

## Viet Nam Ocean Accounting: Case study in Quang Ninh

### FINAL REPORT: EXECUTIVE SUMMARY

December 10, 2019

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## 1 Policy context

The ocean has been considered as a vital source of livelihood, employment, nutrition and economic growth in Asia and the Pacific. Healthy ocean and coastal ecosystems contribute to inclusive development and poverty reduction; they regulate the climate and are essential for a more sustainable future. Despite the importance of the ocean, many countries are faced with fragmented information and governance.

As part of the Ocean Accounts Partnership, ESCAP's project to "Strengthen statistical capacity to achieve SDG14 in selected ESCAP member Countries" will support member States to develop policy-relevant information products according to international standards. It will do this by supporting the strengthening of ocean-relevant international, regional and national partnerships, by engaging the international community on adapting statistical standards for ocean measurement, and by supporting member states in producing new priority data products related to sustainable use of the ocean. An important part of implementing this project is to engage selected members in pilot studies to assess national priorities, governance mechanisms and data availability. The pilot studies will also build on existing activities to add value from the application and testing of standard methodologies.

Vietnam is located in the west of the East Sea, surrounded by sea on three sides. The coastline is 3,260 km long with the total coastal area of over a million square kilometers, which is three times larger than land area. There are 28 coastal provinces/cities. The sea of Vietnam is rich in resources and has a favorable position for marine economic development. There is high biodiversity with many typical estuarine ecosystems, wetland ecosystems, mangrove forests, coral reefs, seagrass beds.

Several national strategies and plans relate to the ocean including:

- The National Strategy on Green Growth and The National Action Plan on Green Growth,
- The Strategy for sustainable exploitation and use of marine natural resources and environment protection until 2020, with a vision towards 2030
- The Action Plan for an integrated coastal zone management (ICZM) strategy in Vietnam up to 2020, with a vision towards 2030
- Viet Nam's Sea Strategy 2020
- The Law on Natural Resources and Environment of the Sea and Islands
- The Planning Law has defined the National Maritime Spatial Plan as a National master plan

## 2 Scoping the pilot

The Scoping Report and First National Workshop suggested focusing on developing ecosystem extent and condition accounts for Quang Ninh Province in relation to tourism activities and impacts in the province.

## 3 Pilot design

Under technical support from ESCAP, a pilot study on ocean accounts for Vietnam has been conducted in collaboration with Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE). The assignment has selected Quang Ninh, a coastal province located in the North-East of Vietnam, as the case study area. The key objectives of the study were:

- Estimate and allocate land-based pollution to drainage basin (using national geospatial standards)
- Ecosystem mapping (comparing maps of two periods of time, using national geospatial standards)
- Estimating impacts of tourism on ecosystems
- Participation in and presentation of pilot study findings at the second national ocean accounts workshop in Viet Nam and the second regional workshop on ocean accounts.

## 4 Activities undertaken

The pilot established a working group, which included the General Statistics Office (GSO), the Ministry of Agriculture and Rural Development (MARD), the Ministry of Natural Resources and Environment (MONRE) and Ha Noi University of Natural Resources and Environment.

A Scoping Study identified policy priorities, Viet Nam's capacity to implement SDG14, stakeholders, policy gaps and good practices, and relevant data holdings. This study provided the basis for more detailed data review and consultation with stakeholders.

As part of the pilot, data were obtained from stakeholders and public sources. Spatial data were integrated in a GIS and combined with tabular data to produce initial accounts.

## 5 Results

The study reviewed major policies and strategies/ programs issued and implemented by the government of Vietnam that support the application and implementation of the concept of the ocean accounts in the country. The pilot collected and analysed spatial data to: i) map the land use, ocean base pollution, ecosystem and its condition; ii) calculate satellite tourism account and contribution of pollution caused by tourism in Quang Ninh. Key result and finding are summarized below.

## 5.1 Land-based pollution in Quang Ninh province

The study examined the secondary data in order to identify and to map (allocate) the main sources of land-based pollutions, including:

### Domestic Wastewater

- There are only five wastewater treatment plants in Quang Ninh province and they are located in Ha Long City. Every city, town and district other than Ha Long City has no centralized wastewater treatment plant. The urban wastewater is discharged to public water bodies. Rural areas have simple wastewater collecting systems which are consisted with sewer pipes and oxidation ponds as wastewater treatment plants, and the wastewater including the greywater is treated in these community wastewater treatment plant. The largest source of water pollution in the rural area is livestock wastewater which includes highly-concentrated organic matters and nitrogen compounds.

### Coal Mining

- Coal mining in Quang Ninh Province accounts for over 90% of total coal production in the country. Quang Ninh has large coal basin, supplying mainly anthracite with high carbon content. The estimated total reserves of 8.8 billion tons in an area of approximately 1,000 km<sup>2</sup> from Dong Trieu to Cam Pha, accounting for 44.6% of the total coal reserves of the Northeast Coal Basin. In prospects to 2020, Quang Ninh maintains to be the main source of coal production of the country.
- Regarding the water environment, the largest source of pollution to surface and coastal water is industrial waste, especially wastewater from coal mining and processing operations. Untreated water from mines flows directly into the rivers, Ha Long Bay and the other public water bodies. It is estimated that around 75 % of mining wastewater was treated before discharge. In 2013, the total volume of mining wastewater from the whole coal mining zone in Quang Ninh Province was around 81 million m<sup>3</sup> /year (230,000m<sup>3</sup>/day) excluding run-off water, but they treat only 74% of whole wastewater by 2012. Therefore, around 20 million m<sup>3</sup>/year of coal mining wastewater (26% of whole wastewater) is untreated or treated preliminarily before discharging to public water bodies. Besides, the surface run-off water of the coal mining sites has not been collected and treated.

### Other Industrial Wastewater

- Quang Ninh has six industrial clusters which are in operation. In regard to water environment, the industrial wastewater is the one of the major sources of pollution to surface and coastal water. Some industrial zones have centralized wastewater treatment plants. However, most of industrial clusters do not have necessary facilities for wastewater treatment
- Power industry is the 4th largest economic activity of Quang Ninh Province, accounting for 8% of total GDP. The province currently has four thermal power plants in operation, which are the main sources of electricity supply in the region. Uong Bi thermal plant being in operation since 1976 is the most stable source of power supply. In regard to the negative effect to water environment, the discharged wastewater from thermal plants is the major issue to be considered. Though Mao Khe, Uong Bi and Cam Pha thermal power plant have enough capacity of wastewater treatment, Quang Ninh thermal power plant does not have enough capacity to treat all wastewater in the context that three more thermal power plants are planned to be constructed by 2020 in the province.

### Solid Wastes/ Garbage

- Total collected waste from the province including domestic waste and road waste is about more than 1,000 ton/day. The existing collection system just handles mixed waste without any recycling or reuse as well as separation at source. There are no recycling facilities and almost all collected waste

is transported to landfill sites except for waste burned at incineration plant. Small-scale landfill sites are not sanitary do not have liner systems, leachate collection, leachate treatment, and gas venting system. Some of the site uses lime soil as cover soil but the quantity is far from sufficient. In almost all landfill sites, waste is unloaded on the ground from the collection vehicles without covering.

#### Inland aquaculture

- Heavy use of organic fertilizer in pond culture can pollute the water outside the culture system, and the use of inorganic fertilizers causes nutrient enrichment of the environment. However, no quantitative data exists on the subject.
- The following chemicals are commonly used in aquaculture in Vietnam, including: copper sulphate (CuSO<sub>4</sub>), malachite green, potassium permanganate solution (KMnO<sub>4</sub>), salt, Melia azedarach leaf, chloramphenicol, tetracycline, streptomycin and sulfanilamide, but contamination of the environment with these agents is not as yet considered a major problem. Rotenone is a drug of vegetal origin that is used for eradicating predator fish, but the impact of this and other chemicals on the environment has not been studied.

#### Freshwater cage culture

- The intensive cage culture practiced on the river and sea produces waste materials which can cause water pollution. The main wastes are uneaten food, and soluble metabolites, such as ammonia. These organic and inorganic wastes can cause dissolved oxygen depletion and increased levels of BOD, solids, nitrogen and phosphorus in the vicinity of culture operations.

## 5.2 Ocean Pollution

#### Pollution by Marine Ships:

- The pollution from marine ships found in water in Tuan Chau Island and in Bai Tu Long Bay in which the pollution caused by marine ships in Bai Tu Long bay is higher than one in Tuan Chau island due to the fact that the marine ship is more active in Bai Tu Long Bay than in Tuan Chau island.

#### Coastal aquaculture

- Coastal shrimp and finfish pond culture has caused salinization of soils and water in some areas. However, the embanking and encirclement of land for conversion into culture ponds and rice fields can prevent the discharge of fresh water. Although such problems have been seen, the impact on the environment has not been determined.
- Deforestation and reduced water flow have also identified as problem caused by coastal fish farms. Mangrove forests are the main nursery areas for high value marine fish species and detritus from mangroves are carried to coastal areas to support other fish and shrimp populations. Furthermore, the forests protect the alluvial grounds from erosion, restrict the damage caused by typhoons and prevent the penetration of seawater into inland areas. These important interactions are being threatened by the over-exploitation of mangrove areas, including exploitation for brackish water aquaculture development.

#### Marine cage culture

- The farms culturing marine fish in cages in sheltered water along the coast of Quang Ninh province, produced an estimated 100 tonnes in 1992. The caged fish are fed trash fish which leads to high wastage. The cages are sited in areas with limited water exchange. Farmers report that in hot summer weather mortalities occur. As there has been no study, it is difficult to ascribe causes, but it

is likely that self-pollution plays a role. Disease outbreaks of unknown disease also occur around this time. Treatments are with unknown antibiotics, reported to be partially successful.

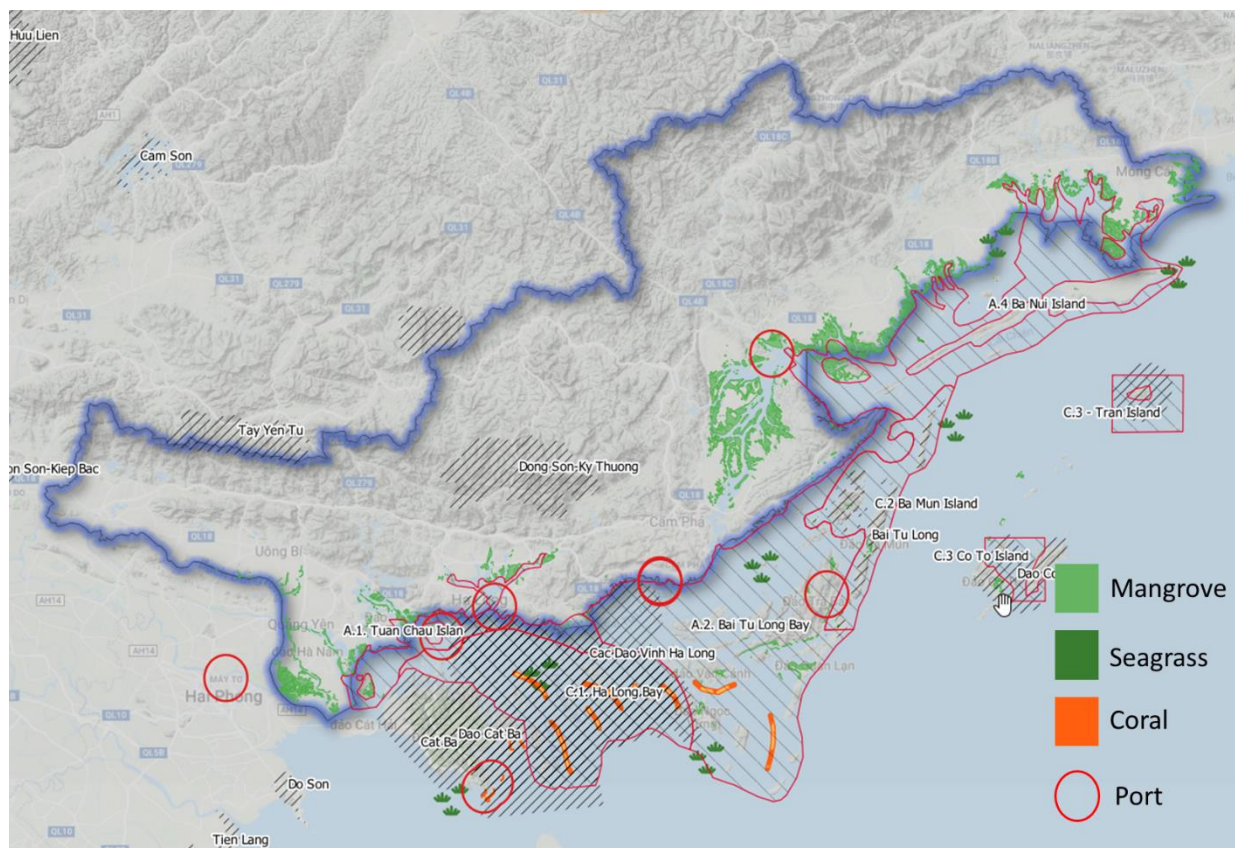
The pollution by fishing activities:

- Activities of fishing boat caused the medium pollution at the aspect of the oil waste. In general, the effects of these contaminants on marine life are poorly understood and there is a need to expand such surveys to make a better assessment of the impacts of marine pollution in Vietnam, as well as to develop strategies for controlling problems.

Pollution by Human Activities in the Island

- Total tourist arrivals of Ha Long Bay have increased from 1.78 million in 2007 to 12 million in 2019. The wastewater from the tourist boats is one of the pollution sources of Ha Long Bay. The pollution load unit from these tourist boats is corresponding to 30% of the pollution load from the local population.

### 5.2.1 Ecosystem Mapping



#### Mangrove

- From 1990 to 2008 the mangrove forest area of Quang Ninh declined significantly by 7,253ha or 25.2%, the inter-tidal flat ecosystem declined by 21.5%.
- From 2015 to 2018 the mangrove forest area has been stabilized and remained as 19,741 ha with annual mangrove change less than 0.5% per year. From 2016 to 2019 the mangrove forest has been increased by 346 ha.

#### Seagrass

- Vietnam has 9,620 ha of seagrass, of which Quang Ninh has 830 ha. Key seagrass species are *Enhalus acoroides*, *Thalassia hemprichii*, *Cymodocea serrulata*, *Halodule uninervis*, *Halophila ovalis* and *Zostera japonica*.
- According to UNEP data, Quang Ninh, has 10 seagrass sites with 3 species, of which 2 species *Halophila ovalis*, *Zostera japonica* were also reported in the Vietnam.

#### **Coral**

- Quang Ninh has 2 typical areas of Coral reefs in coastal areas, including Co To - Thanh Lan and Ha Long - Cat Ba. The detailed survey data in these islands show that almost all areas of rock bottom under tide have corals distributed at different levels. In Co To - Thanh Lan, Quang Ninh province, coral reefs are well developed. Compared to the Northeast, hard corals in Co To - Thanh Lan island account for 54.5% of species and 72.5% of genus.

#### **Protected Areas**

- Quang Ninh has 1 terrestrial protected area, 1 national park and 2 marine protected areas. The National Park Cat Ba Island, also function as a marine protected area, belongs to Hai Phong province but we also listed it here because it is located adjacent to the marine area of Quang Ninh. The Co To islands is a group of 50 small islands has total area of 7,850 ha. Tran Island marine protected area has a total area of 4,200 ha of which marine area is 3,900 ha.

#### **Sea Ports**

- Quang Ninh has 10 large ports located within the border of the province of which 7 ports belong to Quang Ninh and 3 ports belong to Hai Phong province. Quang Ninh is a very active sea-transportation province, that that include 4 ports with individual capacity of more than 2 million tons/year.

### **5.3 Tourism Satellite Account (TSA) and tourism pollution**

Total effect of tourism on other industries was 14,868 billion VND, given that in 2018 total international and domestic tourist expenditures at basic price was 23,628 billion VND (the international tourist expenditures as 12,305 billion dong and the domestic tourist expenditures as 11,323 billion VND). Food services got the most effect with the biggest share 23,44% equivalent to 3.485 billion dong, then accommodation services with 21,55% equivalent to 3.204 billion dong. The following includes the transportation services with 14,74%; entertainment services with 12,74%; sightseeing services with 9,58%; trade services with 8,09%.

As result of the effect on VA of other industries, total contribution of tourism to Quang Ninh GRDP was 16,679 billion dong, occupied 10,96% of GRDP. Among this, the direct contribution of tourism was 6,61% of GRDP equivalent to 10,055 billion dong; the indirect contribution of tourism to GRDP was 4,35%, meanwhile VA of tourism accounted for only 0,94% of GRDP in 2018 in Quang Ninh province.

The total pollution loading from tourism sector in Quang Ninh for 2016 to 2018 is estimated in **Table 1** below.

Table 1 Total pollution loading from tourism in Quang Ninh Province (2016 to 2018)

No	Indicator	Waste discharge from tourists (ton / year)		
		2016	2017	2018
1	COD	1062.4	1071	1585.3
2.	BOD <sub>5</sub>	531.197	1071	1585.3
3.	T_N	188.870	535.522	792.635
4.	T_P	26.560	190.408	281.826
5.	NO <sub>3</sub> + NO <sub>2</sub> *	1.889	26.776	39.632
6.	NH <sub>4</sub> *	103.879	1.904	2.818
7.	PO <sub>4</sub> *	14.342	104.724	155.004
8.	TSS	590.219	14.459	21.401

## 6 Challenges and needs

The pilot was limited in the amount of time allocated (6 months) and therefore could not complete a full integration of all data. Integrating the data from multiple sources required substantial effort to standardize the different concepts and classifications. Technical capacity, especially on spatial analysis and accounting methodology needed to be developed during the project.

## 7 Next steps

Further work will be conducted after the formal completion of the pilot to finalize the results, communicate them to key target audiences (government, business, civil society). The working group will integrate the pilot Ocean Accounts into a test marine spatial plan (MSP) for Quang Ninh province. The accounts developed are an ideal structure to communicate the “big picture” to policy makers and to set standards.