

THAILAND OCEAN PILOT:
CASE STUDY ON
SUSTAINABLE TOURISM,
THE ENVIRONMENT AND THE OCEAN

SEEA: TOURISM SATELLITE ACCOUNT
IN THE TOURISM DEVELOPMENT CLUSTER ANDAMAN
(PHUKET, KRABI, PHANG NGA, TRANG, SATUN PROVINCE)

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REFERENCE

ABBREVIATIONS

GDPT	Gross Domestic Product of Tourism industry
MST	Measuring the Sustainability of Tourism
TSA	Tourism Satellite Account
SEEA	System of Environmental-Economic Accounting
UNWTO	World Tourism Organization

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VI. INTRODUCTION ON THAILAND MARINE AND COASTAL TOURISM POLICY IN SUSTAINABLE CONTEXT

NATIONAL POLICY IN SUSTAINABLE CONTEXT

Thailand and the international community have entered the third year of the implementation of the 2030 Agenda for Sustainable Development, a process to which Thailand attaches utmost importance. The country established the National Committee on Sustainable Development (CSD), chaired by the Prime Minister, as a main mechanism to oversee, coordinate and follow-up and review the sustainable development policies and its implementation. His Majesty the Late King Bhumibol Adulyadej's Sufficiency Economy Philosophy (SEP) continues to be a core principle of Thailand's path toward sustainable development. In 2018, Thailand formally launched the 20-Year National Strategy Framework (2017-2036)¹, as a development framework for the whole of government to realize the vision of "Thailand as a developed country with security, prosperity and sustainability in accordance with the principle of Sufficiency Economy Philosophy". The Strategy covers six areas which include security, competitiveness enhancement, human capacity development, social equality, eco-friendly



Figure 1: 20-Year National Strategy Framework
Source: The 20-Year National Strategic Plan, Thai Health 2017

¹ In the past, the country has set a goal and strategy for development under the National Economic and Social Development Board (NESDB). Each plan covers only 5 years but in practice each government that comes into power places higher importance on its party's policies and campaign promises. When there is a change in government, there often is a change in many economic and social policies, resulting in a break in the continuity of work. Thus, in order to reform national development strategy, and to ensure that all governments that come into power are committed to the larger goal that have already been set, the country should have a long term national goal or National Strategy. (Source: The 20-Year National Strategic Plan, Thai Health 2017)

growth, as well as rebalancing and improving public sector management.

Figure 2: The Vision of the 20-year National Strategy

<p align="center">“Security, Prosperity, Sustainability” in accordance with the principles of Sufficiency-Economy Philosophy.</p>		
Security	Prosperity	Sustainability
<ul style="list-style-type: none"> • Secure and Safe from natural disasters and changes from within the country and outside the country at all levels including at the national, social, community, family and individual level and to be secure and safe in all dimensions of both economic, social, environmental and political. • Nation to be secure in its independent sovereignty, to have a national institution, religion, monarchy that is strong and at the center that is depended upon and trusted by the people. A political structure that is secure and leads to continuous management of the country with transparency according to the principles of good governance. • Society to have reconciliation and unity, able to unite and strengthen national, community and family development. • People to have a secure life. To have a secure work and income adequate to maintain one's life. To have a place to live and to have safety in one's life and assets. • Natural resources and the environment to have security in food, energy and water. 	<ul style="list-style-type: none"> • The country continues to have economic expansion and raise its level to a high income country. To reduce unequal development. The population to receive the benefits of development in more equal proportions. • The economy is more competitive and able to create income from both within and outside the country. To create an economic and social base for the future that is an important link within the region in both communication, transport, production, trade, investment and business. To have an important role in the region and globally arising from its economic relationship and trade with others. • Financial completeness enabling creation and continuation of development that includes human capital, knowledge, financial, industrial machinery, social and natural resources and the environment. 	<ul style="list-style-type: none"> • Development that leads to progress in income and quality of life of the people continue to increase, which is due to the progress and development of the economy that does not overuse its natural resource, not overly create pollution to the environment and promote environmental preservation • Production and consumption that is friendly to the environment and is linked to the regulations accepted by the world community of the abundance of natural resources and the improvement of the environment. For people to have responsibility to the environment, have compassion to one another and show sacrifice for the greater benefit. • Move towards sustainability for the greater benefit that places importance in participation of the people from all sectors for development in all facets equally in a stable and sustained manner. • People in all sectors of society adhere to the philosophy of sufficiency economy

Source: The 20-Year National Strategic Plan, Thai Health 2017

The National Strategy will establish the main development directions that must be followed under any government in order to achieve the country's future development targets. The long-term development master plan will constitute a framework that regulates any and all aspects of development implementation, as well as linking overall and specific development plans at all levels to be properly integrated under the National Strategy.

Not only SEP and SDGs have been integrated in the 20-Year National Strategy Framework but also the 12th National Economic and Social Development Plan (2017-2021). All plans and budgeting of government agencies have been developed in line with SEP and SDGs. The period of the 12th Plan will be an extremely challenging time for Thailand to undertake substantial reforms by accelerating the development of science, technology, research and development, and innovation as key factors in empowering the development of all aspects needed to increase the country's competitiveness with an exceedingly competitive global economy. This development will be environmental-friendly as mentioned in the strategy 4 "strategy for environmentally-friendly growth for sustainable development", comply with SDGs, create and expand new and more inclusive income bases, as well as extend the existing income bases.

Figure 3: SDGs and The 20- Year National Strategy



Source: Thailand's Voluntary National Review on the Implementation of the 2030 Agenda for Sustainable Development, June 2018

Nevertheless, the natural resources and environmental outlook has been challenging and become a weakening basis for production, service provision, and livelihood both inside and outside the cities. Natural resources have declined and degenerated. Because of over-exploitation beyond the carrying capacity of ecosystems, Thailand's forest areas had continually declined by around 2 million Rai per year during 2008-2013. The main causes were

deforestation, which threatened biodiversity. Marine resources have deteriorated due to illegal and intensive fishing beyond the sustainable yield limits, breaking the recovery cycle of nature. On the one hand, economic activities such as infrastructure construction, aquaculture, and tourism expansion have made the major ecosystems vulnerable, such as mangroves, coral reefs and sea grass. On the other hand, climate change has become a crucial risk factor aggravating the deterioration of natural resources.

Thailand's 12th National Economic and Social Development Plan also warns that, "At present the country's natural resources and environmental quality are deteriorating, and have become a weakness in maintaining the basis of production, services and sustainable living. A large volume of the natural resources stock has been utilized for development, resulting in their continuous degradation. The forests have been depleted, the soil has become infertile, and biodiversity has been threatened. While exhibiting a future risk of water shortages, the existing supply of water has not been able to meet the demands of the various sectors. Conflicts over the use of natural resources stem from the unfair allocation of access and exploitation. Moreover, environmental problems have risen along with economic growth and urbanization. All of these problems have affected the quality of life and have added greater economic costs, for example

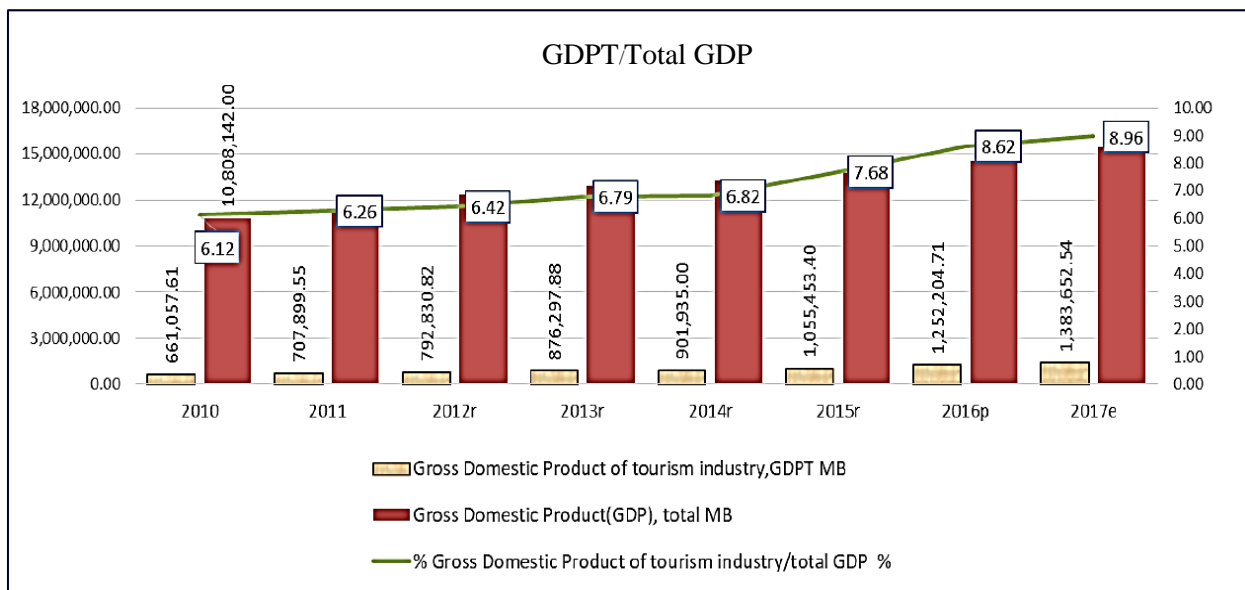
- Rising sea level: The Thai Government's Department of Marine and Coastal Resources (DMCR) has calculated that erosion causes the country to lose 30 km² of coastal land every year. The Thai Office of Natural Resources and Environmental Policy and Planning predicts the sea level will rise one metre in the next 40 to 100 years, which impacts at least 3,200 km² of coastal land at a potential cost to Thailand
- Plastic waste: Thailand's Pollution Control Department (PCD) estimates that plastic waste in the country is increasing at an annual rate of 12 percent, or around two million tons per year. The Thai Marine and Coastal Resources Department has noted that at least 300 sea animals on average—60 per cent of which are whales and dolphins—die from eating plastic fishing gear and trash each year. In 2018, the Thai government awakened fully to the dangers of plastic pollution.
- Air pollution: The World Bank estimates that deaths in Thailand attributable to air pollution have risen from 31,000 in 1990 to roughly 49,000 in 2013. Industrial growth has created high levels of air pollution in Thailand. Vehicles and factories contribute to air pollution, particularly in Bangkok. Other sources of air pollution include garbage burning, open cooking, and agricultural burning practices, including deliberate forest fires.
- etc.

THAILAND TOURISM INDUSTRY

In the global context, tourism is one of the most prominent and fastest growing industries in the world. In 2015, the tourism industry generated more than USD 7.8 billion in value, which accounted for 9.8% of global GDP. Global international tourism receipts have been increasing at a rate of 5% over the past 5 years, reaching USD 1,260 billion in 2015 and becoming the third largest global export after fuels and chemicals. Among these, 33% was generated from Asia-Pacific region and with 8% from Southeast Asia.

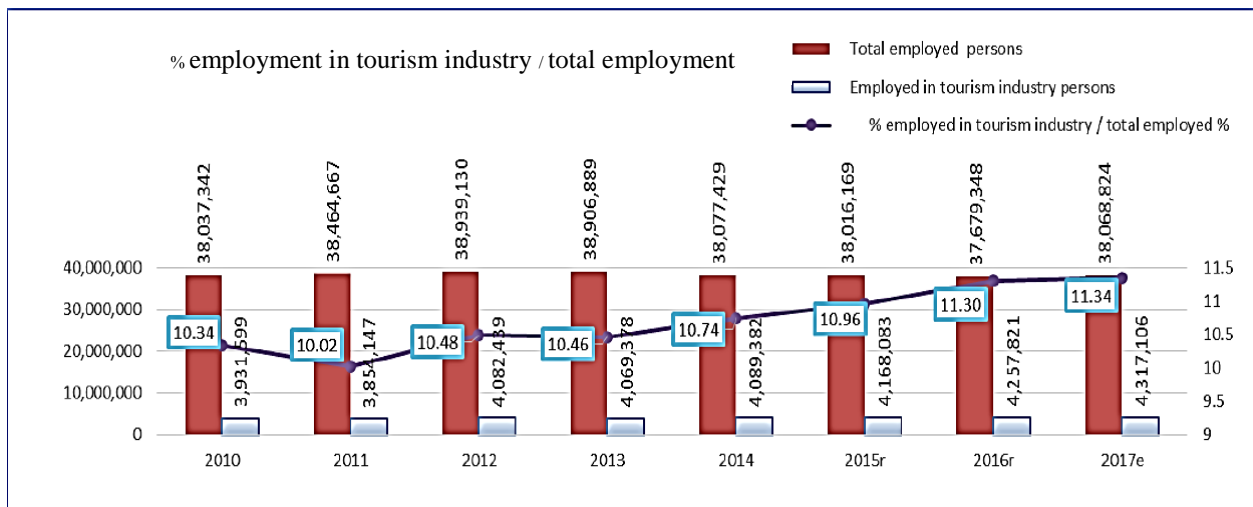
While, in Thailand, the tourism industry is of great economic significance when compared to most countries in the region. Gross Domestic Product of tourism industry accounted for 8.96% of Thailand's GDP in 2017, which surpassed most of the countries in the region and was higher than global average of 9.8%. The tourism receipts have as well been experiencing strong growth since 2011 at 15.6% per annum. In addition to its GDP contribution and receipts, in 2017, the tourism industry was responsible for more than 4.2 million jobs or 11.34% of total national employment, exemplifying its strong contribution to the social economy. (The Ministry of Tourism and Sports, Thailand: 2017)

Figure 4 Gross Domestic Product of tourism industry, GDPT/total GDP 2010-2017, Million Baht (MB) and percentage (%)



Source: Tourism and Sports Economics Division, Office of the Permanent Secretary, Ministry of Tourism and Sports

Figure 5 Thailand's employed in tourism industry/total employed 2010-2017, number of persons and percentage



Source: Tourism and Sports Economics Division, Office of the Permanent Secretary, Ministry of Tourism and Sports

The 12th National Economic and Social Development Plan has set a national target to increase income from economic activities including revenue generated from coastal tourism. With reference to the strategy 4 “strategy for environmentally-friendly growth for sustainable development” also focus on promoting sustainable tourism by taking the carrying capacity of ecosystems (destinations) into account.

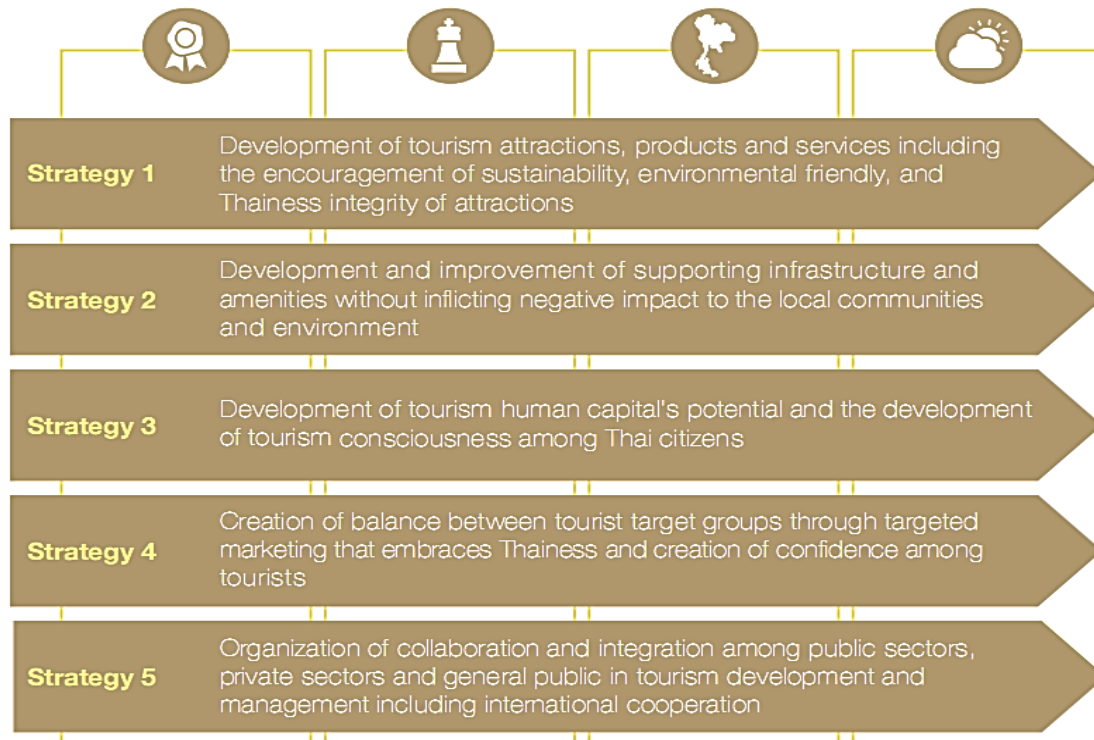
- Upgrade the standards of natural destination management to be comparable with international standards.
- Restrict the improper use of tourism destinations.
- Develop environmental management systems in tourism sites, including solid waste and wastewater treatment facilities.
- Limit the numbers of tourists in any destination by setting quotas depending upon the vulnerability of such ecosystems in order to create balance and sustainability in the development of the Thai tourism industry, which includes developing man-made creative tourist destinations as new attractions for quality tourists from around the world.
- Design and pilot systems of revenue collection in marine protected areas, islands and marine parks.

This income should be used for the conservation and development of these tourism sites. Encourage communities to gain revenue from tourism while conserving natural resources, and preserving local culture and identity. Moreover, communities can earn income from selling their local biological products.

Moreover, the vision of Thailand's tourism by 2036 also has been set in the 2nd Thailand National Tourism Development Plan (2017 - 2021) as “Thailand will be a World's leading quality destination, through balanced development while leveraging Thainess to contribute

significantly to the country's socio-economic development and wealth distribution inclusively and sustainably".

Figure 6 Thailand's tourism's 5-year strategic axes



Source: The Second Thailand National Tourism Development Plan (2017 - 2021), Ministry of Tourism and Sports

In achieving the vision of Thailand tourism in 2036, all parties have the responsibility to take part in cooperative development of Thailand tourism industry. Five strategies have been defined to guide development actions in accomplishing the objectives.

As mentioned in strategy 1, This strategy focuses on improving the core components of tourism which are the attractions and tourism products and services. Tourism offerings should achieve internationally accepted standards and possess the unique values that distinguish them from other tourism destinations. The development of tourism offerings should be carried out in the manner that is environmental friendly and is balanced in terms of location, time, and tourism segments. These elements serve to ensure that the development will result in a spread of opportunities, incomes and wealth throughout the nation.

Tourism industry in Thailand generates the country's second largest source of revenue, which has generated significant revenue and income circulating throughout the nation. Rapid increasing rate of tourists has created negative impact on socioeconomic and environmental conditions, particularly natural exploitation, unequal income distribution and waste management problem. Thus, the need to develop tourism in a sustainable manner has also become a primary concern.

Thailand could still sustain tourist volumes for now by promoting secondary tourist destinations within Thailand, for one. The Tourism Authority of Thailand (TAT) shifted its policy towards more sustainable tourism development, focusing on conservation and benefits to local

communities. The overall goal of ecotourism development in Thailand is to develop a sustainable industry, to maintain a healthy natural and social environment, and to foster self-reliance in local communities. Recently, the TAT introduced the Go Local initiative, allowing tax deductions for domestic travel to its 55 provinces. The initiative also introduces other benefits for travelers, such as the introduction of a TAT Plus online card for use in these secondary destinations, corporate tax exemptions for corporate events, and discounted tour packages for large tourist groups.

Yet bringing secondary destinations to the forefront also needs to be balanced against potential environmental costs if care is not taken to preserve heritage and outdoor sites. There have been instances where the Thai government has stepped in to take such measures, such as the closing of Koh Tachai island to tourists since October 2016. That same year, 10 popular diving locations were also closed to preserve the coral reefs in the area from further coral bleaching problem caused by climate-change-induced rising sea temperature. Coral reefs in the national park suffered from bleaching as seawater's temperature rose to 34°C, forcing the DNP to close a few beaches permanently. The degradation of coral sites affect not only ecology by tourism as millions of tourists each year.²

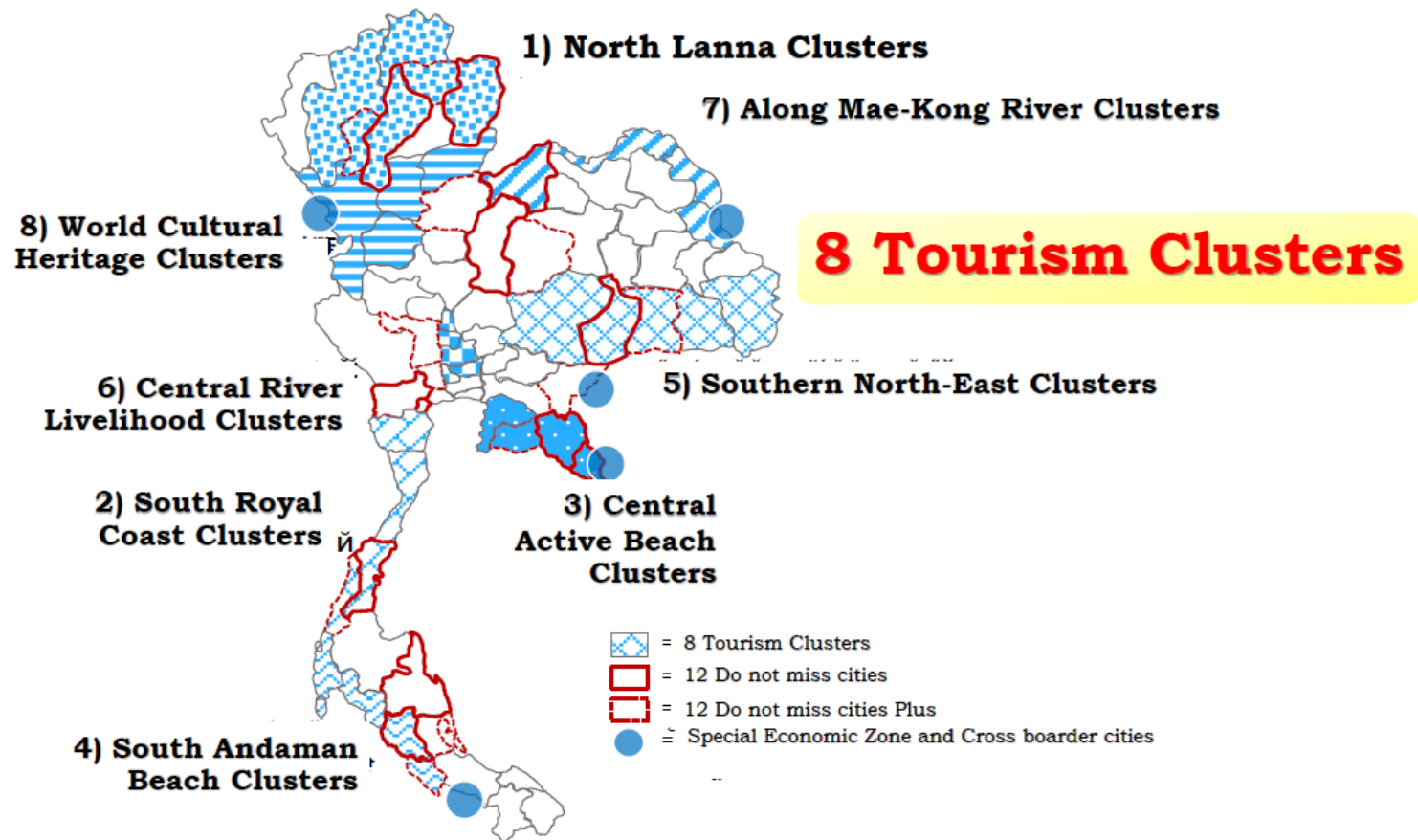
While these are measures relating to the preservation of ocean life, measures also need to be taken to preserve Thai beaches from sand erosion. Thailand's coastline spans 2,000 km along the Gulf of Thailand and 1,000km along the Andaman sea. But as much as 670 km of these beaches are quickly eroding each year because of factors like construction, tourism activity and the reduction of mangrove forests.

² <https://www.bangkokpost.com/news/special-reports/1055849/sustainable-tourism-planned-for-phi-phi>

TOURISM DEVELOPMENT CLUSTER

Ministry of Tourism and Sports focuses on area-based tourism development by promulgating in the Act of National Tourism Policy, B.E. 2551. The Act aimed to create a mechanics to integrate the national tourism policy and administration at all levels to bring about quality and sustainable national tourism development by clustering tourism development in to 8 areas as follows,

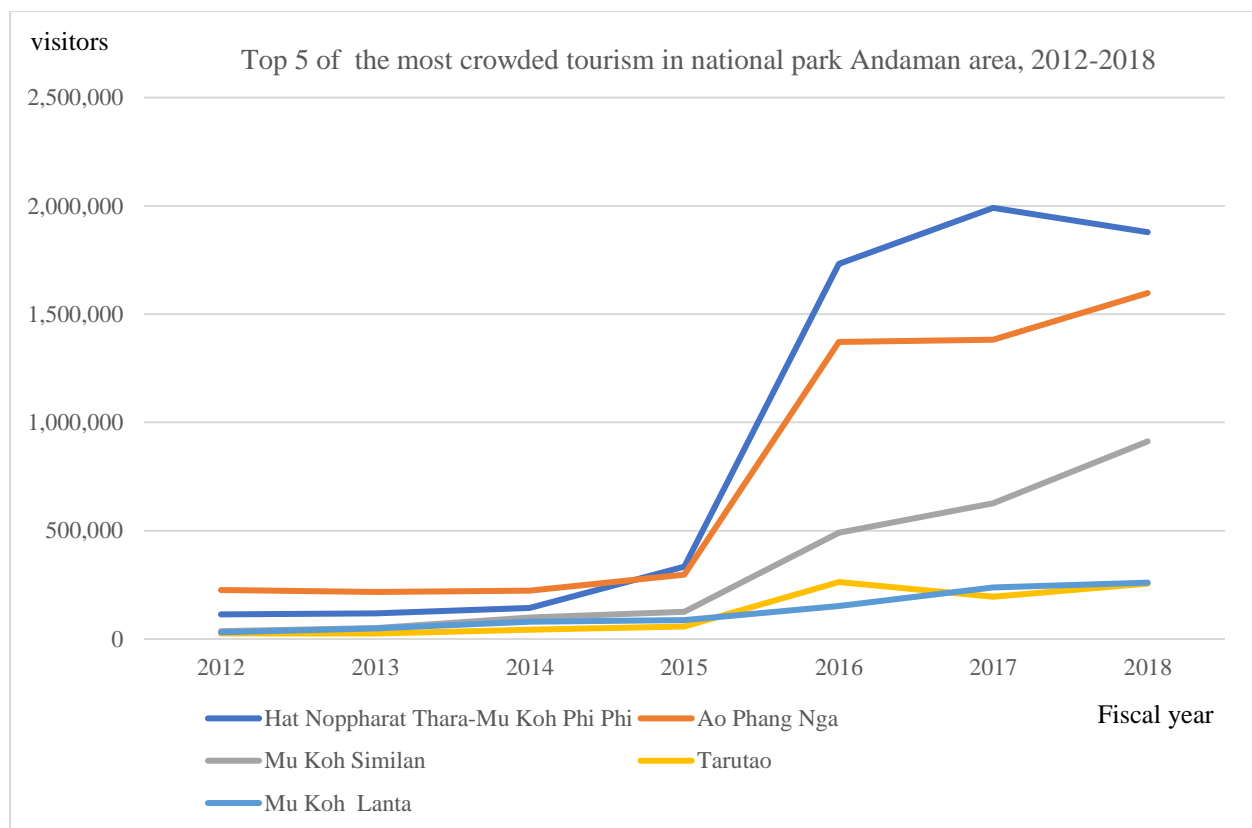
Figure 7 Thailand's Tourism Development Clusters



Source: Thailand Tourism Satellite Account, Regional Workshop on the Compilation of the TSA, Ministry of Tourism and Sports

With the coast stretching 3,148 kilometers running across 23 provinces, Thailand has been utilizing our coastal areas for economic, social, environmental and security purposes. Hence, Thailand attaches great importance to the conservation and sustainable use of the oceans, seas and marine resources for sustainable development. From the result of a scoping report on Thailand ocean account for SDG14 implementation, the Thai Government has special interest in managing the country's marine and coastal areas and resources to foster sustainable growth as evidenced by various plans, policies and measurements in many levels of administration. Thai marine tourism industry has been expanded rapidly and set high on the country's national to potential locations have been identified where ports could be developed on the Andaman Sea coast. Some of the best tourist destinations and natural attractions in Thailand are found along the coasts and within the marine parks.

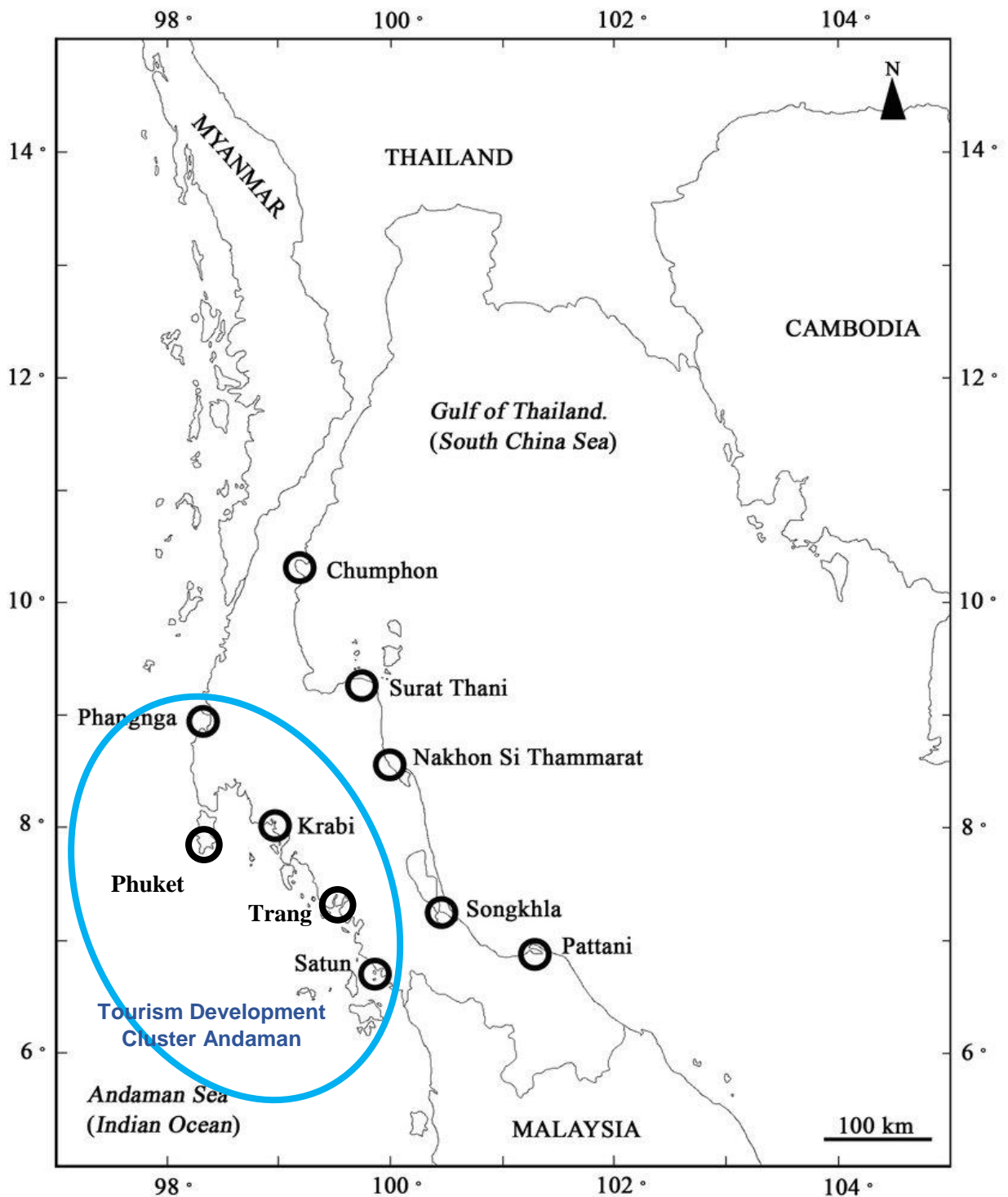
Figure 8 Number of visitors in the top 5 of the most crowded tourism in national park Andaman area, 2012-2018



Source : National park tourism Statistics, National Parks, Wildlife and Plant Conservation Department (DNP)

Thailand has a total of 22 declared marine national parks, covering a total estimated area of 5,812 km² or 1.8 percent of the total marine area of Thailand, 15 of which are located in the Andaman Sea, one of the Tourism Development Clusters.

Figure 9 Map of peninsular Thailand indicating the provinces respectively on the side of the Andaman Sea and the Gulf of Thailand (southern part of the South China Sea).



Source Eight new species of marine dolichopodid flies of *Thinophilus* Wahlberg, 1844 (Diptera: Dolichopodidae) from peninsular Thailand - Scientific Figure on ResearchGate (Samoh A., Satasook C. & Grootaert P., 2017)

The Tourism Development Cluster Andaman, located on Thailand west sea border, including Phuket, Krabi, Phang nga, Trang and Satun province. It is so important for the economic. The so called pearl of Andaman, Phuket catered millions of tourists and generate numerable income to Thailand. In 2016, it was 50.62 percent of value added from tourism in this area and it was the highest proportion of value added compared to the other Tourism Development Clusters as shown in table 1.

Table 1 Value added of 8 Tourism Development Clusters, 2016

Tourism Development Clusters (TDC)	Value Added (Million Baht)			Tourism Ratio (Percentage)		
	Tourism Industries	Non-Tourism Industries	Total	Tourism Industries	Non-Tourism Industries	Total
TDC 1 : North Lanna Clusters	65,090	431,972	497,062	13.09	86.91	100.0
TDC 2 : South Royal Coast Clusters	39,421	212,747	252,168	15.63	84.37	100.0
TDC 3 : Central Active Beach Clusters	154,917	1,755,927	1,910,844	8.11	91.89	100.0
TDC 4 : South Andaman Beach Clusters	232,645	226,984	459,629	50.62	49.38	100.0
TDC 5 : Southern North-East Clusters	30,755	556,110	586,865	5.24	94.76	100.0
TDC 6 : Central River Livelihood Clusters	72,626	1,068,930	1,141,556	6.36	93.64	100.0
TDC 7 : Along Mae-Kong River Cluster	11,722	151,052	162,774	7.20	92.80	100.0
TDC 8 : World Cultural Heritage Clusters	15,890	259,475	275,365	5.77	94.23	100.0

Source: Final Report Tourism Satellite Account: TSA B.E. 2560

Nevertheless, tourism has a major impact on the country's coastline, where the main challenge is to protect the marine ecosystems, says Dr. Thon Thamrongnawasawat, Deputy Dean of the Faculty of Fishery at Kasetsart University in Bangkok. Due to more than half of the foreign tourists who visited Thailand have traveled to the country's charming beaches, according to industry calculations. Even if the negative impact of tourism is clear, the sector cannot be stopped or restricted because it will affect the country's economy and thousands of workers, but they can find a way to make them more sustainable to help and at the same time maintain and develop communities.

The major impacts are obvious at Phi Phi Islands. Even in Low or high season, Phi Phi Islands are invariably super-crowded. According to data on tourist numbers with the National Parks, Wildlife and Plant Conservation Department (DNP), Hat Noppharat Thara-Mu Koh Phi Phi Marine National Park was found to have drawn the highest number of visitors 2017, which is 1,990,649 and 1,877,871 in 2018. Staff park members have an unimaginable workload seven days a week, because the machine of tourism never stops. During the high season and long weekends, the number of visitors can swell over 10,000 in a single day. In the low season where other marine national parks are empty, around 5,000 visitors arrive at Phi Phi. Maya Beach in particular has become supremely popular since 1999 when it was featured in the film *The Beach*.³

³ <https://www.tourism-review.com/negative-impact-of-tourism-needs-to-be-addressed-news10419>

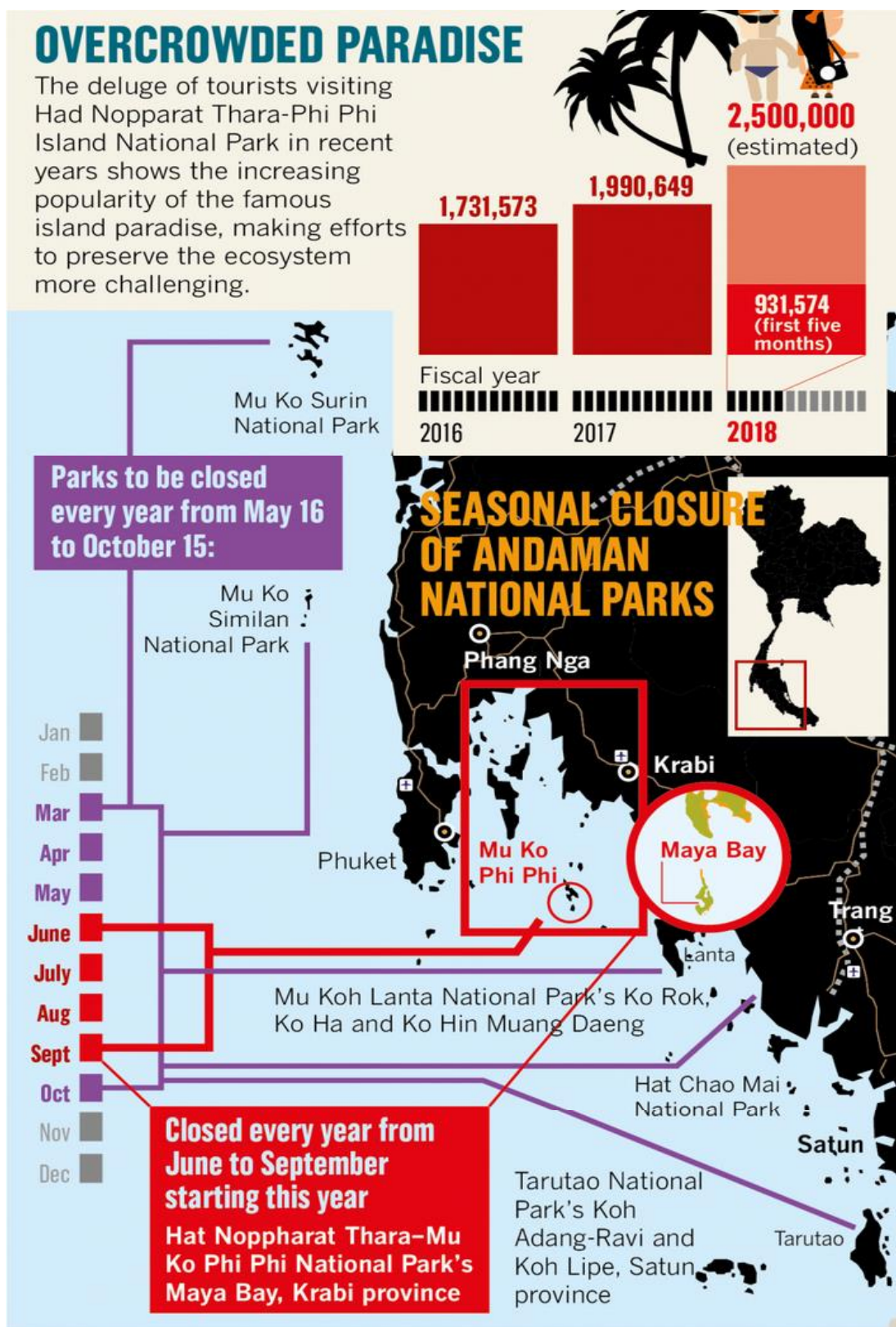
Table 2 Number of tourism in national park in Andaman area, fiscal year 2012 – 2019 (Oct-Apr)

National park in Andaman area	Fiscal year (start from Oct 1 to 30 Sep)							2019 (Oct, 2018 – Apr, 2019)
	2012	2013	2014	2015	2016	2017	2018	
Hat Noppharat Thara-Mu Koh Phi Phi	113,842	118,248	143,555	333,613	1,731,573	1,990,649	1,877,871	705,061
Ao Phang Nga	225,709	217,466	223,309	296,923	1,371,741	1,382,410	1,597,434	680,751
Mu Koh Similan	36,432	50,722	99,243	125,346	490,913	626,313	912,566	656,509
Tarutao	26,036	26,107	43,649	58,626	263,196	194,811	255,338	223,663
Mu Koh Lanta	31,234	49,045	79,994	87,556	152,579	237,628	260,457	188,932
Khao Lak Lam Ru	48,555	52,478	61,380	69,206	74,756	79,757	78,036	55,687
Hat Chao Mai	22,908	42,622	64,960	66,895	85,431	60,796	100,253	70,858
Mu Koh Phetra	41,392	15,924	22,315	34,543	33,179	45,127	64,008	89,860
Khao Lam pi-Hat Thai Mueang	37,754	38,450	30,015	35,228	44,613	48,438	42,979	38,022
Mu Koh Surin	16,711	17,086	11,055	15,563	52,157	49,407	61,235	52,605
Sirinart	20,168	19,052	17,215	27,159	32,086	45,571	44,571	38,372
Hat Khanom-Mu Koh Thale Tai	12,842	22,282	33,481	28,173	44,810	33,986	23,759	19,569
Sri Phang Nga	8,661	9,404	15,357	17,860	22,742	19,817	19,828	16,435
Thale Ban	7,942	7,823	11,036	10,023	11,591	15,461	13,205	8,559
Total	652,198	688,722	858,578	1,208,729	4,413,383	4,832,188	5,353,558	2,844,883

Source : National park tourism Statistics, National Parks, Wildlife and Plant Conservation Department (DNP)

Such popularity means this national park is the highest income generator for the state. According to data from the DNP, income from Hat Noppharat Thara-Mu Koh Phi Phi Marine National Park in fiscal year 2018 (Oct 1, 2015, to Sep 30, 2016) was 639 million baht. The second-high income, 455 million baht, was generated from Mu Koh Similan. And the third-high income, 446 million baht, was generated from Ao Phang Nga. All of the top 3 income generator from national parks are in the Andaman. Compare that with the total income from entry fee from all 131 national parks in the country: 2,708 million baht, All of the top 3 income was more than half of total income. Meanwhile, other popular national parks such as Khao Yai was 110 million baht or Erawan National Park was 102 million baht annually.

Figure 10 Seasonal closure of Andaman national parks



Source of graphic: Maya Bay off limits, The Nation, March 30, 2018.⁴

⁴ <http://www.nationmultimedia.com/detail/national/30342047>

Despite the huge revenue, the Phi Phi Model has been initiated to curb the number of tourists: the DNP has ordered the closure of the Maya Bay of Hat Noppharat Thara- Mu Koh Phi Phi National Park in Krabi province. At previous, the DNP announced to close the bay from 1 June to September 2018 and extended the planned four-month closure to at least a year, due to the extent of the destruction caused by the thousands of day-trippers. However, a royal gazette published on 1 October by Thailand's DNP announced the restrictions on tourism would not be lifted until the ecosystem "fully recovers to a normal situation". This decision was accepted by all stakeholders, including academics and business operators who have witnessed the island's deteriorated environment.

Since 2015, the DNP has enforced a new rule that all tourist boats must register, and imposed tight monitoring in the entry fee collection; this is because the park was beset by rumors of corruption. The programme also includes a strict ban of shark meat and parrot fish meat on the islands to prevent irresponsible and overfishing. The local administration also acts tough with hotels and restaurants, forcing them to do better in controlling waste water. Violators will risk losing business licenses.⁵

Not only the deteriorated environment problems, a research team from Thailand's Kasetsart University's Faculty of Engineering has discovered that the drinking water shortage on the area's main Phi Phi Don island is worsening and reaching desperate levels. The water sources on the small island are insufficient for the huge volume of visitors, while tap water has become contaminated with waste caused by the overburdened tourist industry. The lead researcher revealed that the island has only two significant water-storage facilities, despite its wet climate. The problem has been exacerbated by the influx of tourists during times of low rainfall. The researchers have warned that over-consumption of groundwater could result in saltwater seeping into the system. Of more immediate concern, the study found that groundwater has already been contaminated with harmful pathogens and heavy metals from offshore water pollution. The island's administrative chief appealed for help from Thailand's government. "Many issues are just too big for us to solve alone".⁶

Tourism in Andaman has been affected by various factors for example tourist locations, depleted and degraded natural resources, etc. The main objective is enhancing level of maritime tourism development from national level to global level based on rich Andaman cultures by balancing environmental protection with mass tourism. The Tourism Development Cluster Andaman should be studied, therefore, for solving problems and managing the environment by calculating Green GDP, the value added of tourism, considered as costs of natural resources and the environment to be conserved sustainability. Moreover, Thailand has developed and published country TSA since 2016, key economic data of tourism sector, e.g. gross domestic product and input-output table, at national and sub-national level are available to be studied for as a pilot Thailand SEEA-TSA.

⁵ <https://www.bangkokpost.com/news/special-reports/1055849/sustainable-tourism-planned-for-phi-phi>

⁶ <https://www.telegraph.co.uk/news/2018/12/05/thailands-phi-phi-islands-suffering-water-crisis-tourist-influx/>

VII. SCOPE AND OBJECTIVE OF THE CASE STUDY

GEOGRAPHIC SCOPE: Tourism Development Cluster Andaman (Phuket, Krabi, Phang Nga, Trang, Satun province)

STAGE: From the whole scope of this project, the case study is suggested to include the 3 following stages;

Stage 1: producing water, energy and solid waste accounts to complement TSA information (i.e., TSA-SEEA).

1.1 BIOTEC has conducted a detailed data assessment on water, energy and waste in the five provinces. This stage will utilize the BIOTEC's assessment and conduct further research on data availability and data sources in accordance with the SEEA concepts and structures. It will also provide guidance on how to allocate the SEEA accounts to tourism (e.g., applying the tourism ratio from TSA). It should also provide guidance on appropriate valuation methods and recommendation on additional SEEA accounts of tourism importance. Based on the physical and monetary accounts studied, advice on calculation methods for environmentally adjusted TSA (i.e., tourism value added less environmental cost) should be provided.

1.2 In addition, wastewater discharge spots and waste dump sites/landfills should be georeferenced and overlaid with, for instance, topographic maps and population data to evaluate social impacts as well as potential releases into the ocean.

Stage 2: mapping land cover, tourism and ecosystem information to identify tourism potentials and sites for conservation.

2.1 This stage aims at providing insights on which locations in the five provinces (i) could be promoted for tourism but currently unexploited, (ii) are being over-utilized in relation to their carrying capacity, and (iii) should be conserved (no or limited tourism activities). The "locations" cover those on land and in the ocean. It would involve research on tourism boundary in the ocean, standard spatial units, land cover maps, data and classifications of ecosystem conditions and services, as well as approaches to assigning existing tourism information into the standard spatial units. Subject to further discussion, this stage could focus on one specific location of policy interest for concept testing purposes.

Stage 3: building scenarios to inform decisions on tourism sustainability.

3.1 This stage builds on the results of the first two stages and provides guidance on scenario building for tourism sustainability. It would involve research on tourism projections/targets and tourism income distribution, expected changes in natural resources used and residuals, ecosystem dynamic models, among others. Policy options for sustainable tourism strategies should also be discussed. For instance, how to increase tourism income and improve its distribution, while maintaining or reducing natural resource inputs and residuals as well as sustaining ecosystem integrity.

From the whole scope of this project consisting of 3 stages as shown above, in this study will focus on stage 1.1.

OBJECTIVES:

1. Review the BIOTEC's assessment and conduct further research on availability and sources of water, energy and solid waste data in accordance with the SEEA concepts and structures;
2. Suggest methodologies for producing TSA-SEEA for water, energy and solid waste both in physical and monetary terms;
3. Produce test TSA-SEEA accounts for water, energy and solid waste; and,
4. Recommend and test the calculation methods for environmentally adjusted TSA.

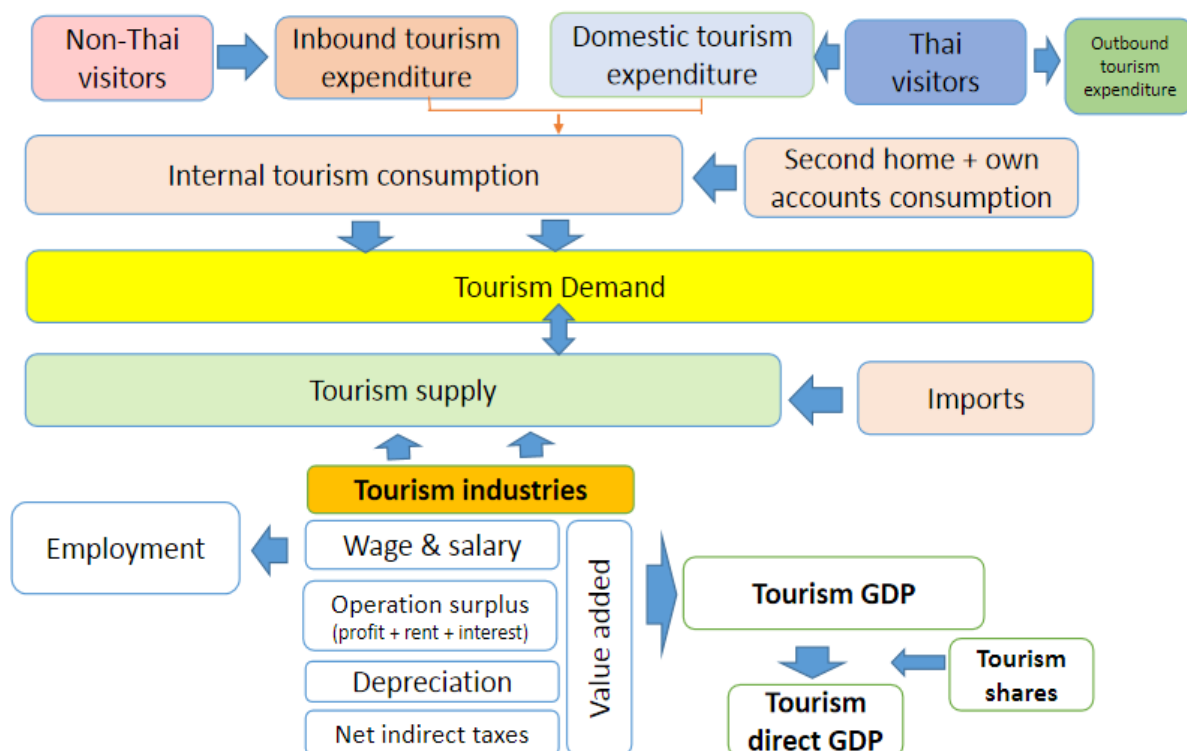
VIII. A TOURISM SATELLITE ACCOUNT (TSA), THAILAND

The national accounts are a comprehensive set of economic data which are fully consistent and complete within the boundary of the economic activities they cover. Gross domestic product (GDP) is perhaps the most recognizable and important economic statistic from the core national accounts. Satellite accounts allow an expansion of the national accounts for selected areas of interest while maintaining the concepts and structures of the core accounts. Satellite accounts present specific details on a particular topic (both in monetary and physical terms) in an account which is separate from, but linked to, the core accounts. Therefore, a 'tourism' satellite account (TSA) highlights tourism within the national accounting framework.

A tourism satellite account integrates data about the supply and use of tourism-related goods and services into a single format. It summarizes the contribution tourism makes to production and employment, consistent and integrated with Thailand national accounts. This ensures that the importance of the tourism sector is measured and understood in the context of the Thailand economy as a whole. Thailand TSA measures expenditure in Thai economy by both resident and non-resident tourists, and thus gives a picture of the overall size of the tourism industry, including its contribution to gross domestic product (GDP) and employment.

Thailand TSA follows the United Nation World Tourism Organization (UNWTO) by using recommended Methodology Framework 2008 (RMF 2008). The Ministry of Tourism and Sports is responsible for conducting Thailand TSA since 2010.

Figure 11 Structure of the Tourism Satellite Account



Source: Thailand Tourism Satellite Account, Ministry of Tourism and Sports

For the Annual TSA, it has been compiled 10 tables. Meanwhile quarterly TSA and 8 Tourism Cluster TSA have been compiled only 6 tables (table1 – table6) since 2015.

List of table 1- table 10 in TSA, Thailand.

Table 1	Inbound tourism expenditure by products and classes of visitors
Table 2	Domestic tourism expenditure by products, classes of visitors and types of trips
Table 3	Outbound tourism expenditure by products and classes of visitors
Table 4	Internal tourism consumption by products
Table 5	Production accounts of tourism industries and other industries(at basic prices)
Table 6	Total domestic supply and internal tourism consumption(at purchasers' prices)
Table 7	Employment in the tourism industries
Table 8	Tourism gross fixed capital formation of tourism industries and other industries
Table 9	Tourism collective consumption by products and level of government
Table 10	Non-monetary indicators

IX. THE SYSTEM OF ENVIRONMENT-ECONOMIC ACCOUNTING (SEEA): TSA

The System of Environmental-Economic Accounting (SEEA) consists of:

1. Physical flow: Accounting for environmental flows in physical terms; into, within and from the economy during an accounting period as follows
 - a. Physical flow accounts for energy
 - b. Physical flow accounts for water
 - c. Physical flow accounts for materials divided to be
 - 1.3.1 Accounting for air emissions
 - 1.3.2 Accounting for emissions to water and associated releases to economic units
 - 1.3.3 Solid waste accounts
2. Environmental activity accounts and related flows: Accounting for environmental transactions. This includes accounting for environmental protection and resource management expenditure, environmental taxes and subsidies and the supply and use of products used for environmental purposes known as follows
 - 2.1 Environmental protection expenditure accounts
 - 2.2 Environmental goods and services sector
 - 2.3 Accounts for resource management expenditures
 - 2.4 Accounting for other transactions related to the environment
3. Asset Accounts: Accounting for natural resources in terms of stocks and changes in stocks at the end of period.
 - 3.1 Asset accounts for mineral and energy resources
 - 3.2 Asset accounts for land
 - 3.3 Accounting for soil resources
 - 3.4 Asset accounts for timber resources
 - 3.5 Asset accounts for aquatic resources
 - 3.6 Accounting for other biological resources
 - 3.7 Asset accounts for water resources

Physical flow (section 1), that is flow of economic activities such as producing goods and services in physical terms transformed into monetary terms, plus environmental protection and resource management expenditure by Government (section 2) such as taxes, subsidies etc., plus the change in stock on asset account (section 3). All are termed “costs of natural resources and the environment” or “economic value of SEEA”. The costs of natural resources and the environment which is subtracted from GDP is called Green GDP

FOUR ACCOUNT IN PILOT STUDY SEEA: TSA, THAILAND

An initial core account for tourism industries has been defined in “Linking the TSA and the SEEA a technical note” by UNWTO. At this stage, in the development of the broader statistical framework for MST, an initial set of four core accounts are described by linking measurement of environmental flows following the SEEA with tourism industries as accounted for in the TSA. The four accounts cover flows of:

- water
- energy
- greenhouse gas (GHG) emissions
- solid waste

The level of detail and industry disaggregation of these four core accounts is relatively uniformed with a clear focus on tourism industries. In addition, specific industries relevant to each account are included, such as the water collection, treatments and supply industry and the sewerage industry in the case of the water account

Using TSA as an important input for compiling Thailand SEEA: TSA, the methodology to create accounts for this pilot study starts with converting part of monetary data from the TSA I-O table into physical units instead of starting with physical data. Therefore, some of non-market sector uncaptured in SNA will rely on other sources of data, such as water use in agricultural sector.

SOURCES OF DATA AND STATISTICS FOR SEEA: TSA IN THE ANDAMAN TOURISM DEVELOPMENT AREA

Tourism Satellite Accounts or TSA in the Andaman Tourism Development Area consists of 6 standard tables following The Tourism Satellite Account: Recommended Methodological Framework 2008 (TSA: RMF 2008) as follows

- (1) Inbound tourism expenditure by products and classes of visitors (table 1)
- (2) Domestic tourism expenditure by products, classes of visitors and types of trips (table 2) presents the expenditure of Thai visitors on domestic trips.
- (3) Outbound tourism expenditure by products and classes of visitors (table 3) presents goods and services belonging to tourism expenditure of residents acquired from non-resident providers
- (4) Internal tourism consumption by products (table 4) combines internal tourism expenditure (made up of inbound tourism expenditure from table 1 and domestic tourism expenditure from table 2), with the other components of tourism consumption. However, the internal tourism consumption in this table is wider range than expenditure.
- (5) Production accounts of tourism industries and other industries (at basic prices) (table 5) presents the production accounts of tourism industries and other industries in the economy of reference. The important outputs from this table are GDP for tourism industry and gross value added (GVA) at basic price.
- (6) Total domestic supply and internal tourism consumption (at purchasers' price) (table 6) presents an overall reconciliation of internal tourism consumption with domestic supply by using Internal tourism consumption by products (table 4) to compare with Production accounts of tourism industries and other industries (table 5). Tourism industry ratio⁷ can be derived from this table.

⁷ The tourism industry ratio is the proportion of an industry's output that is consumed by tourists

List of categories of tourism characteristic activities⁸ in tables 1-6 are referred to The International Standard Industrial Classification, ISIC. As recommended in TSA: RMF 2008, the list of categories of tourism characteristic activities are shown bellows

- (1) Accommodation for visitors
- (2) Food and beverage serving activities
- (3) Railway passenger transport
- (4) Road passenger transport
- (5) Water passenger transport
- (6) Air passenger transport
- (7) Transport equipment rental
- (8) Travel agencies and other reservation services activities
- (9) Cultural activity
- (10) Sports and recreational activities
- (11) Retail trade of country-specific tourism characteristic goods
- (12) Country-specific tourism characteristic activities.

Input-Output Table Tourism Satellite Account (IO-TSA) in the Andaman Tourism Development Cluster contains 26 sectors. An Input-Output table is a widely used matrix framework to supply detailed and coherently arranged information on the flow of goods and services and on the structure of production costs (SNA 1993 para. 20.2.) for intermediate consumption and for final consumption. The IO-TSA has been categorized in to two groups, namely, 12 tourism sectors and 14 other sectors.

Code	Economic Activities
001	Agriculture
002	Mining and Quarrying
003	Food Manufacturing
004	Textile Industry
005	Rubber, Chemical, Petroleum Industries and Plastic
006	Leather Products
007	Non-metallic, Metal Products and Machinery
008	Other Manufacturing
009	Public Utilities
010	Construction
011	Trade
012	Accommodation for visitors
013	Food and beverage serving activities
014	Railway passenger transport
015	Road passenger transport
016	Water passenger transport
017	Air passenger transport
018	Transport equipment rental
019	Travel agencies and other reservation services activities
020	Banking and insurance
021	Cultural activities
022	Sports and recreational activities

⁸ Tourism characteristic activities are those that typically produce tourism characteristic products.

Code	Economic Activities
023	Retail trade of country specific tourism characteristic goods
024	Other country specific tourism characteristic activities
025	Other Services
026	Unclassified

Therefore, tourism Supply and Use Table (SUT) for environmental account, in column of table need to be split as follows

- extract the “manufacture of coke and refined petroleum products” from 005 Rubber, Chemical, Petroleum Industries and Plastic.
- extract the “Water supply; sewerage, waste management and remediation activities”, and “Electricity, gas, steam and air conditioning supply” from 009 Public Utilities.

These will affect to number of SUT rows for environment account to be more than 26 rows, while number of SUT column still remain. Due to the fact that the unit of data in SUT is value term, transformation of unit of data to be fiscal term is necessary by calculating to be average price/unit.

V. COMPILATION OF ACCOUNTS FOR WATER, ENERGY AND SOLID WASTE

ACCOUNT FOR WATER FLOWS FOR TOURISM INDUSTRIES

Physical supply and use table for water describes, in physical units, supply (water resources) and use of water for tourism industries and non-tourism industries including for final consumption in household and government sectors. In this study, accounts for water flows for tourism industries consist of physical and monetary water use table.

Table 3.1 : Tourism industries water flow account (physical supply table), unit: cubic metres

Physical supply table for water														Flows from the Rest of the world	Flows from the Environment	Total supply
Abstraction of water; Production of water; Generation of return flows																
Tourism industries										Water collection, treatment and supply	Sewerage	Other industries	Households			
Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation		Other tourism ind.	Total tourism ind.										
Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total		Tsm 1 Total	Tsm 1 Total			Tsm 1 Total							
1. Sources of abstracted water																
Total supply abstracted water																
2. Water																
Distribution of abstracted water																
Own-use of abstracted water																
3. Wastewater and re-used water																
Wastewater to treatment																
Own treatment of wastewater																
Re-used water produced (for distribution)																
Total Wastewater and Re-used water																
4. Return flows of water																
Total Return flows																
5. Evaporation of abstracted water, transpiration and water incorporated into products																
Total																
TOTAL SUPPLY																

Table 3.2 : Tourism industries water flow account (physical use table), unit: cubic metres

Physical use table for water																	
Abstraction of water; Intermediate consumption; Return flows										Accumulation	Flows to the Rest of the world	Flows to the Environment	Total supply				
Tourism industries								Water collection, treatment and supply	Sewerage	Other industries	Households		Exports				
Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation	Other tourism ind.	Total tourism ind.												
Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total				Tsm 1 Total								
1. Sources of abstracted water																	
Inland water resources																	
Other water sources																	
Total use abstracted water																	
2. Water (use)																	
Use of distributed water																	
Own-use of abstracted water																	
3. Wastewater and re-used water																	
Total Wastewater and Re-used water																	
4. Return flows of water																	
Total Return flows																	
5. Evaporation of abstracted water, transpiration and water incorporated into products																	
Total																	
TOTAL USE																	

Source of Table: Linking the TSA and the SEEA: A technical note, UNWTO

NB: Dark grey cells are null by definition

METHODOLOGY ON WATER ACCOUNT

This study will establish physical use table for water by using 26 x 26 I-O Table in the Andaman Tourism Development Cluster 2016.

- Extract value of water use from 009 code 009, which consists of electricity, water supply and gas, by using use of water proportion from 180 sector Thailand I-O Table 2010 developed by National Economic and Social Development Council. Value of water use in household and government sector would be captured.
- Convert value of water use (monetary in bath) to be quantity (physical in m³) by using average commercial and household water price of Andaman provinces from Provincial Waterworks Authority source, due to the fact that I-O Table in the Andaman Tourism Development Cluster includes all kinds of market oriented water supply (Provincial Waterworks Authority, village water supply and private water supply), except water from natural resources.
- Non-purchased water could also include abstraction for own use by other industries and households, by estimation from water used in each kind of plants and animal production in Andaman provinces from Agricultural Census, NSO
- Calculate total quantity of inbound and domestic tourism water use by using tourism ratio from TSA table 4 and 6 multiply by quantity of water use in each tourism sector and other tourism sector.

ACCOUNTS FOR ENERGY FLOW FOR TOURISM INDUSTRIES

Energy accounts describe, in physical units, of supply and use of energy by energy type i.e., oil, gas, and electricity. In this study, accounts for energy flow for tourism industries consist of physical and monetary use table for energy.

METHODOLOGY ON ENERGY ACCOUNT

This study will establish physical use table for GHG emission by using 26 x 26 I-O Table in the Andaman Tourism Development Cluster 2016. Energy products will be focused on electricity, LPG and oil.

- Extract value of electrical and LPG use from code 009, which consists of electricity, water supply and gas, by using use of electrical and LPG proportion from 180 sector Thailand I-O Table 2010 developed by National Economic and Social Development Council. Value of electrical and LPG use in household and government sector would be captured.
- Extract value of oil use from code 005, which consists of Rubber, Chemical, Petroleum Industries and Plastic, and duplicate the same methodology as electric and LPG to capture the value of oil.
- Convert value of electrical use (monetary in bath) to be quantity (physical in kWh) by using average commercial and household electricity price of Andaman provinces from Provincial Electricity Authority source, due to the fact that I-O Table in the Andaman Tourism Development Cluster includes all kinds of market oriented electrical supply (Provincial Electrical Authority and private electrical supply), except electricity generated for own consumption, for example, palm oil production using by product to generate electricity for own use in production line.
- Convert value of oil and LPG use (monetary in bath) to be quantity (physical in lite) by using average price from Department of Mineral Fuels.
- Calculate total quantity of inbound and domestic tourism energy use by using tourism ratio from TSA table 4 and 6 multiply by quantity of energy use in each tourism sector and other tourism sector.

Table 4.1 : Tourism industries energy flow account (physical supply table), unit: kWh

Physical supply table for energy																				
Production energy products & Generation of residuals										Accumulation	Flows from the rest of the world	Flows from the environment	TOTAL							
Tourism industries								Electricity and gas supply	Other industries	Households										
Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation	Other tourism ind.	Total tourism ind.															
Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Total	Tsm 1 Total													
1. Energy from natural inputs																				
Natural resource inputs																				
Inputs of energy from renewable sources																				
Other natural inputs																				
2. Energy products																				
Total production of energy products																				
3. Energy residuals																				
Total energy residuals																				
4. Other residual flows																				
Residuals from end-use for non-energy purposes																				
Energy from solid waste																				
TOTAL SUPPLY																				

Source of Table: Linking the TSA and the SEEA: A technical note, UNWTO (Remove some of end use of energy product such as peat and peat product, heat, nuclear fuel and other ,etc.)

NB: Dark grey cells are null by definition

Table 4.2 : Tourism industries energy flow account (physical use table), unit: kWh

Physical use table for energy										Final consumption	Accumulation	Flows to the Rest of the world	Flows to the environment	TOTAL
Intermediate consumption; Use of energy resources; Receipt of energy losses												Exports		
Tourism industries								Electricity and gas supply	Other industries					
Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation	Other tourism ind.	Total tourism ind.									
Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Total	Tsm 1 Total							
1. Energy resources														
Natural resource inputs														
Inputs of energy from renewable sources														
Other natural inputs														
2. Energy products														
Transformation of energy products - ToTal														
End-use of energy products by SIEC class														
Coal														
Natural gas														
Oil														
Biofuels														
Waste														
Electricity														
Total end-use for energy purposes														
End-use for non-energy purposes														
3. Energy residuals														
Total energy residuals														
4. Other residual flows														
Residuals from end-use for non-energy purposes														
Energy from solid waste														
TOTAL USE														

Source of Table: Linking the TSA and the SEEA: A technical note, UNWTO (Remove some of end use of energy product such as peat and peat product, heat, nuclear fuel and other ,etc.)

NB: Dark grey cells are null by definition

ACCOUNT FOR SOLID WASTE FOR TOURISM INDUSTRIES

Solid waste accounts describe, in physical units, of supply and use of solid waste residuals and solid waste products. In this study, accounts for solid waste flow for tourism industries consist of physical supply and physical use table for solid waste.

Table 5: Tourism industries solid waste account (tonnes)

Physical supply table for solid waste													
		Generation of solid waste								Flows from the rest of the world	Flows from the environment	Total supply	
		Tourism industries						Other industries	Households	Imports of solid waste	Recovered residuals		
		Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation	Other tourism industries	Total tourism industries						
		Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total	Tsm 1 Total					
A. Generation of solid waste residuals													
	Metallic waste and other recyclables												
	Discarded equipment and vehicles												
	Mixed residential and commercial wastes												
	Other wastes												
	Total solid waste												
B. Generation of solid waste products													
	Total solid waste												
Physical supply table for solid waste													
		Intermediate consumption; Collection of residuals								Final consumption	Flows to the rest of the world	Flows to the Environment	Total use
		Waste collection, treatment and disposal industry					Tourism industries	Other industries	Households	Exports of solid waste			
		Landfill	Incineration	Recycling and reuse	Other treatment	Total	Tsm 1 Total	Tsm 1 Total					
C. Collection and disposal of solid waste residuals													
	Total solid waste												
D. Use of solid waste products													
	Total solid waste												

Source of Table: Linking the TSA and the SEEA: A technical note, UNWTO

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