THAILAND OCEAN ACCOUNTS PILOT: CASE STUDY ON SUSTAINABLE TOURISM,

THE ENVIRONMENT AND THE OCEAN

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

OVERVIEW

In the context of the Thai coastal and marine environment, Thailand's coastline extends 3,010 kilometers (1,500 nautical miles) along the Gulf of Thailand and Andaman Sea in 23 provinces (NRSA, 2017). The total maritime area in Thailand is about 323,488 square kilometers (km^2). Thailand's marine environment and coastal areas are essential components of the country's economy and society, and contribute tremendously to national development. Based on the initial ocean economy assessments recently conducted by PEMSEA (the Partnerships in Environmental Management for the Seas of East Asia), the coastal and marine sector has contributed significantly to Thailand's economy. The total economic value of coastal and marine resources in Thailand is around USD 27.67 billion. Almost 37% of the value of ecosystems and selected endangered species came from indirect use and non-use values (including mangrove forests for carbon sequestration, coastal protection, and fish breeding ground and nursery). Marine fisheries and aquaculture, as well as coastal tourism and marine transportation, are the main economic activities along the country's coasts.[1]

Focusing on tourism industry, it is of great economic significance when compared to most countries in the region. Gross Domestic Product of tourism industry accounted for 7.68 % of Thailand's GDP in 2016 and was responsible for more than 4.2 million jobs or 11.3 % of total national employment, exemplifying its strong contribution to the social economy. In 2016, income generated from tourism industry in Andaman Cluster (Phuket, Krabi, Phang Nga, Trang, and Satun provice), was 16,150 million USD or 37% of value added, the most % share of value added, of the whole Tourism Development Cluster in Thailand.

National Concerns related to the ocean

The following concerns were expressed by stakeholders as part of the project scoping process:
- Unsustainable coastal development
- Unsustainable tourism and over-tourism/carrying capacity
- Conflicts between infrastructure and tourism development policy and artisanal fisheries and local ways of life
- Developing coastal areas while taking into consideration environmental impacts and long-term sustainability
- Illegal, Unreported and Unregulated (IUU) Fishing
- Loss of marine resources and coastal erosion
- Loss of marine ecosystems and biodiversity
- Marine pollution, eutrophication and marine debris
- Ocean acidification

Stakeholders

Thailand has two major groups of stakeholders related to the ocean. The first group is SDG14 stakeholders which include the Department of Marine and Coastal Resources (DMCR) under the Ministry of Natural Resources and Environment (MoNRE), and the Department of Fisheries (DoF) under the Ministry of Agriculture and Cooperatives as co-custodians for SDG14 indicators. Implementation of SDG14 in Thailand is coordinated by DMCR through an interagency working group.

---

[1] a scoping report on Thailand ocean accounting for SDG14 implementation, Dr. Ampai Harakunarak, 2019

The second group is the major marine and coastal stakeholders and related agencies comprising the following Ministries/agencies:

- Ministry of Natural Resources and Environment (MONRE): Department of Marine and Coastal Resources (DMCR), Pollution Control Department (PCD), Office of Natural Resources and Environmental Policy and Planning (ONEP), Wildlife and Plant Conservation Department (DNP)
- Ministry of Agriculture and Cooperatives: Department of Fisheries (DoF) including Fisheries Statistics Analysis and Research Group (FSARG), Marine Fisheries Research and Development Bureau
- Ministry of Tourism and Sports
- National Science and Technology Development Agency (NSTDA) including national research centers ie. BIOTEC, MTEC, NECTEC
- Ministry of Interior: Department of Local Administration, Provincial Electricity Authority, Provincial Waterworks Authority, Department of Disaster Prevention and Mitigation
- Marine Department, Ministry of Transport
- Thai Meteorological Department
- Thai Maritime Enforcement coordinating Center: THAI-MECC
- Office of the National Economic and Social Development Council (NESDC)
- Thai National Statistical Office (NSO)
- Ministry of Industry
- Thai Maritime Enforcement Coordinating Center (THAI-MECC)
- Geo-Informatics and Space Technology Development Agency (GISTDA)
- Command Center for Combating Illegal Fishing (CCCIF), PIPO Centres (Port-in Port-out), FMC (Fisheries Monitoring Center), and the Thai Catch Certificate system
- Thailand Research Fund (TRF)
- Thai Sea Watch Association
- Marine Science Association of Thailand
- Academia

Priorities of policy related to Marine and Coast

During the scoping process, the following ocean-related policy priorities were identified by stakeholders:

- Establish an up-to-date vessel database "Fishing Info": E-license scheme and fishing day scheme based on Maximum Sustainable Yield (MSY).
- Declare marine and coastal conserved and reserved areas, and adopt Marine Spatial Planning (MSP) as an integral part of marine and coastal zone management.
- Conduct research about waste management in coastal provinces. Operate clean-up activities. Implement waste reduction measures in selected pilot areas. Implement a monitoring program for water quality and eutrophication.
- Determine the baseline data on the concentration of nitrate, nitrite, phosphate as well as the amount of Chlorophyll-a in coastal seawater.
- Develop the ocean acidification observing network in the region in close cooperation with the Global Ocean Acidification-Observation Network (GOA-ON).
- Restrict the improper use of tourism destinations. Develop environmental management systems in tourism sites, including solid waste and wastewater treatment facilities. Limit the number of tourists in each destination by setting quotas depending upon the vulnerability of the ecosystems.

There are some more key facts in the Scoping Report and Diagnostic Tool for Environment Statistics Strategic Planning. In keeping with the above stakeholder concerns, policy priorities and limitations of the pilot, the following topics of focus were selected:

Choices of pilot focus
- Solid waste & wastewater
- Ocean economy
- Ecosystems, conditions & services
- Research:
(a) Tourism Sustainability
(b) Fish stock, CPUE & MSY (Sustainable of Small-Scale Fishery)
(c) Marine Protected Areas & Marine Ecosystem-Based Management

Sustainable tourism

Both of them be selected for pilot study

Main considerations for the design of the pilot

1. Stakeholder requirements

Policy stakeholders need data for tourism sustainability planning and management of over-tourism/carrying capacity including the effect on the environment and marine protected areas.

2. Data availability

Data were already available or made available to the project, including:
- Research on SEEA-Blue economy from The National Center for Genetic Engineering and Biotechnology (BIOTEC)
- Tourism Satellite Account (TSA) including I-O tables from the Ministry of Tourism and Sports.
- Geo-Spatial data from Department of Marine and Coastal Resources (DMCR), Geo-Informatics and Space Technology Development Agency (GISTDA), Wildlife and Plant Conservation Department (DNP) and other related agencies

3. Technical capacity

The National Metal and Material Technology Center (MTEC) provides Life Cycle Assessment (LCA) and Life Cycle Impact Assessment (LCIA) technique for estimating the GHG account.

Research questions
- How to measure the sustainable tourism by linking information from the System of Environmental-Economic Accounting (SEEA) and Tourism Satellite Accounts (TSA) frameworks?
- Where are unused tourism potentials, risk areas and sites for conservation?

4. Data sources
- Tourism Satellite Account (TSA) in the Andaman Tourism Development Cluster
- Official statistics and Geo-Spatial data including land use data from related agencies such as NSO, Department of Marine and Coastal Resources (DMCR), Ministry of Tourism and Sports, Wildlife and Plant Conservation Department (DNP), Pollution Control Department (PCD),Office of Natural Resources and Environmental Policy and Planning (ONEP), Department of Fisheries (DoF), Marine Department, etc.

5. Expected outputs:
- 4 core accounts: water, energy, solid waste and GHG emission accounts
- Map views to identify tourism potential areas, risk areas and sites for conservation

6. Reference year: 2016

7. Pilot Area: Tourism Development Cluster Andaman (Phuket, Krabi, Phang Nga, Trang, and Satun). These 5 provinces are the most popular tourist destinations and natural attractions in Thailand.
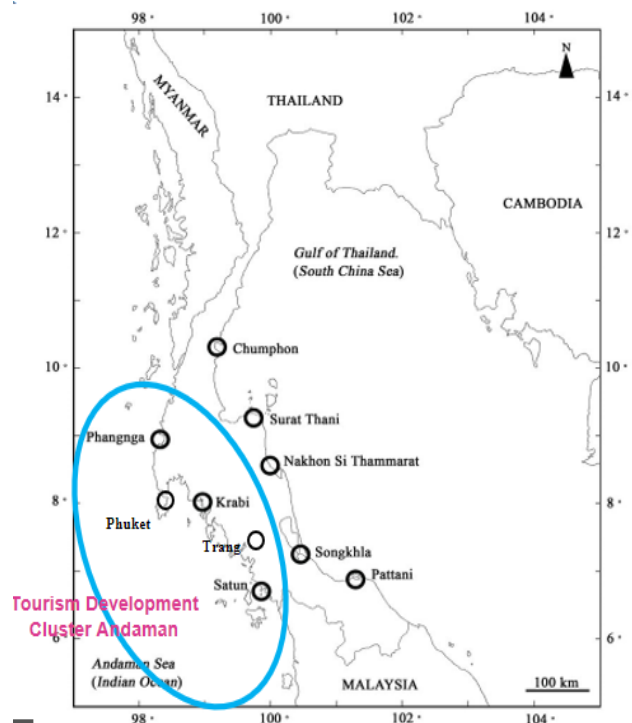
Activities undertaken in the pilot implementation

1. **Establishment of the SEEA working group** to lead national SEEA implementation (including water account, land account, waste account, ocean account and energy account)
   - 1st workshop: identified the priority topic for the pilot study
   - Meeting with Ministry of Tourism and Sports: selected a specific pilot location of policy interest
   - Technical workshops: reviewed methodologies, data availability and the first draft of water, energy and solid waste accounts
   - 2nd workshop: reviewed results and solicited feedback from the SEEA working group and major stakeholders related to ocean accounts

2. **Technical support by UN ESCAP**
   - A scoping assessment on Thailand ocean accounting for SDG 14 implementation, and
   - TSA-SEEA accounts for water, energy, solid waste and GHG emissions.

3. **Data collection**
   - Main data sources: secondary data from official statistics and geo-spatial data from central government agencies
   - Supplementary data by interviewing local officers and gathering secondary data from local agencies in the Andaman provinces such as City Municipality, Regional Environment Office, Provincial Waterworks Authority, Provincial Electricity Authority, environmentally-conscious accommodation services, Kho Lanta Tourism Association, Strategy for Province Development Group, Aonang municipality, etc.

4. **Mapping**
   - Created a base map (i.e., density map in people/km^2) using population projection, land use, boundary of administrative areas, number of tourists, number of accommodation rooms, etc.
   - Overlaid other related data such as the number of tourists in national parks, fishery areas, ports, waste treatment sites, coral reefs, seagrasses, mangroves, etc.

5. **TSA-SEEA methodology**

TSA-SEEA accounts were produced using TSA estimation methods from I-O tables in TSA Andaman Clusters. It is important to note that the methodology described in the section is considered as a research work for the purposes of this project.

Water and energy accounts

Water and energy accounts were initially derived from I-O tables in the TSA Andaman Clusters by converting parts of monetary units into physical units by using appropriate prices as shown below

$$\frac{\text{Value of used resources (water, energy)}^2}{\text{Appropriate price of used resources (water, energy)}} = \text{Quantity of used resources (water, energy)}$$

Subsequently, the toursim ratios of each sector were multiplied with the quantity of used resources to calculate the water and energy used (in m^3 and joules respectively) by tourism and non-tourism in each sector.

Waste accounts

Waste generation by Household (HH) sector has been collected as official statistics by the Pollution Control Department (PCD). However, waste generation by non-HH sector (classified by ISIC) was derived by using an indirect method which differed from the methods used for water and energy accounts as follows:
   - Calculated waste generation by HH sector and non-HH sector (businesses and government sectors)
   - In non-HH sector, calculated tourism waste generation in each sector by
      - Calculating the total intermediate cost (IC) in each sector from I-O table (excluding the service sector which do not generate wastes)

---

[2] Value of used resources in market output can be observed from I-O tables. However, the value of used resources in non-market output such as water for agricultural sector and free water for charity needed to be compiled from other sources.

- Dividing IC by Consumer Price Index (CPI) of products[3] to convert the monetary values into physical terms
- Summing up the derived IC from each sector to calculate total IC for non-HH sector
- Converting the total IC in to percentages (%) to know the proportion of waste generation in each sector
- Multiplying the non-HH sector waste generation by the percentage (%) of IC in each sector to calculate total waste generation by each sector
- Estimated inbound and domestic tourist waste generation using tourism ratios

<u>GHG accounts</u>

GHG emissions accounts were produced by multiplying the quantities of energy products (LPG, Biofuels, Electricity) from the energy accounts by the emission factor of each of the energy products:

GHG Emission (KgCO2) = use of energy products (Unit) X Emission factor of used energy (KgCO2/unit)
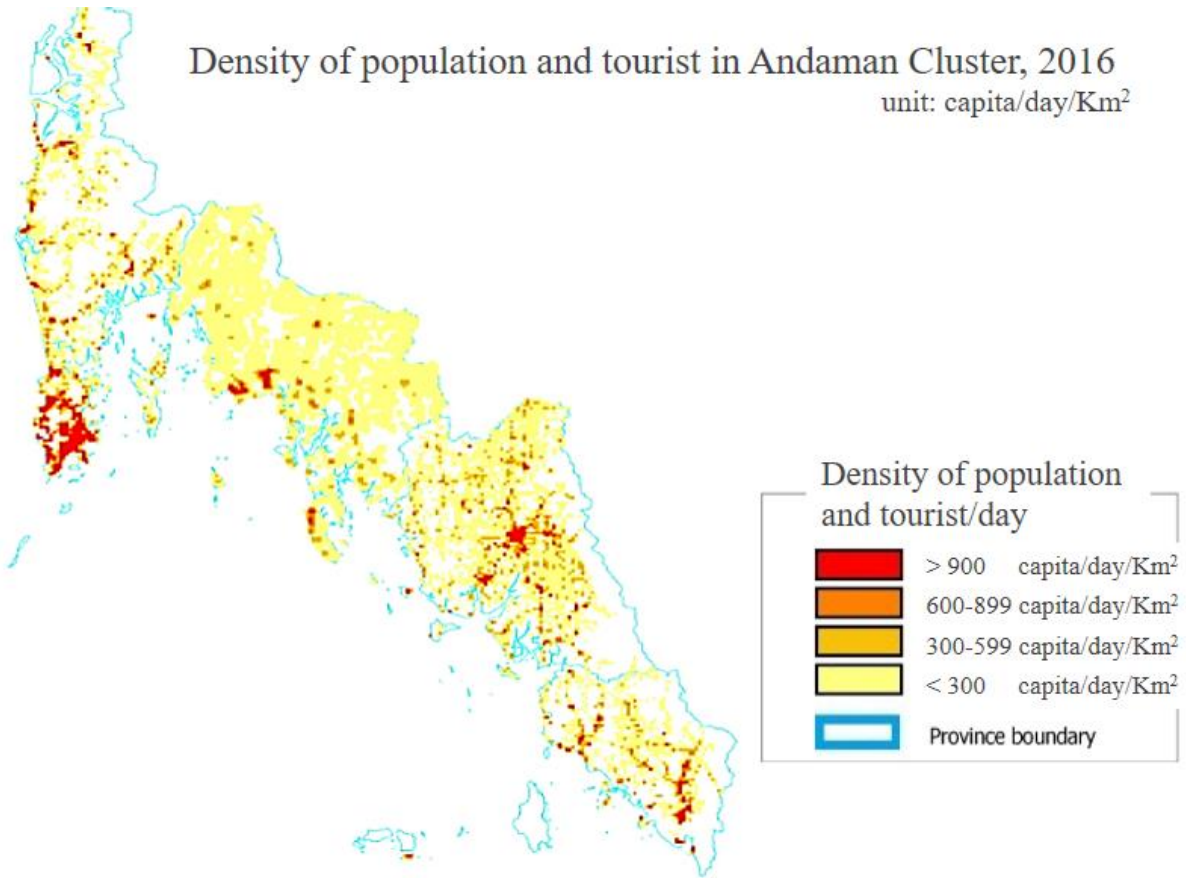
Major Findings

Comparing the number of tourists with the population, 1 in 10 persons in the five provinces were visitors in 2016. 74% of the visitors were tourists (62%inbound and 38% domestic) and 26%were excursionists (67% inbound and 33% domestic).

In terms of % of Gross Domestic Product of Tourism Industry (GDPTI), the five provinces generated 50% of total GDPTI or 7,270 million USD approximately. However, tourism used 21% of the water, 57% of the energy and generated 26% of the waste and 72% of the GHGs.


Visitors in Andaman, 2016

26%

74%

■ Tourist   ■ Excursionist

---
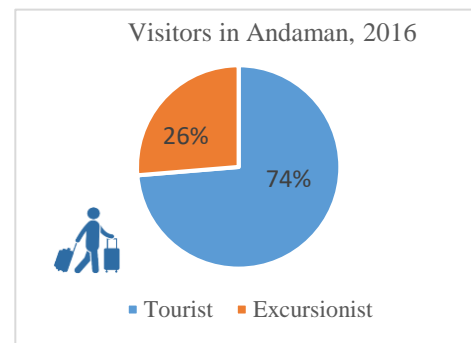
[3] Products which may cause much waste in each sector.

Density of population and tourist in Andaman Cluster, 2016

unit: capita/day/Km^2

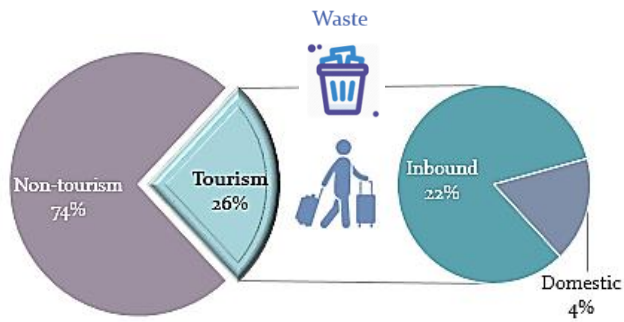Density of population and tourist/day

■ (red)	> 900 capita/day/Km^2
■ (orange)	600-899 capita/day/Km^2
■ (dark yellow)	300-599 capita/day/Km^2
■ (yellow)	< 300 capita/day/Km^2
▭ (blue outline)	Province boundary

Water

Total water abstraction was 149,329,762.1 m^3. Across Tourism Development Cluster (TDC) Andaman, 65% of the abstraction was used for distribution. It was divided to 36% distributed by Provincial Waterworks Authority, 29% distributed by municipal and village suppliers, 30% loss in distribution, and 5% used for own production.

Water

Non-tourism 44%

Tourism 21%

Losses in distribution 30%

Own-use for production 5%

Inbound 18%
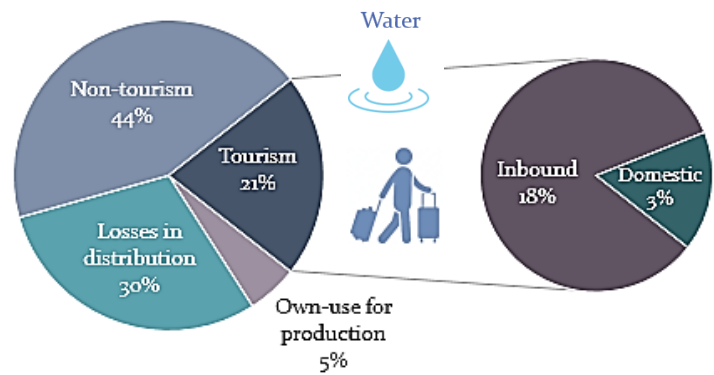
Domestic 3%

Solid wastes

The total solid waste generation in TDC Andaman was 971,385 tons in 2016, of which tourism accounted for 26% (22% by inbound tourists and 4% by domestic tourists. The generation rate was significantly different between the household sector and the tourism sector, 0.88 and 2.36 kg/person/day respectively. Within the tourism sector, inbound tourists generated 2.64 kg/person/day while domestic tourists generated 1.57 kg/person/day.

Most of the solid wastes were collected, treated and disposed. It was estimated that only 0.15% of total solid wastes was likely to flow directly to the environment. However, 28% of the solid waste was improperly treated (open dump, open burn and unknown).
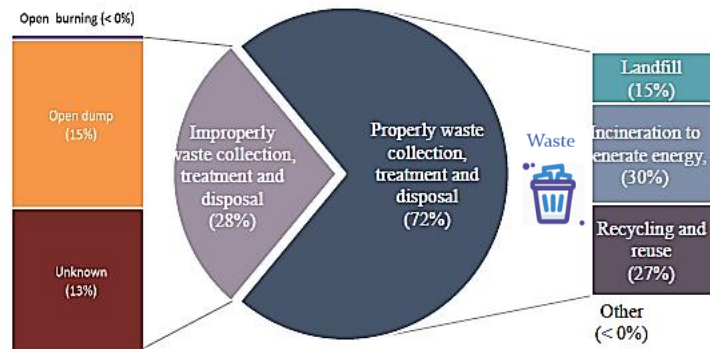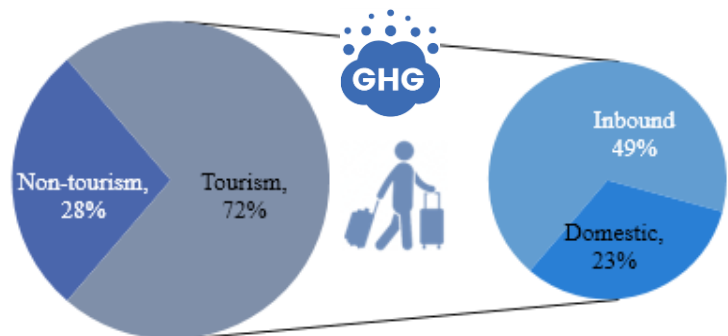

Energy
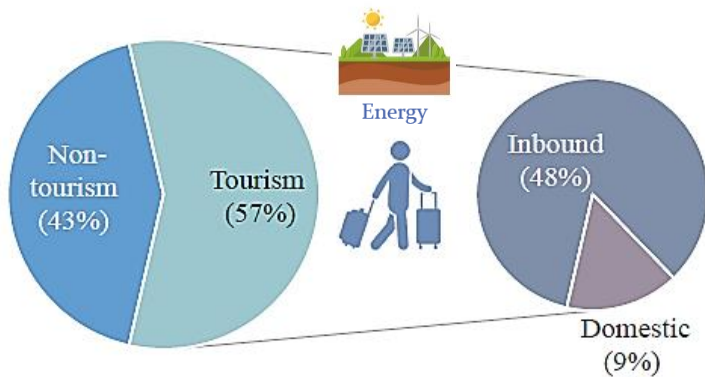
The total energy supply in TDC Andaman was 84.6 petajoules in 2016. While the five provinces had some production capability (i.e. waste-to-energy, solar, biogas, biomass and hydro), most of energy products, nearly 100%, were imported from the Electricity Generating Authority outside the provinces. Energy products used for calculation in this project only included three types of energy i.e. electricity, biofuels and LPG. Usage of these kinds of enegy in TDC Andaman were electricity (49%), biofuels (47%), and LPG (4%).

Tourism used more than half of the total energy supply in the provinces (48% from inbound

tourists and 9% from domestic tourists).

GHGs

Total GHG emissions in TDC Andaman was 10,409.29 1000T CO2eq in 2016. Tourism accounted for 72% of GHGs. Most of GHGs from tourism was attributable to inbound tourists.[4]

---

[4] GHGs was calculated by using energy account, include only three types of energy i.e. electricity, biofuels and LPG.

Next steps and the way forward

Next step of pilot study, due to the limitation of time for this project, the water account needs to work futher on water asset account including quality of water. As finding in the water account, 36 % of water in Andaman provinces distributed by Provincial Waterworks Authority and 29% distributed by municipal and village suppliers, the major problem in this area was not have enough of good quality water resources for water supply production because of contaminant.

For the rest of supply and use table in 4 accounts or mapping in risk areas or potential areas for tourism development, data gap development is so important to work further.

The way forward for SEEA Ocean Account:
From the marine and coastal policy perspective, ocean accounts could be used to estimate the impact of economic development on marine and coastal natural resources and environment. This would support a number of policy planning tools including but not limited to Marine Spatial Planning (MSP), Marine Protected Areas & Marine Ecosystem-Based Management, Ocean Health Index (OHI), and Ocean Economy. Marine and coastal-related agencies also need to work with tourism agencies to develop the code of practice, regulation, and/or laws for Eco-Tourism in support of sustainable tourism development.

From the tourism policy perspective, the pilot project could be expanded to the rest of TDC, which would establish the baseline for TSA-SEEA for the whole country. This requires the cooperation between Ministry of Tourism and Sports and National Science and Technology Development Agency (NSTDA).

In terms of data and statistics, NSO will work further on data and statistics development, including national data gap analysis for SDG14 indicators, to support the marine and coastal policy needs.