



Coastal Ecosystem Assets Accounting: Methods and Case



Shang Sunny CHEN (陳尚)

Shuai He, Wenwen Li, Yuemei Jing

First Inst. of Oceanography, MNR, China


schen@fio.org.cn

Xiaoping Sun, Boping Tan





Yancheng Teachers University



1. What is Coastal Ecosystem Assets?

 Coastal Ecosystem Assets is the coastal ecological resources capable of contributing directly or indirectly to human socio-economic production by providing a useful flow of goods or services

 Coastal Ecosystem Assets include:

-  biological assets,
-  seawater assets
-  surface sed bed assets
-  and whole ecosystem

2. Coastal Ecosystem Assets Pricing Methods

- by the total value of standing stocks of all coastal ecological resources
- by the total value of services of coastal ecosystem
 - Income Approach**
 - Income Capitalization Method**
 - Present earning value method**

$$P = \sum_{t=1}^n \frac{F_t}{(1+i)^t}$$

P: Standing stock value of assets

F_t: Value of ecosystem services

i: Discount rate

t: Duration of ecosystem persistence

$$P = F \frac{(1+i)^n - 1}{i(1+i)^n}$$

$$P = \frac{F}{i}$$

ICS 13.020.10
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中华人民共和国国家标准

GB/T 43677—2014

生态系统评估 陆地生态资产核算技术指南

Ecosystem assessment—Technical guideline for terrestrial ecosystem asset
accounting

**National standard
terrestrial ecosystem asset**

2024 - 03 - 15 发布

2024 - 07 - 01 实施

国家市场监督管理总局 发布
国家标准化管理委员会

ICS 07.060
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中华人民共和国国家标准

GB/T 28058—2011

海洋生态资本评估技术导则

Technical directives for marine ecological capital assessment

**National standard
marine ecosystem asset**

2011—12—30 发布

2012—06—01 实施

中华人民共和国国家质量监督检验检疫总局 发布
中国国家标准化管理委员会

Ecosystem services inventory: 4 groups 19 kinds

Items	Sub-Items	Ecosystem type						
		Forest	Grassland	Wetland	Ocean	Cropland	Orchard	Urban green space
Provisioning services 7	Agricultural products	-	Medium	-	-	High	High	-
	Forest products	High	Low	-	-	Low	High	-
	Pastoral products	Low	High	-	-	-	-	-
	Fishery products	-	-	High	High	-	-	-
	Bioenergy products	Medium	Low	Low	-	High	Low	-
	Biomaterial products	Medium	Low	Low	-	High	Low	-
	Oxygen product	High	High	Medium	High	High	High	High
Regulating services 8	Carbon sequestration	High	High	High	High	-	-	Low
	Climate regulation	High	Medium	High	High	Medium	Medium	Medium
	Air purification	High	Low	Low	Low	High	High	High
	Sewage treatment	-	-	High	High	-	-	-
	Water conservation	High	High	High	-	-	-	Low
	Flood control	High	Medium	High	-	-	-	-
	Soil retention	High	Medium	-	-	Low	Medium	High
	Coastal protection	-	-	High	-	-	-	-
Cultural services 2	Leisure & recreation	High	High	High	High	Medium	Medium	High
	Landscape value-added	High	Medium	High	Low	Low	Low	High
Supporting services 2	Species diversity maintenance	High	High	High	High	Low	-	-
	Ecosystem diversity maintenance	High	High	High	High	-	-	-

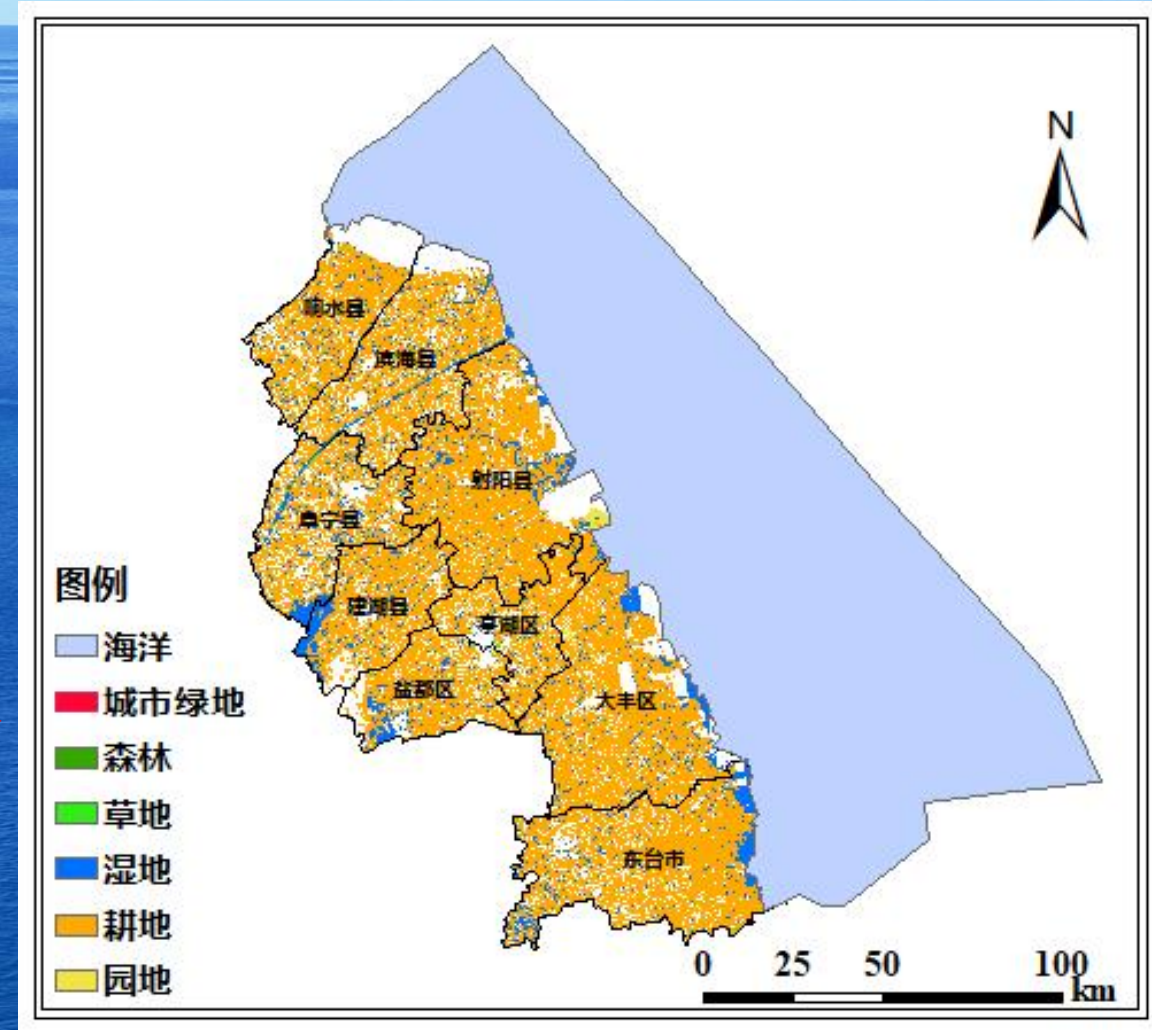
Ecosystem services: accounting methods

Item	Sub-Items	Physical quantity	Value
Provisioning services 7	Agricultural products	Statistics	Market-Price-Method
	Forest products		
	Pastoral products		
	Fishery products		
	Bioenergy products		
	Biomaterial products		
	Oxygen product	Photosynthetic reactions	Cost of air liquefaction
Regulating services 8	Carbon sequestration	CO ₂ Sequestration	Carbon emissions trade price
	Climate regulation	Vegetation transpiration,Sensible & Latent heat flux	Electricity price
	Air purification	Air pollutants(PM10、SO ₂)	Cost of waste treatment
	Sewage treatment	Discharged sewage	
	Water conservation	Supplied water	Water resource fee
	Flood control	Controlled water	Replacement cost
	Soil retention	Nutrients	Chemical fertilizer price
	Coastal protection	Protected coastline	Replacement cost
Cultural services	Leisure & recreation	Questionnaires	Travel-Cost-Method
	Landscape value-added	Statistics	Value-Distance-Model
Supporting services	Species diversity maintenance	Statistics	WTP
	Ecosystem diversity maintenance	Statistics	WTP

3 Coastal Ecosystem Asset accounting Case

Yancheng city in the west Yellow Sea

- Total: 35.8 K km²
- land: 16.9 K km²
- Sea: 18.9 K km²



Ecosystem type	Area (K ha)	Ratio in total terrestrial area	Ratio in total terrestrial and marine area
1. Forest	59.3	3.51%	1.66%
Arbor 乔木林	10.8	0.64%	0.30%
Bamboo & Shrub 竹林及灌木林	0.10	0.01%	0.003%
Other 其他林地	48.4	2.86%	1.35%
2. Grassland	9.4	0.56%	0.26%
3. Cropland	774.5	45.83%	21.63%
Paddy field 水田	476.3	28.18%	13.30%
水浇地	286.1	16.93%	7.99%
Dry land 旱地	12.1	0.72%	0.34%
4. Garden plot 园地	18.5	1.09%	0.52%
Orchard 果园	4.7	0.28%	0.13%
Other 其他园地	13.8	0.82%	0.39%
5. Urban green space 城市绿地	0.90	0.05%	0.03%
6. Wetland	486.8	\	13.60%
Terrestrial wetland	65.9	3.90%	1.84%
Coastal wetland in sea (<6m)	420.9	\	11.76%
7. Sea (>6m)	1469.1	\	41.04%

Yancheng: Coastal Ecosystem Asset

2019: 176.18 trillion CNY

2020: 177.14 trillion CNY

2021: 199.18 trillion CNY

Annual increasing rate: 6.5%

➤ Terrestrial: 23%

➤ Marine: 67%

➤ Wetland: 26%

➤ 4MPAs: 31%

ecosystem area	2019		2020		2021	
	Services billion CNY/yr	Assets billion CNY	Services billion CNY/yr	Assets billion CNY	Services billion CNY/yr	Assets billion CNY
Terrestrial & sea	863.288	17618.122	867.972	17713.714	975.980	19917.959
Terrestrial	402.270	8208.314	408.711	8341.048	464.298	9475.469
Forest	44.373	905.579	45.643	931.490	53.573	1093.327
Grassland	42.168	860.571	38.891	793.694	40.666	829.918
Wetland(Terr + coastal)	219.839	4486.510	215.840	4404.898	252.003	5142.918
Cropland	69.013	1408.429	86.374	1762.742	92.329	1884.265
Urban	26.814	547.224	21.963	448.224	25.727	525.041
Whole Sea	587.640	11992.653	584.156	11921.551	652.558	13317.510
MPA1-候鸟栖息地	131.008	2673.633	128.101	2614.306	138.840	2833.469
MPA2-湿地珍禽	97.324	1986.204	96.270	1964.694	105.157	2146.061
MPA3-麋鹿	27.029	551.612	25.634	523.143	26.693	544.755
MPA4-森林	34.365	701.327	33.978	693.429	35.508	724.653

4 Ecosystem Services in Yancheng city

ES: 975.980 billion CNY in 2021

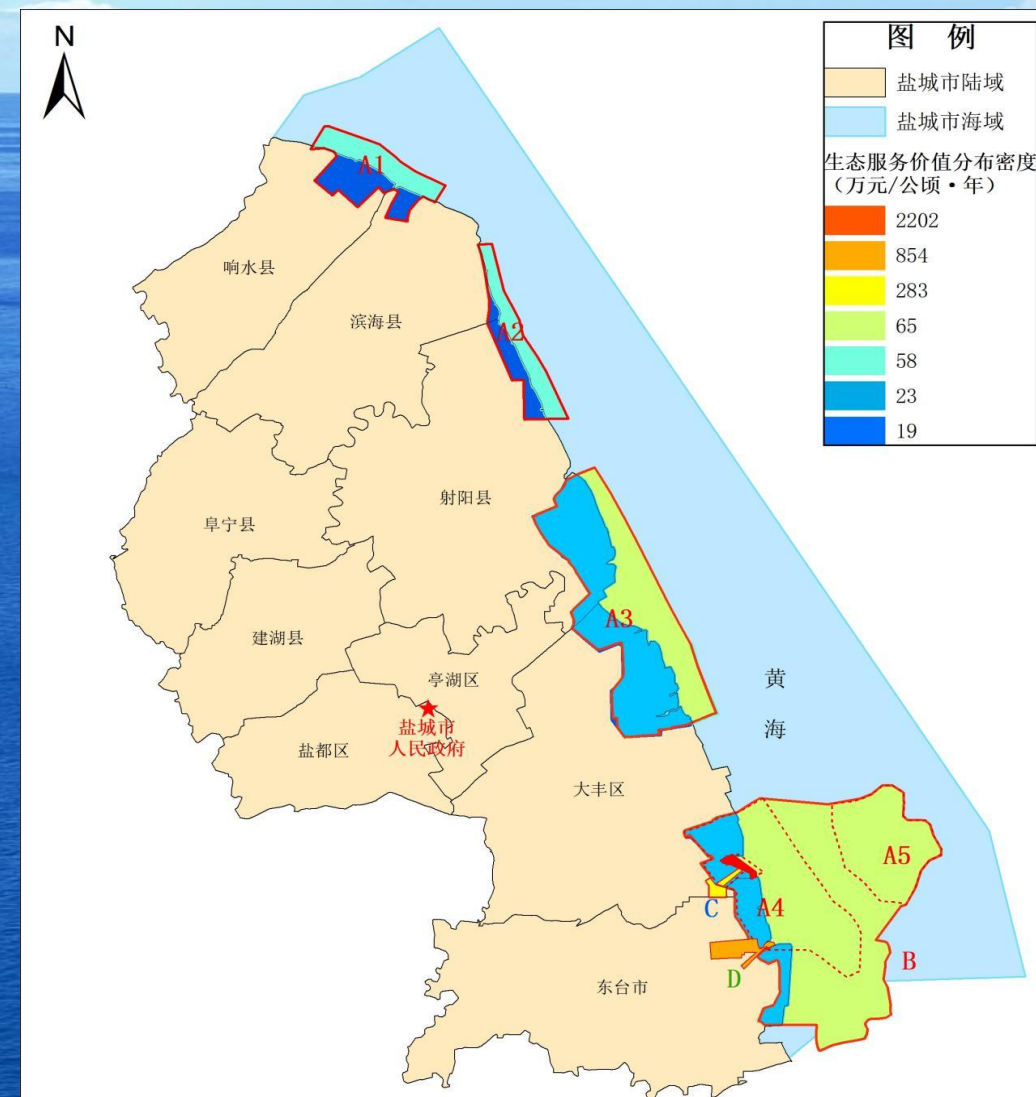
A. The use value in ES is 895.246 billion CNY in 2021.

B. The non-use value in ES is 80.733 billion CNY. From 87 rare species and 11 protected areas

Services	ES(use value) billionCNY		ES (Non-use value)
	Final	Potential	
Provisioning Services	159.295		-
Regulating Services	684.353		-
Cultural Services	47.139	4.457	-
Leisure and recreation	21.816	4.457	-
Landscape Value-added	25.323		-
Supporting Services	-	-	80.733
Species diversity maintenance	-	-	45.759
Ecosystem diversity maintenance	-	-	34.974
Total	890.789	4.457	80.733

Ecosystem Services (YS) from Four National Protected Areas in Yancheng city

1. **Yellow Sea Migratory Bird Habitat:**
138.8 billion CNY, 14.35% of whole city
2. **Yancheng Wetland Rare Birds National Nature Reserve :**
105.1 billion CNY, 10.87% of whole city
3. **Dafeng Elk National Nature Reserve: 26.7 billion CNY, 2.72% of the whole city**
4. **Dongtai National Forest Park:**
35.51 billion CNY, 3.67% of whole city



5 GEP(use value of ES) vs GDP

- 2019-2021, the annual increasing rate of GEP and GDP in Yancheng: 7.05% and 8.53%
The ratio of GEP to GDP is 1.3. 1 billion GEP support 0.74 billion GDP
- Co-growth of ecosystem and economic system in Yancheng!!!

Year	Ecosystem Area (km ²)	GEP (billion CNY)	Unit-area GEP (million CNY/km ²)	Economic System Area (km ²)	GDP (billion CNY)	Unit-area-GDP (million CNY/km ²)	GEP/GDP
2019		780.651	2.62025		565.340	3.48352	1.39
2020	29793	785.962	2.63808	16229	595.340	3.66837	1.32
2021		890.789	2.98993		661.740	4.07752	1.35

6 Take-home information

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- **Ecosystem Asset and ES are the RIGHT ecological index to assess the sustainability of ecosystem and its supporting ability to socio-economic system**
 - **Accurate accounting methods of ecosystem asset and ES should be further improved, esp. in local parameters in mass, local pricing, discount rate and the transportation and consumption analysis of ecosystem services.**