3RD YSLME SCIENCE CONFERENCE
15-19 July 2019
Qingdao, PR China

Proposal of YSLME biodiversity conservation plan in RO Korea

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GLOBAL OCEAN

gef UNDP UNOPS YSLME UNDP/GEF Yellow Sea Large Marine Ecosystem

Part I. YSLME Conservation Plan
Part 2. Case Studies

Part I. YSLME Conservation Plan

1. Background
2. Law and Institution
3. Proposed Plan

- Adopted from RO Korea's 2nd Marine Biodiversity Management Plan (Prof. Ryu Jong-Seung)

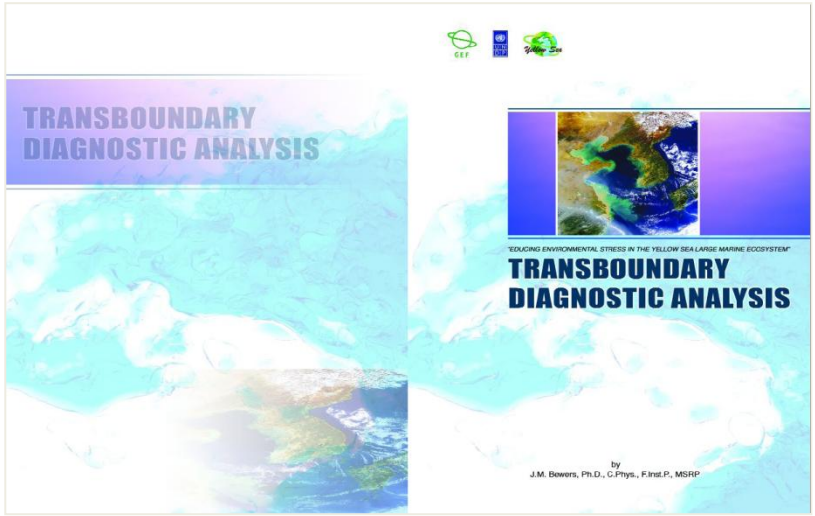
15 years of Yellow Sea project

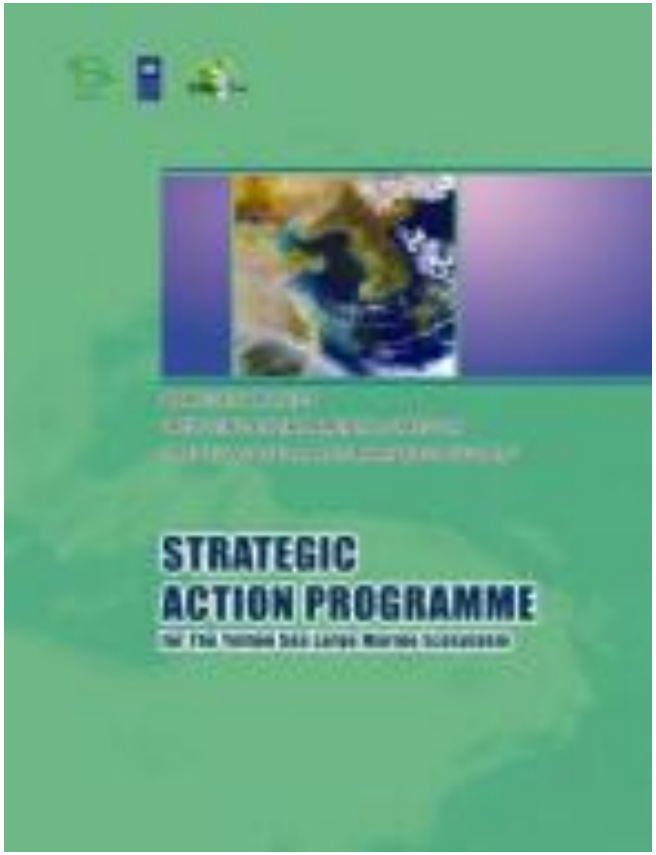
1st phase

2005 YSLME Project Inception
2007 Transboundary Diagnostic Analysis (TDA)
2009 Strategic Action Programme (SAP)
2010~2014 Pilot projects

2nd phase

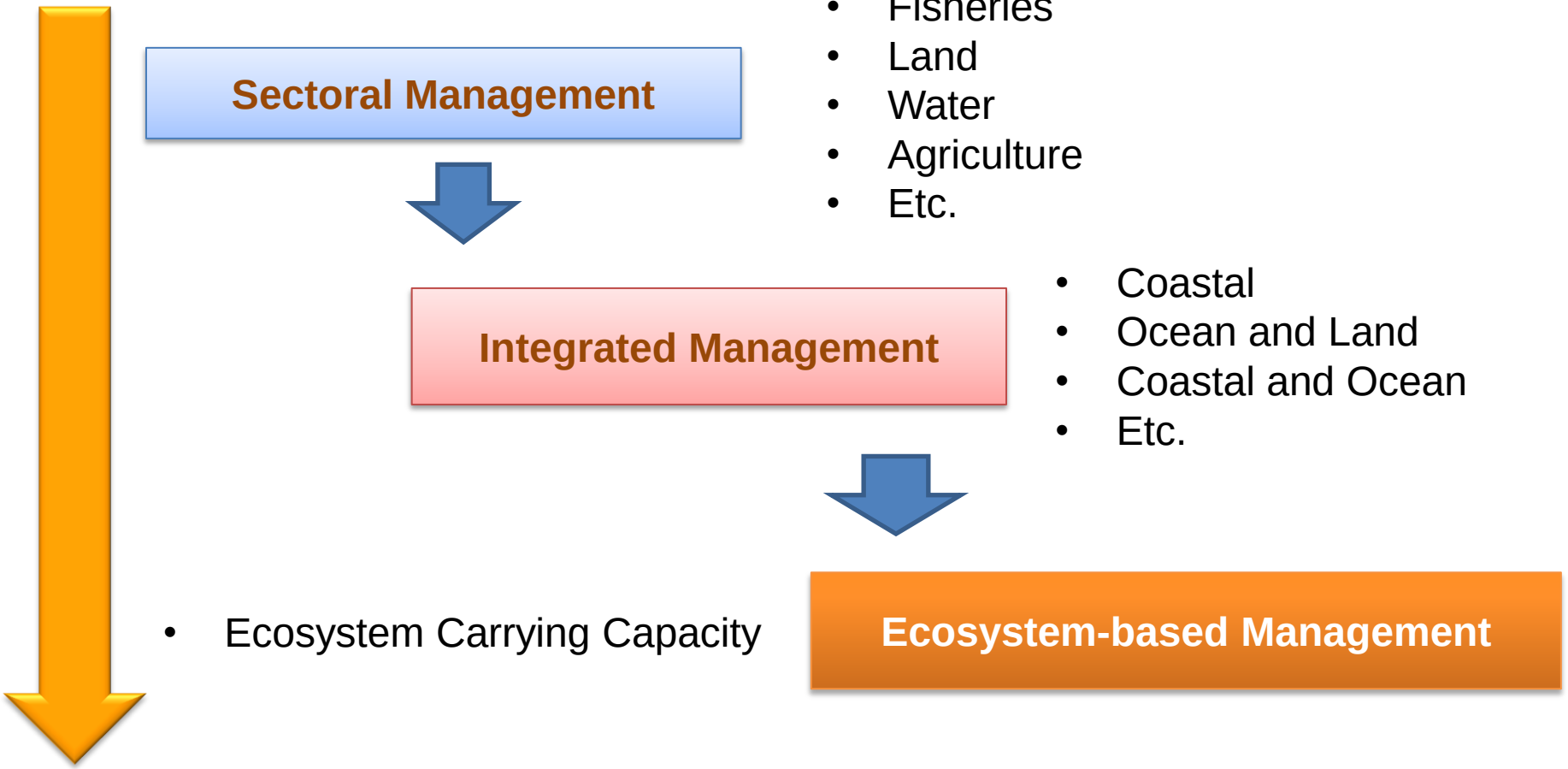
2015 ~ 2019 SAP implementation





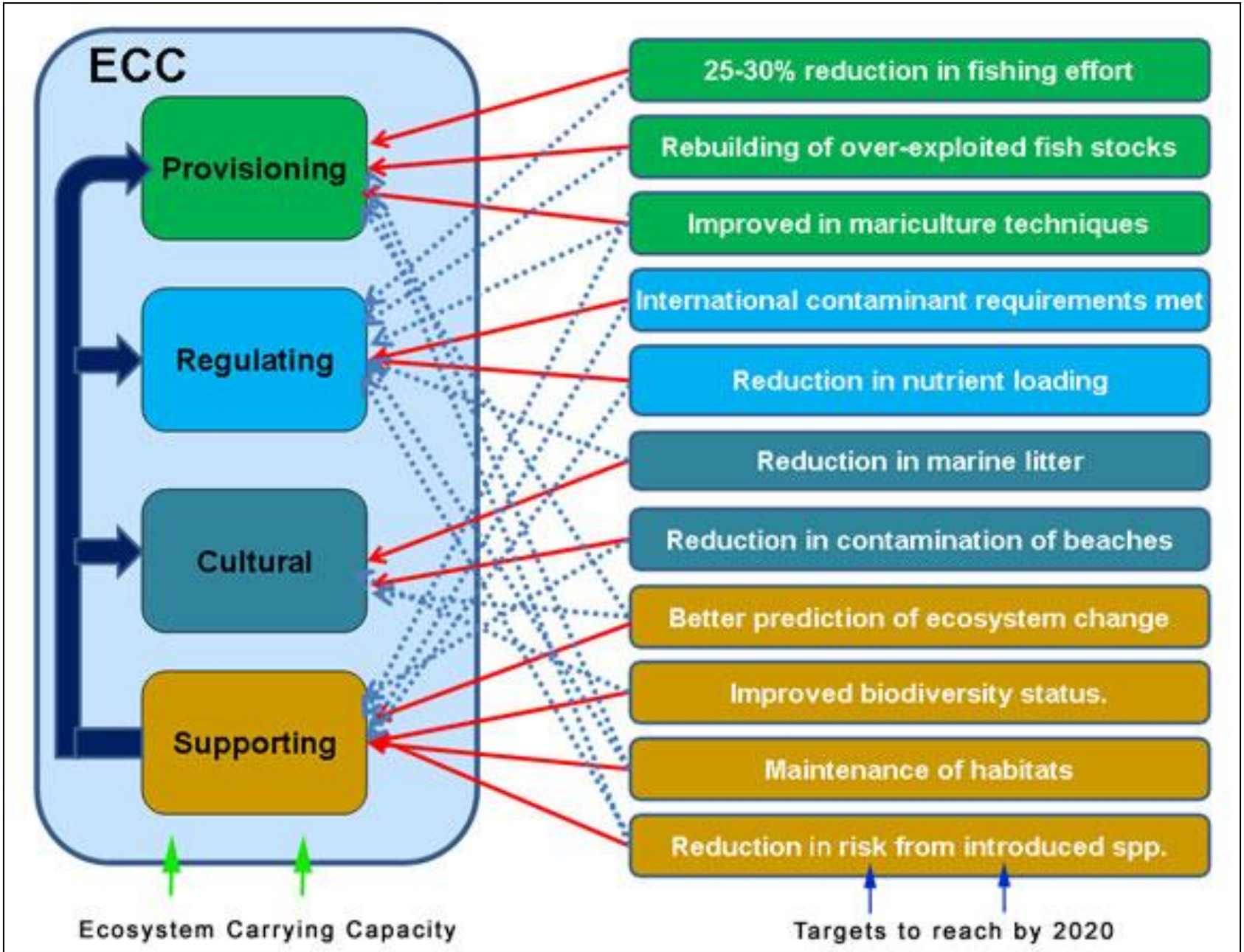
Theory of Change:

Paradigm Shift in Ecosystem Management Practices



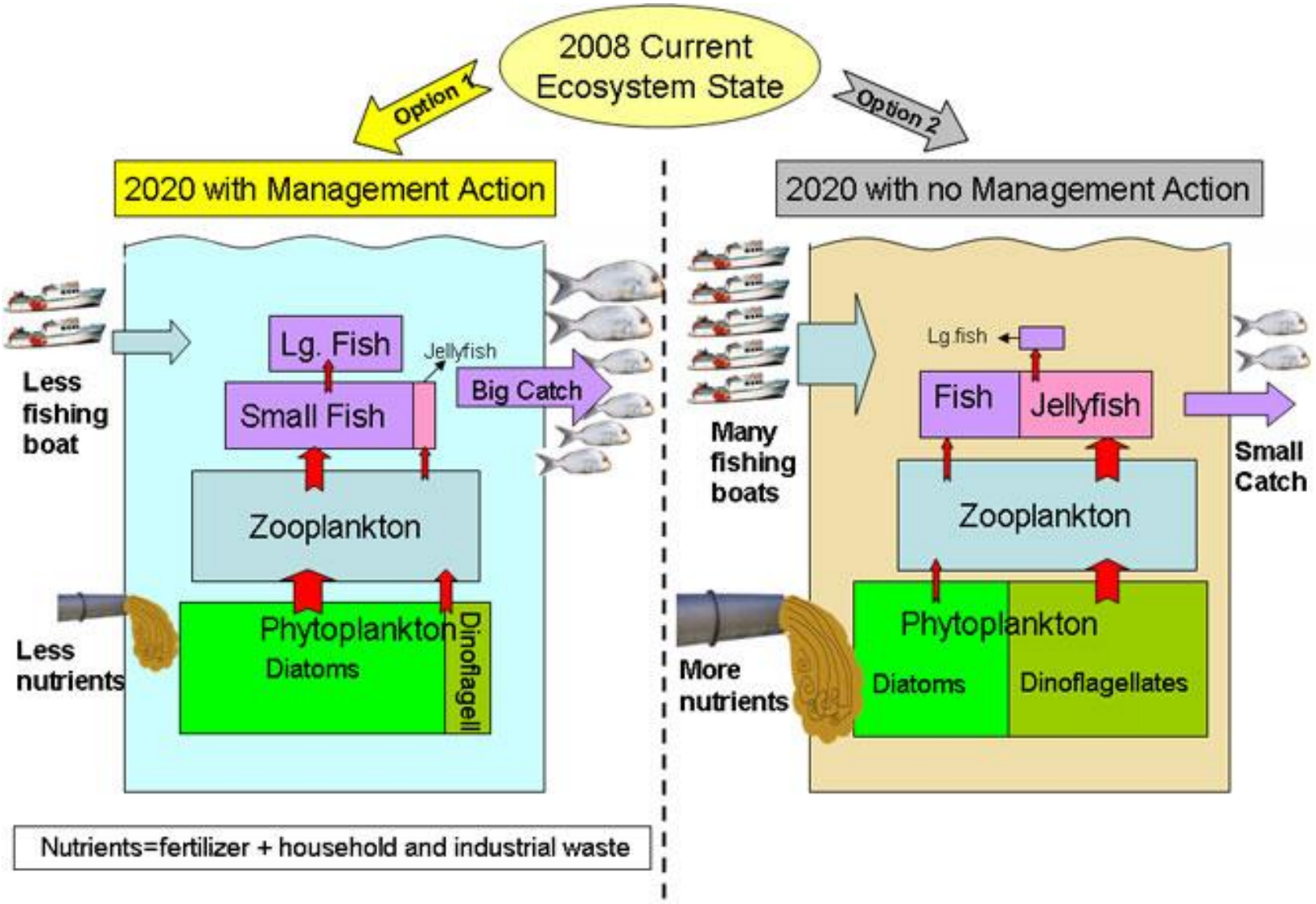
Driving force for change: Economy, Science and Technology

ECC and Targets by 2020 (YSLME SAP)



Projected Changes:

Management Action (with and without)



Trend

Loss of Habitats and Biodiversity

- Coastal development activities (Reclamation) –› loss of habitats, biodiversity and waste assimilation (purification) capacity.
  - Harbor/reclamation engineering projects –› altered the patterns of current/sediment transport and caused coastal erosion.
  - Coastal development contributed in frequent outbreaks of red tides
- During past decades, more than 25% of total tidal flats in Korean coast has been reclaimed
- Decrease of wetlands –› loss of habitats for nesting, feeding, stopover points of migratory birds; 27 endangered/threatened birds are listed by IUCN.

Trend

Habitat destruction and coastal development

1990

2004

Trend

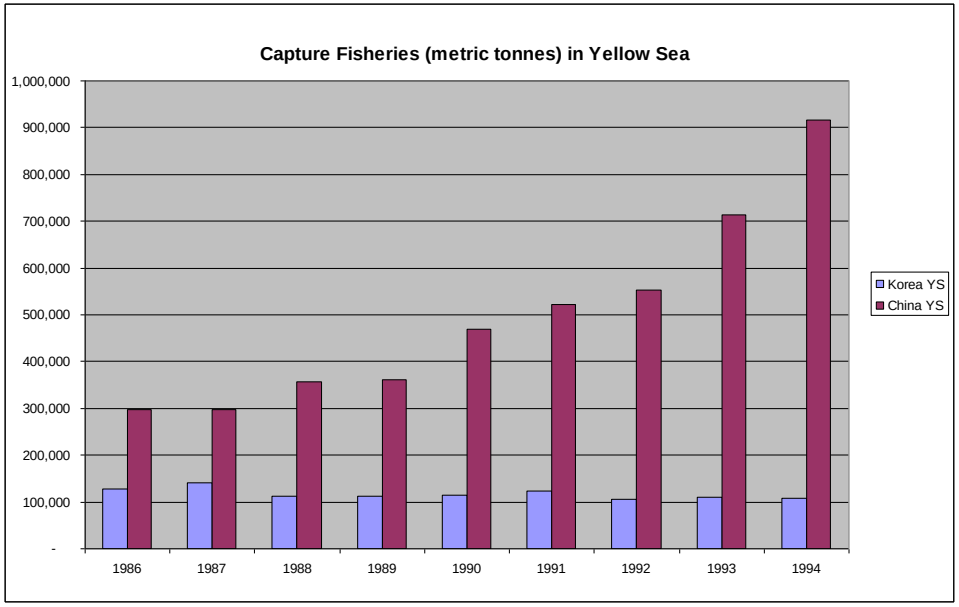
Decline of Fisheries

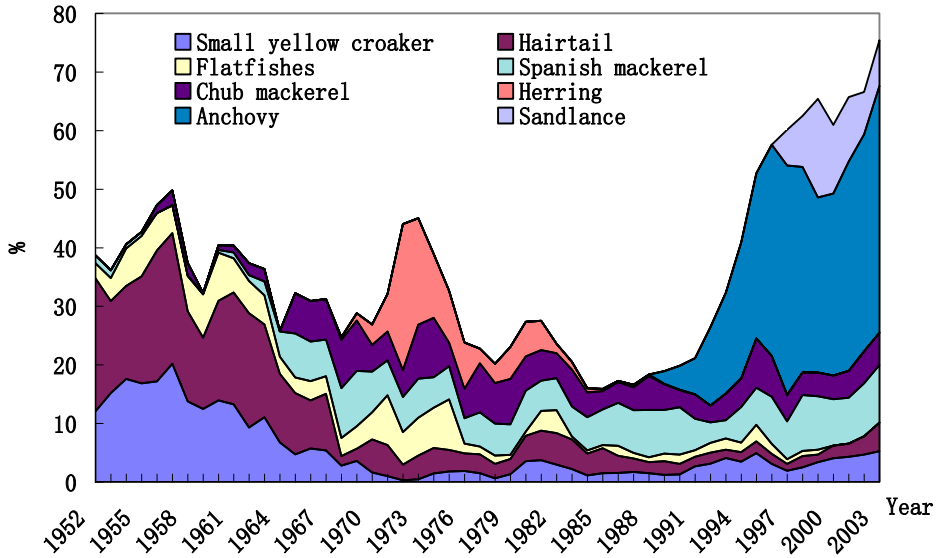
- **CPUE (catch per unit effort) declined to 40%, while fishing effort increased more than 300%** from 1960s to 1990s (Korean case)
- Stocks of *small yellow croaker, hairtail, large yellow croaker, flatfish, cod* and *red sea bream* have been greatly reduced
- Cold water species in the bottom water are almost extinct
- **Shifts in species dominance are outstanding** from *small yellow croaker* and *hairtail* in the 1950~60s to *herring* and *chub mackerel* in the 1970s. Smaller-bodied, fast growing, short-lived, and low-value fish such as *anchovy* and *scaled sardine* increased markedly in the 1980s.

Trend

Overfishing

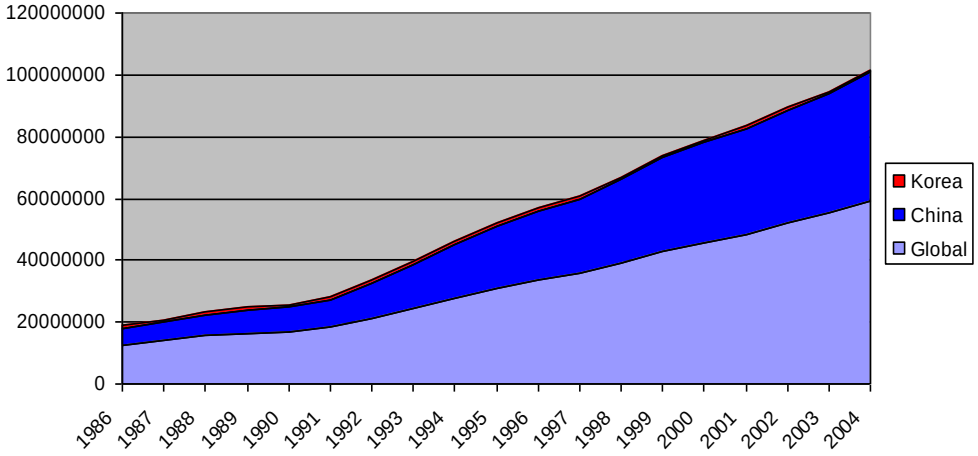
- Change in fish species composition from large, valuable, demersal fish to small, less valuable pelagics in the Yellow and Bohai Seas due to over- fishing and other drivers (UNDP/GEF 2007).

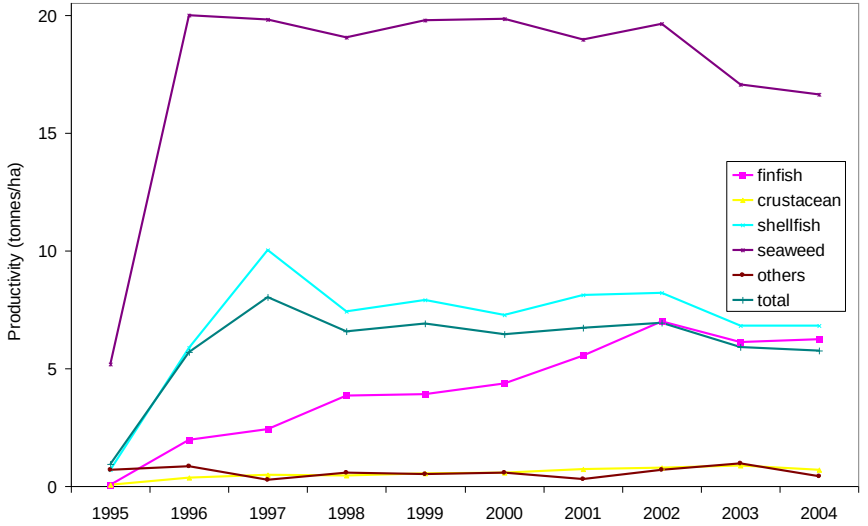




Trend

Aquaculture



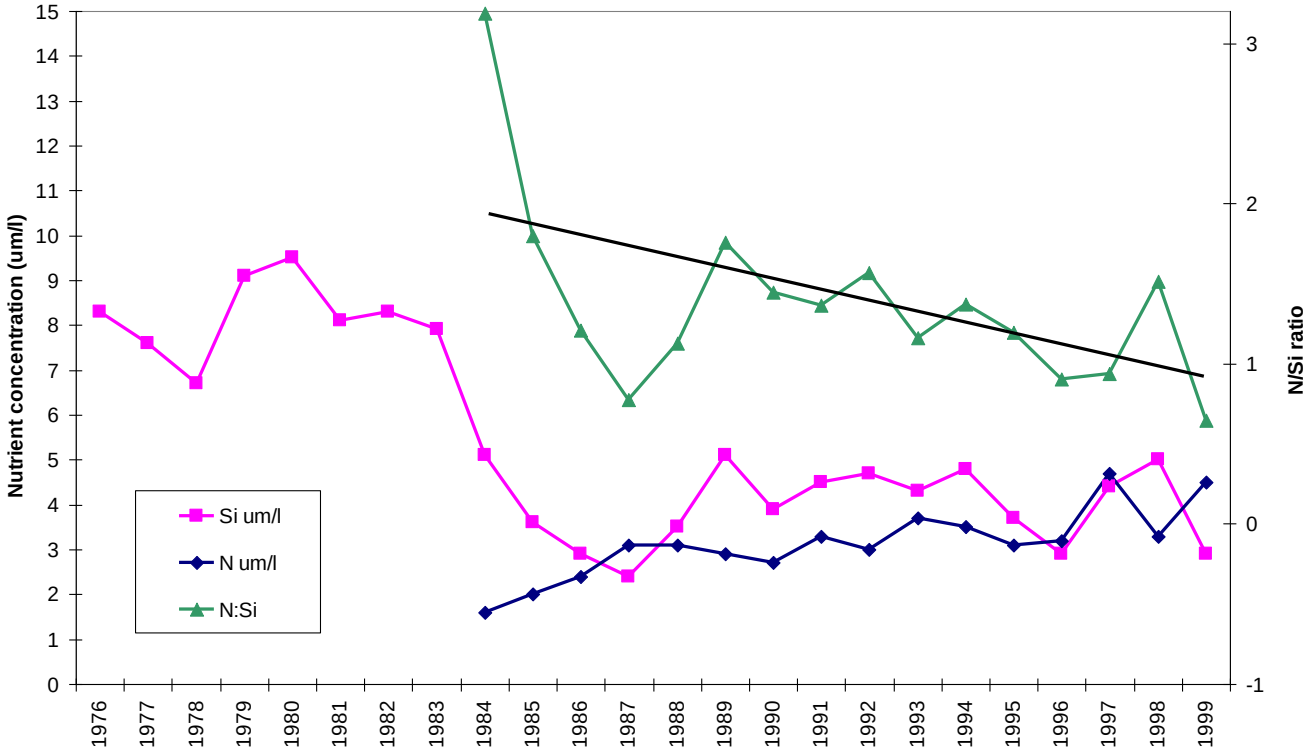


- Rapid increase in aquaculture production in metric tonnes (fresh, salt and brackish water culture) since 1986 (FAO).

The decrease in the aquaculture yield per ha since 1996 points to an increase in environmental stress (UNDP/GEF 2007)

Trend

Silicate change



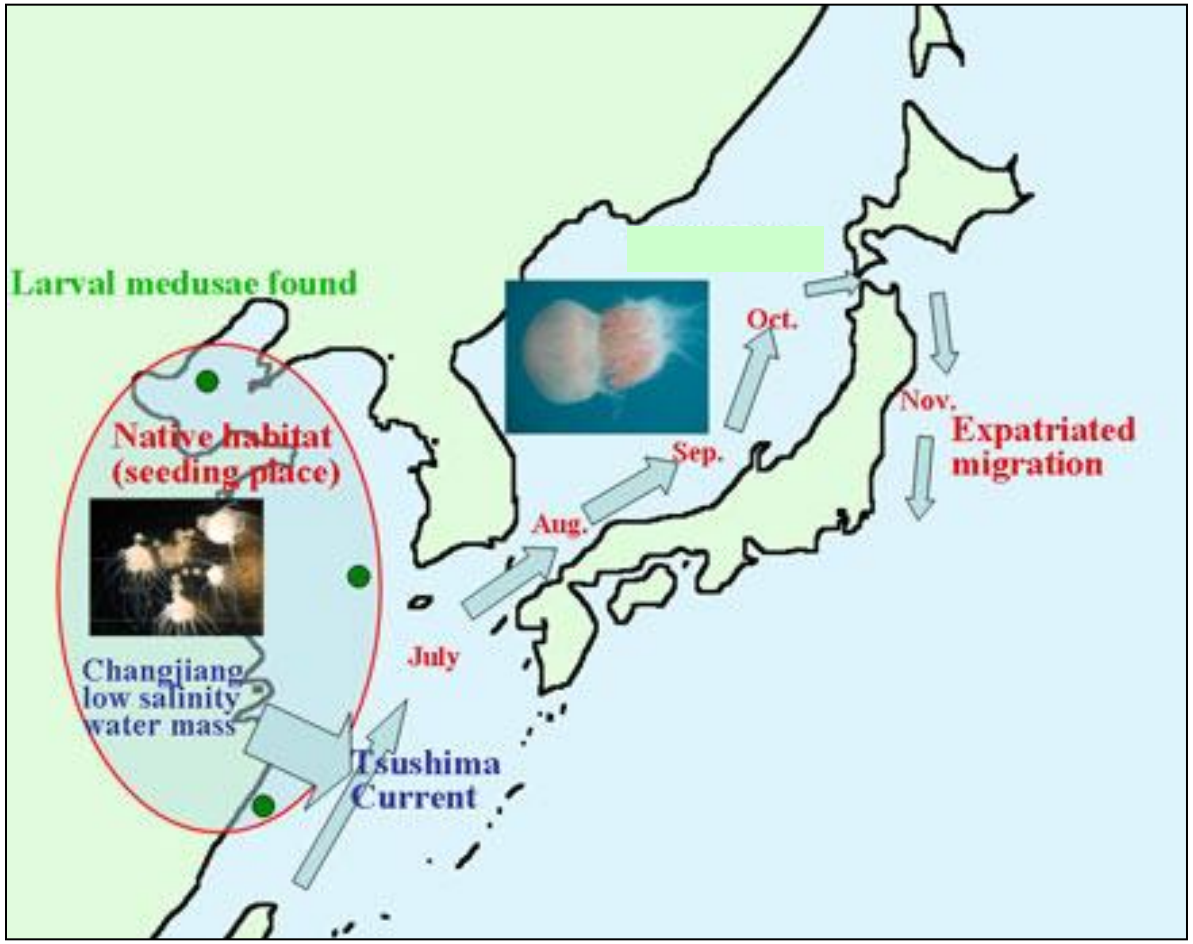
Extracted from Lin et al, 2005

Silicate concentrations have been falling in the Yellow Sea over the last decades **due to changes in freshwater inputs as a result of irrigation and hydroelectric schemes**. At the same time nitrogen concentrations are rising due to domestic and industrial effluent, and increasing fertilizer use. The result is a decrease in the N:Si ratio – which could lead to changes in phytoplankton communities.

Trend

Jellyfish Bloom

- Increase in jelly fish blooms due to over-fishing, changing N:Si ratio, coastal modification and climate change



Trend

RO Korea's Marine Biodiversity Management Framework

Laws		Management Plan
Conservation and Management of Marine Ecosystem Act (2007)	⇨	Comprehensive Marine Ecosystem Management Plan (a 10 year plan)
Wetland Conservation Act	⇨	Comprehensive Wetland Conservation Plan (a 10 year Plan)
Marine Environment Conservation Act	⇨	Comprehensive Marine Environment Management Plan (a 10 year Plan)

RO Korea's management mandate

Land biodiversity: Ministry of Environment

Marine Biodiversity: Ministry of Oceans and Fisheries

Conservation and Management of Marine Biodiversity Act

CHAPTER II FORMULATION OF PLANS AND INVESTIGATIONS

Article 9 (Formulation of Basic Plans on Conservation and Management of Marine Ecosystems)

Article 10 (Basic Investigation of Marine Ecosystems)

CHAPTER III PROTECTION OF MARINE ORGANISMS

Article 16 (Protection of Migratory Marine Animals)

Article 18 (Rescue and Treatment of Marine Organisms)

Article 19 (Plans to Conserve Marine Organisms under Protection)

Article 23 (Management of Organisms Disturbing Marine Ecosystems)

CHAPTER IV DESIGNATION AND MANAGEMENT OF MARINE PROTECTED AREAS

Article 25 (Designation and Management of Protected Marine Areas)

Article 28 (Basic Management Plan of Marine Protected Areas)

CHAPTER V CONSERVATION OF MARINE BIOLOGICAL DIVERSITY

Article 38 (Formulation of Measures to Conserve Marine Biological Diversity and International Cooperation)

Institutional Arrangements

Government

Ministry of Oceans and Fisheries

Marine Biodiversity Institute of Korea (MABIK)

National Institute of Fisheries Science (NIFS)

Marine Environment Management Corporation (KOEM)

Research

Korea Maritime Institute

Korea Institute of Ocean Science and Technology

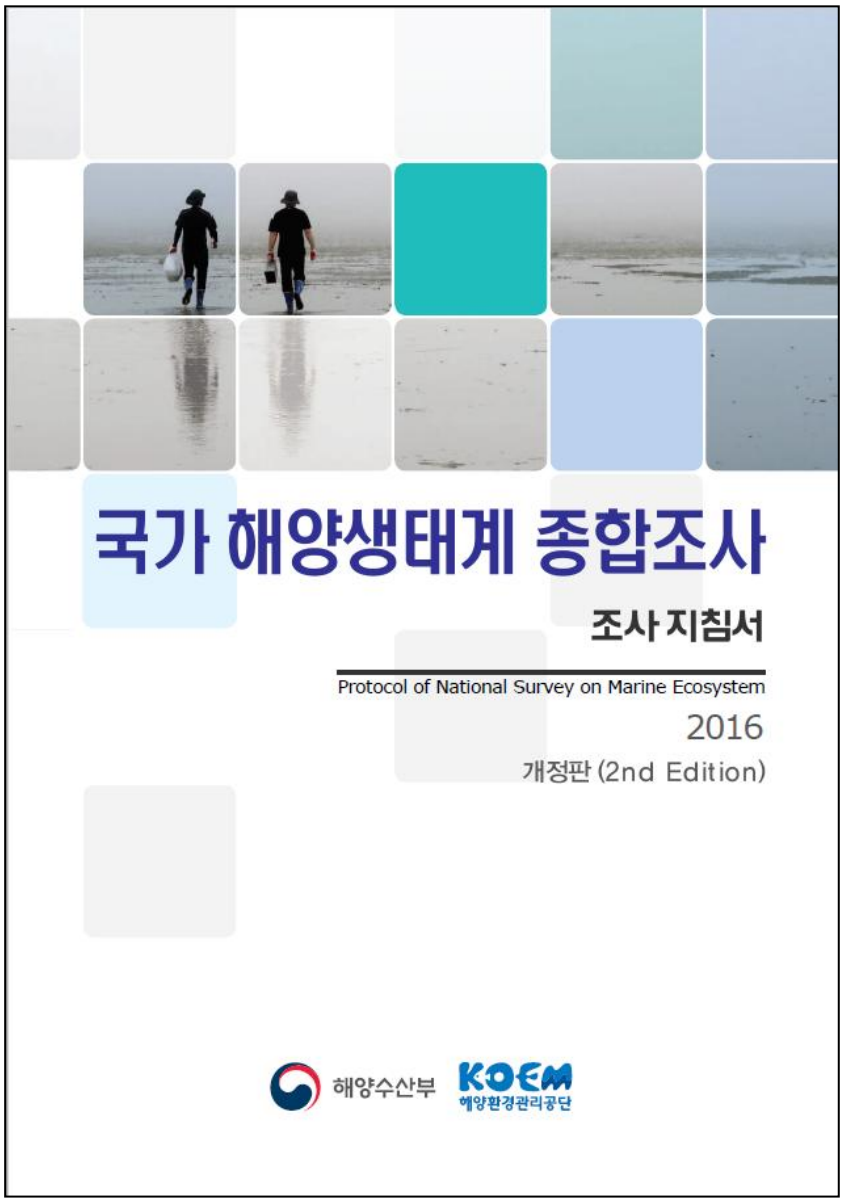
Private

Various private research and consulting companies

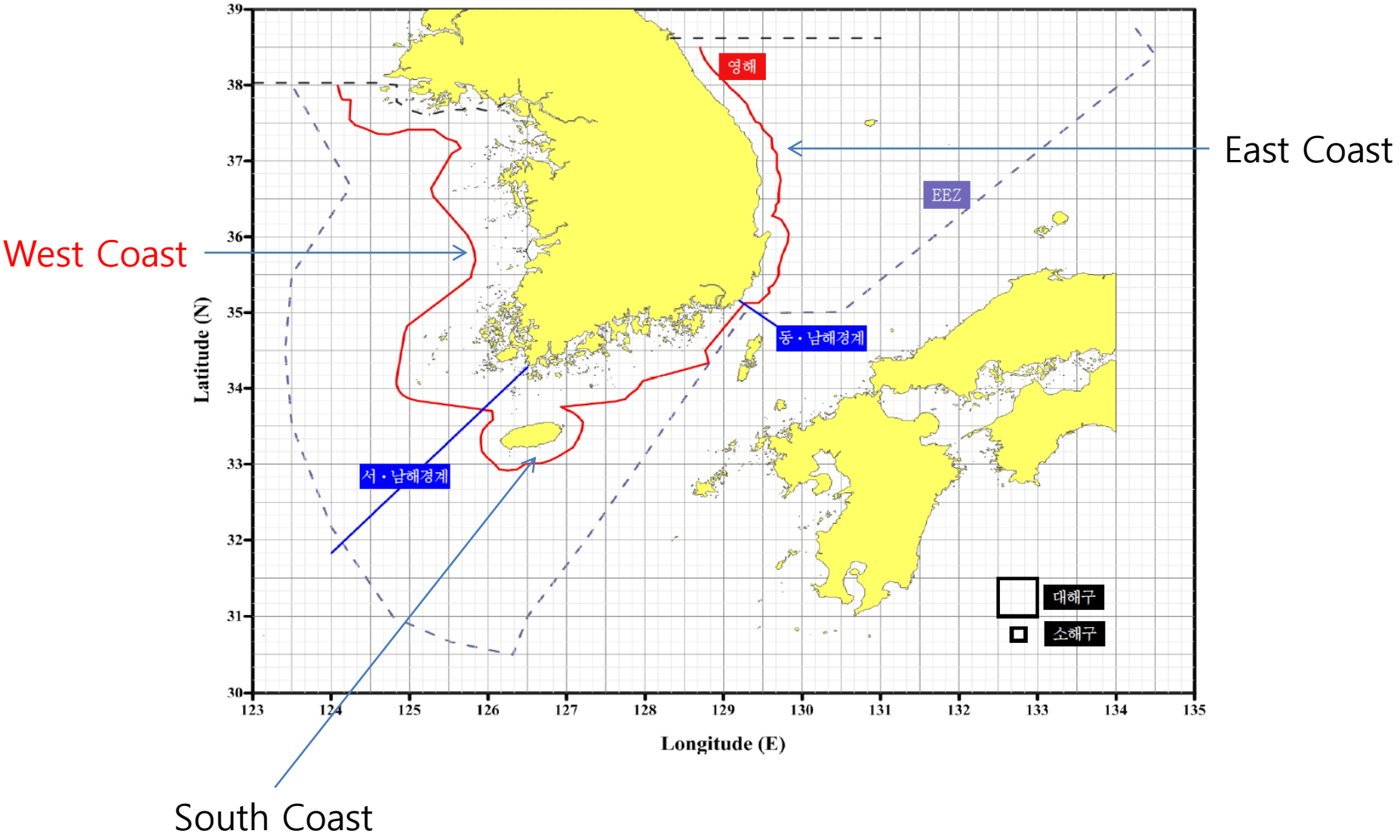
1st Comprehensive Marine Biodiversity Management Plan (2009 – 2018)

- Target 1. Systematic Management of Marine Habitats
- Target 2. Enhancing Conservation and Management of Marine Biodiversity
- Target 3. Enhancing Public Awareness on and Sustainable Use of Marine Ecosystem
- Target 4. Establishing Effective Management System for Marine Ecosystem
- Target 5. Establishing Marine Ecosystem Survey System and Enhancing Knowledge Management

About 100 projects for US$500 Budget



National Marine Biodiversity Survey Guidelines (2nd Ed., 2016)

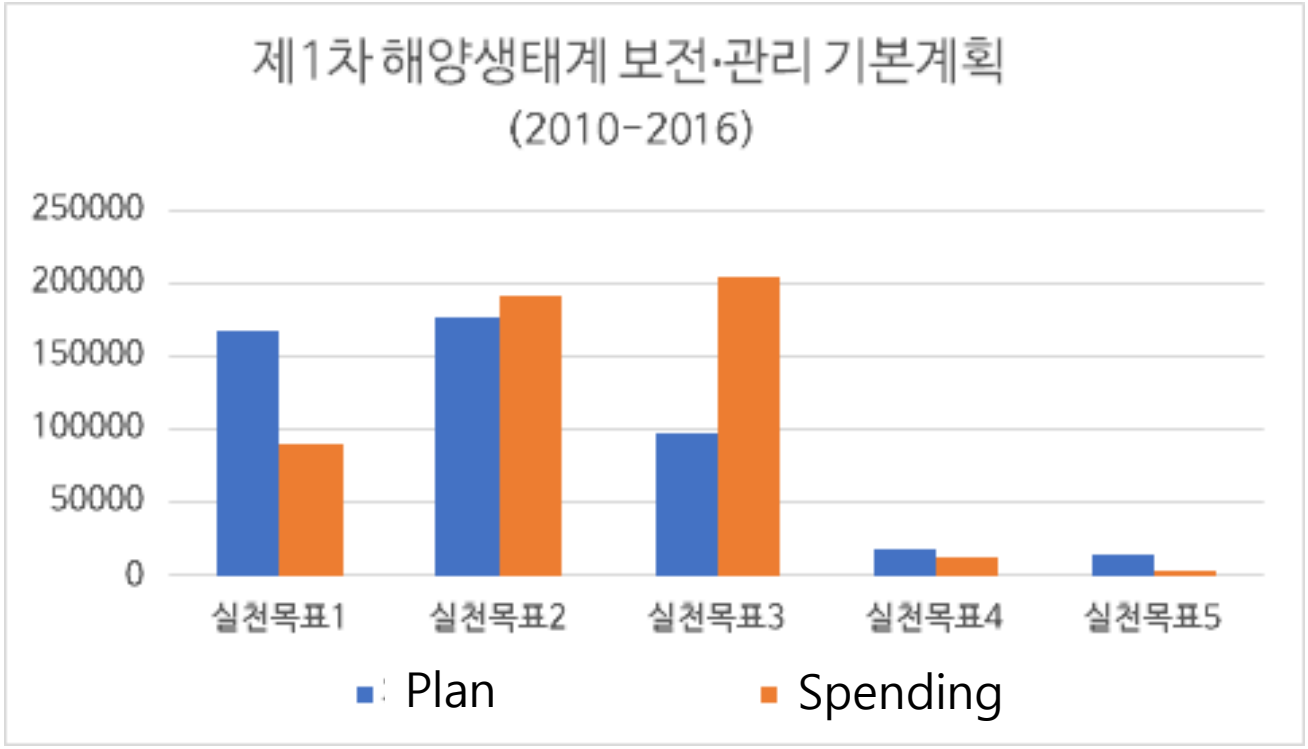


Marine Biodiversity Survey Map of RO Korea

Survey items

대분야	소분야	조사항목	대상영역	세부내용
생물	부유생물	미생물	해역	총균수
		식물플랑크톤	해역	엽록소 a(total/nano), 종조성, 현존량
		동물플랑크톤	해역	종조성, 현존량, 생체량
		어란/자치어	해역	종조성, 현존량
	저서생물	중형저서동물	해역	종조성, 밀도, 생체량
		대형저서동물	갯벌	종조성, 밀도, 생체량, 건강도
			암반	종조성, 밀도, 생체량
			해역	종조성, 밀도, 생체량, 건강도
		해조류	해역	종조성, 피도, 생체량
		해초류	해역	종조성, 밀도, 생체량
		염생식물	갯벌	종조성, 피도, 생체량
	유영동물	어류	해역	종조성, 현존량, 생체량, 위내용물
		갑각류	해역	종조성, 현존량, 생체량
		두족류	해역	종조성, 현존량, 생체량
		기타 수산자원	해역	종조성, 현존량, 생체량
	바닷새		갯벌/해역	종조성, 법적보호종, 군집특성
비생물	해양환경	수질환경	해역	T, S, pH, 투명도, 영양염, DO, SPM, POC/PON, 중금속(Ni,Cr^{6+},Cu,Zn,As,Cd,Hg,Pb)
		퇴적환경	갯벌	지형단면, 입도, 산휘발성황화물, 총유기탄소, 강열감량,중금속(Ni,Al,Cr,Fe,Cu,Zn,As,Cd,Hg,Pb)
			해역	입도, 총유기탄소, 강열감량, 총질소, 중금속(Ni,Al,Cr,Fe,Cu,Zn,As,Cd,Hg,Pb)
	자연・사회・경제현황	사회・경제・문화적 현황	갯벌	자연, 지역현황, 인문・산업・관광환경 등
		경제적 가치	갯벌	생태학적・경제적 가치 평가

Assessment of the 1st Plan



	2012년	2018년
양호	8과제 14%	33과제 34%
보통	22과제 37%	38과제 39%
미흡	29과제 49%	27과제 27%

※ 2009-2017 Budget spending 105.4% (Approx. US$500M Spending)

※ Target 2, 3 Overspending, Target 1, 4, 5 Under spending

Proposed YSLME Biodiversity Plan (2018 – 2027)

(Adopted and modified from the 2nd Comprehensive Marine Biodiversity Management Plan of RO Korea published by MOF, 2018)

Strategy 1. Marine Habitat Protection

Strengthening management of the Marine Protected Area
Establishing management framework for the marine ecosystem corridors
Restoring degraded or damaged marine ecosystems

5 Strategies
16 Actions
106 Activities

Strategy 2. Marine Species Protection and Restoration

Conserving and restoring protected marine species and animals
Strengthening the management of invasive species
Protecting marine animals in response to climate change

Strategy 3. Enhancing the Benefits of Marine Ecosystem Services

Providing services of ecosystem-based marine spatial planning
Establishing framework for increasing the ecosystem services
Promoting marine eco-tourism

Strategy 4. Improving the Governance on Marine Ecosystem Management

Reforming coastal resource use consultation process using marine ecosystem-based management
Enhancing marine ecosystem survey, research and development
Enhancing public awareness and education on marine ecosystem
Coordinating and evaluating marine ecosystem related policies, programs and projects

Strategy 5. Enhancing Collaboration for Marine Ecosystem Conservation

Establishing collaborative framework for central and local governments on marine ecosystem conservation
Enhancing RO Korea's roles on marine biodiversity in international arena
Expanding collaboration on marine ecosystem conservation to DPR Korea and South East Asia

Part II. Case Studies

Case study 1.
Story of Songdo Tidla Flat:
Are we appreciating tidal wetland enough?

Case Study 2.
Story of the Spoon-billed Sandpiper:
Are we conserving the endangered species enough?

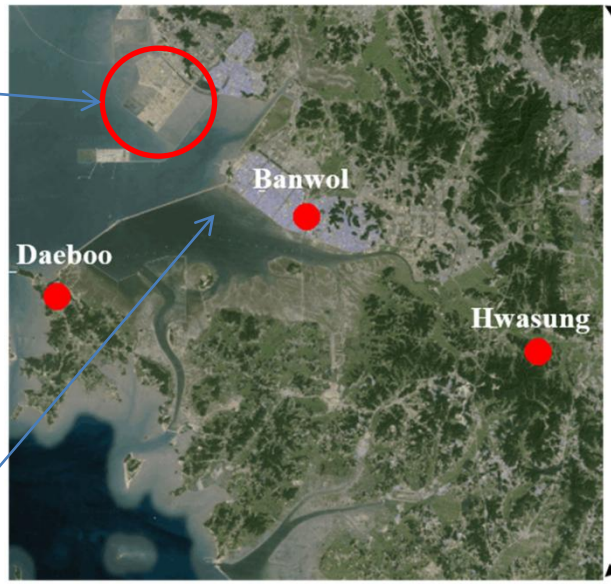
Case study 1.

Story of Songdo Tidal Flat: Are we appreciating tidal wetland enough?

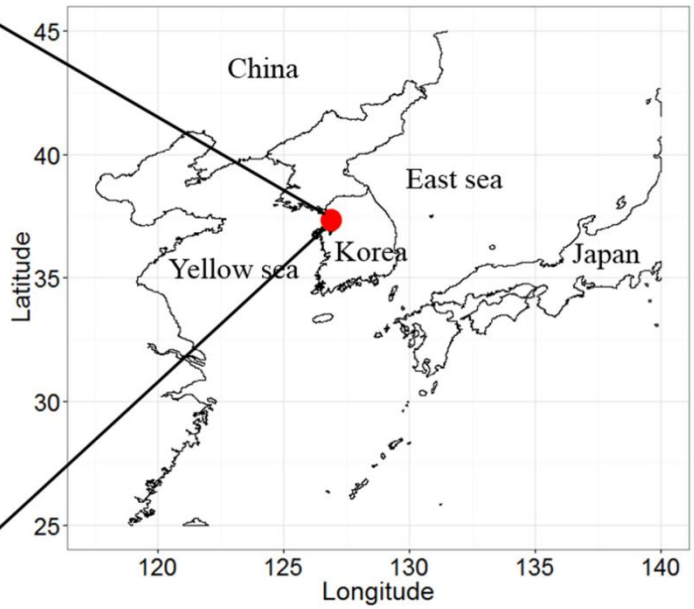
Large scale land reclamation projects in RO Korea

Saemangeum

Songdo



Shihwa Lake



Total Tidal Flat Area of RO Korea

Year	1987	1998	2003	2008	2013
Tidal Flat Area (㎢)	3,203.5	2,393.0	2,550.2	2,489.4	2,487.2

Distribution of Tidal Flat in RO Korea

Region	Area (㎢)	Proportion (%)	Note
Total	2,487.2	100.0	**West Coast: 2,084.5㎢ (83.8%)** South Coast: 402.7㎢ (16.2%)
Incheon	709.6	28.5	
Gyeonggido	165.9	6.7	
Chungchungnamdo	357.0	14.3	
Jollabukdo	118.2	4.8	
Jollanamdo	1,044.4	42.0	
Kyongsangnamdo	68.8	2.8	
Busan	23.3	0.9	

Distribution of Tidal Flat in RO Korea

인천지역 갯벌 분포도

경기지역 갯벌 분포도

충남지역 갯벌 분포도

전북지역 갯벌 분포도

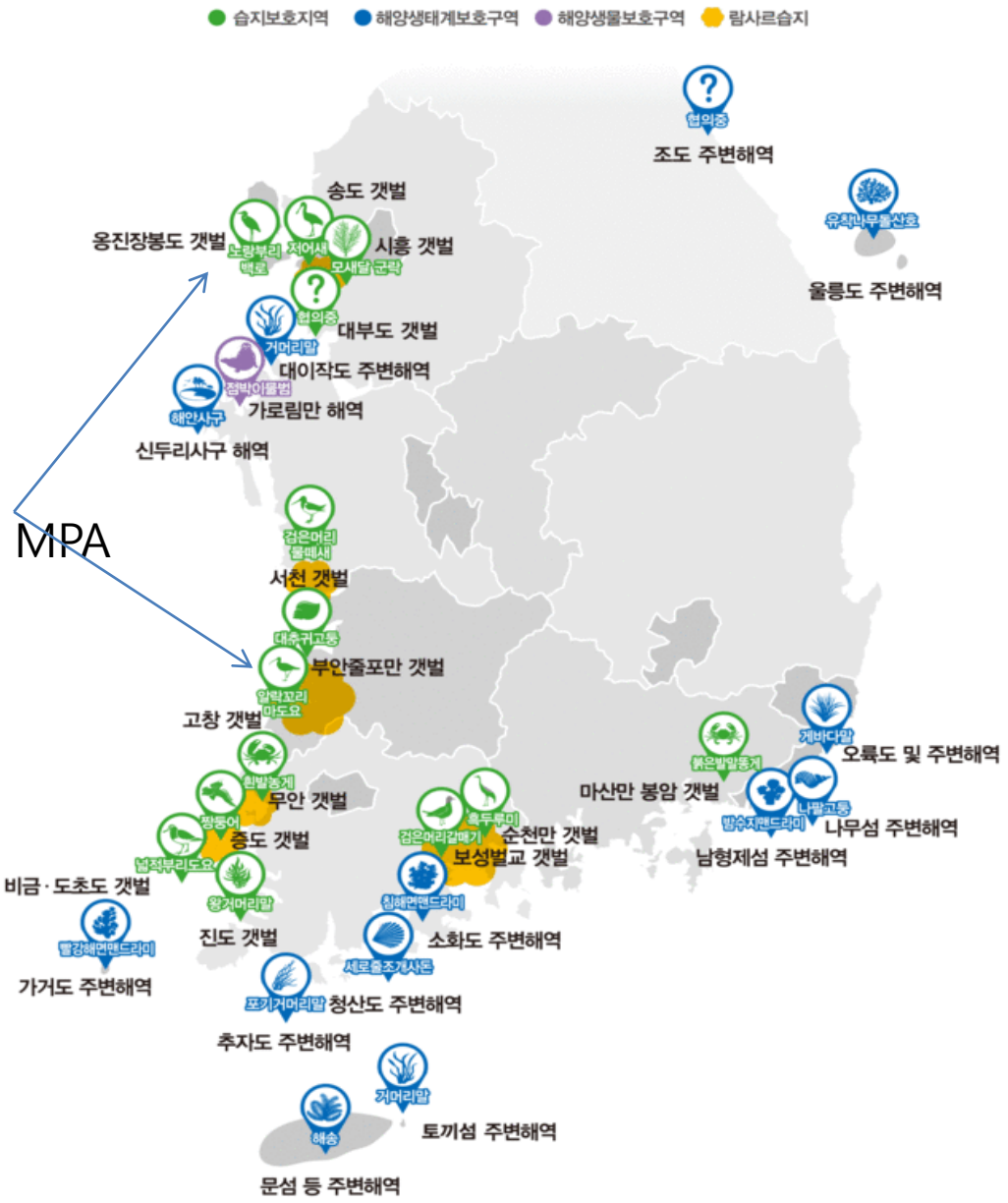
전남지역 갯벌 분포도

경남지역 갯벌 분포도

MPA Map of RO Korea

29 Marine Protected Areas until 2017 (KOEM)

Green color:
Tidal wetland MPA



7 RAMSAR sites

Gochang and Buan Tidal Flats
Jeungdo Tidal Flat
Muan Tidal Flat
Seocheon Tidal Flat
Suncheon Bay Tidal Flat

Songdo Tidal Flat (2014)

Daebudo Tidal Flat (2018)

Songdo Tidal Wetland: MPA and RAMSAR site

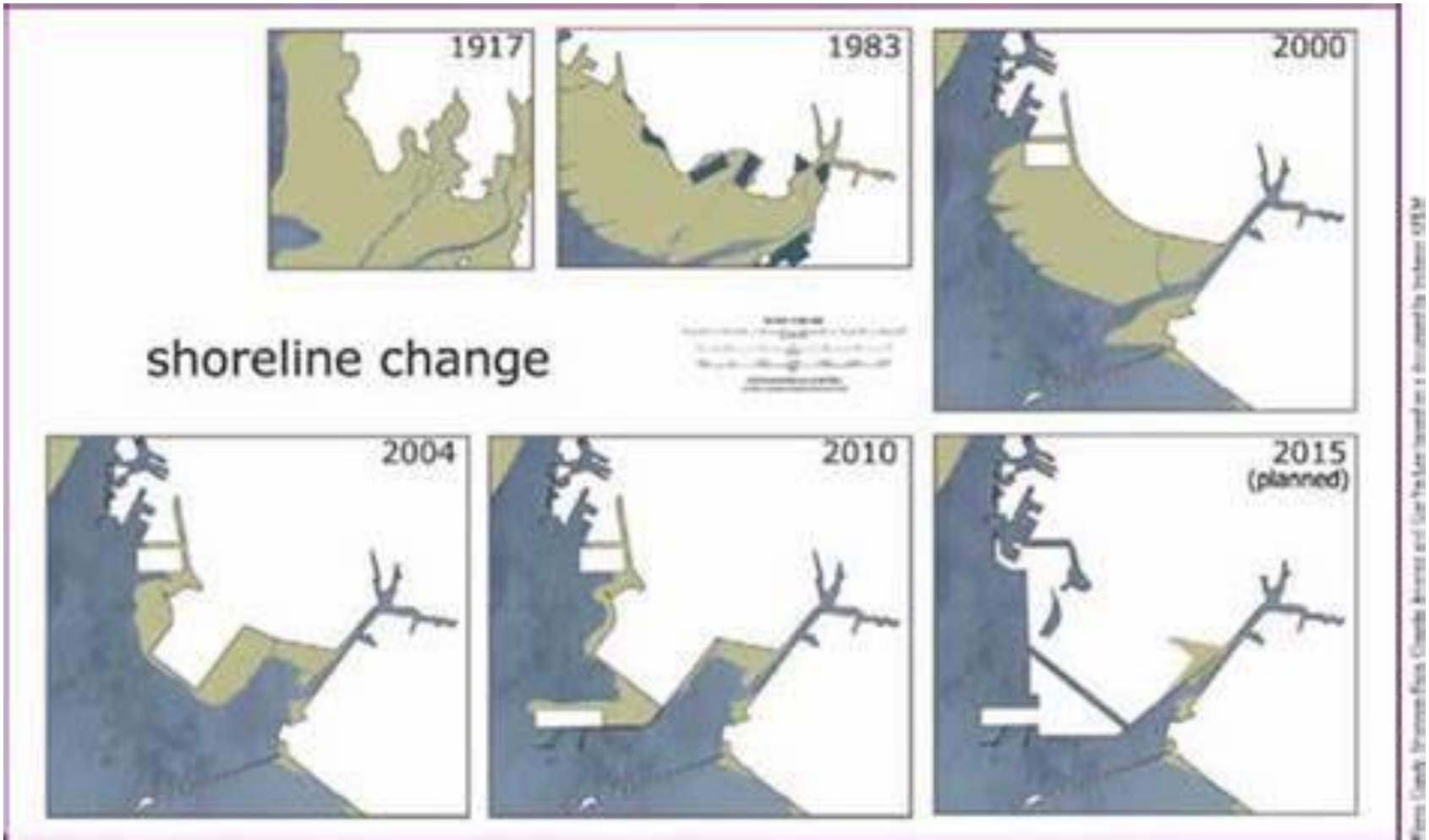
MPA Congress 2014, Songdo, Incheon

Songdo - A City built on tidal wetland

The G-tower where YSLME, EAAFP and GCF are located

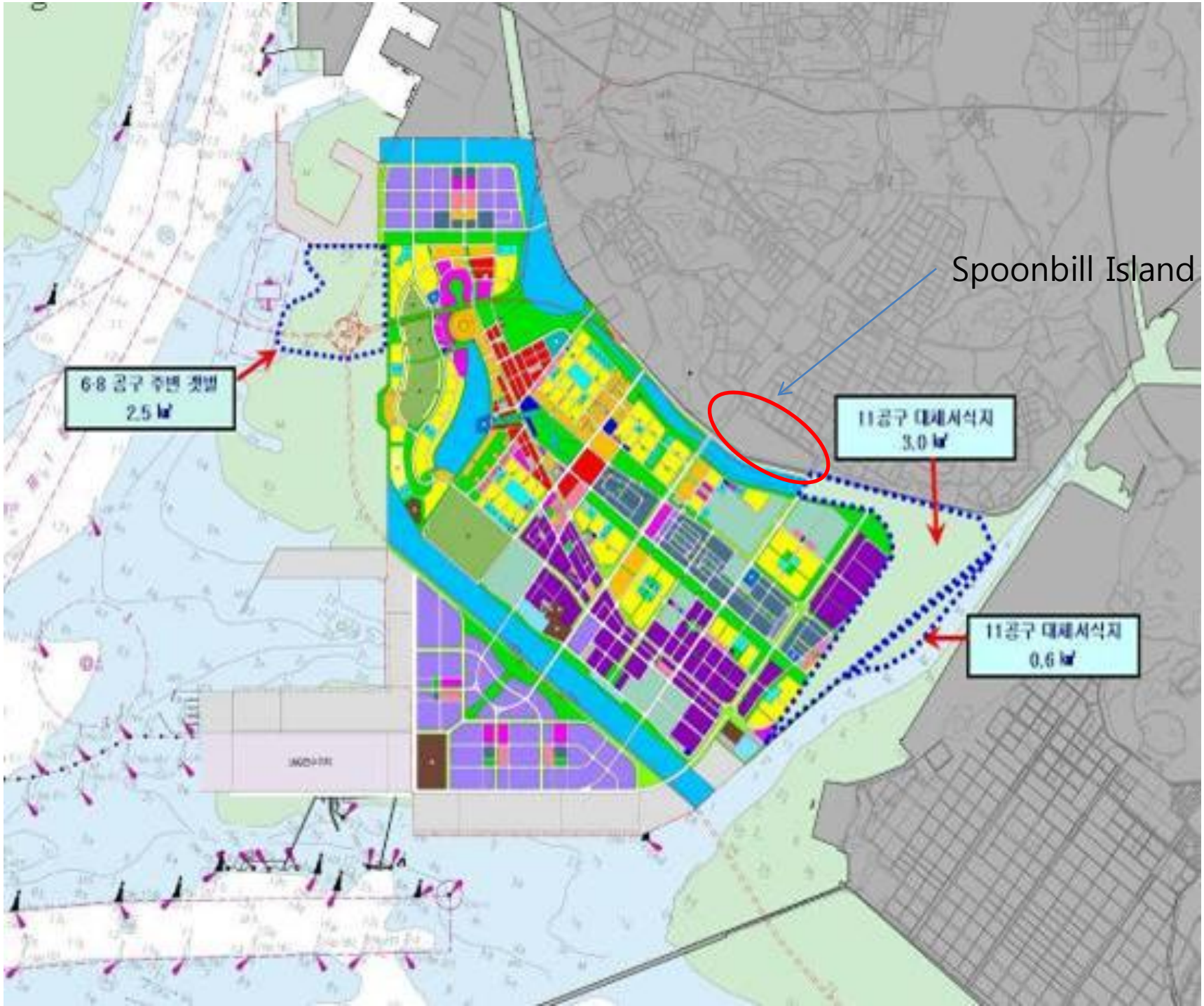
Songdo - a place of endangered migratory bird species

- Black-faced spoonbill
- Saunder's seagull
- Spoon-billed sandpiper
- Great knot, curlew, chinese egret etc..



A shelter for Black-faces spoonbill in the middle of Industrial complex at a flood reservoir near the border of Songdo

Spoonbill Island


Spoonbill Island
6·8 공구 추변 첫벌
2.5 ㎢
11공구 대체서식지
3.0 ㎢
11공구 대체서식지
0.6 ㎢

Artificial habitat for Black-faced Spoonbill in RAMSAR site

Artificial habitat for Saunder's Seagull in RAMSAR site

Development VS. Conservation of Wetlands: Which prevails now and future. What are the alternatives?

Case Study 2.

Story of the Spoon-billed Sandpiper: Are we conserving the endangered species enough?

Protected Marine Species of RO Korea

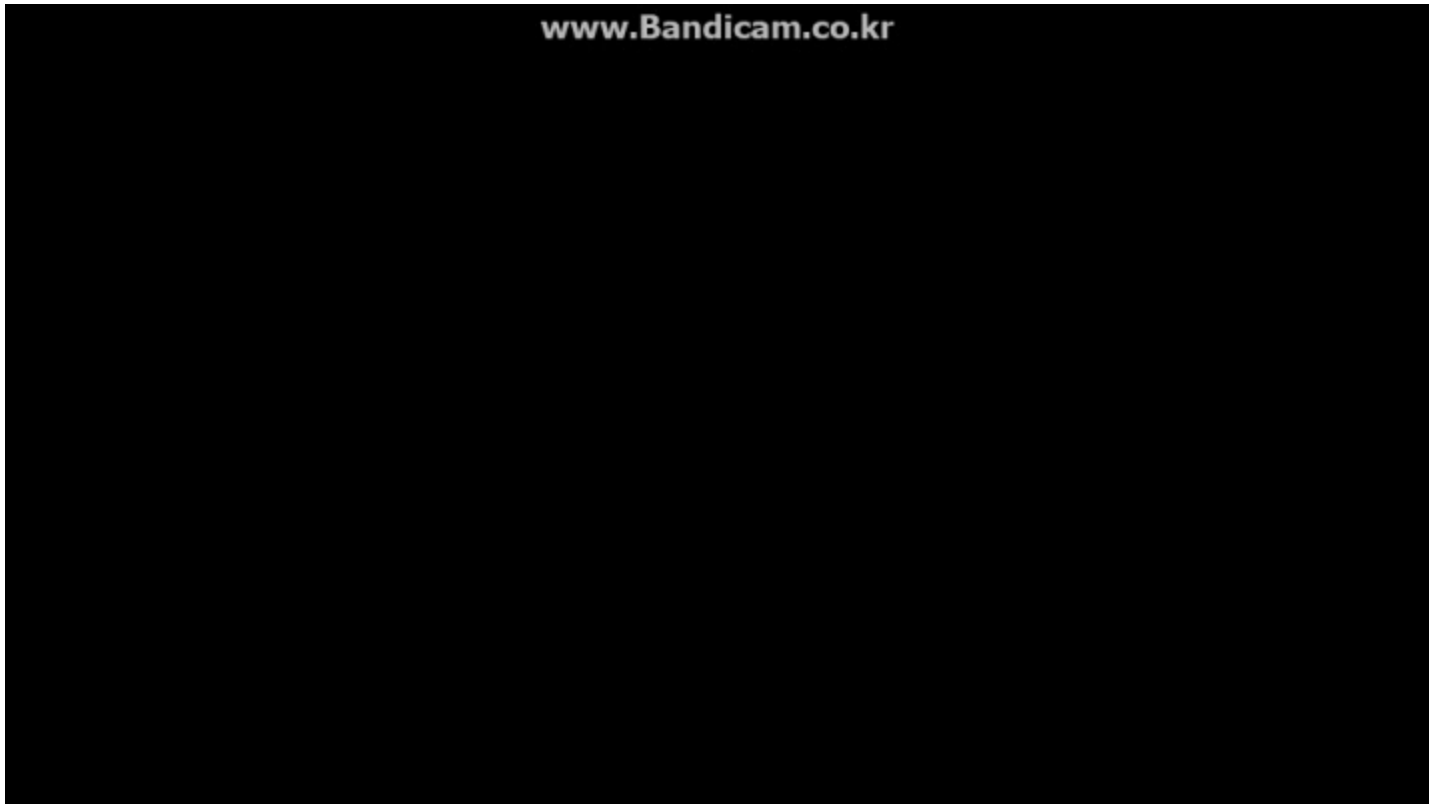
Classification	No. of Species	Name
Marine mammal	16	Indo-Pacific bottlenose dolphin (Tursiops aduncus) etc.
Marine invertebrates	31	Brackish water snail (Clithon retropictum) etc.
Seaweed/Sea plant	7	Eelgrass etc.
Amphibians	4	Green Sea Turtle (Chelonia mydas) etc.
Fish	5	Seahorse (Hippocampus histrix) etc.
Migratory Birds	14	Nordmann's Greenshank (Tringa guttifer) etc.
Total	77	

Who has the interest in this Bird?

Hatching site

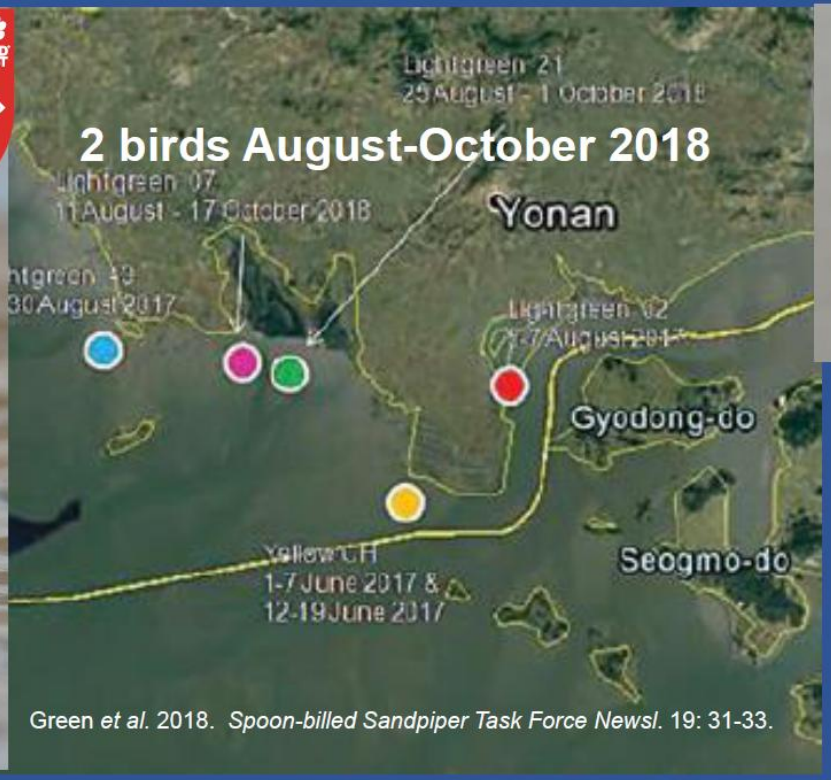
Migrates more than 8,000km

Historic spotted sites of RO Korea:
Spoon-billed Sandpiper


www.Bandicam.co.kr

David Melville

Moulting grounds of Spoon-billed Sandpipers in DPR Korea



Mr. Kim Song Ho
Academy of Science

David Melville

Survey sites 2009-2019

Pūkorokoro Miranda Naturalists' Trust

Won-Tae Shin
2015

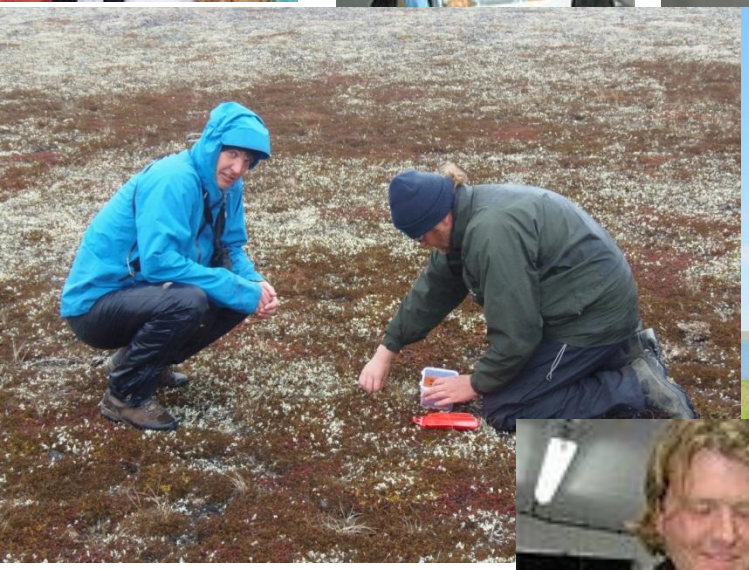
Who are the ones protecting the Bird?

Where are the Koreans?










Bird-watching Tourism in Bangladesh

EAAFP Spoon-billed Sandpiper Working Group

WWT Wetlands for life

saving the spoon-billed sandpiper

Are we doing enough for the endangered species?

> Spoon-billed Sandpiper

> Black-faced Spoonbill

- **Spotted Seal**

How we can increase awareness of the importance of the species?