国家海洋局第一海洋研究所
THE FIRST INSTITUTE OF OCEANOGRAPHY,SOA.

Marine Ecological Capital Assessment:

Theories & Application in China Seas

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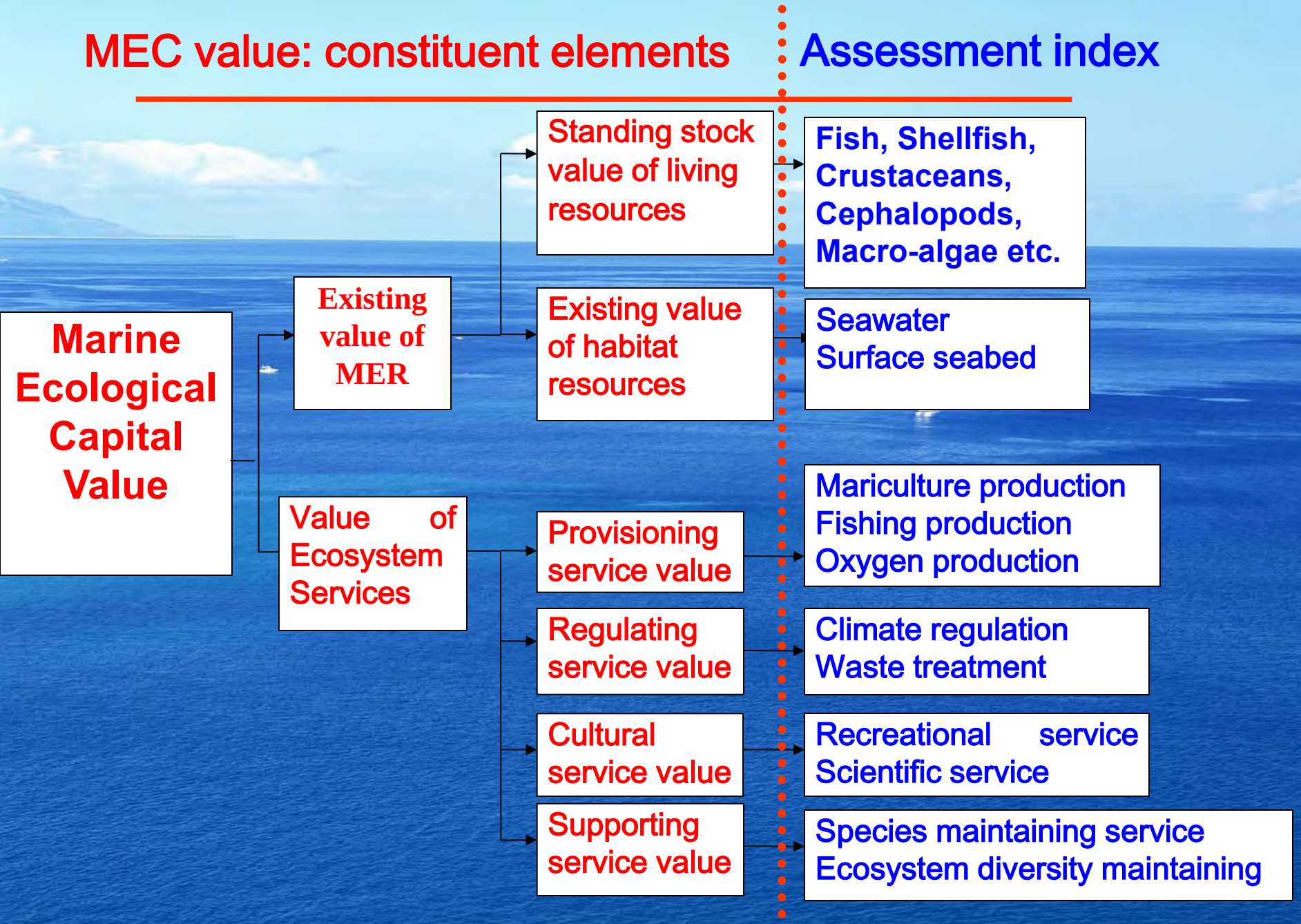
1. What is Marine Ecological Capital (MEC) ?

- Capital: natural capital, man-made capital, human capital and social capital.
- Marine ecological resources are the important component of natural capital.
- MEC is defined as marine ecological resources which have direct or indirect contributions to humans' social and economic production and provide benefits for humans.

2. MEC value: constituent elements & assessment index

- MEC value: the monetized benefits for humans from marine ecological capital, including standing stock value of marine ecological resources and marine ecosystem service value.
- Marine ecological resources (MER): marine living resources and their habitats (i.e. seawater, surface seabed), as well as the marine ecosystem that they act as a whole.


MEC value: constituent elements
Assessment index
Marine Ecological Capital Value
Existing value of MER
Value of Ecosystem Services
Standing stock value of living resources
Existing value of habitat resources
Provisioning service value
Regulating service value
Cultural service value
Supporting service value
Fish, Shellfish, Crustaceans, Cephalopods, Macro-algae etc.
Seawater
Surface seabed
Mariculture production
Fishing production
Oxygen production
Climate regulation
Waste treatment
Recreational service
Scientific service
Species maintaining service
Ecosystem diversity maintaining

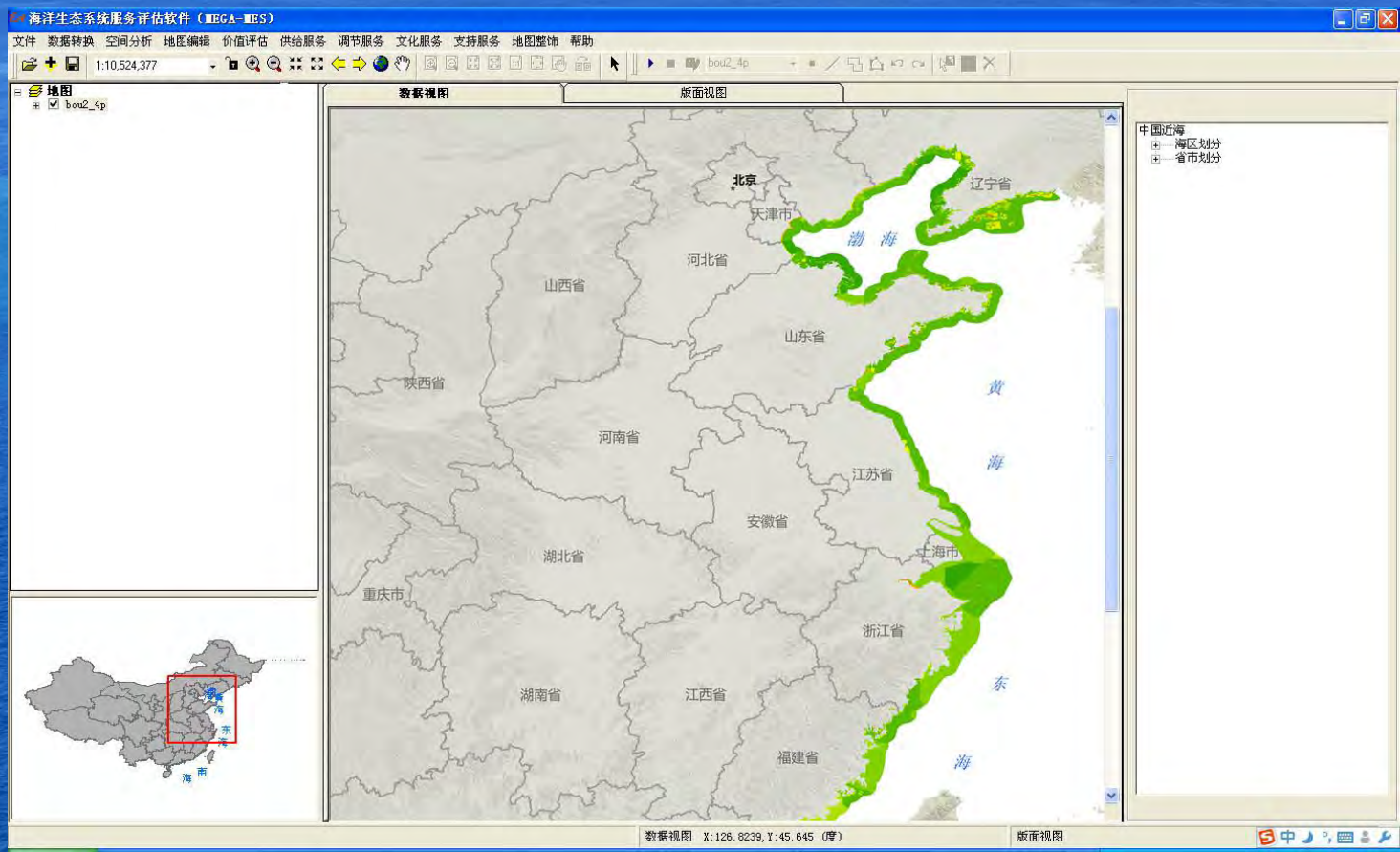
3. Assessment methods national directives

1. How to decide: element of MEC value
2. How to select: assessment index, calculating equations
3. How to get raw data
4. How to calculate each element and total value
5. How to draft assessment report

Technical Directives for Marine Ecological Capital Assessment

3. Assessment methods:

Arc GIS + MEGA-MES V1.0



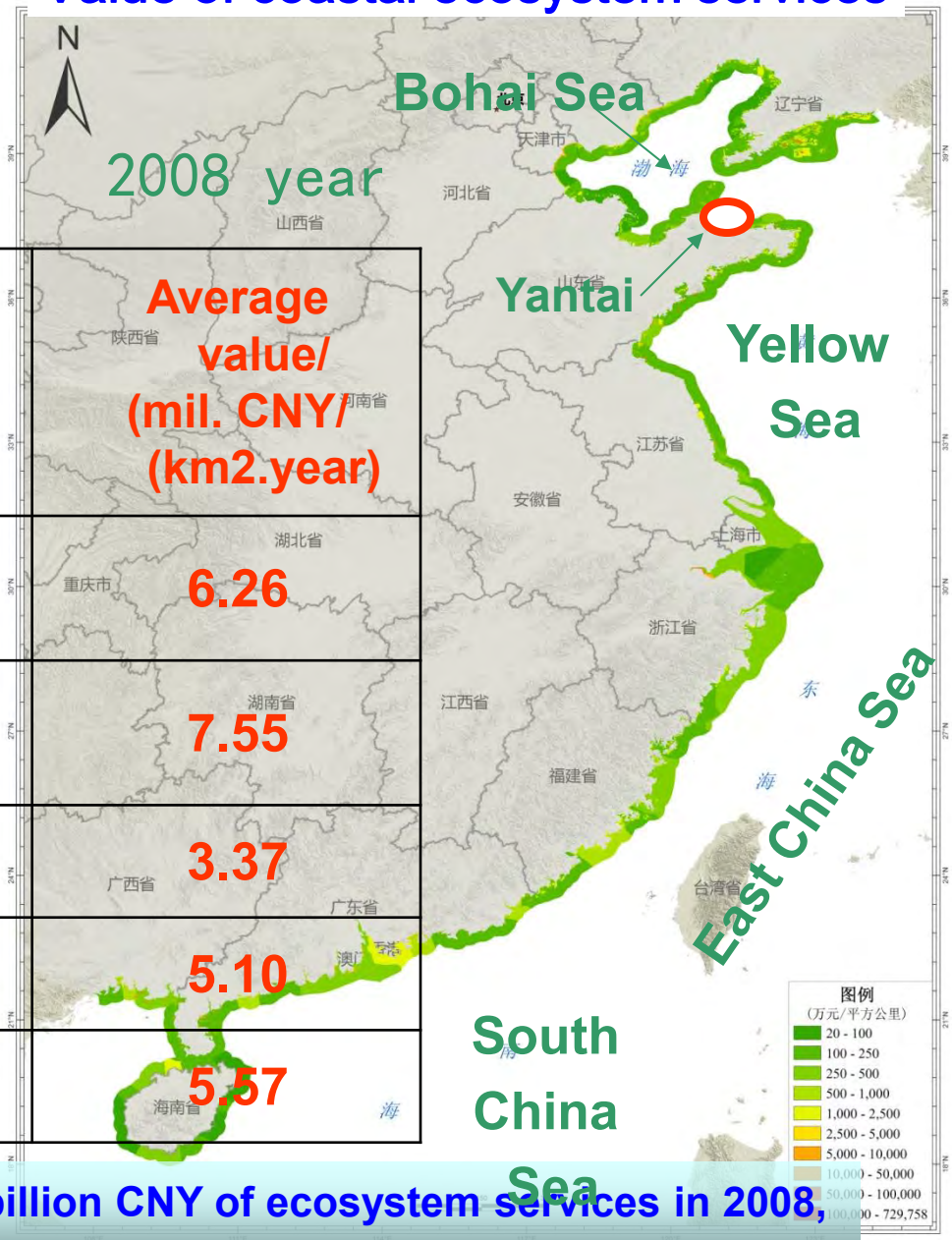
4. Application

- National-scale: 100 000 km^2
- Provincial-scale: 10 000 km^2
- County-scale: 100 km^2

National assessment (2005-2011)

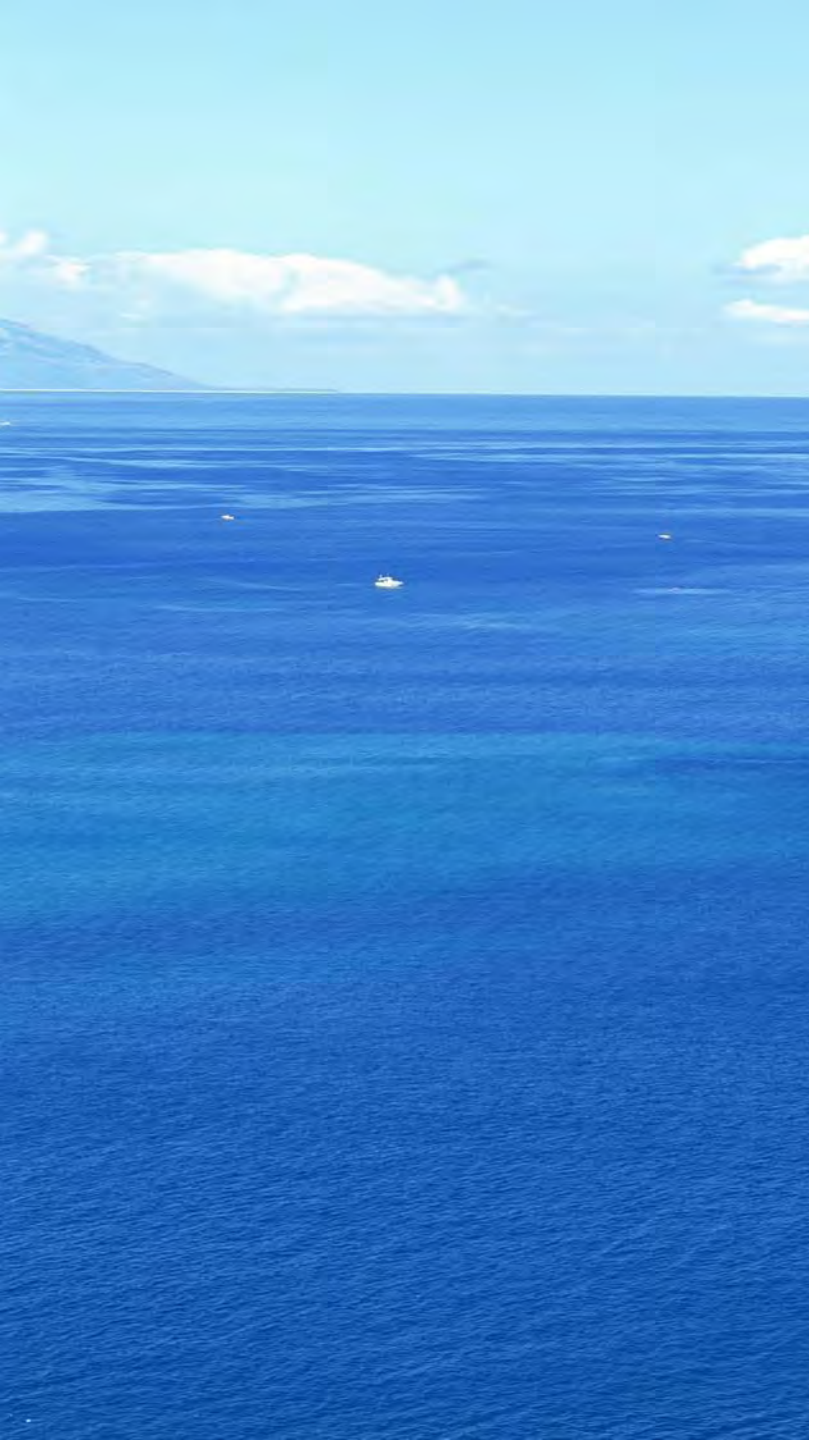
Value of coastal ecosystem services

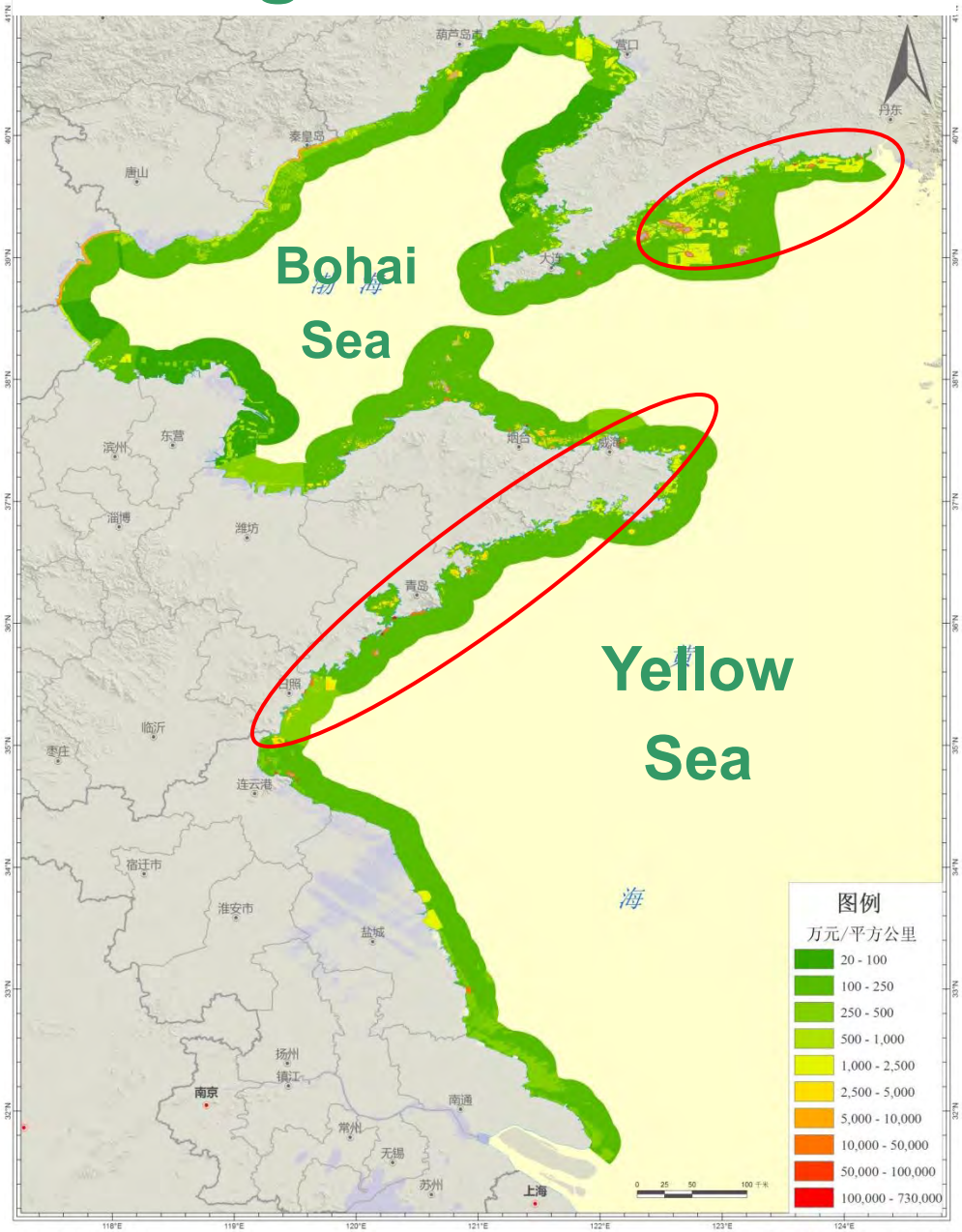
	Assessed area（km^2）	Total value/（Billion CNY/year）	Average value/ (mil. CNY/ (km2.year)
Bohai Sea	34 359	215.2	6.26
Yellow Sea	43 541	328.8	7.55
ECS	56 719	1 91.4	3.37
SCS	58 498	2 98.6	5.10
Total	193 119	1 034.1	5.57



China's coastal ecosystem provided 1,034 billion CNY of ecosystem services in 2008, which supported 1,740 billion CNY of marine industrial output

High value zone





坐 标 系：WGS84坐标系
制图日期：2011年4月20日

制图单位：国家海洋局第一海洋研究所
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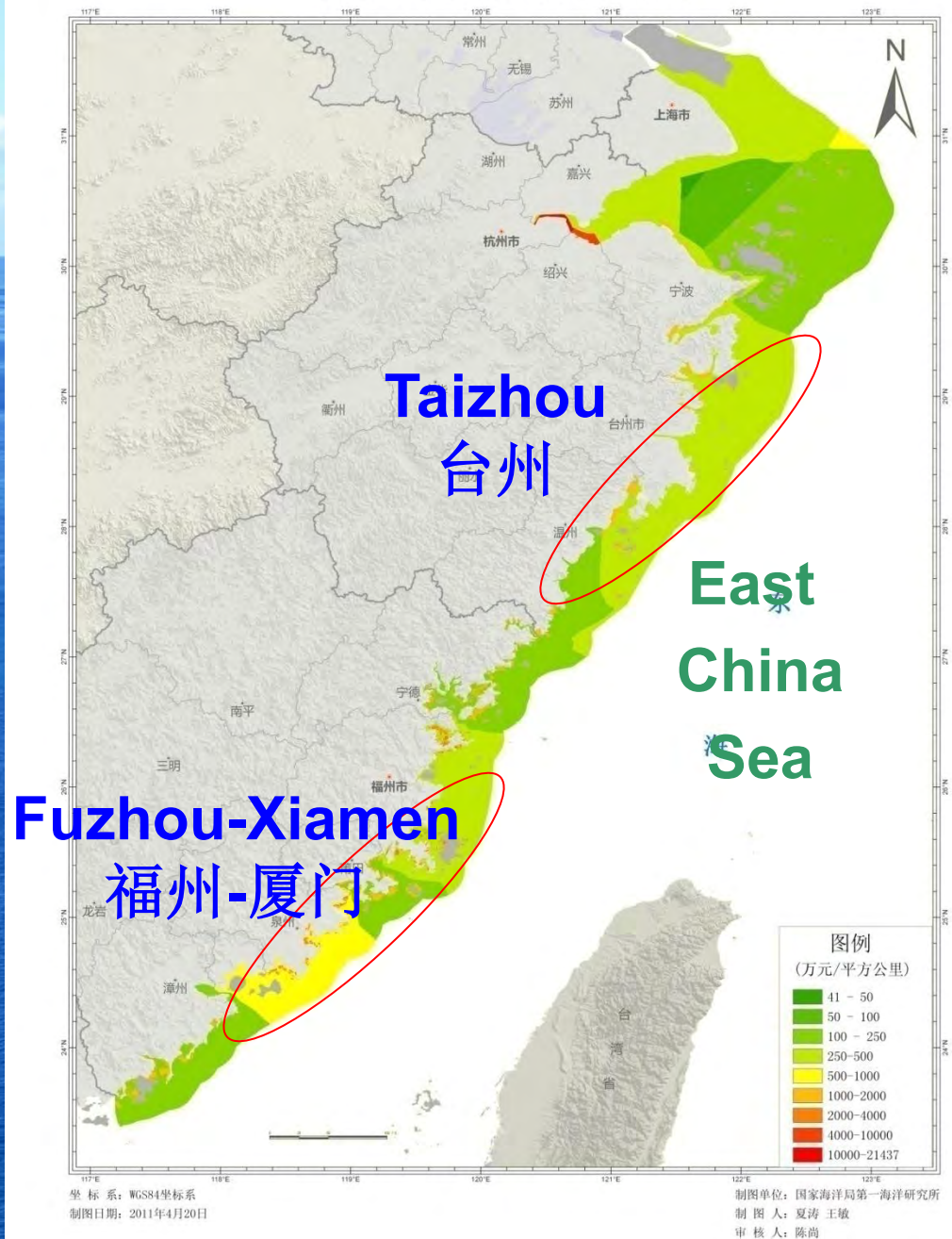
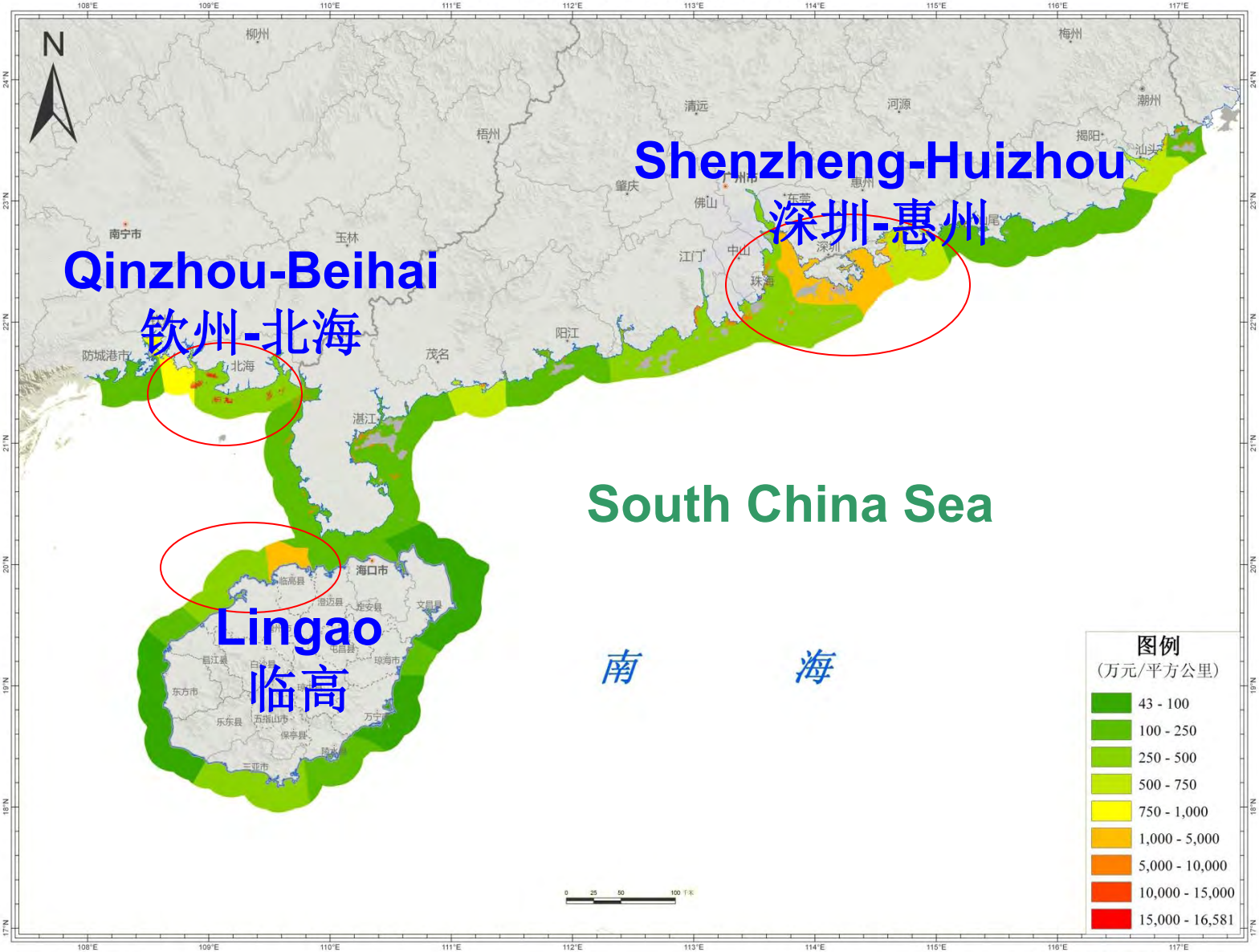
High value zone



High value zone



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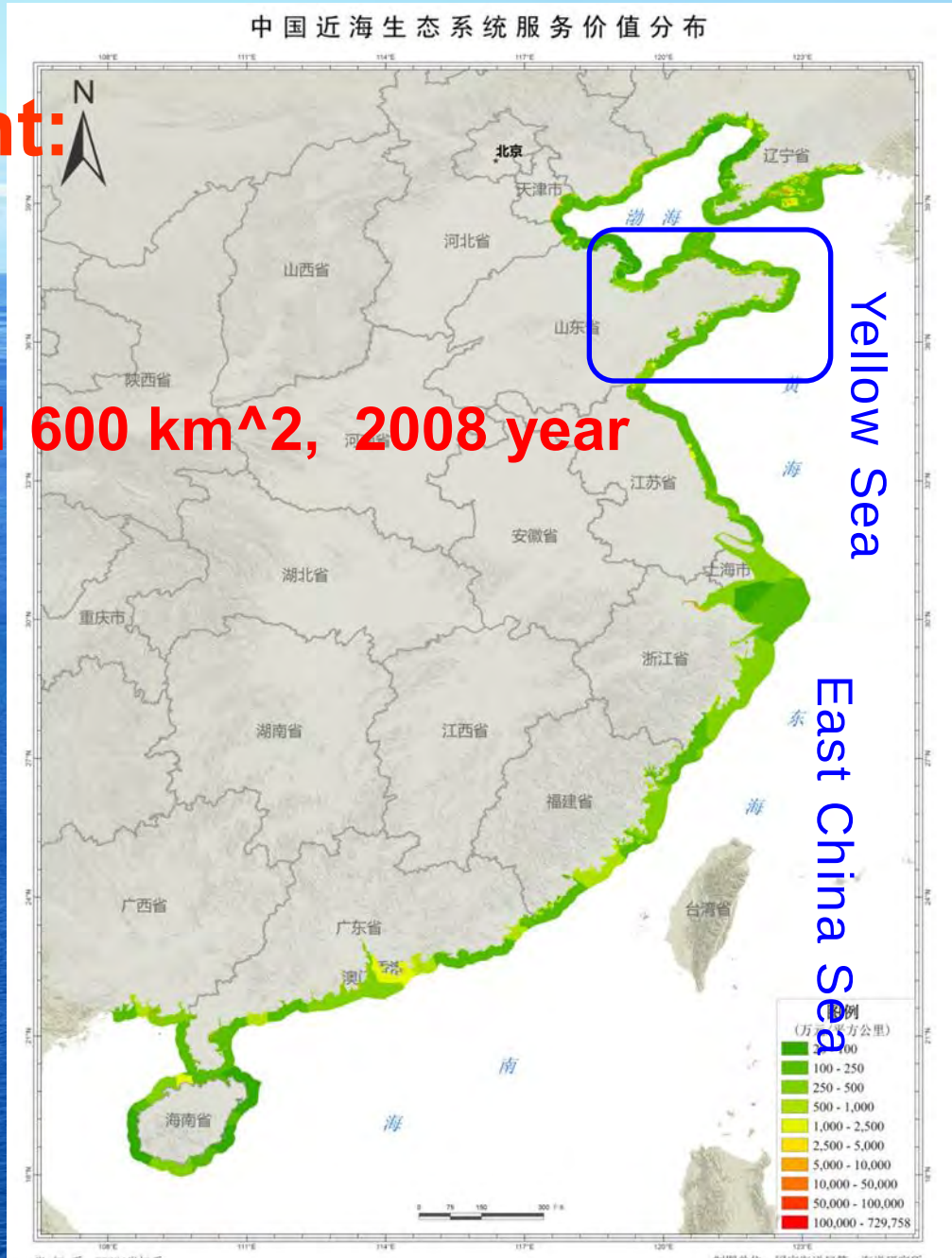
Provincial Assessment:

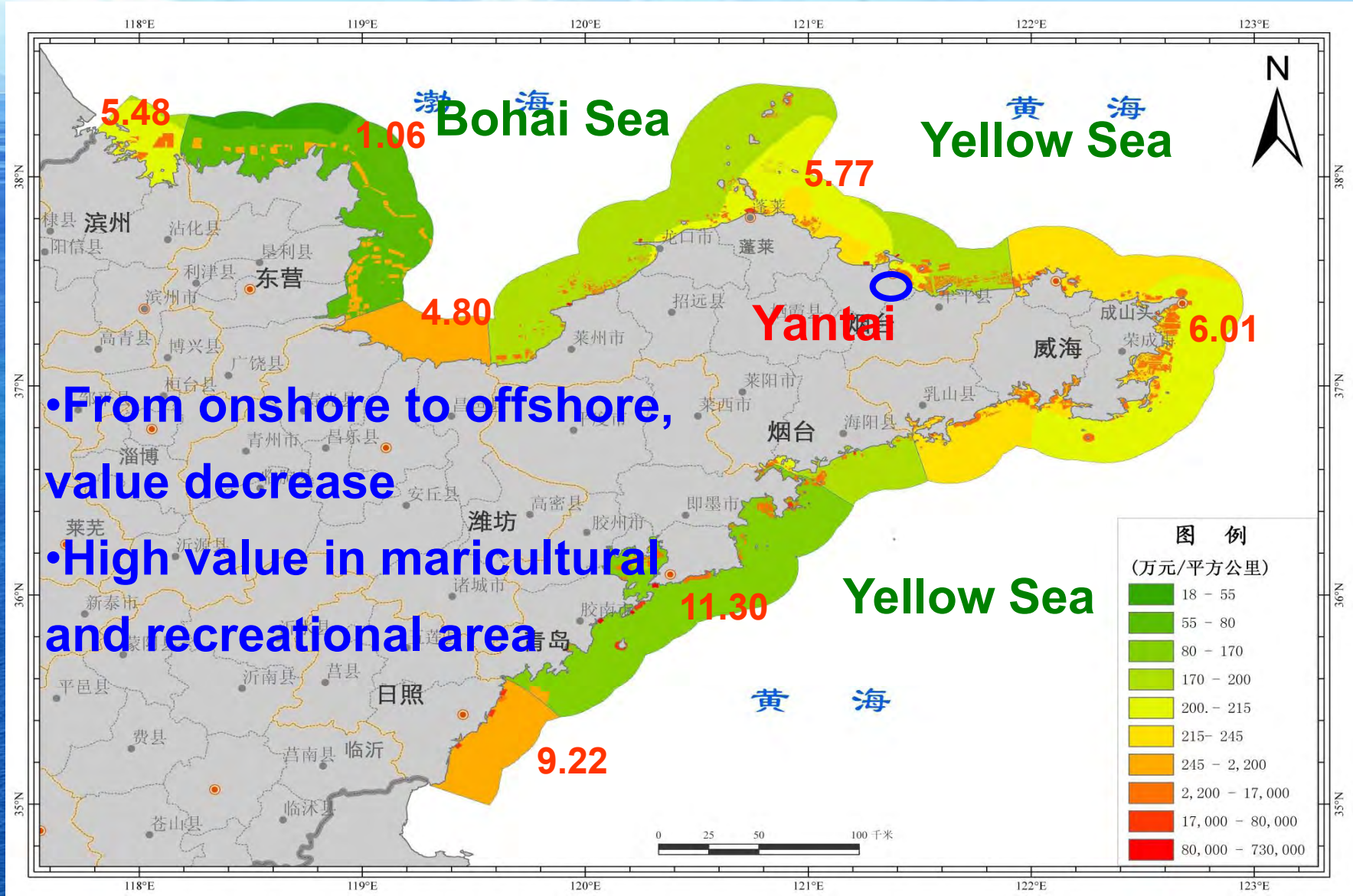
Shandong coastal waters: 31 600 km^2, 2008 year



Spatial distribution of ecosystem service

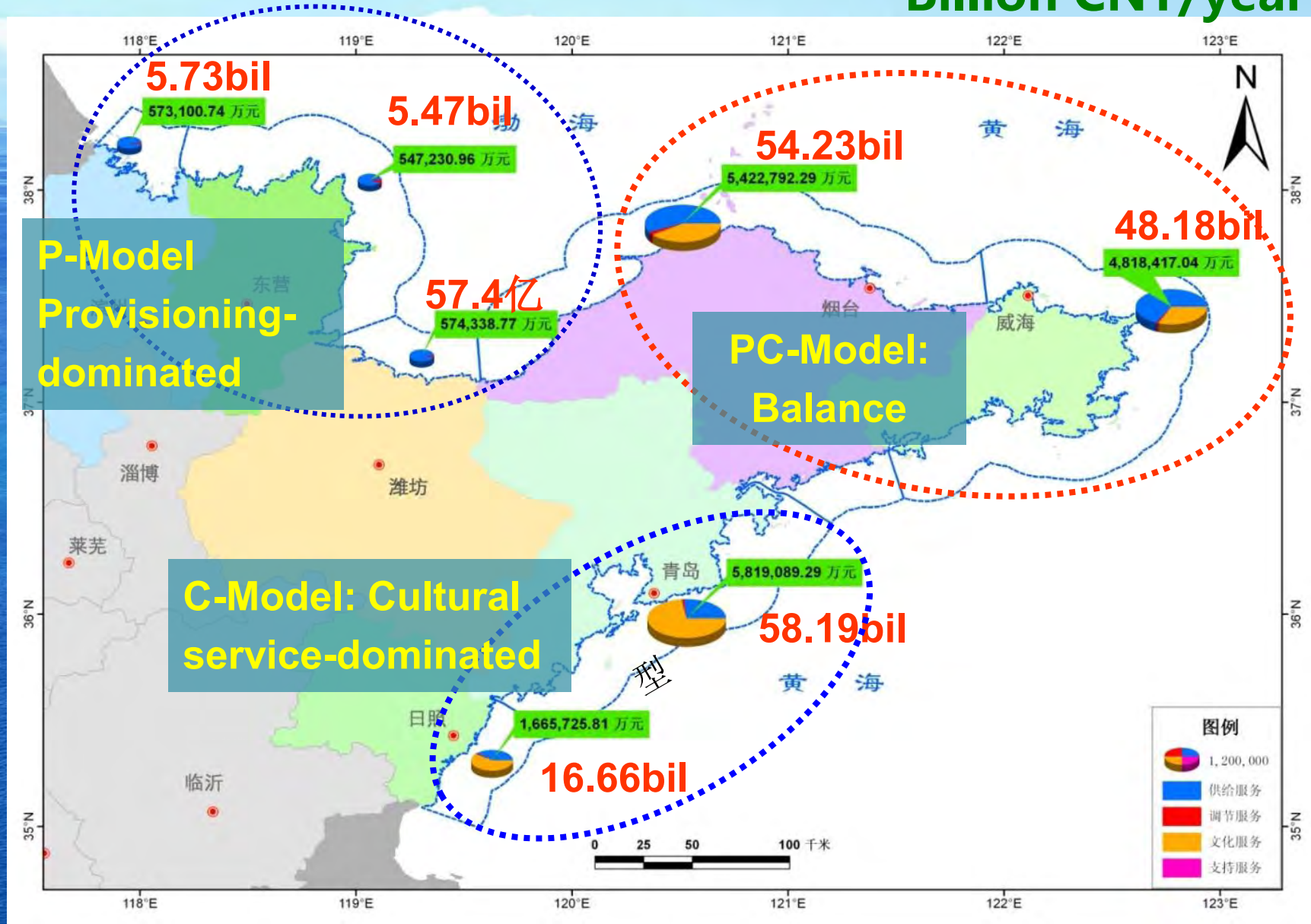
Shandong Province

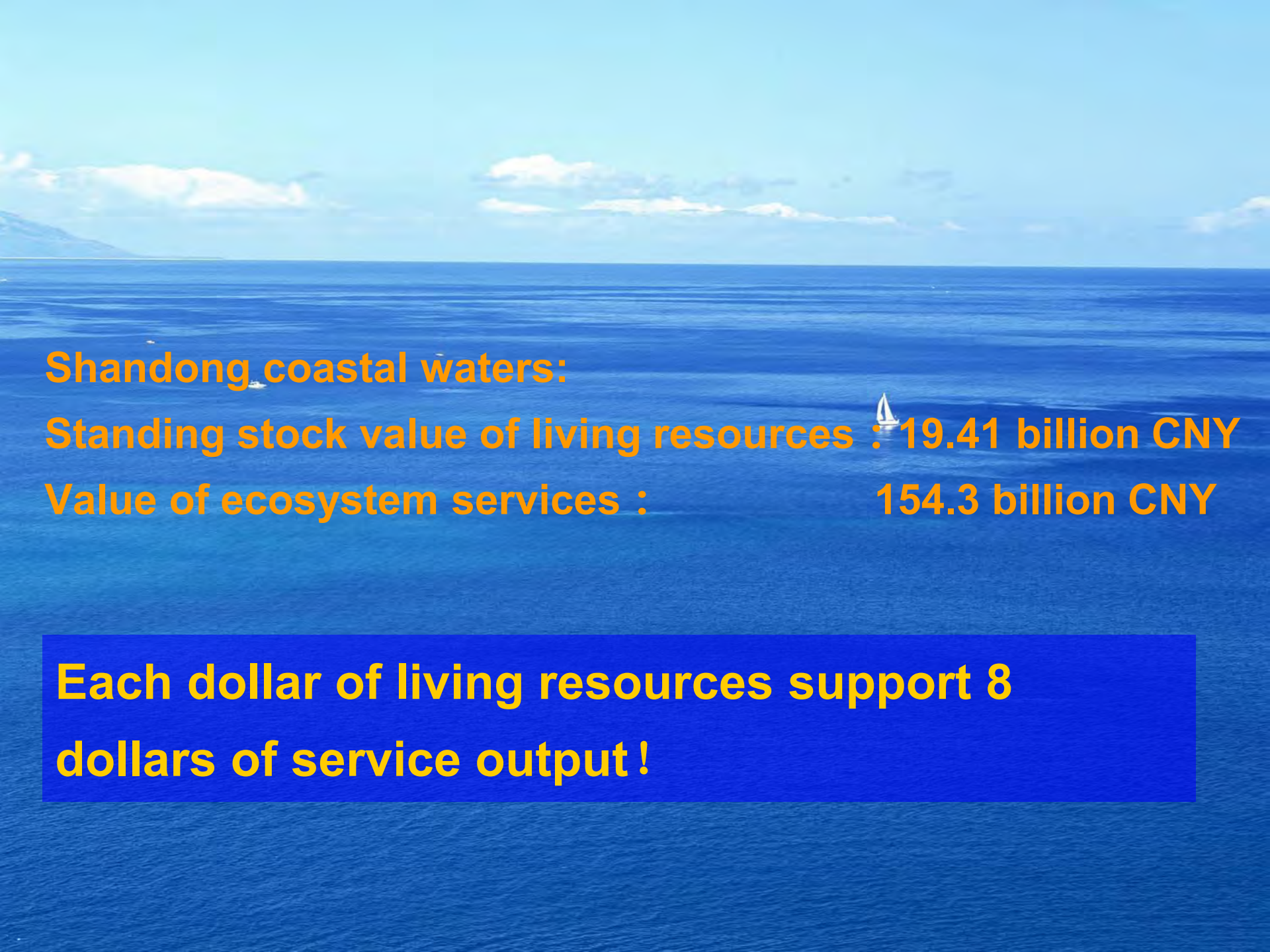
Million CNY/km^2.year



Ecosystem service:
3 kinds of utilization model

Billion CNY/year





Shandong coastal waters:

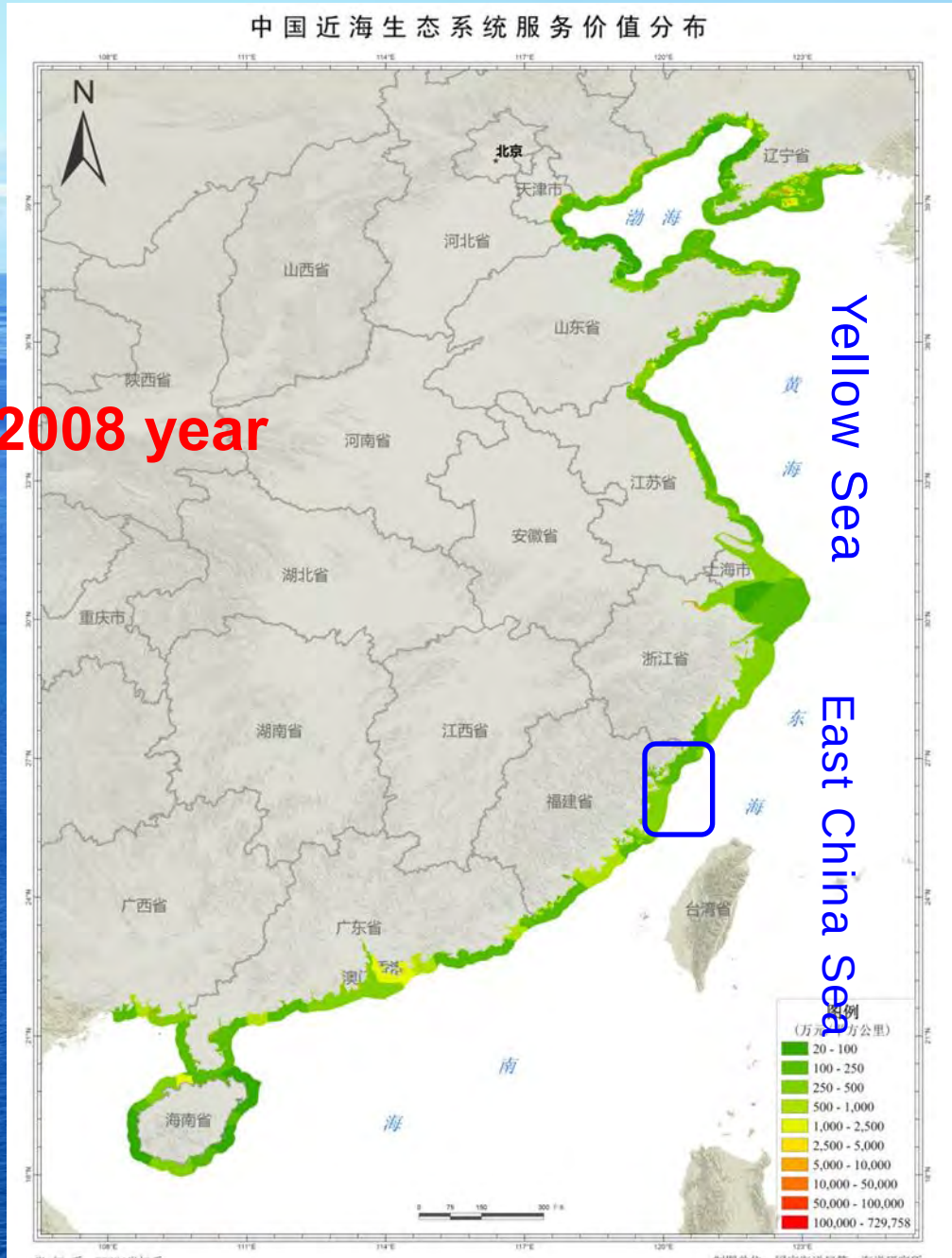
Standing stock value of living resources : 19.41 billion CNY

Value of ecosystem services : 154.3 billion CNY

Each dollar of living resources support 8 dollars of service output !

County Assessment:

Dongshan bay: ~200 km^2, 2008 year



County Assessment: Dongshan Bay

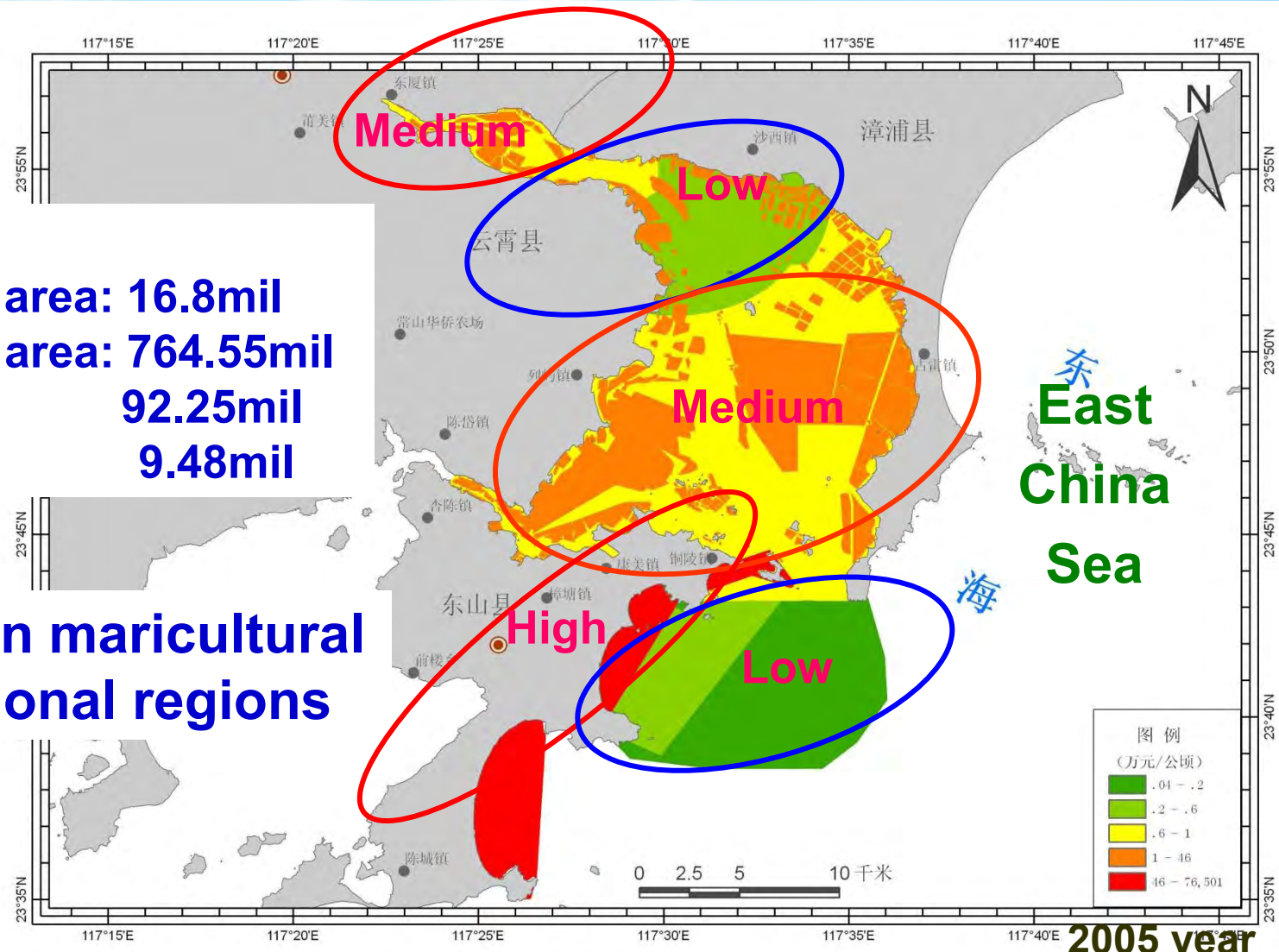
Assessed area: 248km^2

CNY/ha.year

Density

- **Maricultured area: 16.8mil**
- **Recreational area: 764.55mil**
- **MPA: 92.25mil**
- **Whole bay: 9.48mil**

High value in maricultural and recreational regions



2005 year

Dongshan bay:

Standing stock value of living resources : 0.09 billion CNY

Value of ecosystem services : 8.57 billion CNY

Each dollar of living resources support 95 dollars of service output !

5. Summary

1. Value of ecosystem services shows decreasing trend from onshore to offshore
2. Maricultural and recreational activities make major contribution to ecosystem services value and control its spatial distribution pattern
3. The assessment methods we developed are approved to be valid to valuate ES.
4. As supporting tool for Payment for Ecosystem Service or Eco-Compensation policy.

Applications of MES theory

As one of principles to marine spatial zoning and marine development planning

- Setup ecological red line: no-reclamation, no-discharge,
- Setup Protected Area:

As assessment indicators of marine management effectiveness & blue economic policy

- Increases in both economic value and MES

As baseline of eco-compensati or payment for ecosystem service policy

- Baseline value-> damaged value->compensation amount

Many thanks for supports from

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