

A satellite-style map of East Asia and the surrounding oceans. The map shows the Korean Peninsula, Japan, and the eastern coast of China. Major water bodies labeled include the East China Sea, South China Sea, and Korea Strait. Rivers like the Huang and Yangtze are also visible. The text is overlaid on the map.

Sustainable Development of China's Ocean and Coasts: Ecosystem Issues & Policy Options

CCICED Task Force Co-Chairs

SU Jilan

Peter Harrison

Outline of Report

- I. Growing Ocean Economy of China
 - II. Sustainable Development of China's Ocean and Coasts---Challenges
 - III. Ocean Development & Marine Ecosystems
 - IV. International Experience in Sustainable Ocean Development
 - V. Goal of Sustainable Development of China's Ocean & Coasts
 - VI. Policy Recommendations
- Appendix:** Members of the Task Force

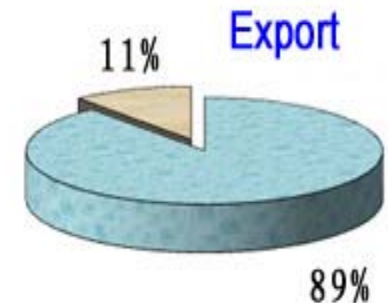
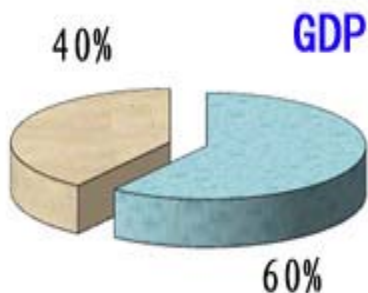
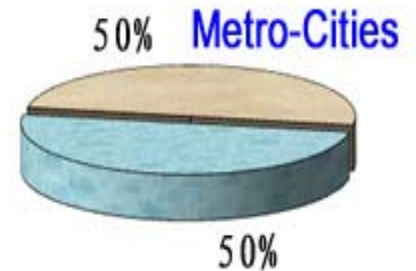
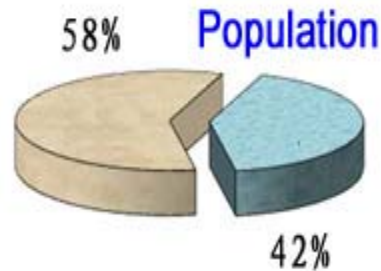
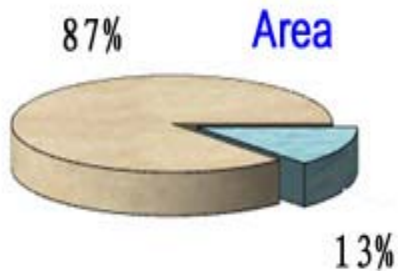
I. Growing Ocean Economy of China

Rapid Growth of China's Coastal Economy

Inland
Provinces

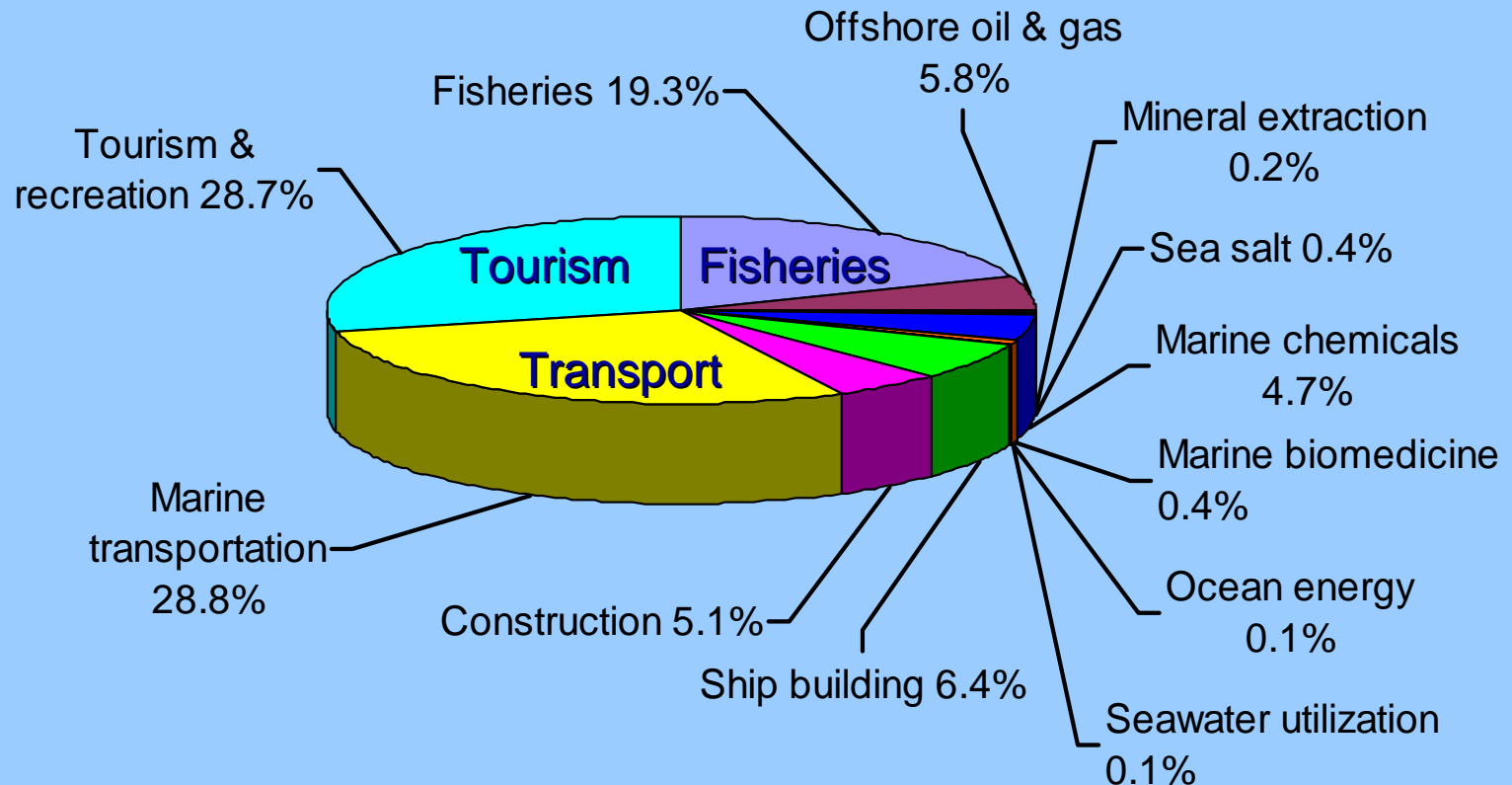
VS

Eleven Coastal
Provinces & Cities



Direct Ocean GDP ~6% of National

(China, 2006) Direct - Ocean GDP by sector



II. Sustainable Development of China's Ocean and Coasts --- Challenges

Top Challenges

Natural Issues

- Eutrophication
- Land reclamation
- Overfishing

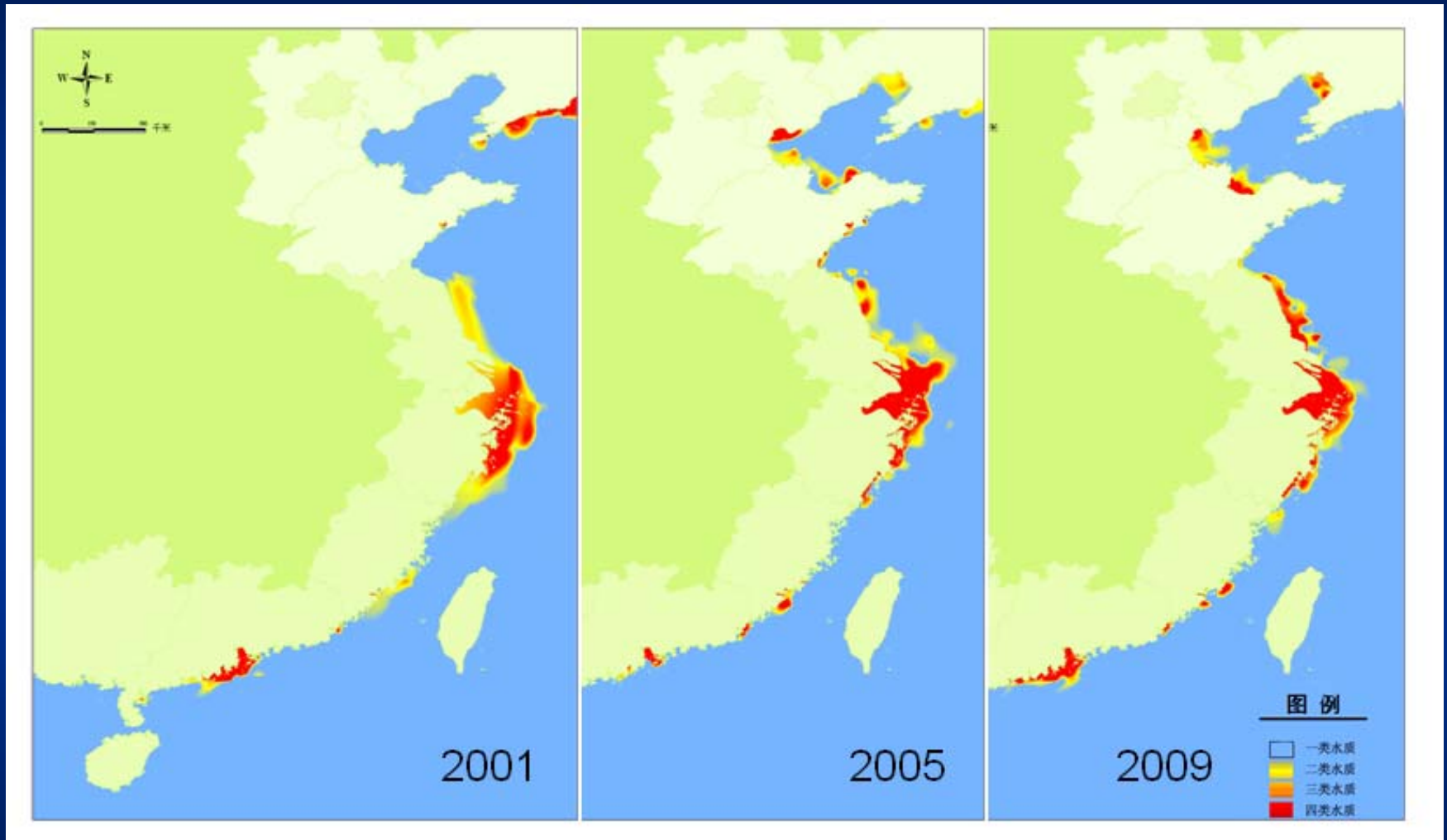
Socio-Economic Issues

- Increased pace of coastal development

Management Issues

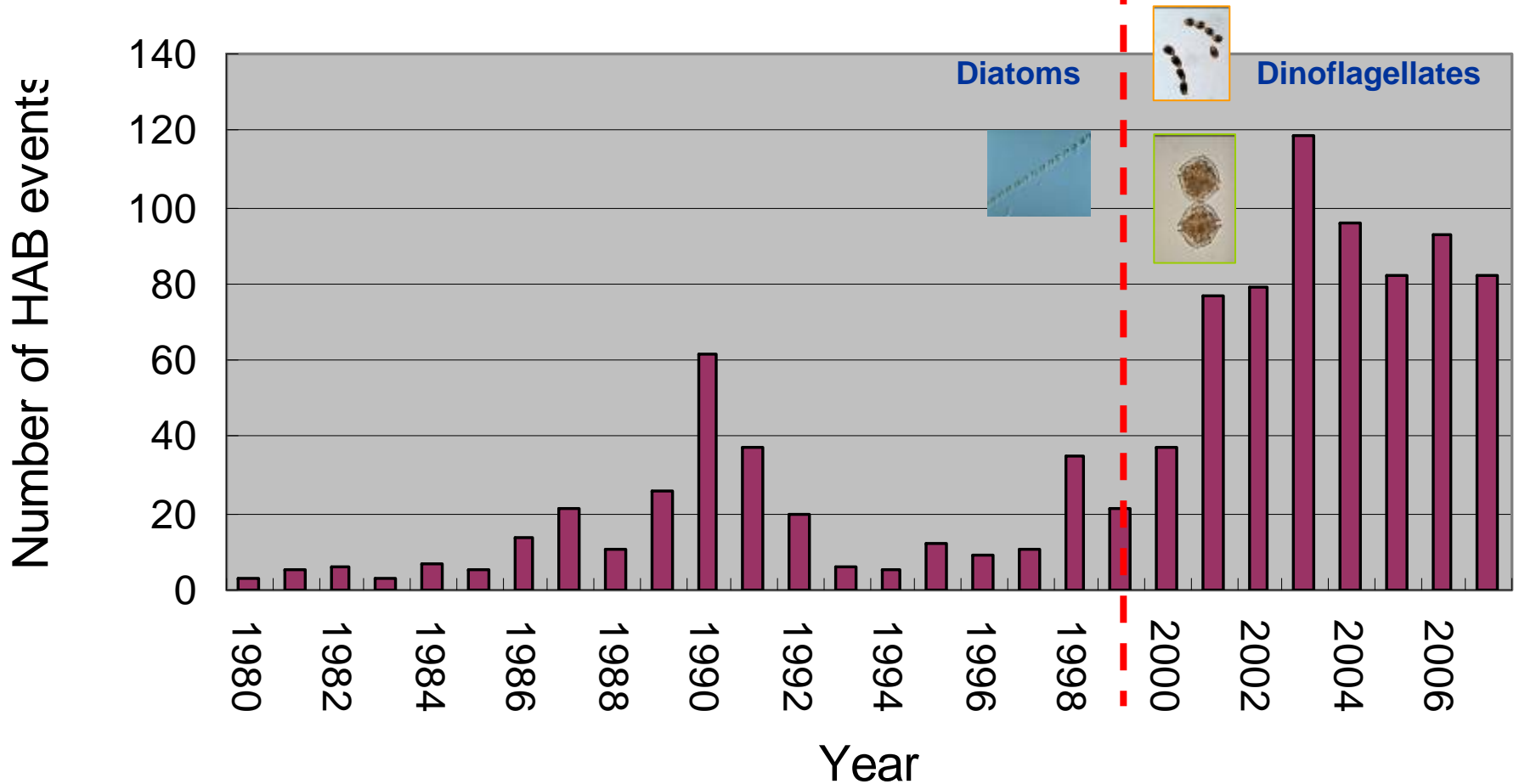
- Lack of national strategy on sustainable ocean development
- Lack of management coordination

1. Increased Eutrophication of Inshore Waters



In 2009, 146,000 km² of offshore waters not meeting water quality standards, of which about 30,000 km² seriously polluted.

Frequent Harmful Algal Blooms & Increasing Toxic Species



An aerial photograph of a coastal area in Zhejiang Province, China. The water is dark blue, and the sky is a lighter blue. In the foreground, there are several large, rocky islands with green vegetation. Numerous fishing boats are scattered across the water, some moving in a circular pattern. To the right, there are large, rectangular aquaculture cages, each filled with a dense grid of white floats. The text "A single HAB event caused over tens of millions of RMB loss in aquaculture in Zhejiang Province" is overlaid in blue at the top of the image.

A single HAB event caused over tens of millions of RMB loss in aquaculture in Zhejiang Province

Karenia mikimotoi 2005-06
complimentary photo from JH Wang

Large Scale Seaweed (*Enteromorpha* sp.) Outbursts

1.3 billion RMB direct loss in 2008

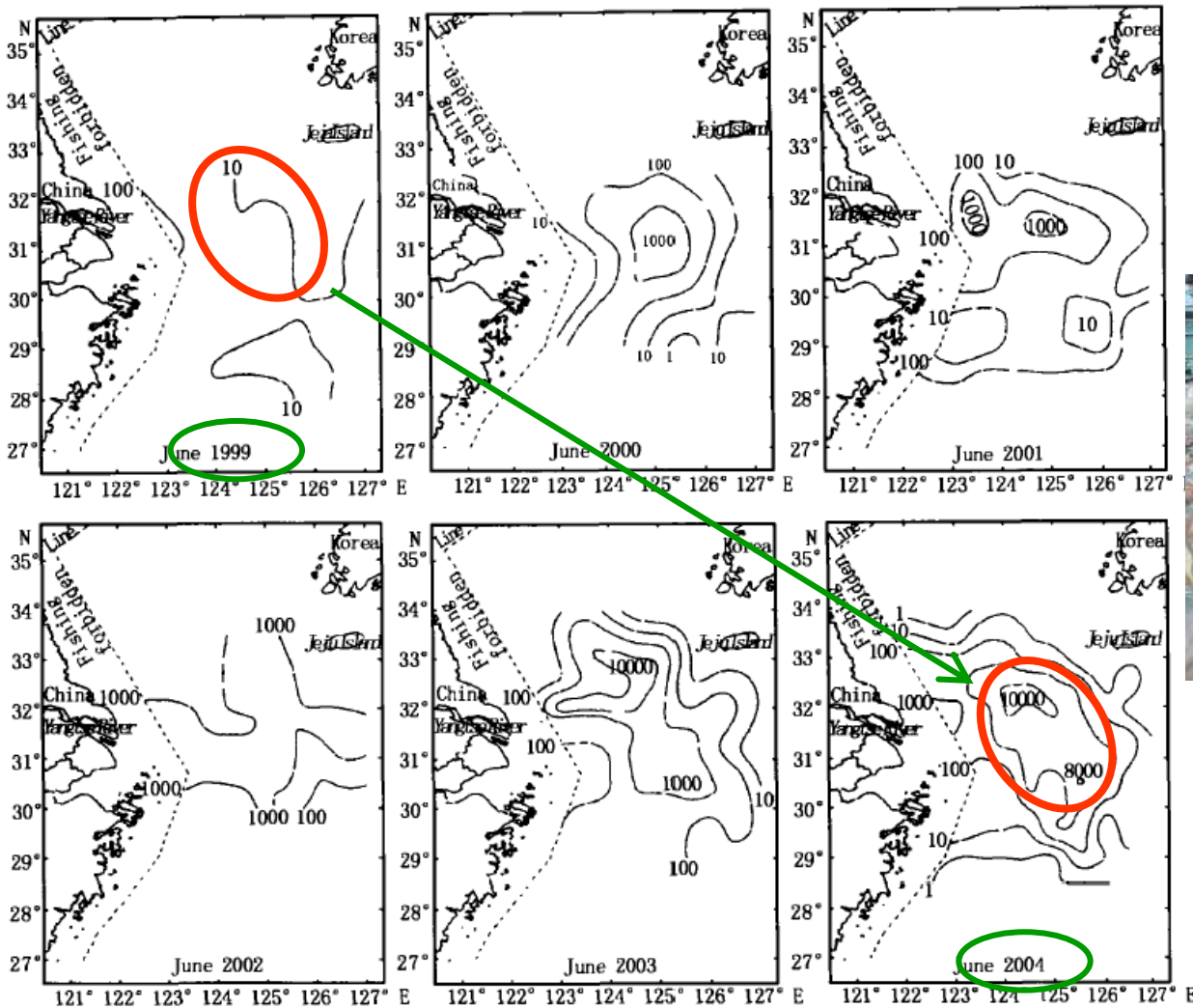


15 July 2009



26 June 2010

Large Scale Jelly Fish Outbursts

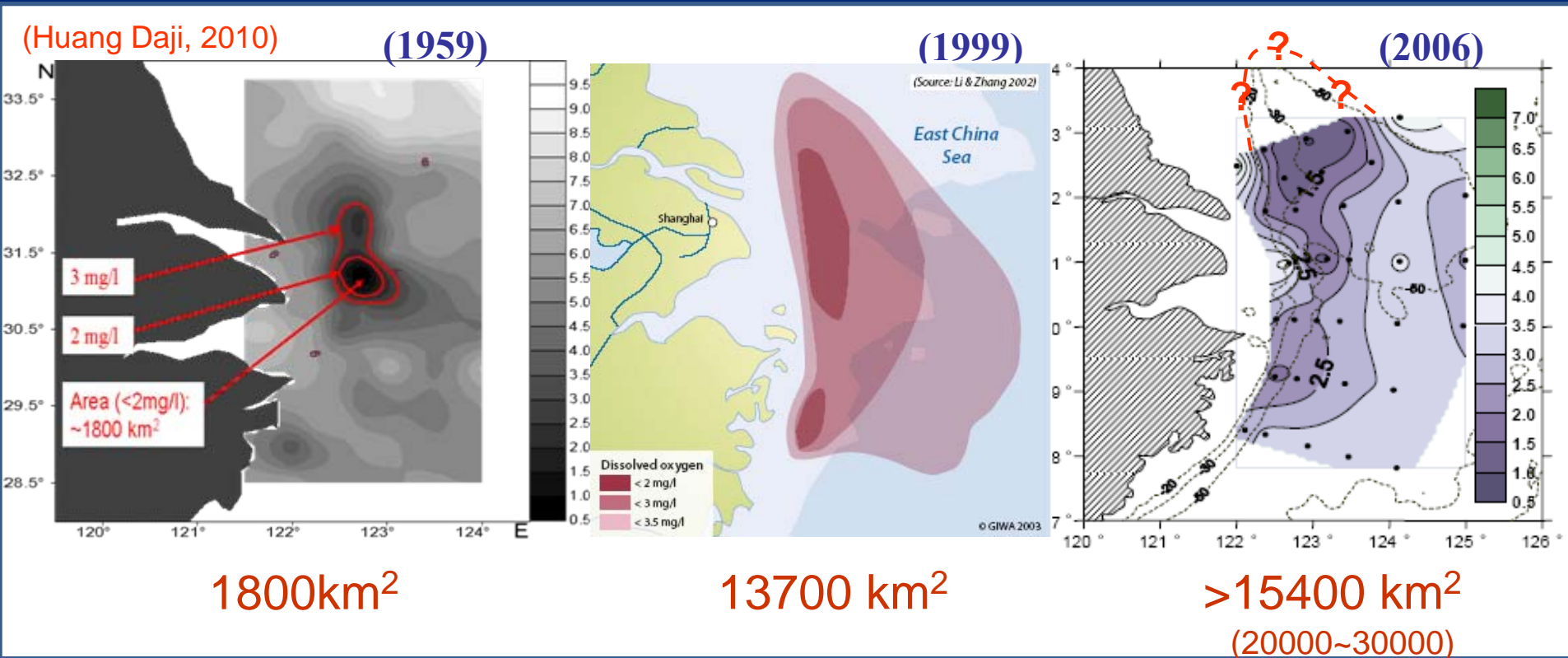


Large scale jelly fish outbursts



(Ding and Cheng, 2005)

Sharp Increase in “Dead Zone” Area off Changjiang Estuary



“Dead Zone” or Hypoxia Area (DO \leq 2.0 mg/l)

2. Large-Scale Sea Enclosing and Reclamation

The four stages of land reclamation in China

1949~1960s	Sea salt industry
1960s~1970s	Farmland
1980s~1990s	Aquaculture
1990s~now	Harbor, industry and city development



Large Scale Land Reclamation

Tianjin

Bohai Bay

- In the last decade, China has lost nearly 1000 km² or 50% wetlands due to land reclamation
- During 2002~2007, the disappearance of wetland increased from 20 km²/yr to 134 km²/yr

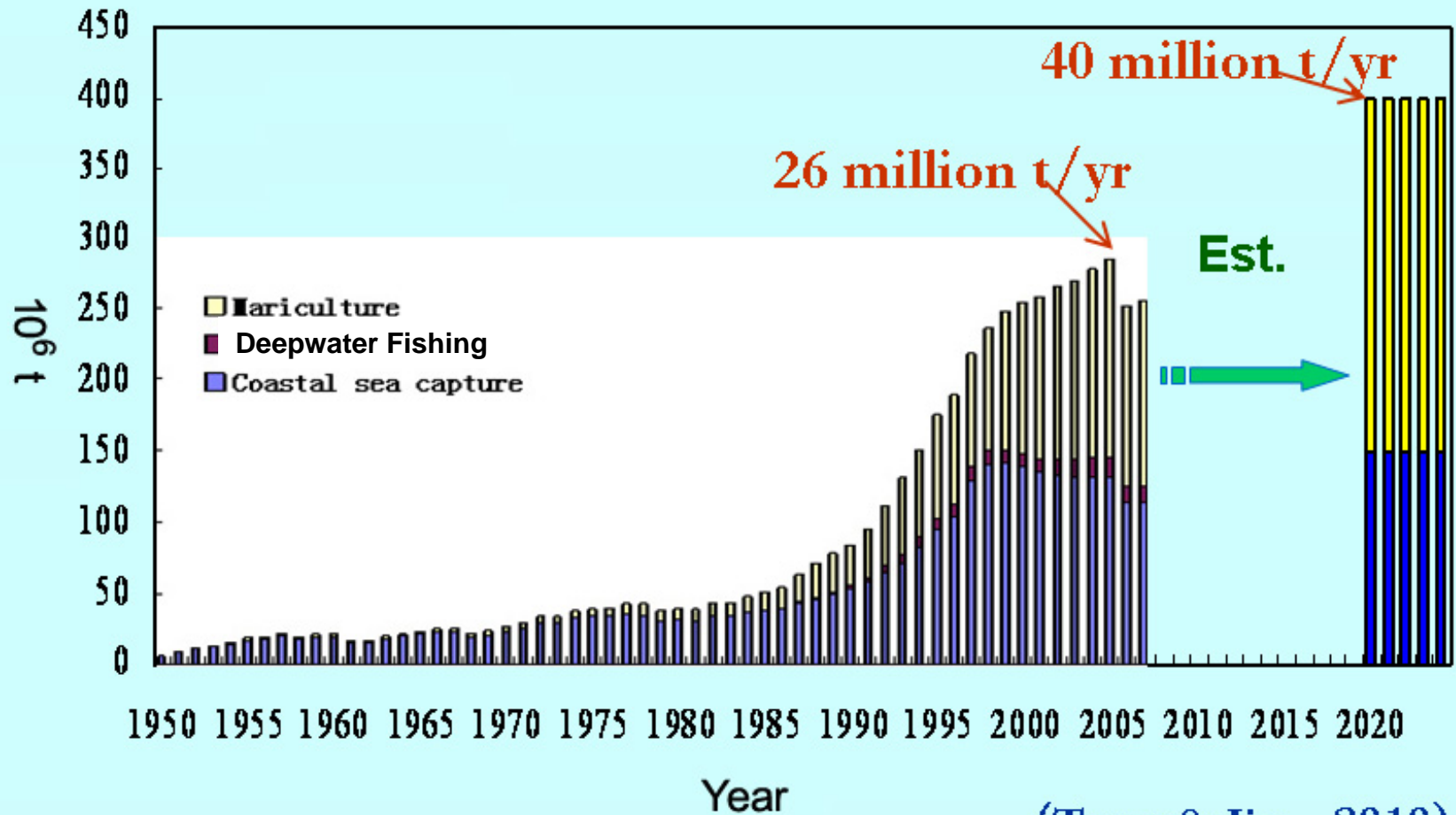
Large Scale Land Reclamation

Laizhou Bay



- In the last decade, China has lost nearly 1000 km² or 50% wetlands due to land reclamation
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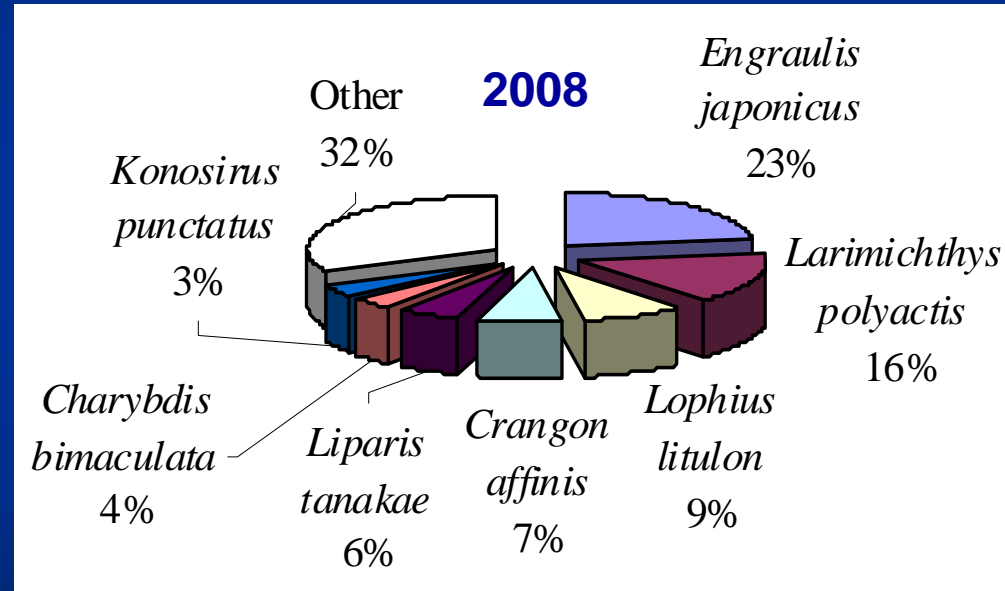
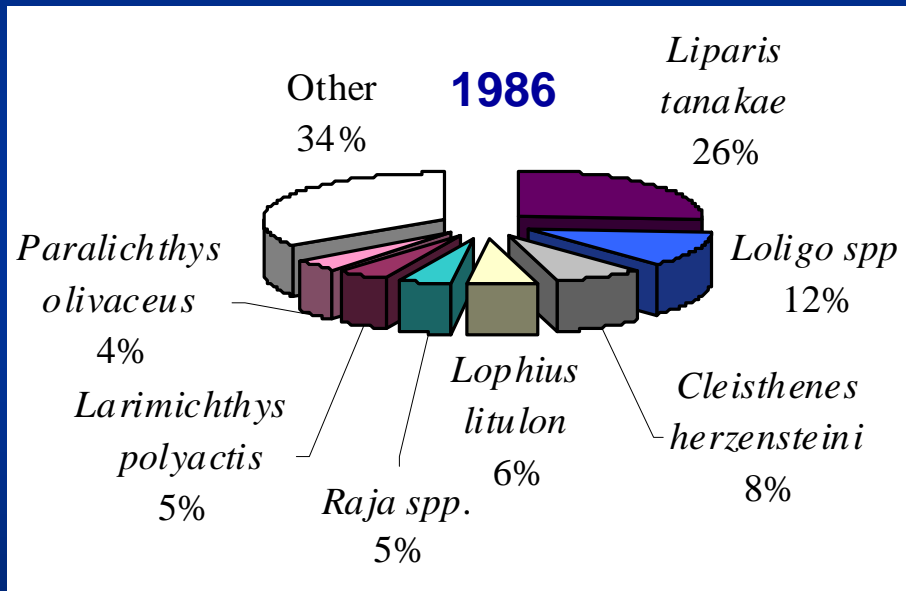
3. Over-Exploitation of Fisheries



(Tang & Jin, 2010)

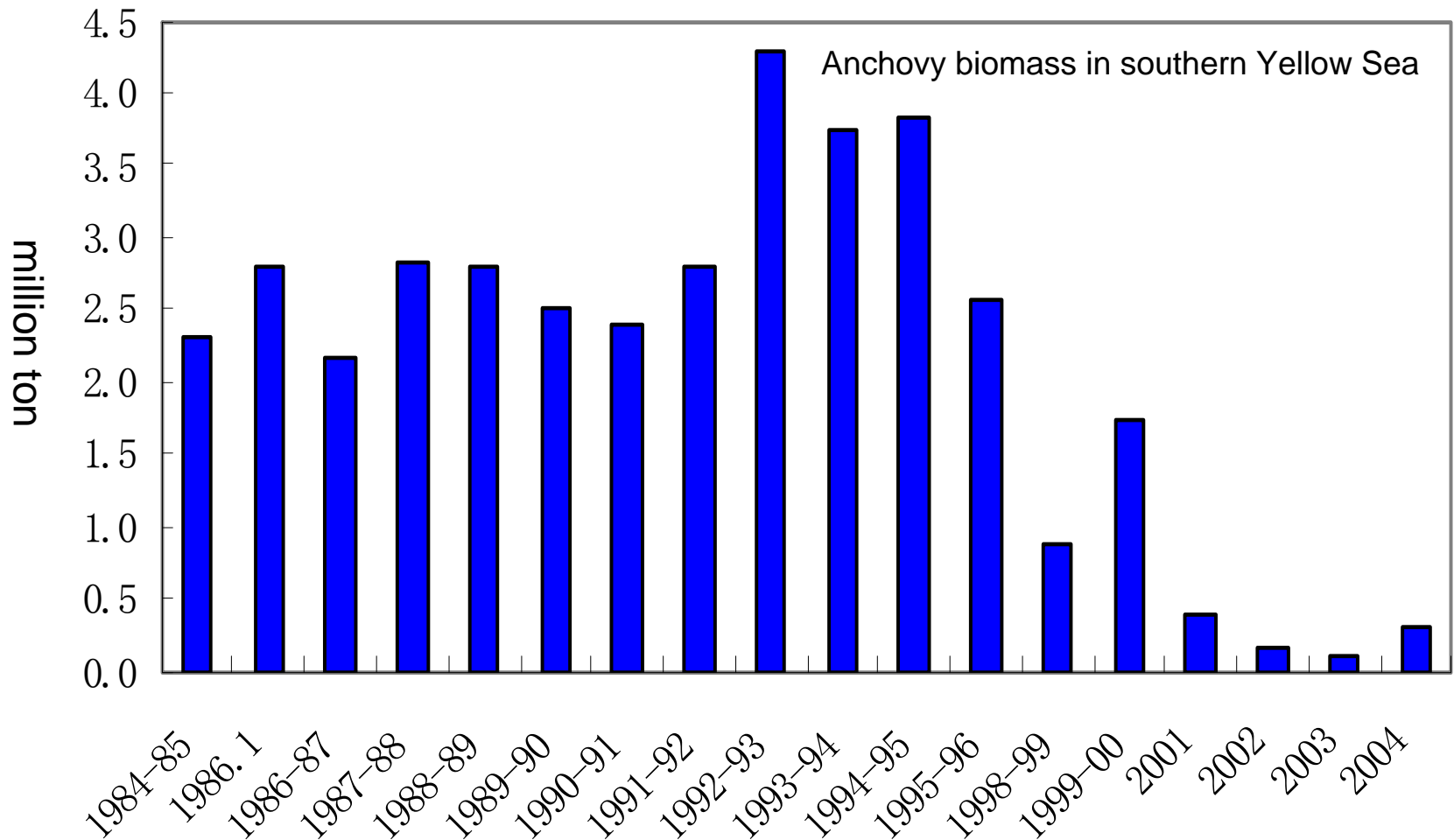
Sharp drop in important fish stock

Increasing ratio of low-valued species



Wild catch value not rising accordingly

Even decline in prey fish biomass



4. Serious Land-Based Pollution –

Deterioration of the Marine environment

5. The Proliferation of Hydraulic Engineering Projects –

Impacts on Estuarine Environments

6. Sea Level, Temperature Rise and Ocean Acidification

– Potential New Threats to the Marine Ecosystems

and others

III. Ocean Development & Marine Ecosystems

Why People Concentrate in Coastal Areas

- Coastal development provides jobs
- Diversity of coastal population attractive
- Pleasing and enjoyable living conditions

The services of coastal ecosystems support all these favorable conditions

Human Beings and the Ecosystem

- Our living necessities and life quality amenities are derived from the ecosystems we are part of

Generally we refer to these functions as
Ecosystem Services

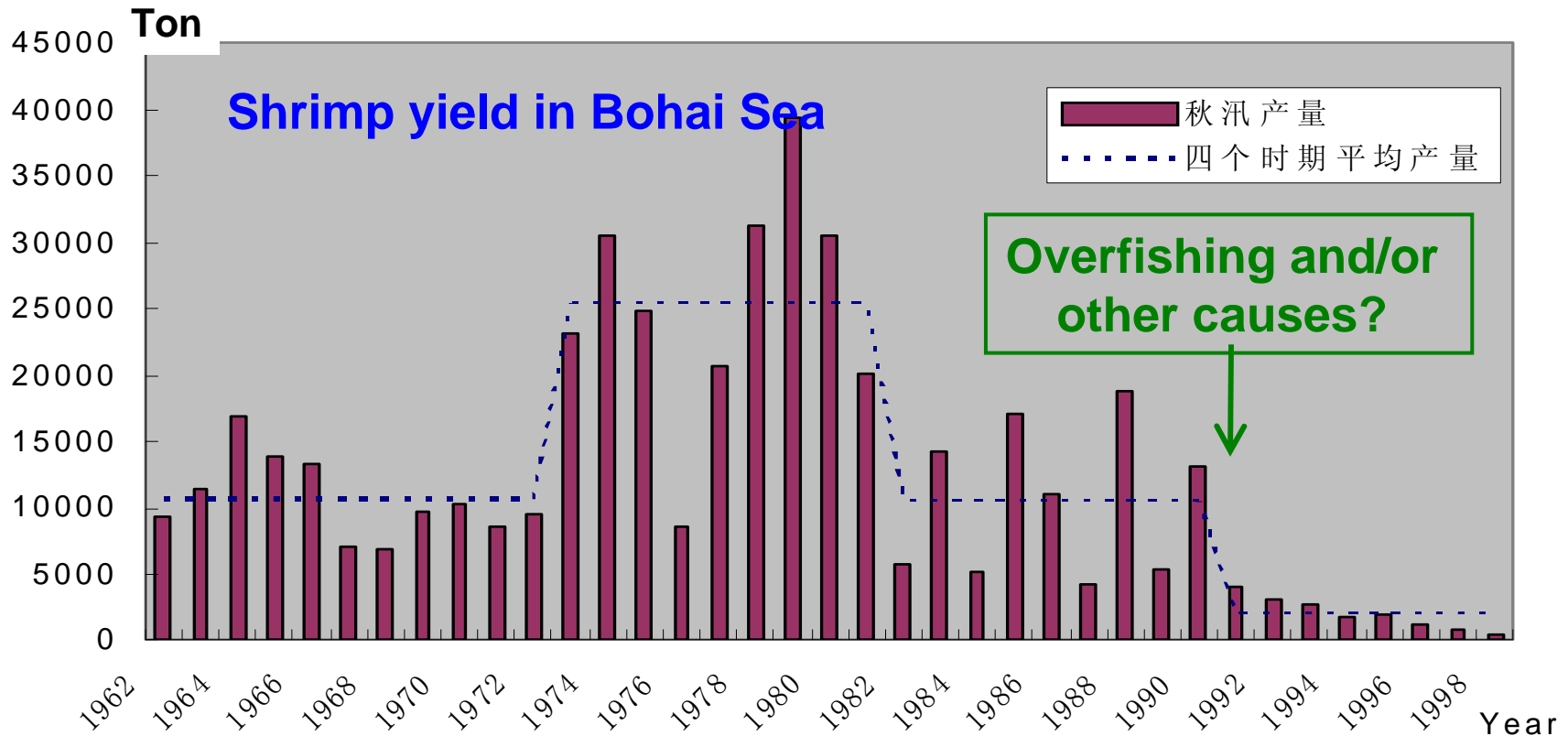
- **Services** include *Materials* and *Environment* derived from the nature for our own welfare (consumption, utilization and enjoyment)

Ecosystem Services & Stressors –

Example of Shrimp *Penaeus chinensis*

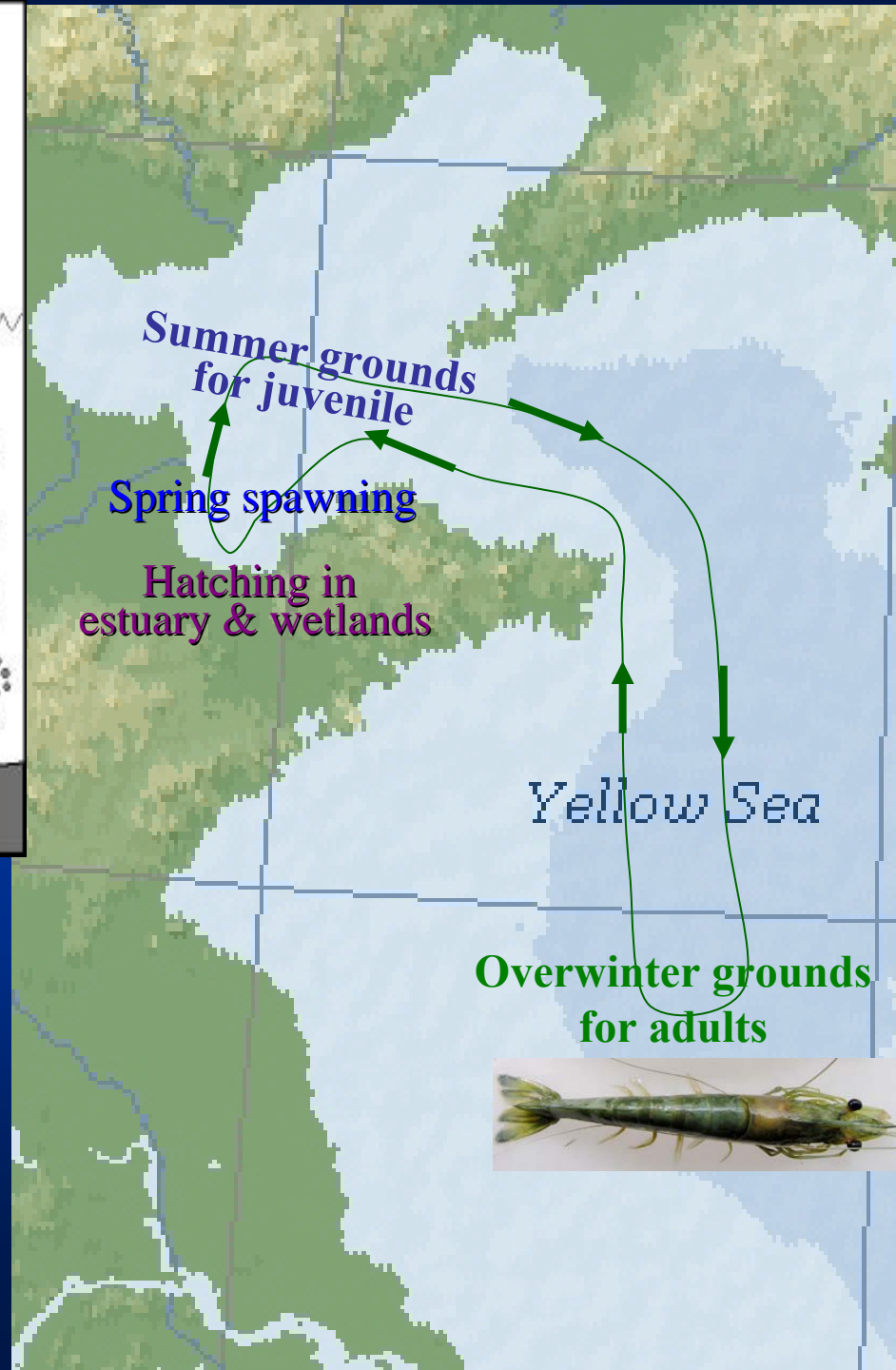
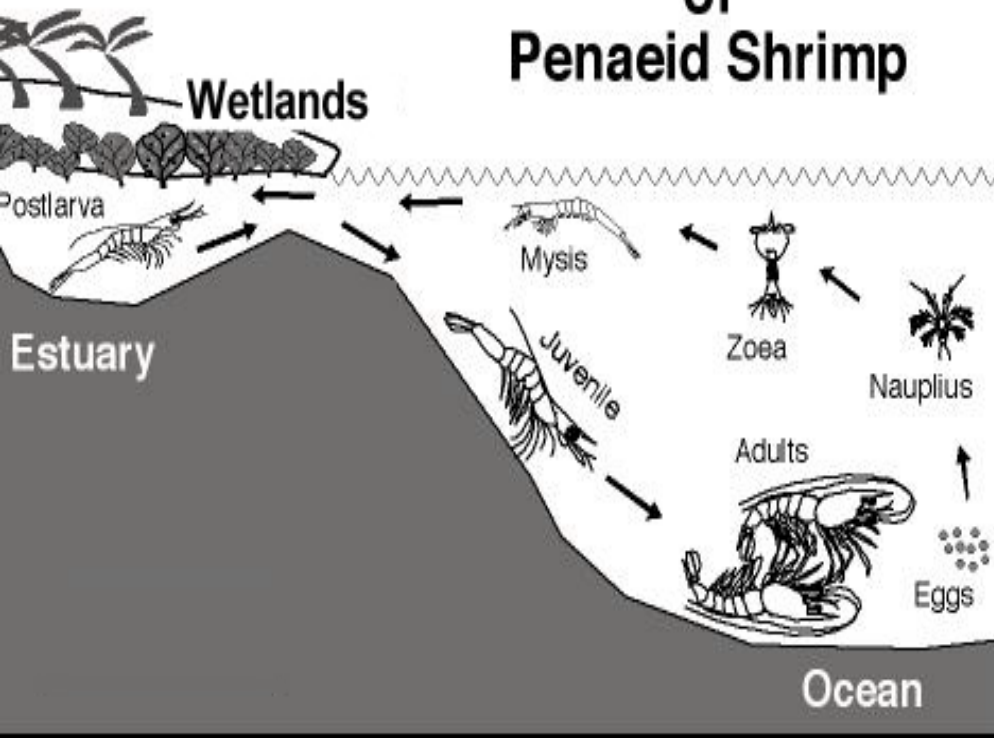


Example: sharp drop in fishing yield of shrimp *Penaeus chinensis* after 1990



In addition to **overfishing**, other human activities or natural stressors on the ecosystems may also influence the shrimp yield.

Life Cycle of Penaeid Shrimp



Take, as an example, the *Penaeus chinensis* species spawning in the Laizhou Bay



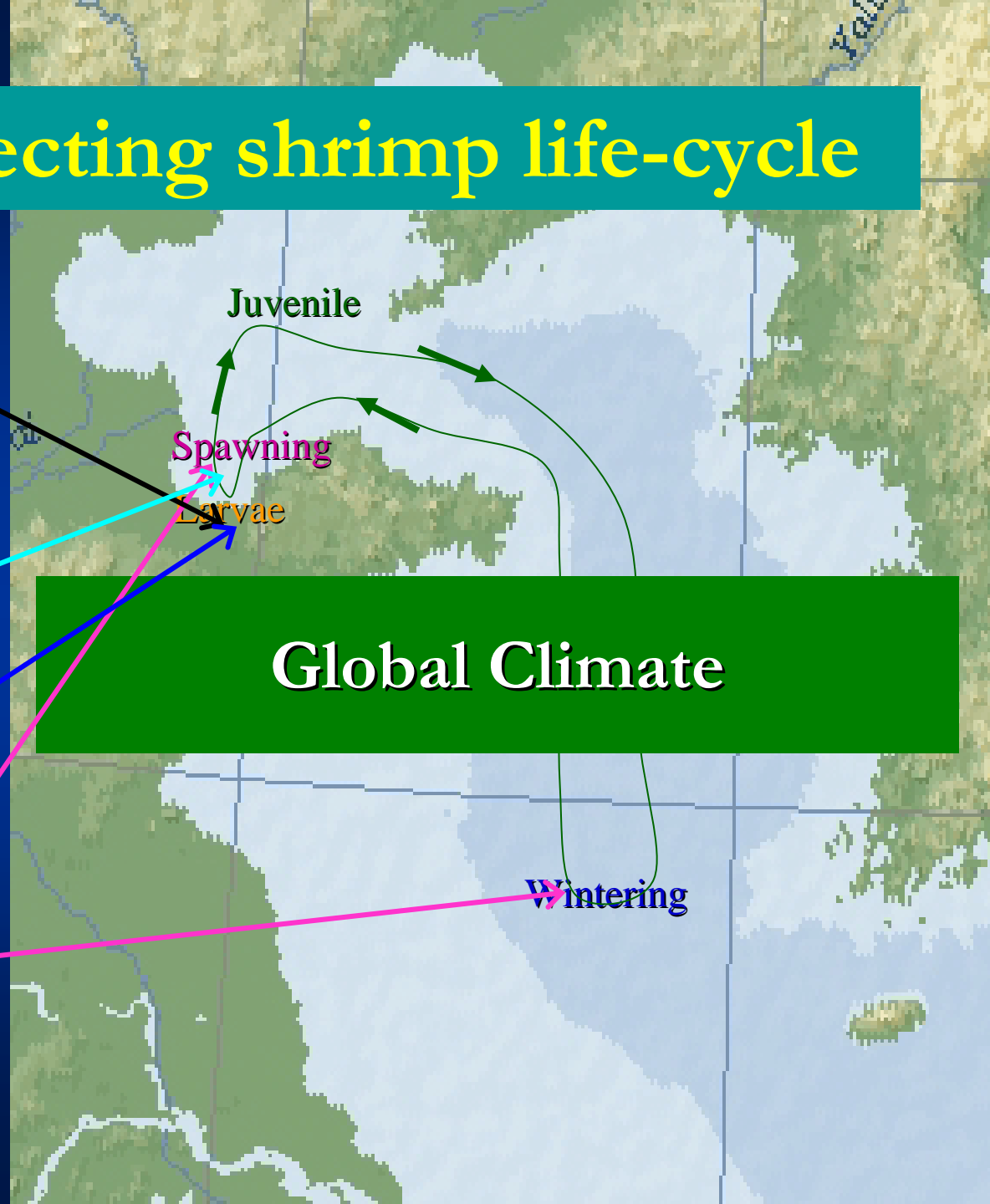
Factors affecting shrimp life-cycle

- Reduced discharge

- Eutrophication

- Reclamation

- Over-fishing



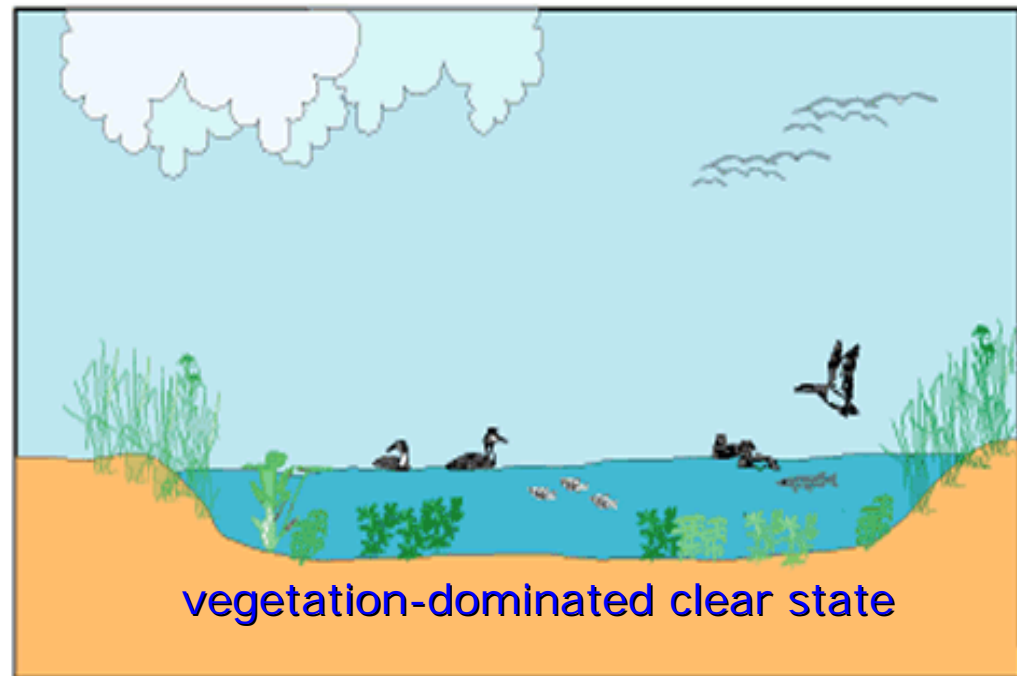
IV. International Experience in Sustainable Ocean Development

Ecosystems are highly nonlinear in nature

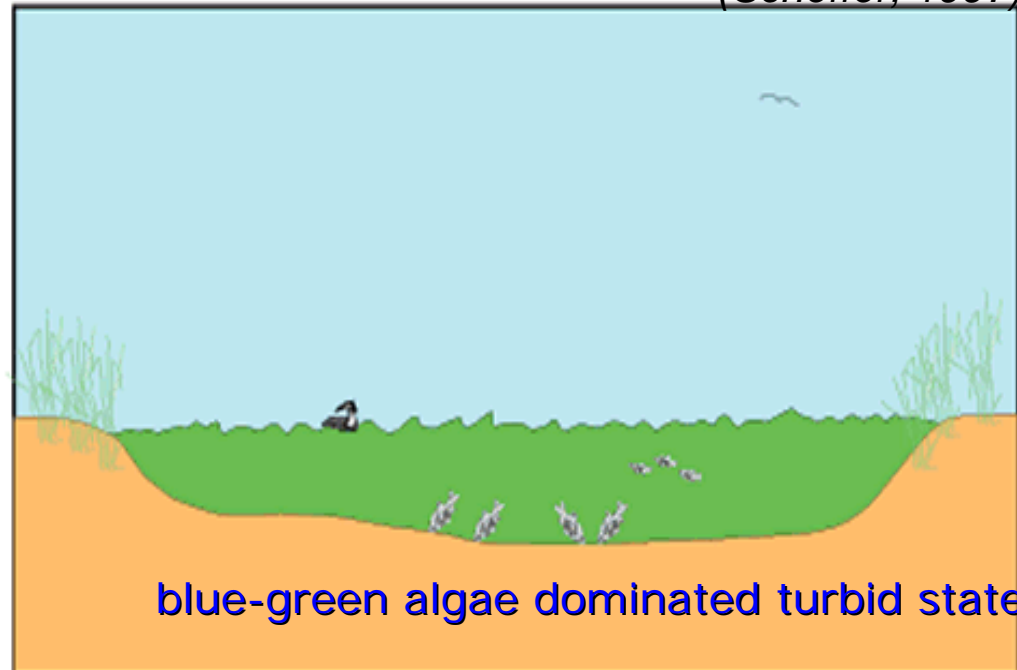
May have drastic changes under pressure

**Resulting in loss of desirable service
functions**

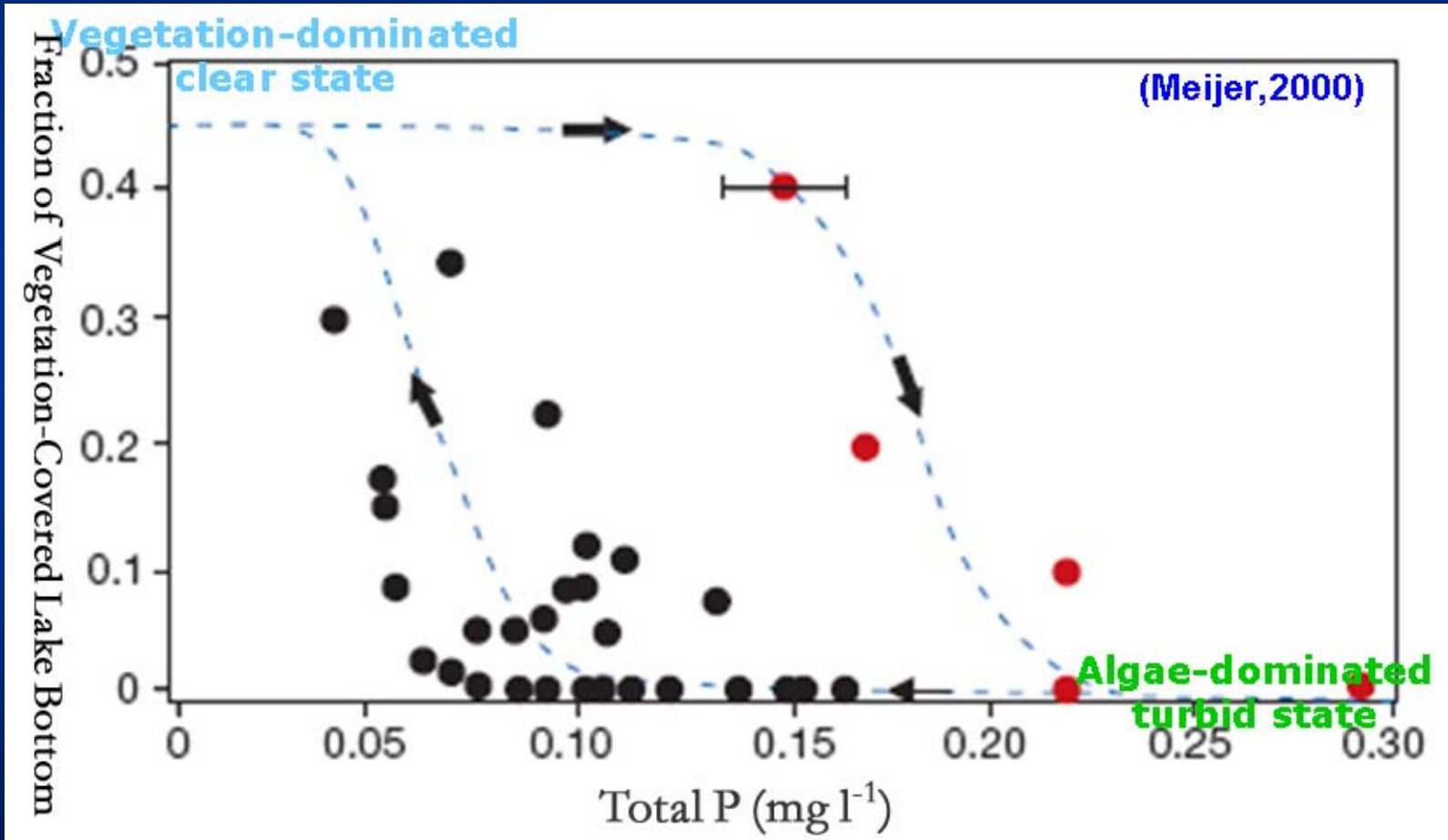
Lake example:
loss of wetlands and eutrophication will turn a shallow lake from a **vegetation-dominated clear state** to an **algae-dominated turbid state**



(Scheffer, 1997)

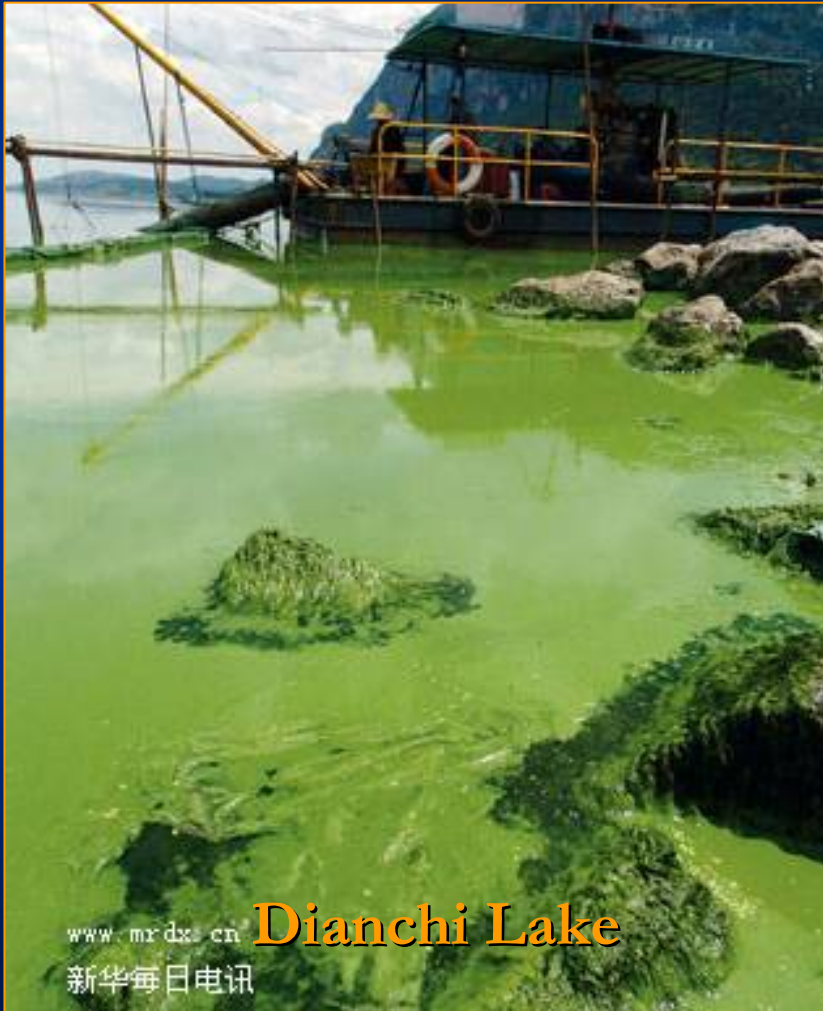


Hysteresis between Turbid and Clear States Rehabilitation Time Consuming & Expensive



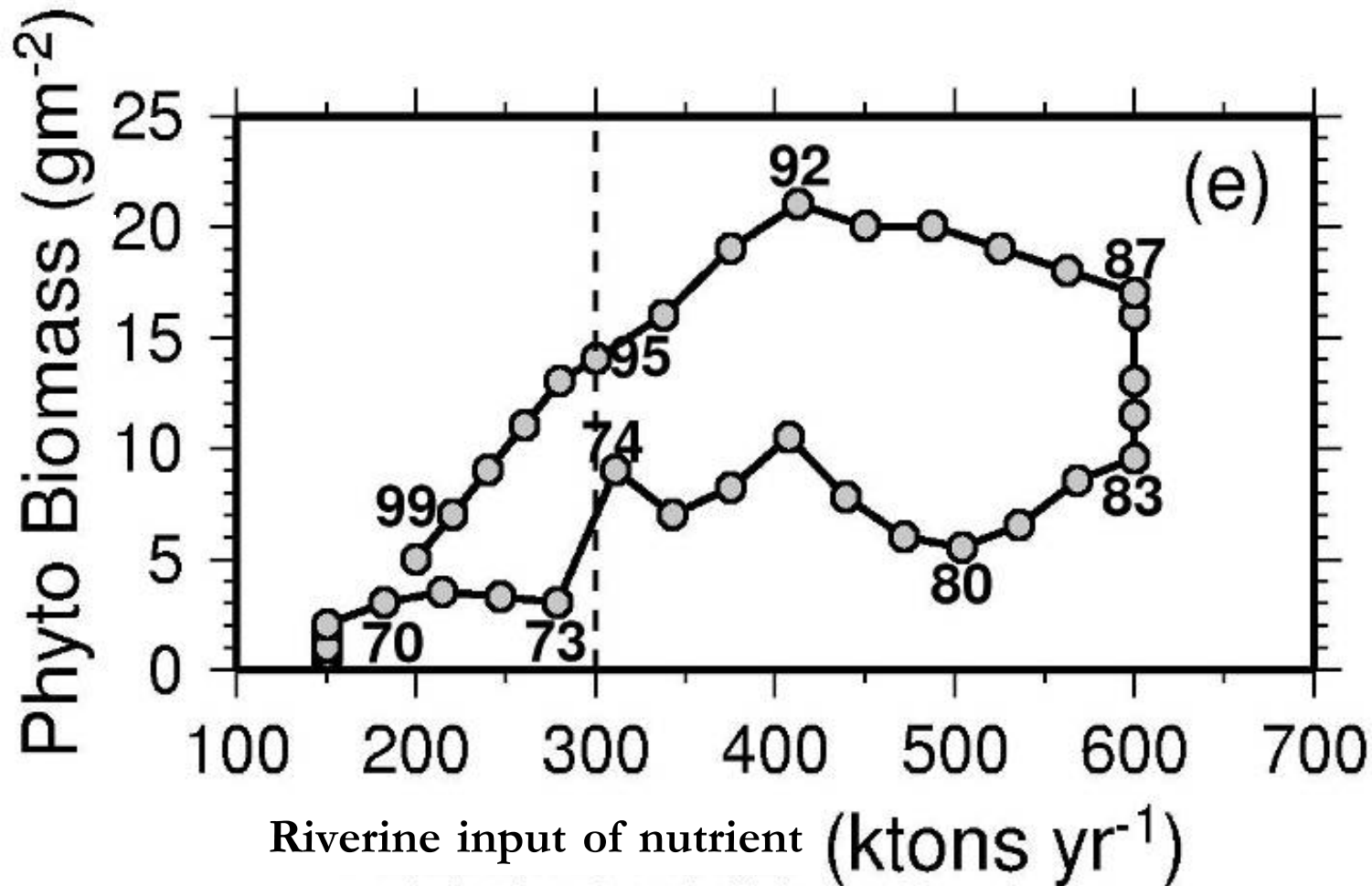
Dianchi & Taihu Lakes are Examples

Hundreds of millions spent with little improvement



Similar examples in bays and seas

Hysteresis also in Black Sea (Oguz etc, 2007)



**To achieve Sustainable Ocean
Development, must emphasize
ocean ecosystem protection**

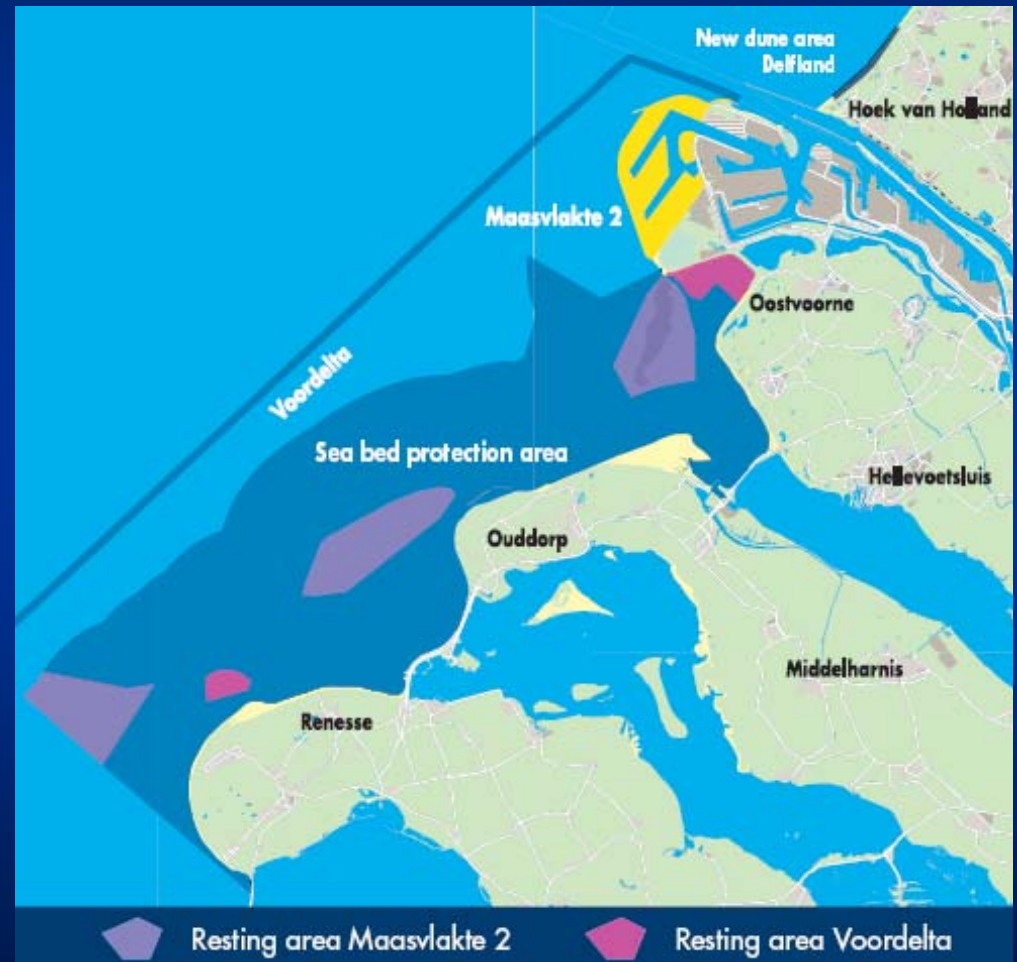
International Experience

Abide by (1) Ecosystem-Based Approach for Ocean Governance, and (2) Integrated Management from Watersheds to the Ocean

A Comparison: Expansion of Maasvlakte 2

20 km² land reclamation project:

- Planned in 1990's
- EIA report was more than 6000 pages long
- Project implemented in 2008, to be in use by 2013
- A 250 km² nature compensation area was set up nearby
- A 750 ha protected area was rehabilitated and set up for recreational purposes



V. Goal of Sustainable Development of China's Ocean & Coasts

Repeated Emphasis by the Central Government

Develop ocean economy, but at the same time:

- **Attach great importance to the environment, development while protecting environment**
- **Green development, green economy**
- **Strengthen scientific research, practice science-based development**

Suggestions for 'The 12th Five-Year Plan' on National Economy and Social Development

(The Fifth Plenum of the 17th CPC Central Committee, 2010.10.18.)

Develop Ocean Economy

- **Continue to advance integrated terrestrial-ocean management**, in setting up and implementing ocean development strategy, and **enhance the ability for** ocean exploitation, governance and **integrated mgt.**
- **Scientifically plan for ocean economic development**, including offshore oil and gas, transportation, fishery and other industries; and rationally utilize ocean resources. Strengthen the building of fishing harbors, and **protect ecosystems of islands, coastal zones and the ocean.**
- **Guarantee the safety of navigation paths**, and **protect national ocean rights and interests.**

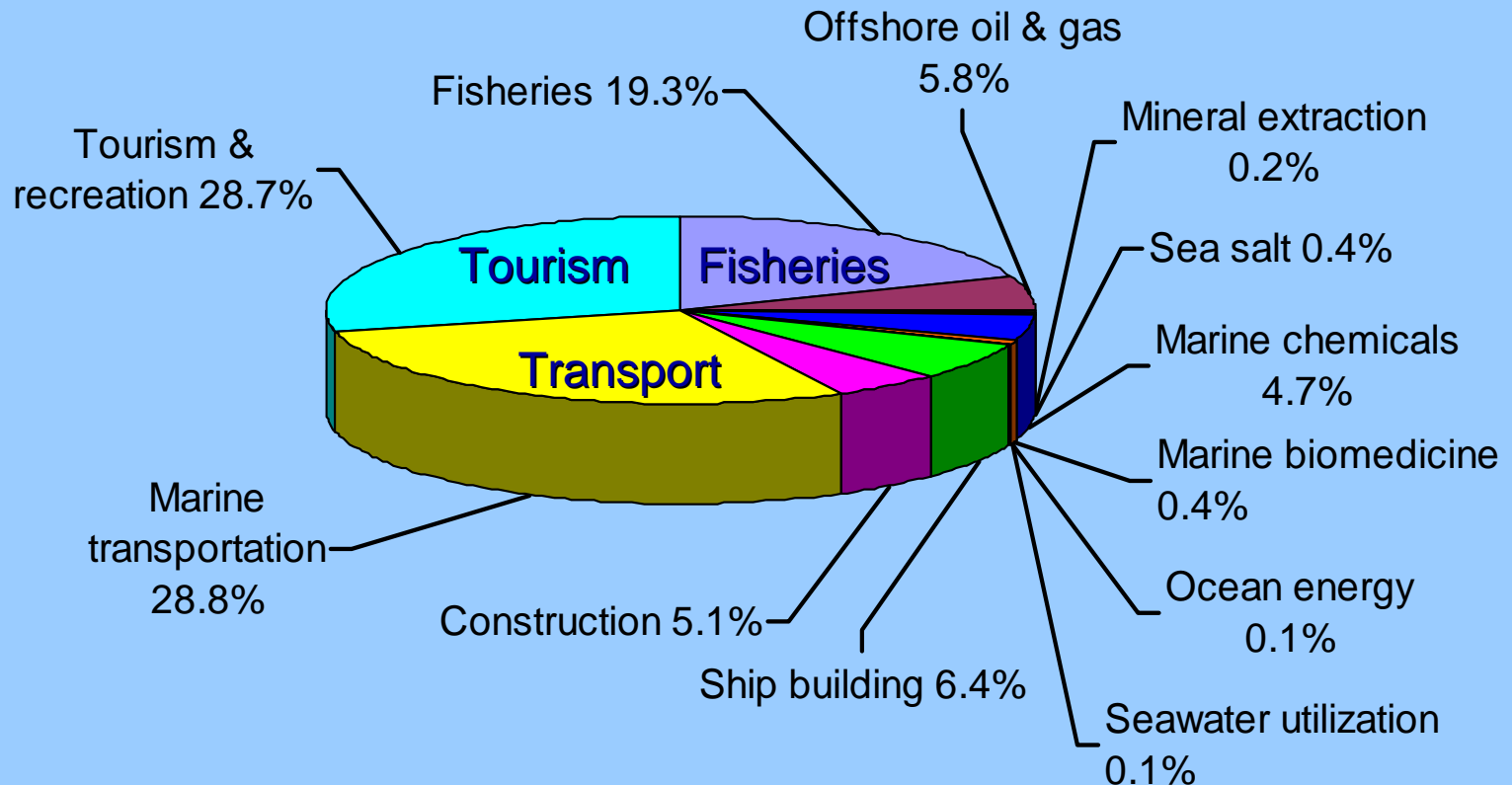
Reality: Challenges Facing Sustainable Development of China's Ocean Economy

- **New round of coastal development ongoing**
 - Several key industrial revitalization plans for the coasts
 - Speeding industrialization and urbanization along the coasts
 - Large-scale relocation of heavy industries to coastal areas
 - Large-scale land reclamation plans throughout the coasts

Propose: Strengthen Ecosystem Protection

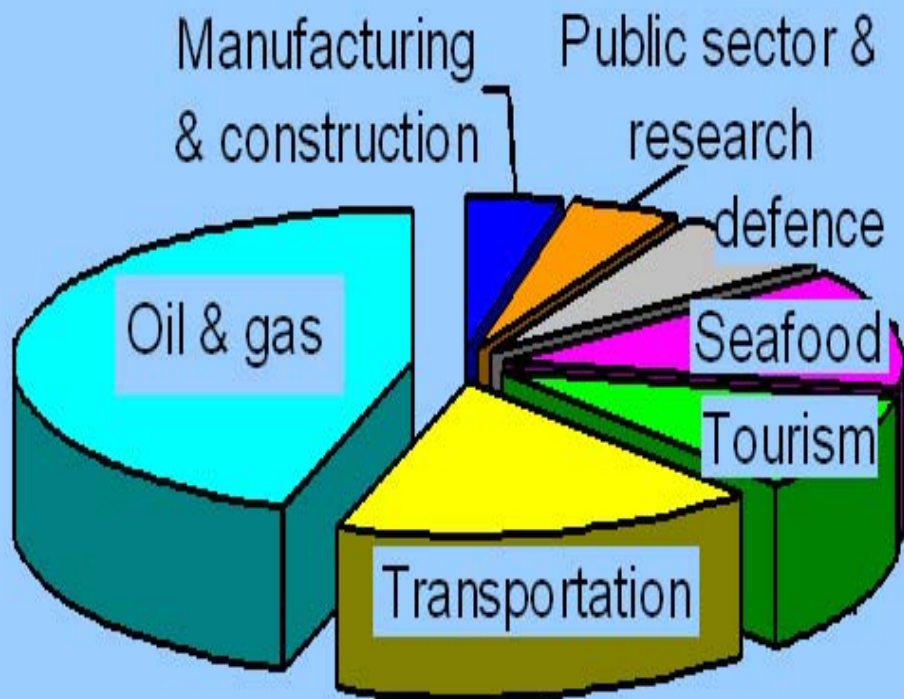
Healthy Growth of Tourism and Fisheries

(China, 2006) Direct - Ocean GDP by sector



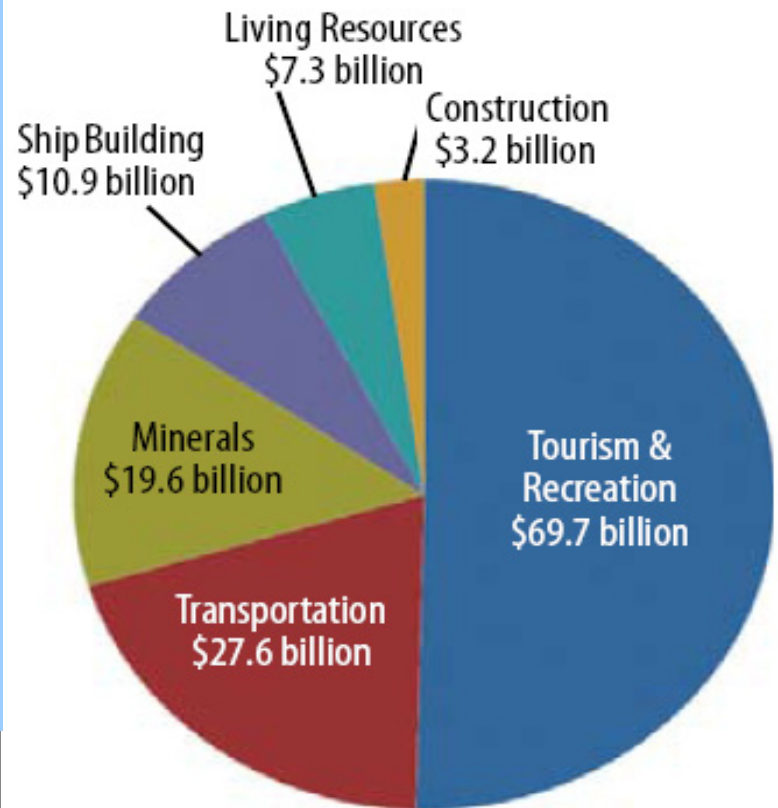
International Marine Economy Examples

(Canada, 2006) Direct - Ocean GDP



The U.S. Ocean Economy 2004

- 1.2% of U.S. GDP
- 2% of U.S. jobs



Addressing the Top Challenges

1. Natural issues

- Eutrophication (land to ocean mgt)
- Land reclamation (region/project EIA)
- Overfishing (capacity & bottom-trawl)

2. Socio-Economic issues

- ↗ Coastal development (region/local strategy)

3. Management issues (policy recom)

- Lack of national strategy on sustainable ocean development
- Lack of management coordination

VI. Policy Recommendations

Current Status of Chinese Ocean Management

- Existing problems in ocean management
 - Lack of strategic plan for integrated management of ocean, coasts and rivers
 - Lack of a whole-of-government approach to management
 - Lack of adequate regulations
 - Lack of consistent policies
 - Lack of adequate operational enforcement

Policy Recommendations

Recom 1: Develop a National Strategy for the Sustainable Development of the Ocean and Coasts

Recom 2: Create A National Oceans Council

(to be led by a Vice-Premier of the State Council)

Bohai Sea Priority-Early focus of National Ocean Council

Policy Recommendations

**Recom 3: Develop an Integrated Ocean Management
Legal Framework**

**Recom 4: Implement Ecosystem-Based Integrated
Ocean and Coastal Management**

**Recom 5: Implement an Optimal Plan to Minimize
Negative Impacts of River Basins on Ocean & Coasts**

Policy Recommendations

Recom 6: Strengthen the Long-Term Monitoring and Forecasting for Terrestrial and Aquatic Ecosystems, and related Fields of Science

Recom 7: Enhance the Early Warning and Emergency Response System for Major Marine Pollution Incidents

Recom 8: Establish a Campaign to Promote Ocean Awareness and Public Participation

- **TASK FORCE MEMBERSHIP**

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Thank You !