The Final Report of UNESCAP Ocean Accounts pilot study of China

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1. Overview

The pilot study of China started on April 2019, and lasted for 6 months. It focuses on identifying the stakeholders and gaps for implementing ocean accounting in China, and mangrove ecosystem assets accounting in Beihai. Through activities of the pilot study, the necessity of incorporating oceanic assets into China's national natural resources assets accounting is broadly recognized, and the SEEA is accepted as a fundamental framework for future work.

2. Organization and Activities

2.1 Organization

The pilot study was organized by Dr. ZHAO Peng from Fourth Institute of Oceanography, Ministry of Natural Resources. The implementation mechanism including the advisory board, the consultant, the working group and invited contributors was established in May 2019.

To facilitate the research and practice of UNESCAP Ocean Accounts pilot study of China, experts, local officials, nature managers and other stakeholders were involved in the working group. Experts were invited to contribute their ideas and suggestion, and some of them contributed directly to the scoping report and pilot study.

2.2 Activities

Two workshops were organized: one on 15 May 2019 in Beijing and the other on 25 September 2019 in Beihai. Officials from the central government agencies and local governments, scientists and specialists from research institutes, universities and national nature reserves, officials from UN system, international governmental and nongovernmental organizations, and journalists and editors from media attended the two workshops. (Figure 1)

Figure 1 Two workshops in Beijing and Beihai

Members of the working group attended the Global Dialogue on Ocean Accounting[1] during 12–15 November 2019, at which the working group contributed four presentations and the results of the pilot were reviewed.

2.3 Pilot site and content

The site of the pilot study is Beihai, Guangxi, which is famous for its subtropical coastal ecosystems such as mangroves, seagrasses, tidal marshes and coral reefs. The pilot study received support from the local government. The mangroves ecosystem was the focal point of the study for the convenience of data collection and processing, and the great potential to expand the experience of this study to other coastal blue carbon ecosystems (mangroves, seagrasses, tidal marshes and seaweeds).

Several field studies and ground truthing were carried out during June to September for collecting data and testing new techniques. Satellite remote sensing, Lidar, and hyperspectral techniques were employed in this study.

3. Main Outcomes

3.1 There is an urgent need in China to incorporate ocean assets and then ecosystem services into China's National Natural Resources Assets Accounting, which is the basis for the Natural Resource Assets Balance-sheet[2] and the Audit of Outgoing Officials' Natural Resource Assets Management.

3.2 Main stakeholders are the Ministry of Natural Resources, the National Bureau of Statistics, and the National Audit Office.

3.3 The archive data of China's marine economy statistics, monitoring and survey data as well as research data will support ocean accounting, but there are still many gaps for data acquisition. For example, China marine statistic data are national and provincial data, which will help to Ocean Accounting in economic and industrial aspects, but are limited in the aspect of ecosystem services accounting. The data on the environments and ecosystems are very limited in the annual statistics yearbooks.

3.4 Following the Ocean Accounting framework established by UNESCAP, the pilot study tries to focus on accounting the asset of coastal ecosystems, and clarify the scope and definition of oceanic assets and connect them with existing environmental asset category. (Table 1)

Table 1 Oceanic environmental assets based on SEEA Central Framework

	SEEA-2012Environmental Assets	Oceanic Environmental Assets
1	Mineral and energy resources	Marine minerals and energy resources
1.1	Oil resources	Offshore oil resources
1.2	Natural gas resources	Marine natural gas resources

1.3	Coal and peat resources	Submarine coal mine
1.4	Non-metallic mineral resources	Marine non-metallic mineral resources
1.5	Metallic mineral resources	Marine metal mineral resources
2	**Land**	**Sea area**
3	**Soil resources**	**Sediment and seawater nutrients**
4	**Timber resources**	**Marine higher plants**
4.1	Cultivated timber resources	Cultivated marine higher plants
4.2	Natural timber resources	Natural marine higher plants
5	**Aquatic resources**	**Marine living resources**
5.1	Cultivated aquatic resources	Cultivate marine living resources
5.2	Natural aquatic resources	Natural marine living resources
6	**Other biological resources**	/
7	**Water resources**	**Marine freshwater resources**
7.1	Surface water	River Input
7.2	Groundwater	Rainfall
7.3	Soil water	Sea Ice
8		Other

3.5 The assets of mangrove ecosystems include mangrove area, as well as its component sediment and seawater nutrients, mangrove biomass, marine living resources and input freshwater.

3.6 The area of mangroves is increasing from 4.68km^2 to 32.79 km^2 in the result of Landsat 8 data interpreting. (Table 2, Figure 2）

Table 2 Sea area use change between 1988 and 2018

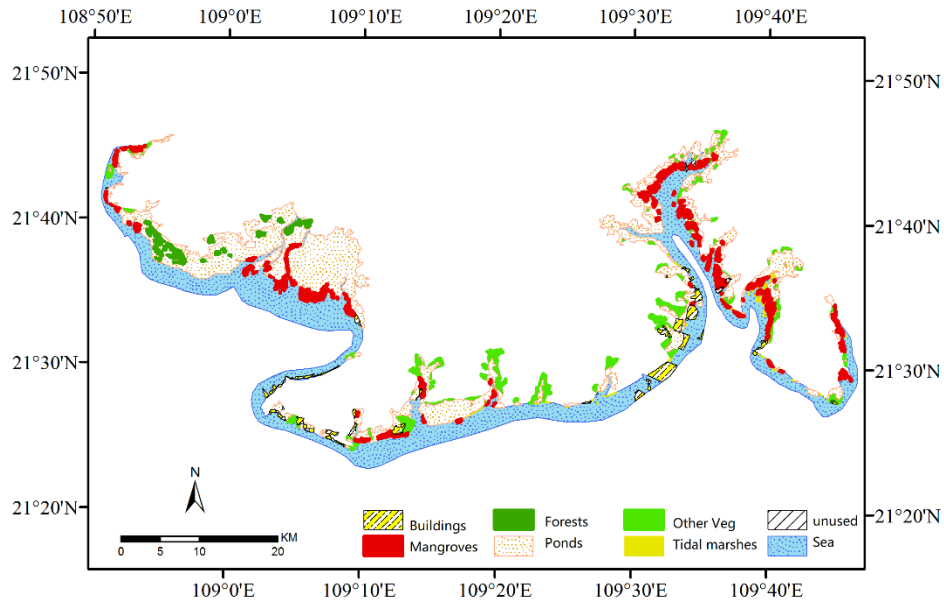| Year	Building	Farmland	Mudflat	Mangroves	Ponds	Other vegetation	Unused land	Sea Water	Tidal marshes	Total
1988	3.31	140.62	0.00	4.68	52.96	92.36	11.48	476.37	0.00	781.77
1993	4.37	133.13	94.62	12.14	72.58	90.35	8.67	367.28	0.00	783.16
1998	4.19	126.82	190.38	16.81	105.58	77.46	6.21	252.43	0.00	779.88
2008	5.42	17.03	31.61	25.46	284.46	36.70	0.43	380.88	0.00	782.00
2018	24.87	7.67	0.00	32.79	290.96	35.71	0.85	384.25	6.45	783.55

Figure 2 Sea area use of Beihai in 2018

3.7 The content of sediment total organic carbon (TOC) was, on average 100.4 t C/ha. Considering the average ratio of biomass carbon to sediment carbon of mangroves is about 1:1, it is inferred that the total carbon stock of mangroves in Beihai is 100.4×2×3279ha=6.7×105 t C. This data and the sea area use matrix is the basis to compile the Green House Gases Inventory (Coastal Wetlands), and will connect the Ocean Accounting to UNFCCC and Paris Agreement.

3.8 The amounts of other oceanic assets per unit (crab, mollusks, crustaceans, fish, birds, freshwater) were cited from published papers or books.

3.9 Measuring cultivated mangrove biomass and cultivated marine living resources (crab) shows the impacts of restoring the mangrove ecosystem. An abandoned shrimp pond in Beihai was restored for increasing the assets. The restoration project was listed in the Compendium of Contribution Natural Based Solutions of UN Climate Change Summit.

Figure 3 Mangrove restoration project in Beihai

4 Main challenges and needs

4.1 Data

Since environmental and biological factors change with depth, it is necessary to adopt a three-dimensional spatial data framework although a two dimensional one is enough for coastal ecosystems in this pilot study. It is also necessary to reflect the ocean fluidity and animal migration.

4.2 Technical capacity and linkage

With respect to remote sensing, links to international ocean monitoring systems and experience in modeling methods will help to minimize the data gaps.

4.3 Technique guideline

There is an urgent need to reach agreements or international standards on 3-D data framework and assets and ecosystem services framework under the technical guidance document on ocean accounts as well as the SEEA in general.

4.4 International collaboration

We strongly suggest to collaborate under the framework of UN systems. It is suggested to seek financial and technique support under the international, regional and national initiatives, such as the Belt and Road Initiative, South to South Cooperation Fund, and take Ocean Accounting as a useful tool for hot issues including climate change and biodiversity conservation.

5 Future Planning

In the next step, we are looking forward to extending the pilot study to other coastal ecosystems such as seagrasses, tidal marshes and seaweeds, linking the Carbon-related assets accounting to National/Local Greenhouse Gas Inventories (Coastal wetlands), establishing an experimental database framework for Oceanic SEEA.