations could be reduced if they are not in line with government policies.

3.2. THAILAND’S BIODIVERSITY EXPENDITURE AND MAJOR FUNDING SOURCES

Funding for biodiversity in Thailand come from both domestic and external sources. An important domestic source is the annual national budget allocation disbursed to activities, projects, initiatives that are in line with national-level policies and in accordance to government agencies’ work plans. For biodiversity, agencies that are funded mainly through the government budget can be divided into core environmental agencies, sustainable use and ABS agencies, mainstreaming and economic agencies, implementation agencies and research institutions, and local authorities and communities (see Table 2). Biodiversity-related expenditures for the core environmental agencies account for the largest share (80 percent) of the overall biodiversity budget for 2015.

Table 2: Agencies Included in the Expenditure Review

Source	Institutions
<i>Government Budget</i>	
A. Core Environmental Agencies	Department of National Parks, Wildlife and Plan Conservation Royal Forest Department Department of Marine and Coastal Resources Biodiversity-based Economy Development Office The Botanical Garden Organization The Forestry Industry Organization The Zoological Park Organization Plant Genetic Conservation Project Office of Natural Resources and Environmental Policy and Planning Pollution Control Department Department of Water Resources Department of Environmental Quality Promotion

Source	Institutions
B. Sustainable Use and ABS Agencies	Ministry of Agriculture and Cooperatives Ministry of Public Health Ministry of Interior Office of the Royal Development Projects Board
C. Mainstreaming Agencies/ Economic Sectors	Ministry of Education (excluding universities) Ministry of Industry Ministry of Tourism Ministry of Transportation Ministry of Defense Ministry of Commerce Ministry of Energy Marketing Organization for Farmers
D. Implementation Agencies/ Research Institutes	Ministry of Science and Technology Universities National Science Museum
E. Local Authorities and Communities	Provinces and clusters of provinces
<i>Outside Government Budget</i>	
F. Non-Government Organization	Earth Net Foundation
G. Private Sector, State-Owned Enterprise, and Specialized Financial Institution	Bangchak Petroleum

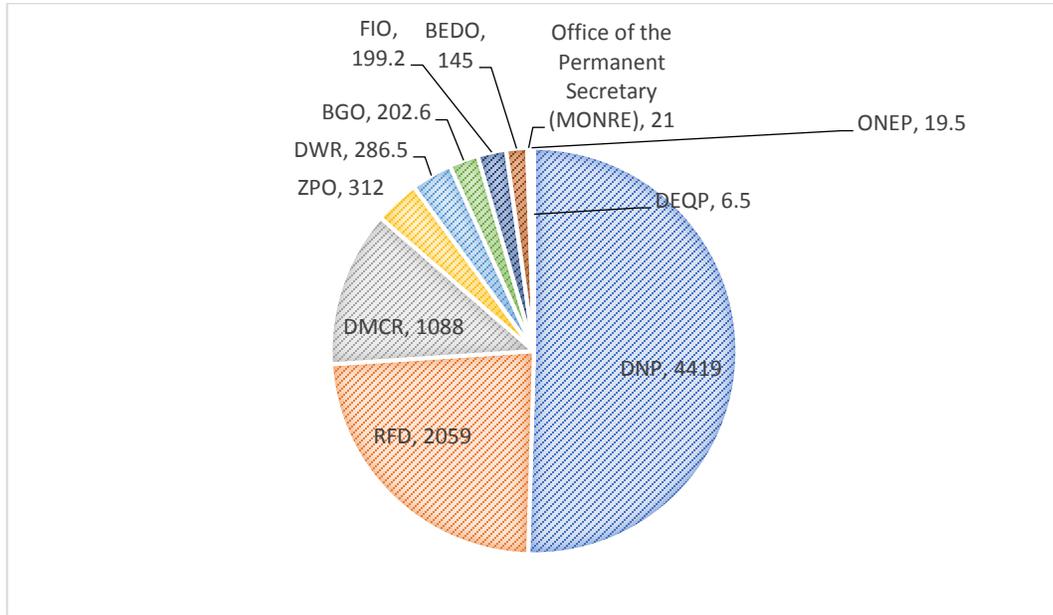
Source: Modified from Chuaprapaisilp (2017)

Of the core environmental agencies, the Department of National Parks, Wildlife and Plant Conservation (DNP), the Royal Forest Department (RFD), and the Department of Marine and Coastal Resources (DMCR) are the three government agencies that receive the largest amount of biodiversity funds. In 2015, the total biodiversity-related expenditures for these three agencies totaled THB 7,556 million (US\$ 226 million). Estimations by the BER show that one-quarter of these funds cover personnel costs. Operational expenses make up one-third to one-half of expenditures, while investment account for 20 – 40 percent. These proportions are stable in the review period, suggesting that these items are allocated in roughly the same ratio from year to year. Budget allocations to these three agencies and to other core environmental agencies are shown in **Figure 6**.

In addition to the DNP, RFD, and DMCR, other agencies that undertake core environmental functions for biodiversity-related activities include the Plant Genetic Conservation Project (RSPG), the Office of Natural Resources and Environmental Policy and Planning (ONEP), the Department of Environmental Quality Promotion (DEQP), the Biodiversity-based Economy Development Office (BEDO), the Botanical Garden

Organization (BGO), the Forest Industry Organization (FIO), and the Zoological Park Organization (ZPO). Together, these agencies’ activities can be classified as mainstreaming, protection, implementation, ABS, restoration, and sustainable use categories according to BIOFIN classification. For the 2015 fiscal year, the BER estimates that the activities of these core environmental sector agencies totaled THB 914 million (US\$ 27.3 million).

Figure 6: Biodiversity-Related Expenditures by Core Environmental Agencies



Source: Chuaprapaisilp (2017)

Unit: THB Million

Sustainable use and ABS sector agencies include departments within the Ministry of Agriculture and Cooperatives (MOAC) such as the Department of Agriculture, the Office of Agricultural Economics, the Department of Sericulture, and the Department of Livestock Development. Some agencies within the Ministry of Public Health are included such as the Department of Medical Science and the Department of Traditional and Alternative Medicine. Agencies within the Ministry of Interior such as the Department of Lands, the Department of Public Works and Town and Country Planning, Department of Local Administration also serve as sustainable use and ABS sector agencies. The Office of the Royal Project Development Board (RDPB) is also included in this category. Total budgeted expenditures for the 2015 fiscal year falling under this category was THB 916.5 million (US\$ 27.4 million).

Mainstreaming agencies have some work with intended impacts on biodiversity, although their core functions are not related to biodiversity conservation. The BER finds that expenditure for the mainstreaming agencies in the 2015 fiscal year totaled THB 171.4 million (US\$ 5 million). Expenditures on biodiversity protection projects by the Ministry

of Defense (MOD) takes up the lion's share (THB 105.9 million). These include conservation programs and public infrastructure works that support conservation efforts, as well as royal initiated projects. The Department of Tourism within the Ministry of Tourism and Sports (MOTS) received funds to develop green/eco-tourism. The Ministry of Education received funds to support RSPG projects. The Ministry of Industry received funds to support eco-industrial towns, as well as safety and environmental standards for primary industries. The Border Patrol Police received funds to support RSPG survey and restoration works. The Ministry of Commerce (MOC) and the Marketing Organization for Farmers received funds to promote green products. The Ministry of Energy received funds for environmental impact assessment of petroleum operations and local alternative energy development projects.

It is important to note that mainstreaming and conservation activities at the local level are mainly supported through the budgets of provincial and local authorities. Furthermore, the work of many national-level agencies is carried out with local participation. This is in line with growing awareness of the importance of biodiversity conservation and management at the local level. Involvement of those in close proximity to natural resources and the environment can help ensure increased effectiveness of biodiversity-related programs. Such involvement also helps to alleviate funding constraints by not relying too much on the budget of environmental and mainstreaming agencies.

In addition to the agencies above, budget is allocated to support knowledge and database systems, capacity building for utilizing biodiversity resources and benefits sharing, as well as for research related to conservation and utilization of biodiversity resources. The expenditures for these items totaled THB 173.1 million (US\$ 5.2 million) in the 2015 fiscal year. The majority of these funds comprised of expenditures for research by universities, funding of research programs provided by the National Research Council, and expenditures for biodiversity research and utilization database by the National Center for Genetic Engineering and Biotechnology (BIOTEC). Other agencies within this category includes the National Science Museum, the National Innovation Agency, and the Highland Research and Development Institute. The former agency is a state-owned enterprise, while the latter two agencies are public organizations.

In comparison with expenditures, biodiversity-related revenues are small, but show an increasing trend according to data from 2011 to 2014 gathered from the BER process. Revenues are generated from the forest, coastal, and wetland ecosystems. These come from the Department of National Parks, Wildlife, and Plant Conservation, which is in charge of overseeing terrestrial and marine parks, the Forest Industry Organization, and the Botanical Gardens Organization. While the budget for these items increase from year to year, it is important to note that the BER finds that budget items for activities with possible adverse impacts on the environment are also increasing.

In sum, the BER estimates that total biodiversity-related expenditure for all agencies in Thailand amount to approximately THB 11 billion (US\$ 330 million). This is around 0.5 percent of total government budget and is about 0.1 percent of GDP. When examining the ratio of total biodiversity-related expenditure to GDP, it is found that the ratio is fairly constant throughout the review period of fiscal years 2011 to 2015. With GDP growing from year to year, this translates to a slightly-increasing amount of biodiversity budget. Biodiversity expenditures also account for an increasing proportion of total expenditures throughout the review period. Nonetheless, the rise from year to year is fairly small (See Table 3).

Table 3: Total Biodiversity Expenditure, FY2011 - 2015

Unit: THB million

	FY2011	FY2012	FY2013	FY2014	FY2015
Nominal GDP	10,523,089	11,243,980	11,938,250	12,061,090	13,368,450
Total Government Expenditure	2,050,539	2,148,475	2,171,460	2,246,307	2,378,114
Biodiversity Budget	9,257	9,042	9,244	9,829	11,110
% of GDP	0.09%	0.08%	0.08%	0.08%	0.08%
% of Total Expenditure	0.45%	0.42%	0.43%	0.44%	0.47%

Source: BIOFIN Thailand's BER Report

The work of public agencies allocated biodiversity funds together cover three main ecosystems in Thailand; marine and coastal ecosystem, terrestrial ecosystem, and wetlands and rivers ecosystem. The marine and coastal ecosystem is under the care of DMCR and DNP within MONRE, Marine Department within the Ministry of Transport, and the Department of Fisheries within the Ministry of Agriculture and Cooperatives. There are also projects by the Pollution Control Department and the DEQP. The projects span the range from protection, restoration, implementation, sustainable use, and mainstreaming categories according to the BIOFIN classification. According to the BER, the total expenditure for the main government agencies related to the marine ecosystem in the 2015 fiscal year is THB 2,095 million (US\$ 62.7 million).

For the terrestrial ecosystem in Thailand, key government agencies are the RFD and the DNP. These agencies' biodiversity-related expenditure in 2015 amount to THB 2.1 billion (US\$ 60 million) and THB 3.9 billion (US\$ 117 million) accordingly. Both agencies are within MONRE and are the key implementing agencies for Strategies 1,2, and 4 of the NBSAP. In total, biodiversity-related expenditure for these two departments in the 2015 fiscal year amount to roughly THB 6 billion (US\$ 177 million). These cover activities

categorized as mainstreaming, sustainable use, protection, restoration, and implementation under the BIOFIN classification. Other agencies that work on the terrestrial ecosystem in Thailand include BEDO, the Department of Thai Traditional and Complementary Medicine (DTAM). The former is a Global Environment Facility (GEF) funding recipient and is a public organization under MONRE. The latter is within the Ministry of Public Health.

For the wetland and rivers ecosystem in Thailand, the main government agencies are the DNP, Department of Water Resources, the PCD, the Land Development Department, the Rice Department, as well as the Royal Irrigation Department. The total expenditures of these departments in the 2015 fiscal year total THB 871.4 million (US\$ 26 million). They cover the restoration and sustainable use categories according to BIOFIN classification.

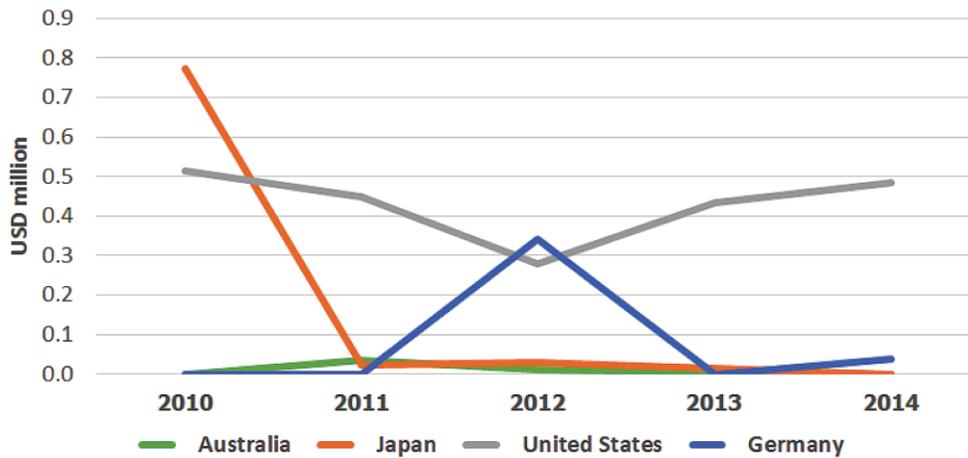
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Outside of the government budget, there is biodiversity funding from the private sector and civil society. Private sector funds are mainly channeled through corporate social responsibility (CSR) activities of corporations, especially from major companies in the construction, mineral and petrochemical sectors. Larger users of biodiversity resources also expend on research and development. These include those in the bio-industry such as the pharmaceutical sector. Members of the Thailand Business Council for Sustainable Development (TBCSD) include companies in the sectors such as the financial sector, and agriculture and consumer product industries. Some private companies and civil society agencies are active in CSR and conservation activities. The private sector also helps fund activities of key conservation agencies such as the RFD and RSPG. For example, in 2015, private funding to support RFD programs totaled THB 15.9 (US\$ 0.5 million), and funds to support the RSPG totaled THB 13.2 million (US\$ 0.4 million).

For external finances, an important source is the foreign Official Development Assistance (ODA). Important external funding sources are the GEF and bilateral grants from individual countries. The GEF is a multilateral funding arrangement and accounts for a larger proportion of ODA when compared with bilateral grants. The ODA funds generally go to government agencies that work on environmental issues. The funds are also usually co-financed by the government and international NGOs. The funds are targeted towards the protection of crucial ecosystems, as well as projects aimed at reducing pressures on natural habitats. Important bilateral donors are the United States, Germany, Australia, and Japan. The OECD's Creditor Reporting System shows that commitment ODA funding

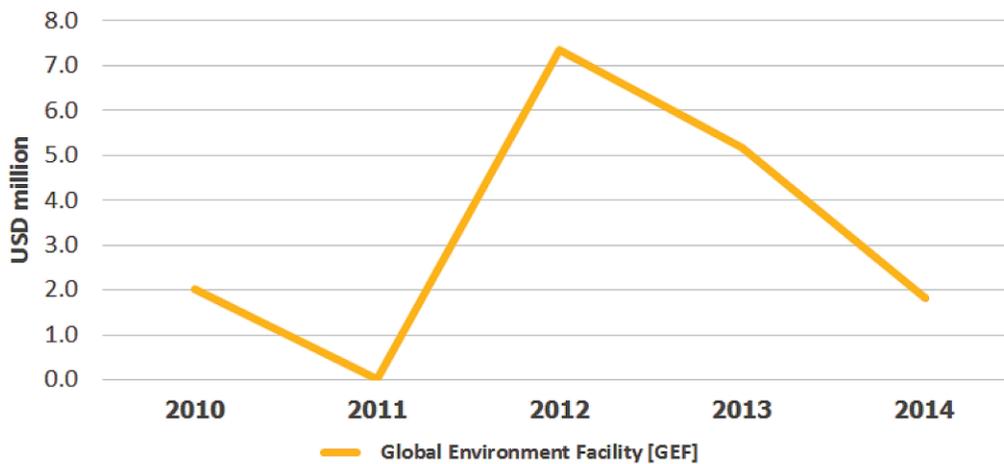
between 2011 to 2014 amount to US\$ 16.48 million. The large majority of this (US\$ 14.34 million or 87 percent) come from the GEF. Nonetheless, there is no clear trend for these funds as the amount tends to fluctuate from year to year (see Figures 7 and 8).

Figure 7: Bilateral ODA Flows to Thailand 2011 – 2014



Source: BIOFIN Thailand BER Report

Figure 8: Multilateral ODA Flows to Thailand 2011 - 2014



Source: Data from OECD Creditor Reporting System, figure from BIOFIN BER Report

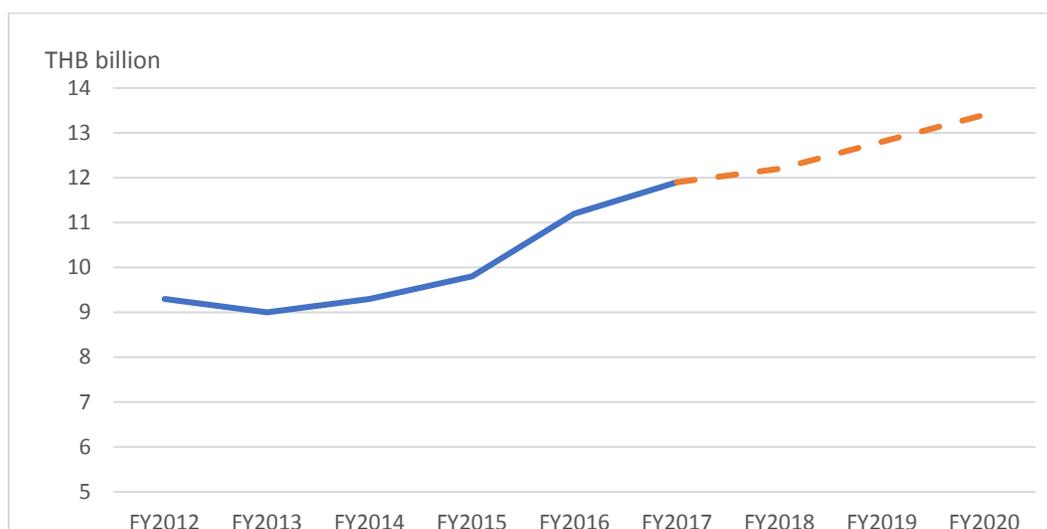
3.3. BIODIVERSITY EXPENDITURE CATEGORIES AND BASELINE PROJECTION

Baseline projection for biodiversity expenditure under the BAU scenario as estimated in the BER report is shown in

Figure 9. Estimated expenditures for fiscal years up to 2015 are based on data collected from the relevant agencies and classified according to BIOFIN methodology. These numbers are adjusted using the relevancy coefficient attribution that are in accordance with BIOFIN methodology. Extension of the data to cover fiscal years 2016 and 2017 are done based on the annual budget structure and allocation to each agency. Extrapolation to fiscal years 2020 are done based on average nominal growth rates over the previous two fiscal years (FYs 2016 –2017). The implicit assumptions are that the spending rate and biodiversity relevancy coefficients are constant for each program. The coefficients used are based on information in 2015, the latest year for which data is available at the time of the writing of the BER report.

Expenditures in all fiscal years can be divided into five categories. These are (i) sustainable use, (ii) restoration, (iii) protection, (iv) mainstreaming, and (v) implementation. However, the majority of the expenditures fall under the protection and restoration categories. This is followed by sustainable use and implementation categories. The smallest amount of expenditures goes to the mainstreaming category.

Figure 9: Actual and Projected BAU Expenditures For Biodiversity (Total)



Source: Chuaprapaisilp (2017)

3.4. POLICY RECOMMENDATIONS

Following the review and assessment of biodiversity-related expenditures from all stakeholders within the country using BIOFIN methodology, the BER report identifies three areas of improvement that could lead to increased mobilization of efforts and resources toward planning and implementation of biodiversity work in Thailand. These are as follows.

1) Inclusion of all stakeholders from the public, private, and civil society sectors in the NBSAP process. This includes agencies within the Prime Minister’s Office, royal initiated projects, communities, local government, civil societies, and economic and business organizations with financial capacity and incentives aligned with engagement in biodiversity-related activities.

2) Enabling informed budget and investment decisions of all stakeholders by the collection and utilization of biodiversity policy and finance information. For example, information that could be used in the budget formulation process across different government levels include information on green GDP, water management and watershed area restoration, industrial zone impact assessment, and ecotourism and sustainable forestry practices. Information on risks in terms of regulation, reputation, and political risks of activities that exert negative pressures on biodiversity should be also be made apparent. For example, information on risks associated with the use of fertilizer, forest encroachment, and the adoption of genetically-modified organisms should be provided in order to ensure sound decision-making by private sector actors.

3) Ensuring that decision-makers in the budget formulation stage and

mainstreaming economic agencies are well-informed of the significance of biodiversity. Agreement to consider sustainable policy alternatives in the budget formulation and realignment process should be sought. This is to ensure that the country knows the amount of public funds that can be allocated for biodiversity. This also allows an understanding of how future investments can be financed.

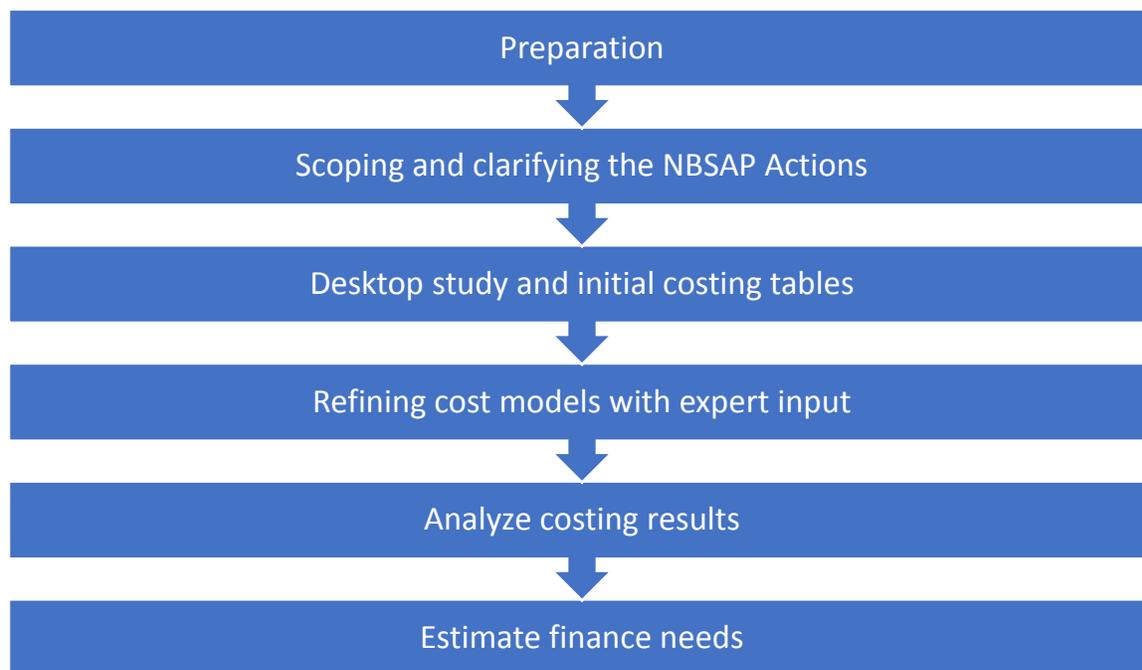
4. FINANCIAL NEEDS ASSESSMENT

The Biodiversity Financial Needs Assessment (FNA) is aimed at making a comprehensive estimate of the financial resources required to achieve national biodiversity targets. Conducted according to the BIOFIN methodology, the FNA key reference points are the targets included in the NBSAP, MONRE's Strategic Plan, and the 20-Year National Strategy. Thailand also experimented with using a 'bottom-up' approach by including the added financial needs of three core agencies that received the largest amount of funding for biodiversity from the government's budget allocation. From the Budget and Expenditure Review (BER), agencies that receive over 80 percent of biodiversity-related budget in fiscal years 2011 – 2015 are the Royal Forest Department (RFD), the Department of National Parks, Wildlife and Plant Conservation (DNP), and the Department of Marine and Coastal Resources (DMCR). Strategic plans of these agencies are reviewed, and their financial needs calculated and incorporated into the FNA.

4.1. METHODOLOGY

The FNA comprises of 6 main steps (Figure 10). The steps allow for the identification of 'costable actions' linked to national biodiversity targets, and the production of a detailed budget for each costable item by defining unit costs and quantities over the target time period. The costs are then linked to the national budget processes, and the financing gap is calculated as the difference between Business As Usual biodiversity expenditure projects from the BER and the financial needs in the FNA. For Thailand, in addition to costing the items in key policy documents at the national level such as the NBSAP and the MONRE's 20-Year Strategic Plan. Key line agencies are also consulted throughout the process.

Figure 10: FNA Process



Source: BIOFIN (2016)

With the emphasis on using a ‘bottom-up’ approach, the strategic plans for three-line agencies that received the bulk of the nation’s biodiversity budget are reviewed and involvement of these agencies are actively sought. According to the BER, three departments; RFD, DNP, and DMCR, received over 80 percent of the national biodiversity budget in the 2011 – 2015 fiscal year. The FNA team prepared preliminary calculations and extensively discussed and consulted with the key line agencies to determine if the costing were acceptable. Key criteria were the costable items, unit costs, and the assumptions used. The FNA made use of the unit costs that the department themselves use when preparing the departmental budget for cabinet approval. During the BIOFIN Phase I’s exit strategy workshop⁸, the FNA team validated the approach with key stakeholders such as the DNP, RFD, and the Office of Natural Resources and Environmental Policy and Planning (ONEP).

4.2. THAILAND’S BIODIVERSITY VISION AND STRATEGY: A RECAP

Key policy documents consulted in the FNA are the NBSAP (2015 – 2020), the MONRE’s 20-Year Strategic Plan (2017 – 2036), the 20-Year National Strategy (2018 – 2037), and the key line agencies’ strategic plans. The decision to include non-NBSAP plans in the FNA stems from the fact that there are other biodiversity activities identified in addition to the NBSAP activities. These targets are also costed and accounted for in

⁸ This was conducted on February 26 – 28, 2018 at Khao Yai National Park.

determining the financing gap for biodiversity in the country. Thailand's long-term targets related to terrestrial ecosystems are in Table A.1 of the Appendix. Activities related to coastal and marine resources are under the DMCR and can be found in Table A.5 of the Appendix. Since the majority of these activities have not been included in the NBSAP, they are treated as NBSAP plus activities.

4.3. FINANCIAL NEEDS ASSESSMENT

Financial needs are estimated for the NBSAP, for the 20-Year MONRE Strategic Plan, and for the items listed under the strategic plans of the RFD, DNP, and DMCR under the 'bottom-up' approach. Key strategies identified in Section 4.2 are quantified and costed and assessed for the years 2016 – 2021 to be in line with the NBSAP period. Discussions and work on NBSAP and MONRE Strategic Plan find that measures to be undertaken by key line agencies such as the RFD, DNP, and DMCR were not covered in the NBSAP and MONRE targets. Furthermore, these line agencies' plans were not costed. BIOFIN has stepped in to fill this gap by estimating the financial needs required to meet the key line agencies' biodiversity targets.

Financial needs according to the NBSAP references two documents; the NBSAP Action Plans for 2015 – 2016, and for 2017 – 2021. Budget is estimated by the line agencies at the request of the Office of Natural Resources and Environmental Policy and Planning (ONEP). Budget estimates are shown in Table 4. A closer examination of the numbers shows that the NBSAP budget for 2017 – 2021 is similar in size to the NBSAP budget for 2015 – 2016. Attempts to find more information on this did not allow the clarification of this matter. As such, several uncertainties over these budget estimates remain. Thus, uncertainties exist as to the extent to which the 2017 – 2021 numbers could be used to present the development direction of Thailand's biodiversity resources. One particular issue is whether the line agencies reported their actual budget as the NBSAP budget or whether they reported additional budget needed to meet biodiversity targets. As such, the financing gaps in the FNA are calculated both with NBSAP budget estimates, and without these budget estimates. These details appear in Section 4.4.

Table 4: NBSAP Estimates for the Period Between 2015-2021

Strategy	2015-2016		2017-2021	
	Mil. THB	Mil. USD	Mil. THB	Mil. USD
Strategy 1: Integrating the value and management of biodiversity resources involving stakeholders at all levels through participatory processes. Under this Strategy, there are two action plans: (i) Action Plan 1.1 is increasing awareness and providing knowledge about biodiversity resources and (ii) Action Plan 1.2 to integrate and promote participation in the management of biodiversity resources.	890	26	1,088	32
Strategy 2: Conservation and restoration of biodiversity resources. This Strategy comprises 5 Action Plans which are (i) Conservation, restoration and protection of biodiversity resources, (ii) Reducing the pressure and ensuring sustainable use of biodiversity resources, (iii) Management of Wetlands, (iv) Management of alien invasive species and (v) Biosafety.	7,539	222	8,637	254
Strategy 3: Protecting the national rights in terms of access and benefit sharing that is consistent with the concept of Green Economy. This strategy comprises two Action Plans. The first is to protect genetic resources, with an estimated budget of 51 million Baht. The second, with an estimated budget of 265.7 million Baht, covers Research and Development for the purpose of creating market values for biodiversity resources.	2,078	61	288	8
Strategy 4: Developing the knowledge and standardized database on biodiversity resources so that it is consistent with international standards. This strategy comprises two Action Plans with a combined budget of 541.76 million Baht. The first under this strategy is Knowledge Management and Database. The second is to Protect Local/Traditional Knowledge about Biodiversity Resources.	542	16	2,622	77
Total	11,049	326	12,634	372

Note: Average exchange rate for 2017= 33.94 Baht/1 USD

Source: BIOFIN (2018a).

For the MONRE 20-Year Strategic Plan, financial needs are determined for the years 2016 – 2021 to coincide with the NBSAP period. MONRE’s budget estimates for this period is THB 315,793 million (Table 5). This number of 14 times higher than the total

NBSAP estimate for the same time period. Furthermore, when assessed against the usual criteria of the budget increase cap of 4 percent per annum (the BAU scenario)⁹, the budget estimate for the MONRE Strategic Plan exceeds it by THB 83,165 million. This is more than 30 percent difference. Information gathered from representatives of the DNP, RFD, and DMCR indicate that it is unlikely these numbers would be used in justifying budget increase requests by MONRE. As such, *MONRE's estimates are not included in BIOFIN's assessment of the financing gap.*

Table 5: MONRE's Estimates for the Period Between 2016-2021

	Million Baht	Million USD	Relevance to Biodiversity
Strategy 1: Integrated Conservation and restoration of natural resources that fulfills the objective of development, sustainable utilization and fairness	113,721.50	3,446.10	Direct
Strategy 2: Integrated and efficient management of surface and ground water	99,852.10	3,025.80	Indirect
Strategy 3: Participatory conservation and restoration of environmental quality	8,731	264.60	Indirect
Strategy 4: Prevention, mitigation and adaptation to extreme weather events and climate change	9,523.10	288.60	Indirect
Strategy 5: Institutional improvement for management of natural resources and the environment	83,966.10	2,544.40	Indirect
Total	315,793.90	9,569.50	

Using the bottom-up approach, budget estimates for planned activities in the RFD, DNP, DMCR, and the Pollution Control Department (PCD) are calculated as part of estimating the financial needs for biodiversity conservation in Thailand. RFD, DNP, and DMCR are chosen because they receive more than 80 percent of the nation's biodiversity budget in the 2011-2015 fiscal years, and because their planned activities serve as complementary to the NBSAP activities. The PCD is chosen because of its role in pollution control, which plays an essential role in reducing negative pressures on natural resources.

Budget estimates for the RFD is costed based on its 20-Year Strategic Plan, which comprises of 7 core strategies. Discussions with the agency to determine the relevant measures resulted in the costing of strategies relevant to improving the efficiency and effectiveness in forest protection and restoration of degraded forests. The agency's own unit cost is used whenever available. These measures put estimates of the RFD budget spending for 2019 – 2021 at THB 4,952,873,000 per year (see details in Table 6). –

⁹ Calculation of MONRE BAU uses the actual budget for 2015 – 2017, MONRE's budget estimates for 2018 – 2021. The figures for 2020 and 2021 are estimates that assume a budget increase of 4 percent per annum from the previous year's budget. The BAU figure is THB 232,628.44 million.

Table 6: Budget Estimation for RFD

Strategy		2019	2020	2021
Strategy 1				
Forest patrol unit @ 1,745,100 Baht/unit*30 units/year ^{1/}		52,353,000	52,353,000	52,353,000
Capacity building for forest patrol unit @ 70,000 Baht*521 unit ^{2/}		36,470,000	36,470,000	36,470,000
Strategy 6				
Area coverage between 2017-36 (rai) ^{3/}	19,100,000			
Area coverage during NBSAP period 2017-2021 (rai) ^{4/}	3,000,000			
Areas to be developed as community forest each year between 2019-2021	1,000,000			
Number of communities to receive funding (village) @500 rai/community forest ^{5/}	2,000			
Budget allocation to establish community forest (Baht) ^{5/}	20,000			
Estimated cost of community forest per village @20,000 Baht/community*2000 communities		40,000,000	40,000,000	40,000,000
Community forest management expenses @ 70,000/village* 2000 villages		140,000,000	140,000,000	140,000,000
Planting trees to demarcate land designated for utility purposes @ 5,000 Baht/rai*10 rai/village ^{5/}		10,000,000	10,000,000	10,000,000
The cost to create wet forest fire line @6,965 Baht/rai ^{5/}		348,250,000	348,250,000	348,250,000
Strategy 2				
Restoring degraded forest between 2017-36 (rai) ^{3/}	8,700,000			
Restoring degraded forest during NBSAP period 2017-2021 (rai) ^{4/}	1,305,000			

Strategy		2019	2020	2021
Degraded forest area to be restored each year between 2019-2021	435,000			
Restoring degraded forest@3,900 Baht/rai *435,000 rai/year ^{5/}		1,696,500,000	1,696,500,000	1,696,500,000
Maintenance@ 1,020 Baht/rai ^{5/}		443,700,000	443,700,000	443,700,000
Target area for this Strategy (rai). Urban area for 70,000 community (rai) ^{3/}	3,500,000			
Annual target area for this Strategy (rai)Number of communities to cover each year	175,000			
Target area for this Strategy during the NBSAP period (rai)Number of communities to be covered during NBSAP period	525,000			
Cost for urban forest @ 831,200 Baht/community; assuming an area of 10 rai/community; target area of 175,000 rai would be 1,750 communities ^{5/}		1,454,600,000	1,454,600,000	1,454,600,000
Increase in tree coverage in agricultural area during 20 years ^{3/}	8,600,000			
area to cover during NBSAP period	1,290,000			
Area to cover each year	430,000			
Cost to plant year1 @ 1,000 Baht/rai ^{5/}		430,000,000	430,000,000	430,000,000
Maintenance @ 700 Baht ^{5/}		301,000,000	301,000,000	301,000,000
Total		4,952,873,000	4,952,873,000	4,952,873,000

1/ RFD currently has 521 patrol units each to cover 149,797 rai. Budget allocated in 2018 was 34,902,000 for 20 units = 1,745,100 Baht/unit. Our calculation is based on the assumption that 3 additional units will be financed per year. Note: No costs are estimated for 2017 and 2018 based on the assumption that funds mobilization is unlikely to have taken place during this period.

2/ Current budget allocation is 128,153,600 Baht for 521 units = 245,796 Baht/unit. Since there is already normal budget allocation, our calculation assumes that an increase of 30% per unit would help increase the effectiveness of forest patrol.

- 3/ Area is indicated in the RFD 20-year plan.
 4/ Assuming that activities can only realistically start in 2019, this means that funding will only be for the last 3 years of the current NBSAP period.
 5/ Based on unit costs information provided by the RFD, it is stated that community forest area per village (rai) is 500 rai
 Source: BIOFIN (2018a).

Financial needs for the DNP costed activities pertaining to the replanting of degraded forests, the maintenance of replanted areas, and the cost of making forest fire lines. These costs are calculated from different types of protected areas, namely national parks, and wildlife sanctuaries. Costs of stepping up protection measures are also included. Unit costs from the agency are used whenever possible, and the financial needs estimation is done in close collaboration with the agency to ensure the appropriateness of assumptions and cost calculations. It is found that additional budget required for the DNP is a little over THB 2 billion per year for the 2019 – 2021 period (see Table 7).

Table 7: Budget Estimation for the DNP

Items		2019	2020	2021
1. Protected Area				
1.1. National Park (rai)	39,253,241			
1.1.1 Replanting				
• assuming 10% of national park area needs to be reforested	3,925,324			
• Area to be replanted each year within 20 years	196,266			
• Area to be replanted within NBSAP period 2017-2022 (6 years)	1,177,597			
• Area to be replanted each year in the 3 remaining years of current NBSAP	392,532	392,532	392,532	392,532
• unit cost for replanting @,3,900 Baht/rai		1,530,876,399	1,530,876,399	1,530,876,399
1.1.2 Maintenance @1,020 Baht/rai		400,383,058	400,383,058	400,383,058
1.1.3 Forest fire line				
• coverage @ 1 km/100 rai = 39,253 km of forest fireline for 3,925,325 rai to be reforested				
• Forest fireline to be constructed each year within 20 years	1,963			
• Forest fireline to be constructed within	11,776			

Items		2019	2020	2021
NBSAP period 2017-2022 (6 years)				
<ul style="list-style-type: none"> Forest fireline to be constructed each year in the 3 remaining years of current NBSAP 		3,925	3,925	3,925
<ul style="list-style-type: none"> cost per 1 km of forest fireline = 5,140 Baht 		20,174,500	20,174,500	20,174,500
1.2 Forest Park	909,885			
<ul style="list-style-type: none"> assuming 5% of forest park area needs to be reforested 	45,494			
<ul style="list-style-type: none"> Area to be replanted each year within 20 years 	2,275			
<ul style="list-style-type: none"> Area to be replanted within NBSAP period 2017-2022 (6 years) 	13,648			
<ul style="list-style-type: none"> Area to be replanted each year in the 3 remaining years of current NBSAP 		4,549	4,549	4,549
<ul style="list-style-type: none"> unit cost for replanting @,3,900 Baht/rai 		17,742,765	17,742,765	17,742,765
1.2.1 Maintenance @ 1,020 Baht/rai		4,640,415	4,640,415	4,640,415
1.2.2 Forest fire line				
<ul style="list-style-type: none"> coverage @ 1 km/100 rai = 454.94 km of forest fireline for 45,494 rai to be reforested 				
<ul style="list-style-type: none"> Forest fireline to be constructed each year within 20 years 	455			
<ul style="list-style-type: none"> Forest fireline to be constructed within NBSAP period 2017-2022 (6 years) 	2,730			
<ul style="list-style-type: none"> Forest fireline to be constructed each year in the 3 remaining years of current NBSAP 		910	910	910
<ul style="list-style-type: none"> cost per 1 km of forest fireline = 5,140 Baht 		4,677,400	4,677,400	4,677,400
1.3 existing wildlife sanctuary	23,142,359			
<ul style="list-style-type: none"> assuming 5% of existing wildlife sanctuary area needs to be reforested 	1,157,118			

Items		2019	2020	2021
• Area to be replanted each year within 20 years	57,856			
• Area to be replanted within NBSAP period 2017-2022 (6 years)	9,643			
• Area to be replanted each year in the 3 remaining years of current NBSAP		3,214	3,214	3,214
• unit cost for replanting @,3,900 Baht/rai		12,534,600	12,534,600	12,534,600
1.3.1 Maintenance @1,020 Baht/rai		3,278,280	3,278,280	3,278,280
1.3.2 Forest fire line				
• coverage @ 1 km/100 rai = 11,571 km of forest fireline for 1,157,118 rai to be reforested	11,571			
• Forest fireline to be constructed each year within 20 years	579			
• Forest fireline to be constructed within NBSAP period 2017-2022 (6 years)	3,471			
• Forest fireline to be constructed each year in the 3 remaining years of current NBSAP		1,157	1,157	1,157
• cost per 1 km of forest fireline = 5,140 Baht		5,946,980	5,946,980	5,946,980
1.4 Wildlife sanctuary to be declared	150,990			
• assuming 5% of wildlife sanctuary area to be declared needs to be reforested	7,550			
• Area to be replanted each year within 20 years	377			
• Area to be replanted within NBSAP period 2017-2022 (6 years)	2,265			
• Area to be replanted each year in the 3 remaining years of current NBSAP		755	755	755
• unit cost for replanting @,3,900 Baht/rai		2,944,500	2,944,500	2,944,500
1.4.1 Maintenance @1,020 Baht/rai		770,100	770,100	770,100

Items		2019	2020	2021
1.4.2 Forest fire line				
<ul style="list-style-type: none"> coverage @ 1 km/100 rai = 75.5 km of forest fireline for 7,550 rai to be reforested 	75			
<ul style="list-style-type: none"> Forest fireline to be constructed each year within 20 years 	4			
<ul style="list-style-type: none"> Forest fireline to be constructed within NBSAP period 2017-2022 (6 years) 	24			
<ul style="list-style-type: none"> Forest fireline to be constructed each year in the 3 remaining years of current NBSAP 		8	8	8
<ul style="list-style-type: none"> cost per 1 km of forest fireline = 5,140 Baht 		41,120	41,120	41,120
2. Increasing capacity to forest patrol				
assuming 200 units/year @ 159,130 Baht		31,826,000	31,826,000	31,826,000
Total		2,036,243,167	2,036,243,167	2,036,243,167

Source: BIOFIN (2018a)

For the DMCR, financial needs are assessed according to the DMCR roadmap (2018 – 2036). Since the majority of these activities are not covered in the NBSAP, they are considered to be NBSAP plus activities. Costs of protection and restoration of mangroves are calculated, as well as restoration costs of coral reefs and the seagrass ecosystem¹⁰. Restoration of mangroves include reclaiming encroached mangrove areas, as well as replenishing existing ones. These costs are included in the financial need analysis. Calculations are based on unit cost estimates by the Budget Bureau and the target in the DMCR roadmap. Unit costs, targets, and costs for mangroves are found in Table 8.

Table 8: Costs of Mangrove Protection and Restoration

	Unit cost ^{1/}	Target for 2018-2021 (rai) ^{2/}	2019 (THB million)	2020 (THB million)	2021 (THB million)	Total (THB million)
Protection	1,160 Baht/rai ^{3/}	1.5954	1,815	1,815	1,815	5,445

¹⁰ This is because restoration costs for coral reefs and the seagrass ecosystem are high and are unlikely to be covered by the normal budgetary allocation. Furthermore, the costs of protection are assumed to be covered by the DMCR's annual budget.

Reclaim	3,560 Baht/rai ^{4/}	30,000	27	27	27	81
Replant	6,390 Baht/rai	54,000	86	86	86	258
Total			1,928	1,928	1,928	5,784

Note :1/ Data from the Budget Bureau

2/ Based on DMCR Action Plan for 2016-2036

3/ This is technically the cost of maintaining the conditions of the mangroves and is used here as the lower bound estimate of the cost of protect.

4/ The cost is for replenishing the mangroves based on the assumption that whatever is reclaimed is in degraded condition and needs to be replenished.

Estimated costs for the restoration of coral reefs is based on the artificial restoration option that represents the middle range of costs at THB 7,560,000 per rai¹¹. The target area to be restored is set at 121 rai per year. Total estimated costs for coral reefs estimation for the 2019 – 2021 period is THB 2,789 million (see Table 9). Cost estimation for seagrass restoration is based on the assumption that 1 percent of the areas in ‘poor’ condition are replanted. The unit cost for seagrass restoration of THB 10.6 million is based on Nabangchang (2012)’s study on the economic value of seagrass ecosystem. Estimates for seagrass ecosystem restoration is found in Table 9 and amounts to THB 3,240 million in the 2019 – 2021 period.

Table 9: Costs of Restoration of Coral Reefs and Seagrass

	Unit cost	2019 (THB million)	2020 (THB million)	2021 (THB million)	Total (THB million)
Coral Reefs Restoration					
Target: Area to be restored each year is 121 rai					
Restoration	7.560 million Baht/rai	916	916	916	2,748
Maintenance	1.5 percent of restoration costs	n/a	14	27	41
Total		916	930	943	2,789
Seagrass Restoration					
Target: Seagrass in ‘poor’ condition areas is 10,034 rai. Area to be restored each year is 100 rai.					
Replanting	10.60 million Baht/rai	1,064	1,064	1,064	3,192
Maintenance		n/a	16	32	
Total		1,064	1,080	1,096	3,240

Source: BIOFIN (2018a).

4.4. FINANCIAL NEEDS UNDER DIFFERENT SCENARIOS

Financial needs are estimated based on the budget estimates from the NBSAP,

¹¹ Other options are replanting on concrete (lowest cost at THB 106,400 per rai), and developing floating nurseries (highest cost at THB 18,720,800 per rai).

MONRE’s 20-Year Strategic Plan, the PCD, and the three-line agencies that receive the lion’s share of the national biodiversity budget; RFD, DNP, and DMCR. Based on uncertainties regarding the inclusion of certain items in the NBSAP, three scenarios are calculated. Details are below; -

1) Scenario A

This is an estimate of the financial needs in the business-as-usual case, which assumes there will be no changes in the rate of increase in the annual budget allocation. This scenario includes the budget for the DMCR, DNP, MONRE, PCD, and RFD. Budgets for 2016 and 2017 are actual budget allocations. Figures from 2019 to 2021 are projected increases based on the assumption that the budget will increase by a fixed rate of 5 percent per annum. Based on this, the total estimated budget for the NBSAP period is THB 125,700 million (see Table 10).

Table 10: Financial Needs Under the Business As Usual Scenario.

Scenario A for the current NBSAP Period 2016 – 2021 (Unit: THB million)						
Agency	Budget in 2016*	Budget in 2017*	Budget in 2018	Budget in 2019	Budget in 2020	Budget in 2021
DMCR	1,370	1,397	1,497	1,572	1,680	1,764
DNP	10,928	10,916	11,574	11,902	12,437	12,996
MONRE	1,547	1,598	1,682	1,754	1,833	1,915
PCD	656	616	567	517	515	506
RFD	4,461	4,605	5,501	5,581	5,779	6,035
Sub-Total	18,963	19,131	20,820	21,325	22,244	23,217
Total NBSAP budget for 2016 – 2021 = THB 125,700 million						

Note: * Budgets in 2016 and 2017 are actual budgets.

Source: BIOFIN (2018a).

2) Scenario B

Scenario B assesses the financial needs by assuming that the DNP, RFD, and DMCR would need additional budgets to carry out the measures and activities in their strategic plans. Again, the budgets for 2016 and 2017 are actual budgets. Budgets for 2019 – 2021 for the PCD and MONRE are found by assuming a 4 percent per annum increase in budget. The estimated NBSAP budget is then added on. The total financial needs under this scenario is THB 181,357 million (see Table 11).

Table 11: Financial Needs With the Unit Costs to Implement Selected Measures in the NBSAP.

Scenario B for the current NBSAP Period 2016 – 2021 (Unit: THB million)						
Agency	Budget in 2016*	Budget in 2017*	Budget in 2018	Budget in 2019	Budget in 2020	Budget in 2021
DMCR	1,370	1,397	1,497	3,667	3,805	3,920
DNP	10,928	10,916	11,574	13,938	14,473	15,032
MONRE	1,547	1,598	1,682	1,754	1,833	1,915
PCD	656	616	567	517	515	506
RFD	4,461	4,605	5,501	12,078	12,276	12,533
NBSAP estimates	11,049	2,526	2,526	2,526	2,526	2,526
Sub-Total	30,012	21,658	23,347	34,480	35,428	36,432
Total NBSAP budget for 2016 – 2021 = THB 181,357 million						

Note: * Budgets in 2016 and 2017 are actual budgets.
Differences between Scenario A and Scenario B are shown in blue.

Source: BIOFIN (2018a).

3) Scenario C

Due to uncertainties regarding whether there would be additional government budget allocation to cover the expenses for implementing the NBSAP Action Plans, Scenario C is estimated without the NBSAP budget estimate. This figure is deemed to be a more realistic base for calculating the financing gap. Under this scenario, the estimated budget is THB 157,678 million (see Table 12).

Table 12: Financial Needs Without NBSAP Budget Estimates

Scenario C for the current NBSAP Period 2016 – 2021 (Unit: THB million)						
Agency	Budget in 2016*	Budget in 2017*	Budget in 2018	Budget in 2019	Budget in 2020	Budget in 2021
DMCR	1,370	1,397	1,497	3,667	3,805	3,920
DNP	10,928	10,916	11,574	13,938	14,473	15,032
MONRE	1,547	1,598	1,682	1,754	1,833	1,915
PCD	656	616	567	517	515	506
RFD	4,461	4,605	5,501	12,078	12,276	12,533
Sub-Total	18,963	19,132	20,821	31,954	32,902	33,906
Total NBSAP budget for 2016 – 2021 = THB 157,678 million						

Note: * Budgets in 2016 and 2017 are actual budgets.
Differences from Scenario A and Scenario B are shown in blue.

Source: BIOFIN FNA Report 2018.

4.5. FINANCING GAPS

Financing gaps under two options are estimated against the normal budget allocation, which is the BAU scenario of 4 percent annual budget increase (Scenario A). Under **Option 1, the difference between Scenario A and Scenario B** is calculated. This represents the gap between the BAU budget assessment and the estimated budgets for planned activities of the DNP, RFD, DMCR, and PCD as well as NBSAP budget estimates. Under this option, **the financing gap is THB 55,656 million (\$1,639 million) for the 2019 – 2021 period. Option 2 calculates the gap between Scenario A and Scenario C.** This is the difference between BAU budget estimates and the estimated financial needs for planned activities of the DNP, RFD, DMCR, and PCD without NBSAP budget estimates. Under this option, **the financing gap is THB 31,978 million (\$942 million) for the 2019 – 2021 period.**

BIOFIN Thailand technical team believes that Option 2 is the more realistic assessment of the gap as it assumes that the NBSAP budget is already included in the budget requested by line agencies and, thus, avoids the error of double counting. Nonetheless, even with this lower approximation, the figure of THB 31,978 million is already twice as much as the budget for biodiversity-related expenditures estimated in the BER report. Thus, there is a large gap to be filled in order for Thailand to achieve its NBSAP targets.

The THB 31,978 million gap can be broken down into 2 parts. First, 81 percent of this amount are estimated financial needs for the DNP and RFD, which have mandates over the country's terrestrial ecosystem. Second, 19 percent of the sum are financial needs for the DMCR, which is directly responsible for the coastal and marine ecosystems. The targets toward which the money will be used for are broken down by department in Table 13. As discussed earlier, the budget for the PCD is also included in the analysis of the financing gap due to its role in mitigating negative pressures on natural resources by way of preventing, controlling, and minimizing pollution. Nonetheless, since the PCD plays a supporting role, its targets are not included here.

The targets set by the DNP, RFD, and DMCR shown in Table 13 will help further conservation efforts and expedite the implementation of tasks under five BIOFIN categories. They will also contribute to meeting four Aichi targets, and 3 sustainable development goals (SDGs). The five BIOFIN categories are

- (i) Forests/terrestrial,
- (ii) Protected areas,
- (iii) Inland wetlands,
- (iv) Coastal and marine, and
- (v) Urban biodiversity.

Table 13: Departments and Targets

Royal Forest Department	
	<p>Strategy 1: Protection and maintenance of areas under forest coverage</p> <ul style="list-style-type: none"> • Establishing 90 forest patrol units • Capacity building for 521 forest patrol units
	Strategy 2: Restoring degraded forests (1,305,000 rai)
	<p>Strategy 3: Promoting the development of economic forests</p> <ul style="list-style-type: none"> • 525,000 rai of urban forests established • Increase tree cover in rural/agricultural area (1,290,000 rai)
	Strategy 6: Promote people participation: 6,000 community forests established
Department of National Parks, Wildlife and Plant Conservation	
	<ul style="list-style-type: none"> • Replanting degraded forests within National Parks (1,177,597 rai) • Replanting degraded Forest Parks (13,648 rai) • Restoring degraded forests in existing Wildlife Sanctuaries (9,643 rai) • Restoring degraded forests in new Wildlife Sanctuaries (3,471 rai)
Department of Marine and Coastal Resources	
	<ul style="list-style-type: none"> • Replanting 364 rai of degraded coral reefs • Replanting 301 rai of degraded seagrass beds • Mangrove targets: <ul style="list-style-type: none"> ○ 1,564,655 rai of mangrove protected ○ 22,500 rai of mangroves reclaimed ○ 40,500 rai of mangroves replanted

The four Aichi targets are

(i) Target 5: *‘By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation, and fragmentation is significantly reduced.’*

(ii) Target 11: *‘By 2020, at least 17 percent of terrestrial and inland water, and 10 percent 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.’*

(iii) Target 14: *‘By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.’*

(iv) Target 15: *‘By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including*

restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.’

The 3 SDG goals are SDGs 15 (Life on Land) and 13 (Climate Action), and SDG 14 (Life below Water). Contributions from the DNP and RFD contribute to SDGs 13 and 15, while the actions planned under the DMCR will help the country in furthering its SDG 14 goal.

4.6. OVERALL RESULTS OF THE FINANCIAL NEEDS ASSESSMENT

Estimated based on consultation with key policy documents and important stakeholders, the financial needs assessment for BIOFIN Thailand uses a ‘bottom-up approach’ that includes costing for measures to be taken by core line agencies like the DNP, RFD, and DMCR. Using this approach, the estimated financing gap between the BAU scenario and Scenario C, which includes the activities of the line agencies, is THB 31,978 million or \$942 million for the remaining 3 years of the NBSAP (2019 – 2021). This is twice the total budget for biodiversity-related expenses estimated in the BER report. As the figure clearly shows, substantial investment needs to be made in order to Thailand to meet its biodiversity targets.

Application of the BIOFIN methodology with the bottom-up approach results in the discovery that many of the biodiversity activities included in the key line agencies’ strategic plans were not included in the NBSAP estimates. BIOFIN contributes by estimating these expenditures and including them in calculating the financing gap. BIOFIN Thailand’s Financial Needs Assessment process also finds that a more collaborative process between the planners (in this case, the Office of Natural Resources Environmental Policy and Planning (ONEP) and the top line agencies (the DNP, RFD, and DMCR) that have direct mandates regarding biodiversity. In addition to the collaboration among agencies, BIOFIN Thailand provides ‘cost distribution’ information that suggests areas for immediate funding and/or which can inform funding and planning decisions. Finally, it is recommended that the FNA process should be institutionalized into the ONEP, the three-line agencies (DNP, RFD, DMCR), the PCD and the Office of National Economic and Social Development Council (NESDC). This would allow the FNA to be an organic process based on the real financial needs of the parties involved and allow for accurate estimation of the financing gap in the post-NBSAP period.

5. CONCLUSION AND REFLECTIONS ON THE BIOFIN PROCESS

The three assessments of the BIOFIN process comprising of the policy and institutional review (PIR), the budget and expenditure review (BER), and the financial needs assessment (FNA) show that the key policies guiding biodiversity-related activities in Thailand extends beyond the NBSAP to include national-level strategies such as the 20-

Year National Strategy, and the NESDC's five-year plan, as well as key line agencies' strategies and plans. By looking at biodiversity by ecological function, the PIR process is able to identify key ministries and agencies that are directly responsible for biodiversity activities in terrestrial, wetlands, marine and coastal, and urban ecosystems respectively. The PIR finds that biodiversity-related activities in Thailand are not limited to the NBSAP. Line agencies strategies and action plans also include measures related to biodiversity that are not included in the NBSAP. As such, these are treated as NBSAP plus activities. The PIR also finds that the key player in biodiversity activities in Thailand are government agencies, especially the departments within the Ministry of Natural Resources and the Environment (MONRE). The PIR also identifies possible financing solutions to fill in the budget gap between the desired biodiversity outcome and the existing level of financing available.

While the PIR helps to identify core agencies by ecosystem type, the BER allows for the identification of the key line agencies that receive the largest share of biodiversity budget. These are three agencies within the MONRE. They are the Royal Forest Department (RFD), the Department of National Parks, Wildlife and Plant Conservation (DNP), and the Department of Marine and Coastal Resources (DMCR). There is also the Pollution Control Department (PCD) whose activities help alleviate negative pressures on biodiversity resources across ecosystems. In assessing the financial needs for BIOFIN Thailand, the strategies and action plans of these key line agencies are taken into consideration since many of the planned activities are not included in the NBSAP. As such, they are treated as NBSAP plus activities. A bottom-up approach is utilized in order to better understand the existing situation, to utilize the relevant agency's unit costs, and to verify the results. This process results in ***an estimated budget gap of THB 31,978 million or \$942 million for the remaining 3 years of the NBSAP (2019 – 2021)***. This is twice the total budget for biodiversity estimated in the BER report. As such, substantial investments need to be made.

To fill the financing gap for biodiversity, a number of finance solutions need to be identified and implemented. These finance solutions could close the financing gap through a reduction in finance needs as well as an increase in resources. These can be achieved through realigning and avoiding expenditures, delivering better, and generating revenues for biodiversity. Finance solutions would need to be suited to the context in which they will be implemented. Potential finance solutions are identified in the PIR reports by ecosystem type. They range from the use of payment for ecosystem service programs, biodiversity offsets, conservation license plates, social impact investment, and crowdfunding. These finance solutions will be considered in detail in the Biodiversity Finance Plan (BFP) and implemented in the next phase of BIOFIN.

The three assessments from the first phase of BIOFIN in Thailand has led to many

valuable insights into the institutional context, the budget allocated, and the amount of unmet financing needs. The assessments benefit from dividing biodiversity into four main ecological functions. This not only ensures comprehensiveness, but also prevents any possible overlaps in the allocation of public funds for biodiversity. The BIOFIN process also allows for the identification of core agencies that receive the largest biodiversity budgets and, therefore, should be supported in their work on biodiversity. The bottom-up approach used in the financial needs assessment also results in the discovery that some of the targets and activities planned by line agencies are not directly included in the NBSAP. This allows costing for these activities to be taken into consideration, and the financing gap calculated in a way that incorporates this information. This paves the way for the finance solutions to be formed in an informed manner.

In addition to the findings that can be used to formulate and implement finance solutions, several lessons can be drawn from the BIOFIN process. First, there is a large gap between the budget that is needed to achieve biodiversity targets and the actual budget allocated. Thus, efforts to fill this gap needs to be stepped up by all stakeholders. Involvement of more stakeholders should be explored. With the public sector already contributing the lion's share of biodiversity funds in Thailand, contributions from the private sector, civil society groups, and citizens should be explored and encouraged.

Second, successful conservation and enhancement of biodiversity resources requires the involvement of local governments and communities. Thus, finance solutions that are considered should include these stakeholders as partners. Furthermore, the ideas embodied in the BIOFIN process can be applied at the local level in order to understand the policy and institutional context and identify the source funds for biodiversity.

Third, the BIOFIN process reveals that while there are efforts to collect biodiversity data, there is, as yet, no holistic database for monitoring and tracking the status of biodiversity resources in Thailand. Without good data, it will be difficult to keep track of the progress or decline in important biodiversity resources. Responsible parties should be charged with data collection, while a central agency would gather the data from all sources into one database. This database could be organized by ecological function, which would help in monitoring and evaluation of biodiversity-related activities.

Fourth, increasing the awareness of the importance of biodiversity in the younger generation is crucial to sustaining biodiversity resources. Thus, activities towards this end should be supported and, if possible, lessons on the importance of biodiversity should be included in classrooms nationwide. This will ensure that efforts that biodiversity resources continue to be conserved and enhanced in the years to come.

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