ASIAN FORUM

5th International Conference
on the Environmental Management of Enclosed Coastal Seas
(EMECS 2001)

Asian Forum

APN Asia-Pacific Network for Global Change Research

IGES kansai Research Center

EMECS

5th International Conference
on the Environmental Management of Enclosed Coastal Seas

Asian Forum

-Report-

20 November 2001, Kobe, JAPAN

Organised by:

Asia-Pacific Network for Global Change Research
(APN)

Institute for Global Environmental Strategies
(IGES)
Kansai Research Center

International EMECS Center
(EMECS)

PREFACE

Coastal zones are a common treasure of the world's people, and they are particularly important for Asia. Asian coastal zones have precious ecosystems, such as wetlands, tidal flats, coral reefs, and sea grass beds. The Asian coastal zones are the most productive and richest in biodiversity in the world. They produce abundant fishery resources, making fishery an important industry of this region. Tourism and marine transportation are among other activities taking place in the coastal zones. Thus, coastal zones provide an important basis for people's lives in Asia. Recently, however, coastal zones have been facing tremendous pressures.

If we look at the human side, Asian people occupy 55% of the world population, and nine of the world's thirteen mega-cities with over 10 million people are in Asia. Most of these mega-cities are located on coasts, such as along semi-enclosed bays and on low-lying deltas. Rapid urbanization and industrialization during the 21st century will induce more pressures on these coastal zones through land reclamations, deterioration of ecosystems, and discharge of land-based pollutants. Urbanization and development in this region should be pursued in a sustainable manner in order to preserve the coastal environment.

Coastal zones also face threats from global warming. International efforts have been made to prevent and slow down global warming since the 1990s. We have to conduct scientific assessments of the effects of global warming on the natural environment and human society to further enhance such efforts. Since coastal zones are vulnerable to sea level rise, flooding, and storm surge, we need to identify the possible impacts of global warming on coastal zones.

In order to promote the preservation of coastal zones, cooperation is most essential among countries, international organizations, academic societies, and NGOs in the region. As a basis of such cooperation, we need firm scientific understanding on the present status of coastal zones. Furthermore, long-term future perspective and policy directions should be identified. To meet such goals, the International EMECS Center plans to perform a comprehensive assessment, for example, the Comprehensive Environmental Assessment for the Asian Coastal Zones.

We specifically planned the Asian Forum in the EMECS 2001 Conference against such a background. The objectives of the Asian Forum were to present, exchange, and discuss the present status of the Asian coastal zones. We also discussed the future perspective and policy directions. Moreover, we tried to examine the significance and feasibility of the Comprehensive Environmental Assessment for the Asian Coastal Zones, and to present related studies.

For these objectives, we invited five presenters from Asian countries. We received vivid explanations of the present problems and constructive suggestions for future actions. Also, through the panel discussion, we clarified the present problems of the entire Asian region, and the necessity for immediate action to preserve the coastal zones. As a first step, the integrated coastal zone assessment should be launched soon. I look forward to active and fruitful follow-up activities for the assessment in the future.

Coordinator Nobuo Mimura
Professor, Center for Water Environment Studies
Ibaraki University, Japan


ASIAN FORUM　アジアフォーラム

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Introduction

The Asian Forum of the 5th International Conference on the Environmental Management of Enclosed Coastal Seas (EMECS 2001) took place in Kobe, Japan, on 20 November 2001, and was co-organised by the Asia Pacific Network for Global Change Research (APN), the Institute for Global Environmental Strategies (IGES) Kansai Research Center, and the EMECS Center.

The Asian Forum's theme was the current status of Asian enclosed coastal seas and the realisation of an integrated assessment. The objective of the forum was to present, exchange, and discuss the present status, future perspective, and policy directions of Asian coastal zones; and to examine the significance and feasibility of a Comprehensive Environmental Assessment for the Asian Coastal Zones.

Opening Session

As coordinator of the Asian Forum, Professor Nobuo Mimura of the Center for Water Environment Studies, Ibaraki University, Japan, opened the forum. Professor Mimura explained that coastal zones are a common treasure for the people of the world, and they are particularly important for Asia. Asian coastal zones have precious ecosystems, such as wetlands, mangroves, tidal flats, coral reefs, and sea grass beds. The Asian coastal zone is the most productive and the richest in biodiversity in the world. They produce abundant fishery resources, which makes fishery an important industry of this region. Tourism and marine transportation are among other activities in the coastal zones. Thus, coastal zones provide an important basis for people's lives in Asia. However, the coastal zone is now facing tremendous pressures from land reclamation, deterioration of ecosystems, and discharge of land-based pollutants. The urbanization and development of this region should be pursued in a sustainable manner to preserve the coastal environment. Coastal zones also face threats from global warming. In order to promote the preservation of coastal zones, cooperation is most essential among countries, international organizations, academic societies, and NGOs in the region. As a basis of such cooperation, we need firm scientific understanding on the present status of the coastal zones. Furthermore, long-term future perspective and policy directions should be identified. To meet these goals, the International EMECS Center plans to perform a Comprehensive Environmental Assessment for the Asian Coastal Zones. The Asian Forum was specifically planned against such a background. Professor Mimura expressed hope that the Asian Forum would initiate future actions to create desirable coastal zones in Asia.

Presentation Session

Dr. Jingshan Yu of the Institute of Environmental Sciences, Beijing Normal University, China, gave an overview of large cities and the coastal zone citing the urban ecological redevelopment plan of Guangzhou as a case study, and referred to the 'Ecological Control Unit' as a practical management tool for proficient urban planning and development. Professor Porfirio M. Aliño of the Marine Science Institute, University of the Philippines, focused on coastal ecosystems, in particular the coastal ecosystems of East and South-east Asia. The core of Professor Aliño's speech outlined that despite the highly political and social basis of the realities faced by the coastal ecosystems of East and South-east Asia, the scientific and conservation challenges in the understanding and sustainable use of these ecosystems may hold one of the important keys to their solutions. Professor Piamsak Menasveta of the Department of Marine Science, Chulalongkorn University, Thailand, presented water pollution and habitat degradation as a result of industrialisation, community

development and mismanagement, using the Gulf of Thailand as an example. This was followed by coastal zone management – practices and future directions, concentrating on the prediction of the marine environment for coastal area management. Dr. Dong-Young Lee of the Korea-China Joint Ocean Research Centre addressed this issue. Dr. Lee concluded that concerning the management of the coastal and ocean area scientifically, marine environmental information needs to be produced along the coast of regional seas by means of coastal and ocean prediction models with cooperation from neighbouring countries. The final presentation by Professor Sanit Aksornkoae of the Faculty of Forestry, Kasetsart University, Thailand, focussed on the future scenario of the coastal zone in Asia. In his speech, Professor Aksornkoae stressed the need to develop future strategies and solutions to create sustainable socio-economic conditions in the coastal zone, which are also sensitive to its environmental carrying capacity. Suggested strategies include a stronger and more readily implemented legal framework; mangrove and other products to carry 'eco-labels'; to utilise future technology to restore mangroves and coral reefs; less dependence on coastal natural resources; more appreciation of conservation values; the establishment of a national plan for Coastal Zone Management, which would involve coastal communities; as well as cooperation among Asian countries.

Panel Session

The Panel discussion's central theme was the current coastal environment in Asia and a comprehensive assessment with a goal to reach conclusions as to how best continue the exchange of information in the region, to develop an international network of experts and related people, and to start planning the Comprehensive Environmental Assessment for the Asian Coastal Zones. Professor Mimura guided the session, and panellists included Asian Forum presenters and Mr. Yasushi Hosokawa of the Coastal and Marine Department, National Institute for Land and Infrastructure Management, Japan. This gave way to an interactive discussion between members of the audience and panellists. Key issues raised included the need to present scientific results in a clear and concise manner for policy makers to easily comprehend. Local community education and awareness raising promoting environmentally friendly activities, such as shifting from traditional systems to intensive systems was also discussed. The importance of regional cooperation and coastal marine monitoring was stressed. It was suggested that EMECS could become a centre of excellence for coastal zone management. As for scientific research, it was highlighted that organisations like the APN already place a high priority on coastal zone management, and have indeed funded coastal zone projects in the past and present. The APN can also collaborate with other international organizations, such as EMECS and IGES. It was acknowledged that we have an understanding of coastal zone problems, and now is the time to act.

Conclusions and Recommendations

a) Coastal zones are precious assets to the people of Asia, as well as to the rest of the world;
b) Coastal zones are facing serious problems including water pollution, degradation of ecosystems caused by land-based human activities;
c) There have been good practices to address the problems placing an importance on science and technology to support policy-makers and raise people's awareness, systematic approach of ecological urban planning in coastal cities, education of/and cooperation with local communities;
d) The idea of a Comprehensive Environmental Assessment for the Asian Coastal Zones will act as a blueprint, and could create positive linkage between scientists and policy-makers and other stakeholders for actions, and could also bridge the 5th EMECS conference in Kobe and the 6th EMECS conference in Thailand in 2003;

e) Close international research collaboration, especially the impact of human activities on coastal zones, should be identified;
f) Promotion of education and training on integrated coastal management in Asian countries is essential; and
g) Database information systems, including the Global Coastal Information System (GLOCIS), should be available, particularly in the Asian region.

The coordinator of the Asian Forum, Professor Mimura, thanked the presenters for their informative and interesting presentations, the organizers for their efforts, and finally the audience for its active participation in what was an extremely productive special session of the EMECS 2001 conference.

INTRODUCTION

INTRODUCTION

Theme

Current status of Asian enclosed coastal seas and realization of an integrated assessment

Background

(1) The Asian region is home to 55% of the earth's population. Nine of the world's 13 largest cities with a population greater than 10 million are located within this region, and urbanization and industrialization are expected to progress even further throughout the 21st century. Most of the largest cities are located on inner bays, at the mouths of rivers and in other coastal areas that include enclosed coastal seas. In order to preserve the environments of such enclosed coastal seas, urbanization and industrialization in Asia must be pursued in a sustainable manner.

(2) International efforts to prevent global warming began in the 1990s and are continuing. However, further progress for these measures will require scientific evaluations and advance forecasts of the impact of global warming on ecosystems and socio-economic systems. Enclosed coastal seas contain seaweed beds, tidelands and other valuable ecosystems, and cities that are centers of population, social infrastructures and so on are located further inland. These areas are easily affected by natural disasters such as rising sea levels, floods and high surf. For this reason, the relationship between changes in the global environment and enclosed coastal seas must also be identified.

(3) In light of this situation, the environmental management of enclosed coastal seas in Asia must be promoted by cooperation among countries, international organizations, academic societies, citizens groups and other entities, both within that region and in other regions as well. To facilitate such cooperation, scientific identification of the current status of enclosed coastal seas in Asia from an academic perspective and a comprehensive and wide-ranging grasp of factors such as population, resources, environment, development and land use must be conducted to determine future prospects from both medium and long-term perspectives, and to propose policies for the international community to consider.

Objectives

The Asian Forum will be held with the following objectives:

(1) To present and discuss research achievements on the current status, long-term perspective, and policy direction of coastal environments in Asia.

(2) To identify the current status of relevant studies and research of enclosed coastal areas in the Asia-Pacific region from the medium/long-term viewpoint, and to evaluate the significance and the feasibility of the above-mentioned studies and research.

Key Questions

(1) Present status of Asian coastal zones

- What are the values and functions of Asian coastal zones?
- What problems do Asian coastal zones face?

(2) Measures and policy directions for the coastal preservation

- How can urbanization and development coexist with the coastal environment?
- How is sustainable development in Asia?
- How is integrated coastal zone management implemented?
- What is missing for desirable coastal zone management?
- What roles should science play for desirable coastal zone management?
- How should international cooperation address common trans-boundary problems?

(3) Possibility of the comprehensive assessment

- Is Comprehensive Environmental Assessment for the Asian Coastal Zones feasible and valuable?
- Are there any practices for related database development and assessment?
- Which subjects should be included in the comprehensive assessment?
- How can we join forces internationally for the assessment?

Tentative Goals

- To continue the exchange of information in the region.
- To develop an international network of experts and related people.
- To start planning the Comprehensive Environmental Assessment for the Asian Coastal Zones.
- To publicise an intermediate version of the assessment at the 6th EMECS Conference in 2003.

PROGRAMME

PROGRAMME

Tuesday, 20 November 2001
Ohwada A, South Wing 1F, Kobe Portopia Hotel, Kobe, Japan

09:30-09:40 **Opening**

Opening Address
- Prof. Nobuo Mimura
  Professor, Center for Water Environment Studies, Ibaraki University
  JAPAN

Presentations

09:40-10:00 "Urban Redevelopment Plan of Guangzhou"
- Dr. Jingshan Yu
  Associate Professor
  Institute of Environmental Sciences, Beijing Normal University
  CHINA

10:00-10:20 "The Marine Ecosystem of South East Asia and the East Asian Seas"
- Prof. Porfirio M. Aliño
  Deputy Director for Research
  Marine Science Institute, University of the Philippines
  THE PHILIPPINES

10:20-10:40 "State of Water Pollution and Habitat Degradation in the Gulf of Thailand"
- Prof. Piamsak Menasveta
  Director of Marine Biotechnology Research Unit
  Department of Marine Sciences, Chulalongkorn University
  THAILAND

10:40-11:00 "Prediction of Marine Environment for Coastal Area Management"
- Dr. Dong-Young Lee
  Director, Korea-China Joint Ocean Research Center
  REPUBLIC OF KOREA

11:00-11:20 "Future Scenario of the Coastal Zone in Asia"
- Prof. Sanit Aksornkoae
  Professor, Faculty of Forestry, Kasetsart University
  THAILAND

11:20-11:30 Break

11:30-12:20 **Panel Discussion**

"Current Coastal Environment in Asia and Comprehensive Assessment"

- Coordinator: Prof. Nobuo Mimura
  Professor,
  Center for Water Environment Studies
  Ibaraki University

- Panelists: Mr. Yasushi Hosokawa
  Director, Coastal and Marine Department,
  National Institute for Land and Infrastructure Management

  Prof. Sanit Aksornkoae
  Professor
  Faculty of Forestry, Kasetsart University

  Prof. Porfirio M. Aliño
  Deputy Director for Research
  Marine Science Institute, University of the Philippines

  Prof. Piamsak Menasveta
  Director of Marine Biotechnology Research Unit
  Department of Marine Sciences
  Chulalongkorn University

  Dr. Dong-Young Lee
  Director
  Korea-China Joint Ocean Research Center

  Dr. Jingshan Yu
  Associate Professor
  Institute of Environmental Sciences
  Beijing Normal University

12:20-12:30 **Conclusion**

- Prof. Nobuo Mimura
  Professor, Center for Water Environment Studies, Ibaraki University JAPAN

PRESENTATIONS

Urban Redevelopment Plan of Guangzhou

Jingshan Yu
Associate Professor
Institute of Environmental Sciences
Beijing Normal University

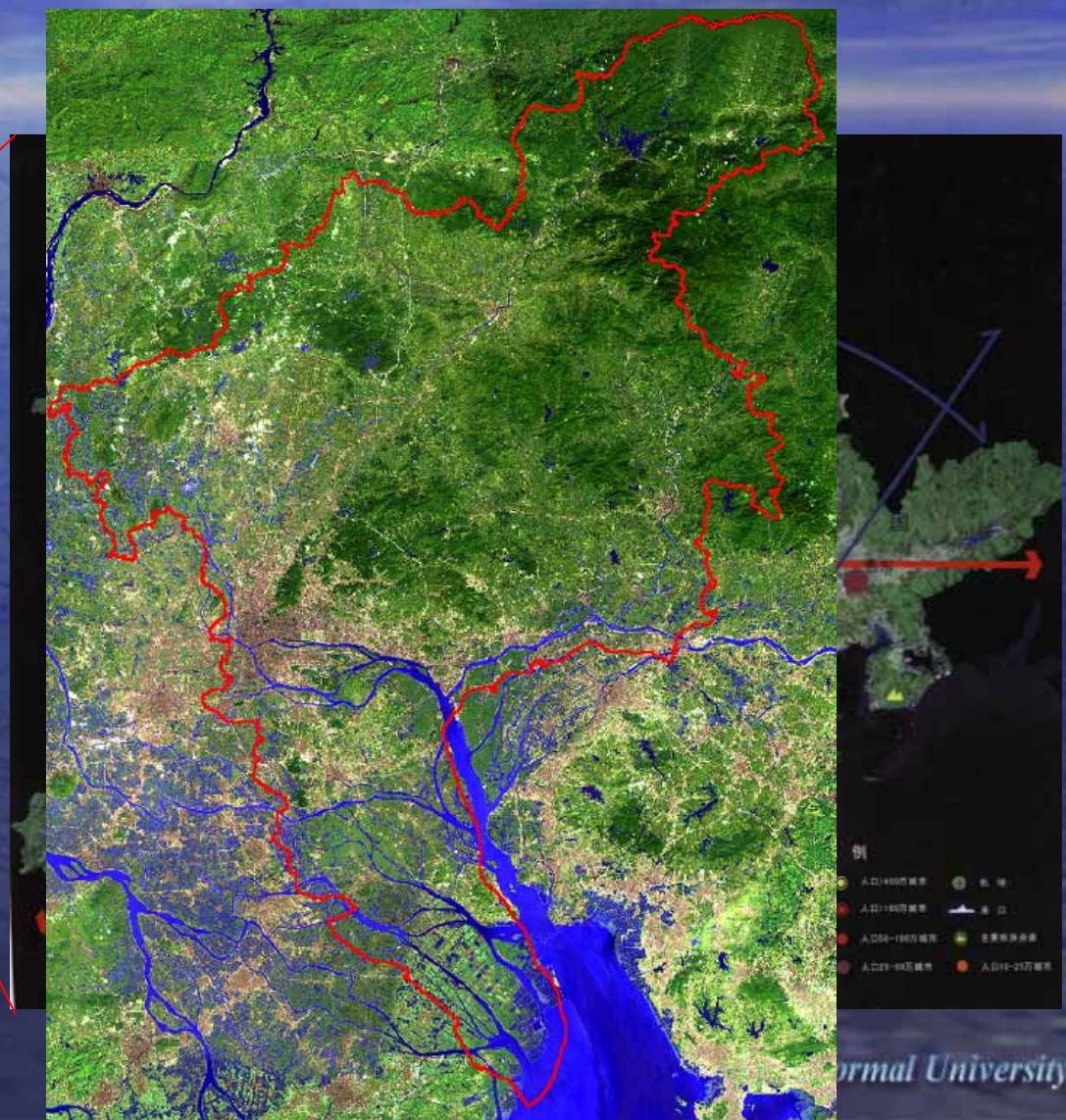
Guangzhou is one of China's 3 largest cities. With very rapid urbanization in the last two decades, its population has increased to nearly 10 million. Urbanization has imposed tremendous impact on the eco-environment. However, little effort has been made to address ecological factors before generating an urban development planning in China. We have embarked on a research aiming at increase our understanding of the ecological structure of Guangzhou city, and giving an advice to the local government for the future urban development. Our ecological planning is to give a pre-thought to eco-environmental factors and not to just add a few token gestures as an afterthought. Therefore, we suggest it must be done before generating an overall urban development planning to promote sustainable urbanization. In this report we introduce a concept of ecological region depending on eco-sensitivity and eco-service analysis to describe ecological characteristics of Guangzhou city. Geological condition, water environment, agricultural productivity and climate circumstance are considered for the classification of the eco-region. Also a new concept of "Ecological Control Unit" is introduced to provide a method for practical management. In conclusion, our study described above leads to the conclusion that Guangzhou city must expand towards east and south respectively, for modern industry and high-tech industry developments.

Urban Redevelopment Plan Of Guangzhou

Jingshan Yu

Institute of Environmental sciences
Beijing Normal University, CHINA

Guangzhou - general situation



Goal of urban ecological planning

- **Adjust unreasonable structure of urban ecosystem based on systematical study**
- **Improve self-adjusting ability of the urban system to achieve sustainable development through developing technology and administration methods**
- **The ultimate goal is to provide service for building an ecological city**

Theories applied

- **Based on the ecological theories**
  - **Principle of urban complex ecosystems**
  - **Principle of ecological controls**
  - **Principle of ecological health in ecosystems**
- **Principle of ecological and environmental economics**
- **Concept of sustainable development**

Urban built-area ecosystem and urban ecological support system

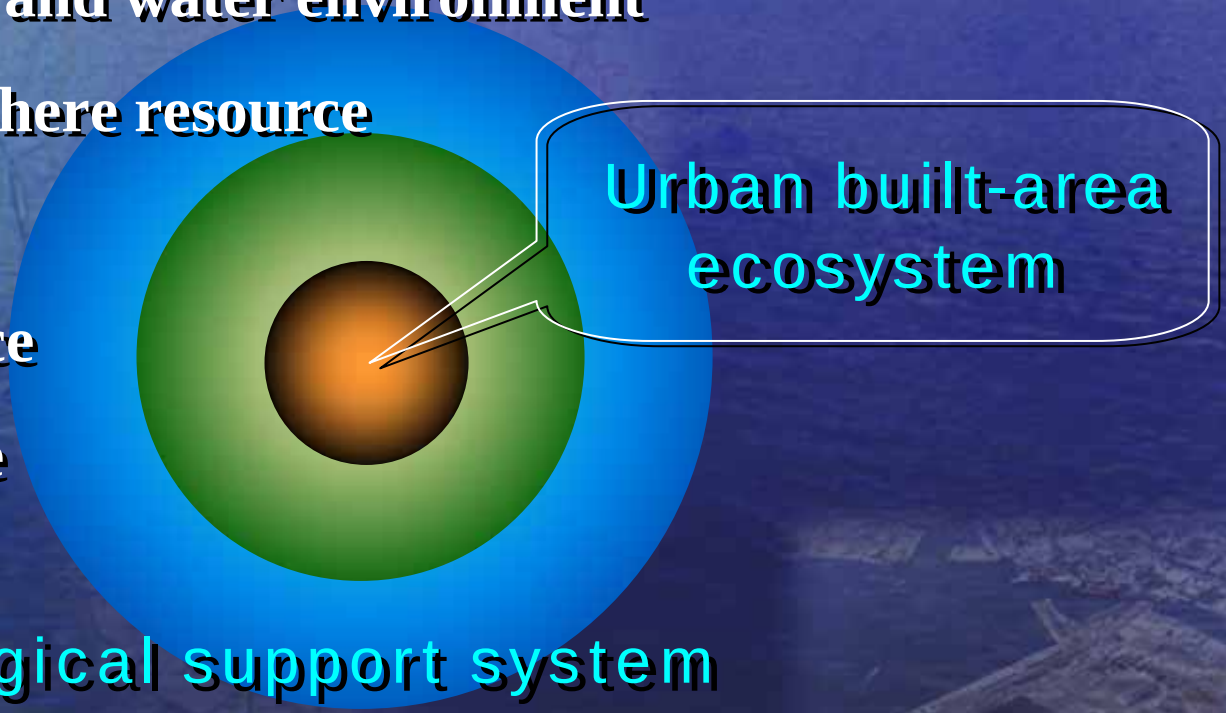
Water resource and water environment

Climate/atmosphere resource

Soil resource

Mineral resource

Forest resource



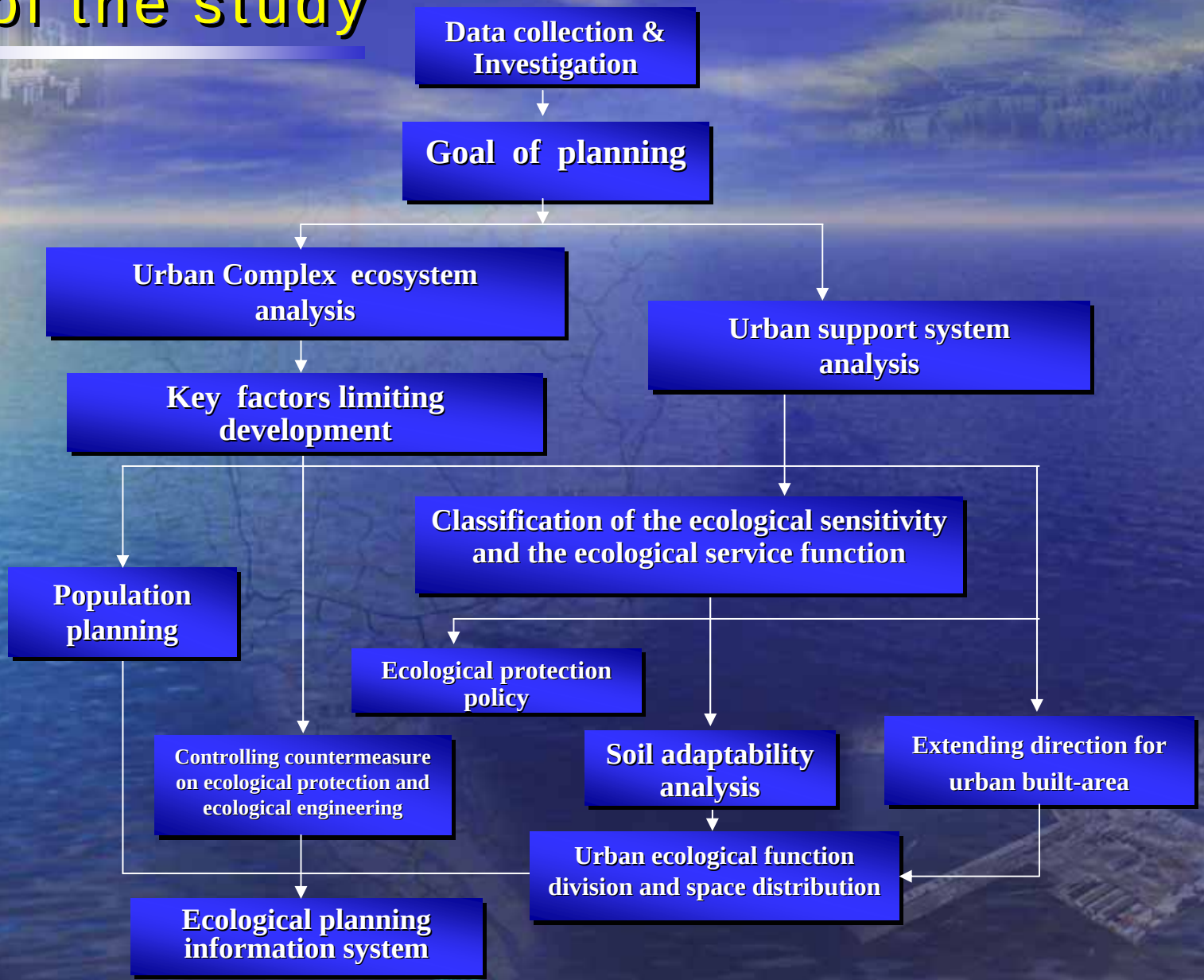
Connotation of ecological city in Guangzhou

Exterior- **with strong ecological support system**

Interior- **urban complex ecosystem's health and harmony**

- **The high efficiency process of substance flow, energy flow, population flow and information flow.**
- **Sustainable production pattern**
- **Sustainable consumption pattern**
- **High efficiency management**

Flow of the study



Methods applied

- Systems analysis
- Assembling ecological factors
- MCHARG ecological map superimposition
- Cost-benefit analysis

Content

1. Ecological index system and assessment of Guangzhou
2. Analysis of urban complex ecosystem and urban supporting system
3. Ecoregion mapping and ecological urban space strategy
4. Population planning

Ecological index system of Guangzhou

1. Nature- ecological index
2. Economics- ecological index
3. Social- ecological index

Nature- ecological index

- City plants (green)
- Environmental quality
- Level of environmental management

Economics- ecological index

- Level of development
- Structure of economics
- Efficiency of economics

Social- ecological index

- Population
- Distribution of resources
- Infrastructure
- Education and technology
- Social security
- Information level

Assessment of the ecological level

Index value of Guangzhou and other cities

Index	Guang zhou	Beijing	Shen zhen	Shang hai	Planning value of Guangzhou in 2010	STD value	Power
Nature-ecological	0.301	0.425	0.581	0.264	0.748	1	0.333
Economic-ecological	0.134	0.133	0.324	0.136	0.801	1	0.333
Social-ecological	0.22	0.151	0.467	0.281	0.586	1	0.333

Analysis of urban complex ecosystem

Structure
- Economy
- Society
- Environment

Function
- Substance flow
- Energy flow
- Population flow
- Information flow

Analysis of urban supporting system

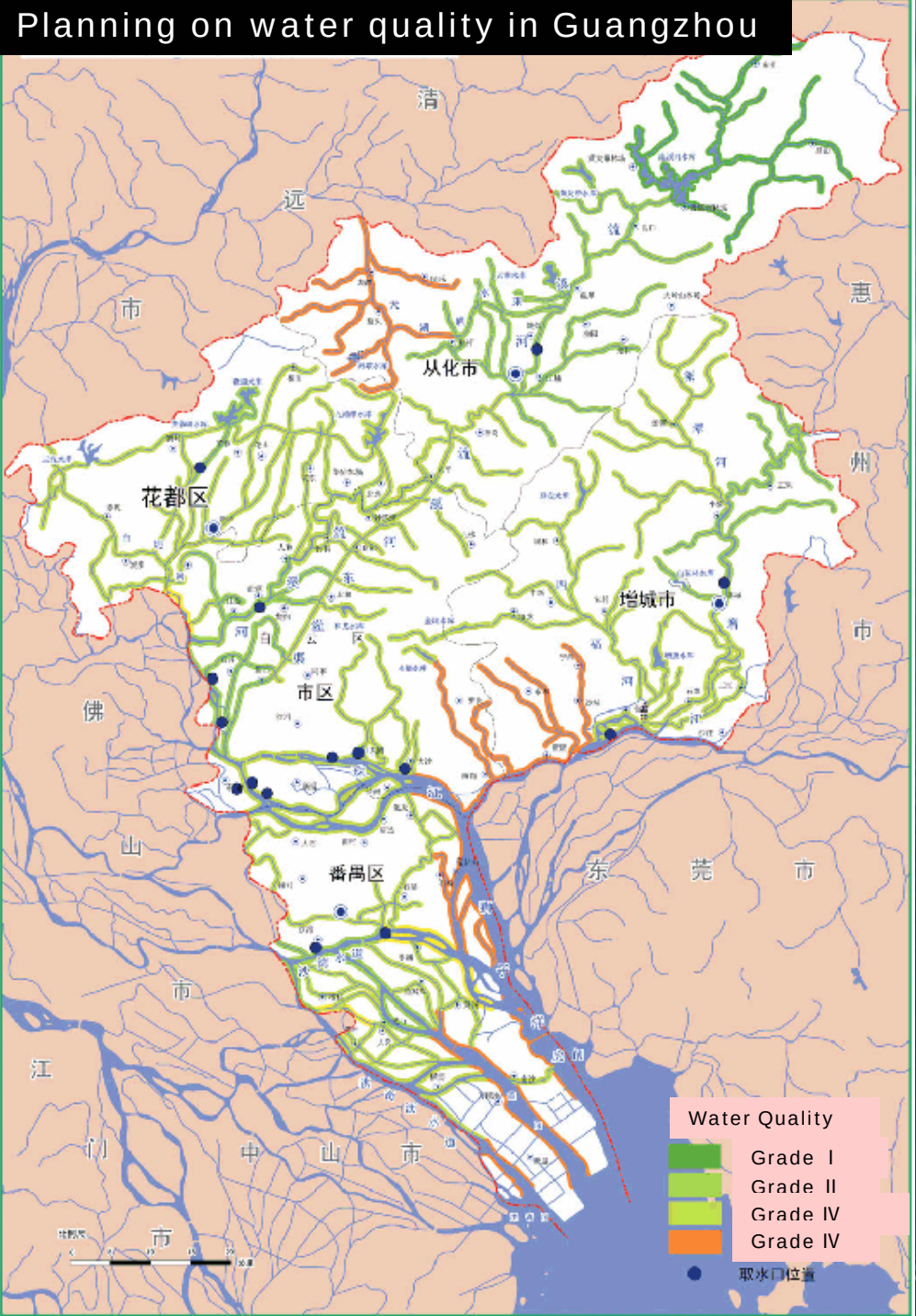
- **Water resource and the water environment**
- **City climate and atmospheric environment**
- **Energy resources** (omitted)
- **Forest resources** (omitted)
- **Soil resource and food supply**
- **Mineral resources** (omitted)

Water resource and water environment

- Carrying capacity of the water resource
- Planning on water quality and watershed protection

Carrying capacity of the water resource

Item	Prediction	Carrying capacity (population)
Native water resource (no consideration for quality)	2010	10,096,000
	2020	17,038,800
Native water resource (considering quality)	2010 Ⅳ grade	1,479,100
	2020 Ⅳ grade	6,855,500
Taking account the passing water resource (no consideration for quality)	2010	36,152,900
	2020	40,962,600
Taking account the passing water resource (considering quality)	2010 Ⅳ grade	7,899,600
	2020 Ⅳ grade	20,583,200
	2020 Ⅲ grade	6,533,500



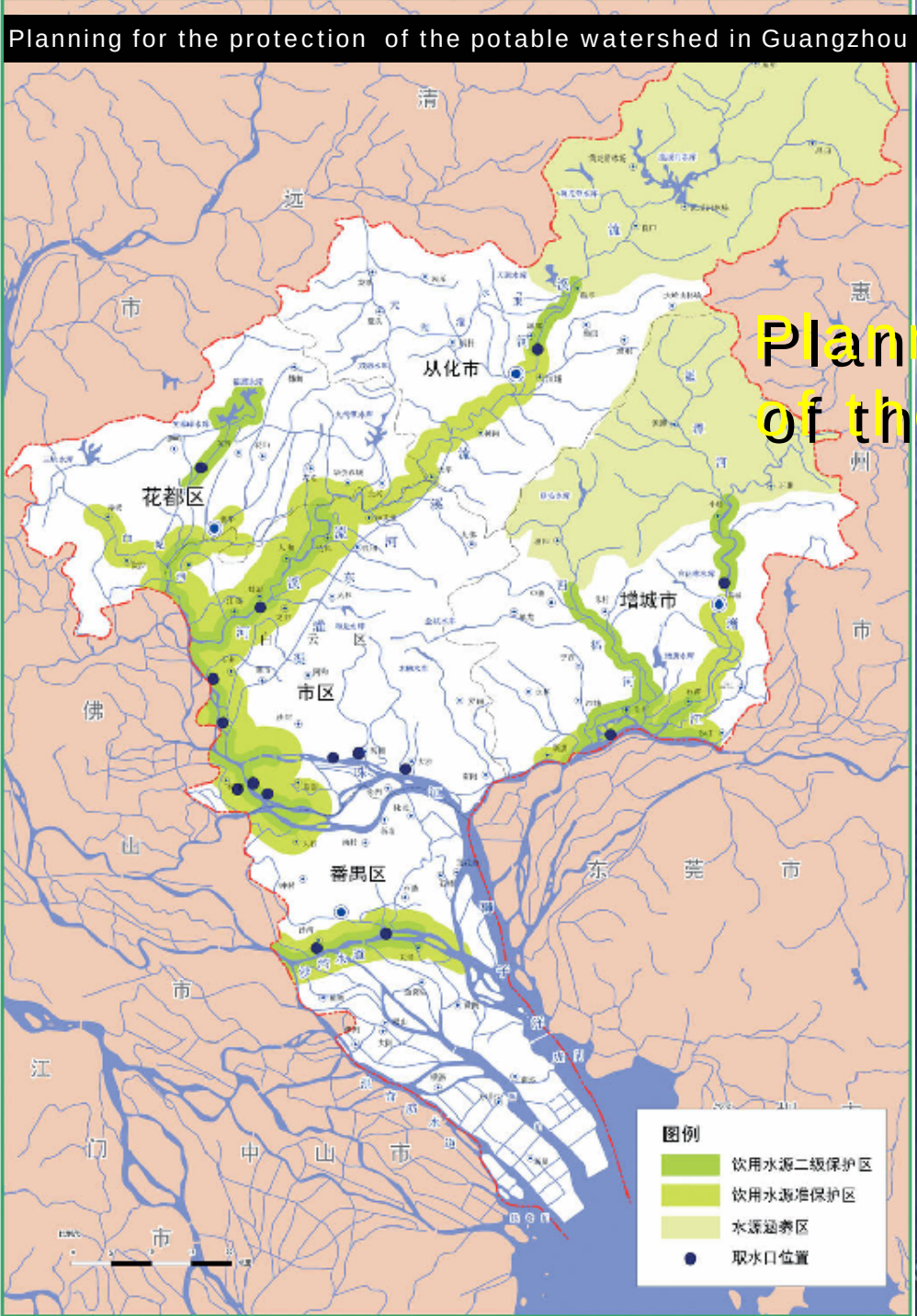
Analysis of urban supporting system
> water resource and water environment

Planning on water quality

stitute of Environmental Sciences, Beijing Normal University

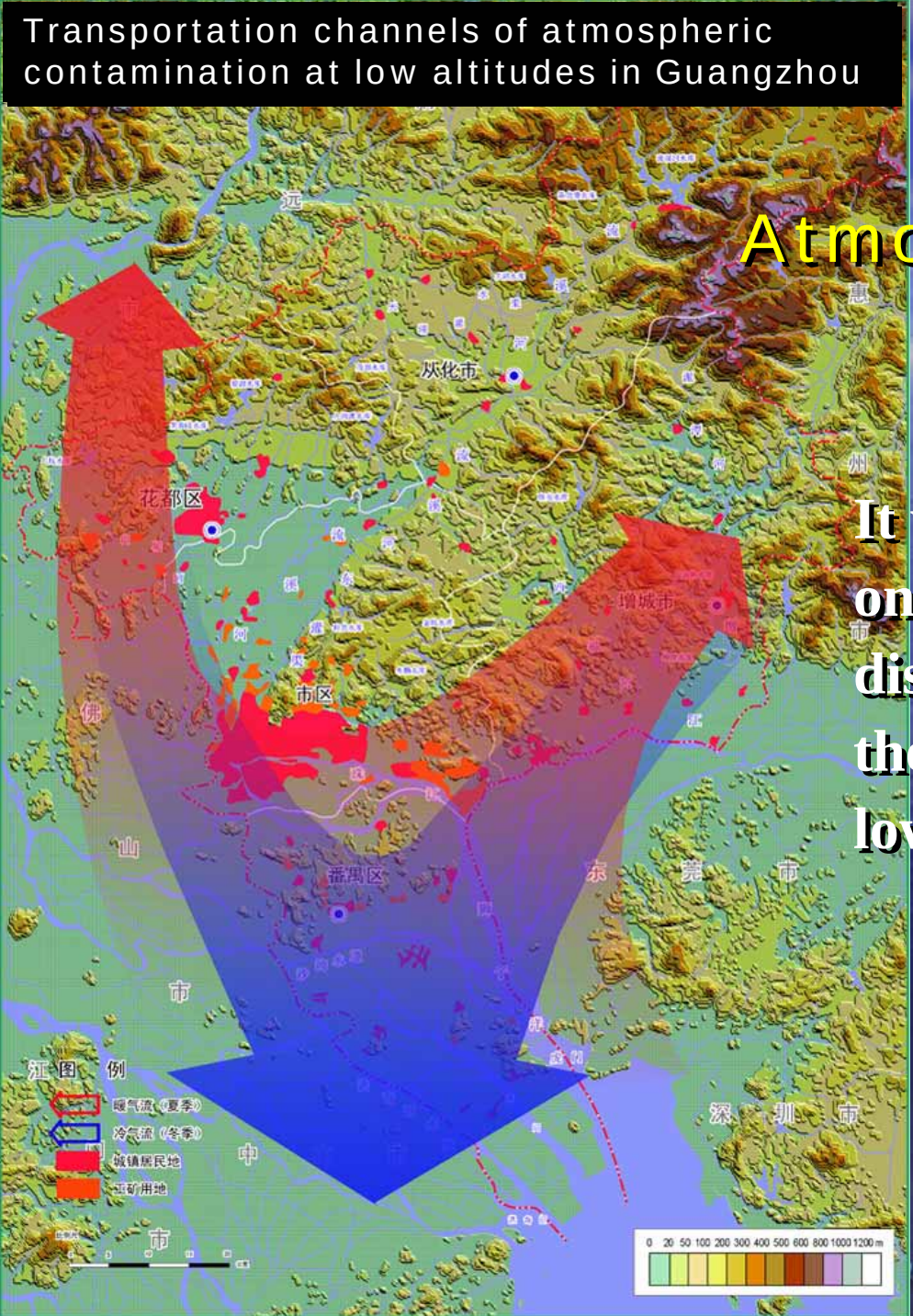
Analysis of urban supporting system
> water resource and water environment

Planning for the protection of the potable watershed



Atmospheric environment

Transportation channels of atmospheric contamination at low altitudes in Guangzhou



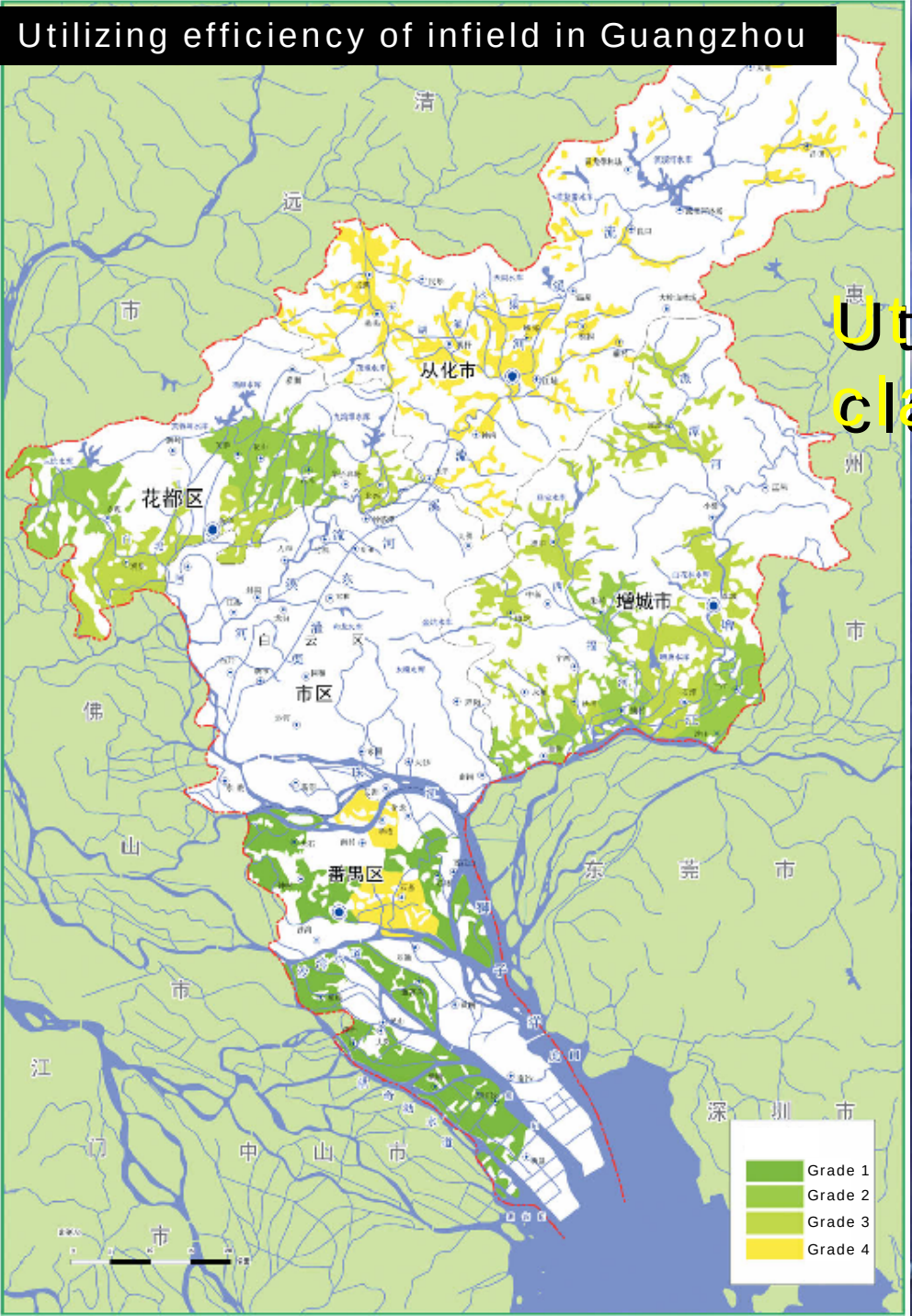
It will not have a distinct influence on populated areas, if industry districts are located in regions to the ENE, based on the analysis of low altitude wind patterns

Problems in utilizing the soil resource

- **Soil resource is deficient**
- **Quality of soil is falling**
- **Soil utilization is unsuitable**

Analysis of urban supporting system
> soil resource

Utilizing efficiency classification of infield



Prediction of food self-support for Guangzhou

Items \ Anticipative year		1998	2010	2020
Seed-area (ha)	Prediction by trend	180,266.00	137,201.20	121,971.80
Output per area (t/ha)	Prediction by trend	5.73	6.34	6.98
	Maximum yield	14.24	14.24	14.24
Gross output	Prediction by trend	1,032,994.00	869,910.40	851,777.00
	Maximum yield	—	1,953,059.00	1,736,268.00
Demands (t)		1,766,441.40	2,021,100.00	2,223,210.00
Needed from outside (t)	Prediction by trend	733,447.40	1,151,189.60	1,371,433.00
	Maximum yield	—	68,041.00	486,942.00
Self-support ratio	Prediction by trend	58%	43%	38%
	Maximum yield	—	97%	78%

Ecoregion and urban space strategy

- **Ecological mapping**
- **Select direction for future construction**
- **Ecological urban space strategy**

Integrated ecological mapping

- Classification on sensitivity of the ecosystem
- Classification on the service function of the ecosystem
- Ecoregion mapping

Ecoregion and urban space strategy
> ecological mapping

Sensitivity of ecosystem

Ecoregion and urban space strategy

> ecological mapping

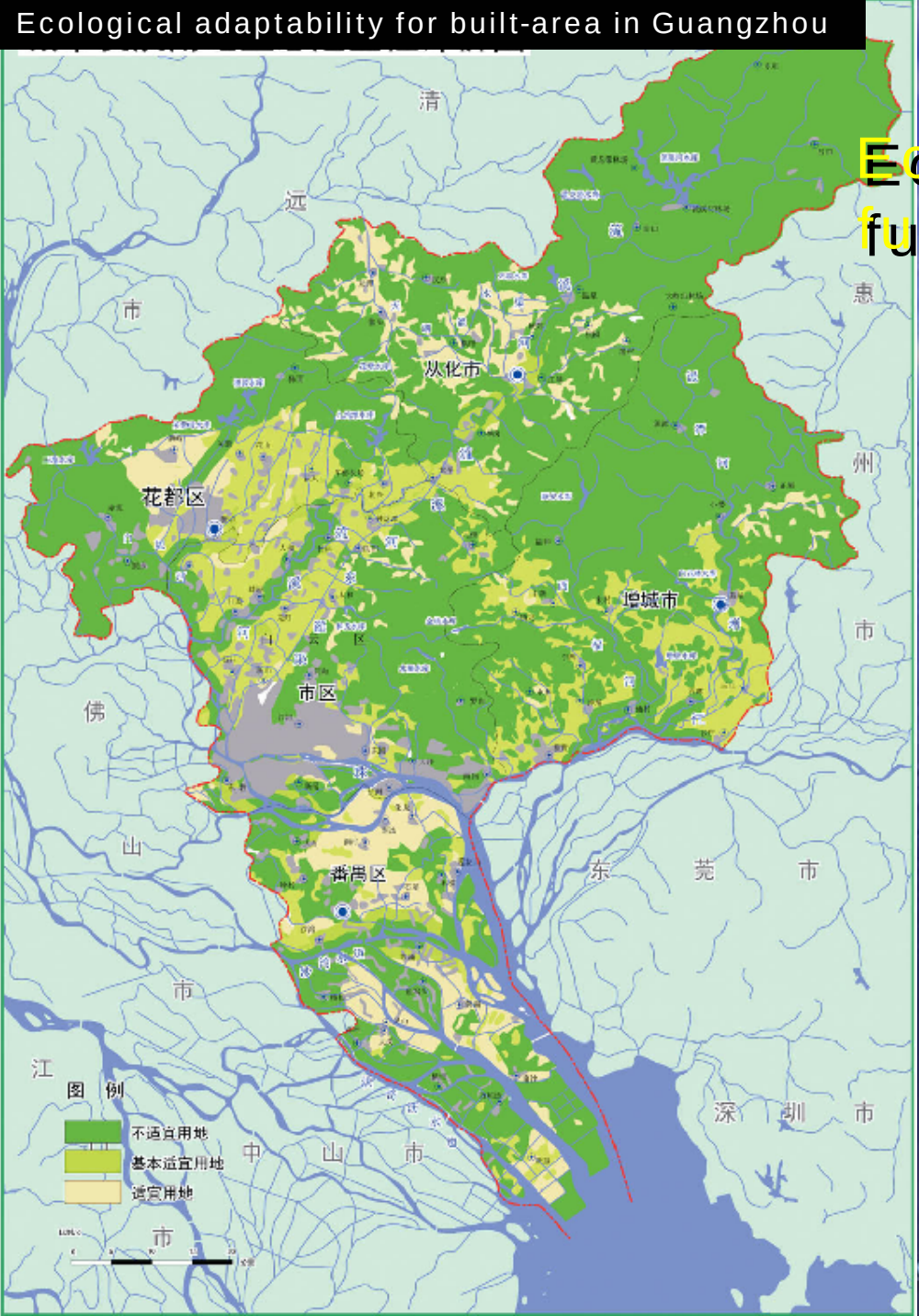
Service function of ecosystem

Ecoregion mapping in Guangzhou

Ecoregion mapping

Type	Area (km^2)	%
I	2483.0	35.8%
II	969.2	14.0%
III	890.7	12.9%
IV	1521.0	22.0%
V	545.1	7.9%
Populated and other areas	517.4	7.5%

Ecological adaptability for built-area in Guangzhou



Ecological adaptability for future urban built-area

Type	Area (km^2)	%
Not available	4374.5	63.2%
Basically available	1163.0	16.8%
Available	871.5	12.6%
Populated and other areas	517.4	7.5%

Selection for future built-area

Attention must be paid to:

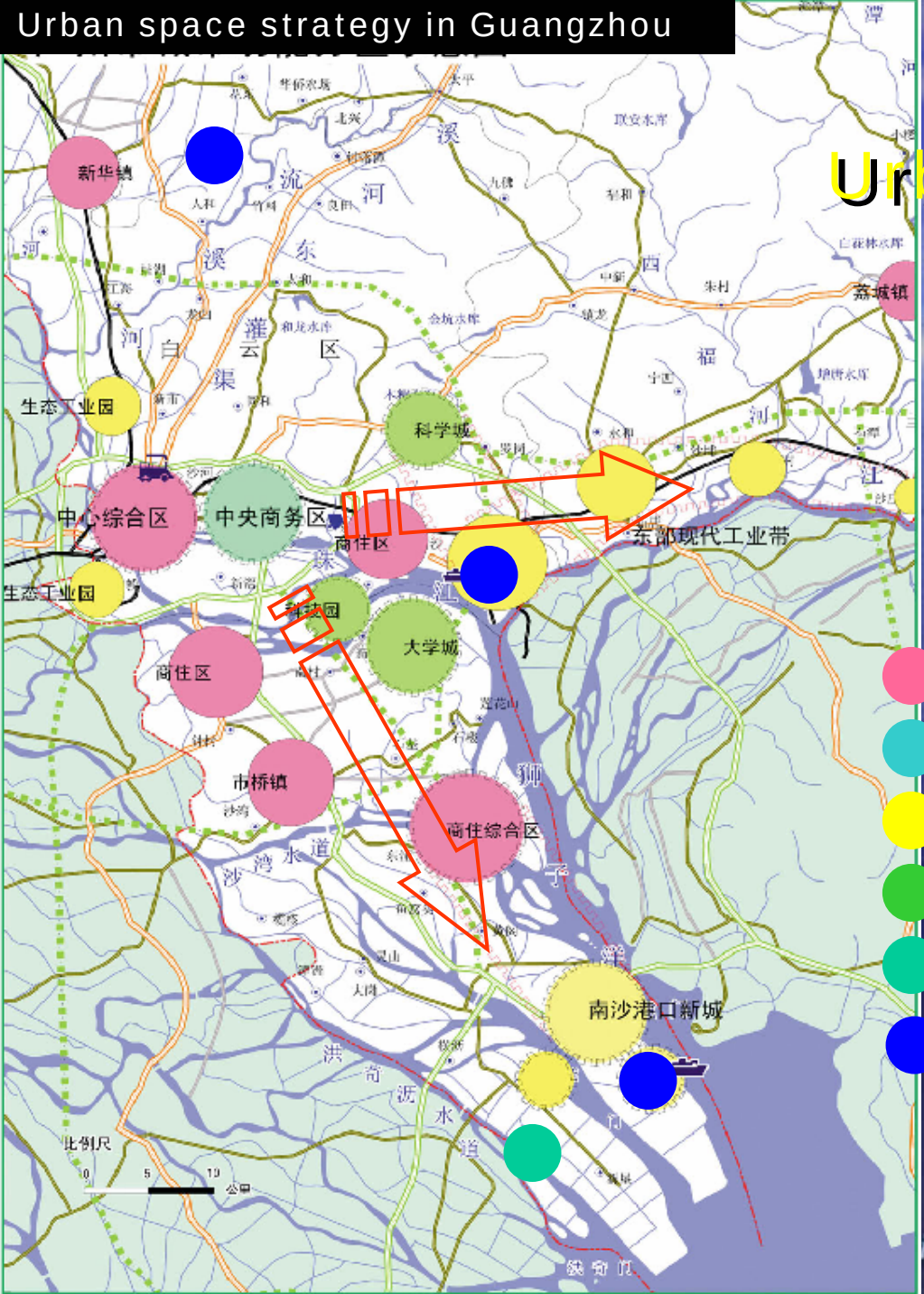
- **History of the city's development**
- **Traffic conditions and patterns**
- **Resources and the environment - water, soil and climate**
- **Urban industry development**
- **Geological conditions**

Ecological urban space strategy

Classification of urban ecological functions

- **Business and residential regions**
- **Financial and commercial regions**
- **Modern manufacturing industrial belt**
- **High technology industry and port regions**
- **Urban agriculture regions**

Urban space strategy



- Business and residential regions
- Financial and commercial regions
- Modern manufacturing industry
- High technology industry
- Urban agriculture regions
- Port regions

Population planning

- **Actuality of the population**
- **Moderate the size of the population**
- **Density distribution planning**

Actuality of the population

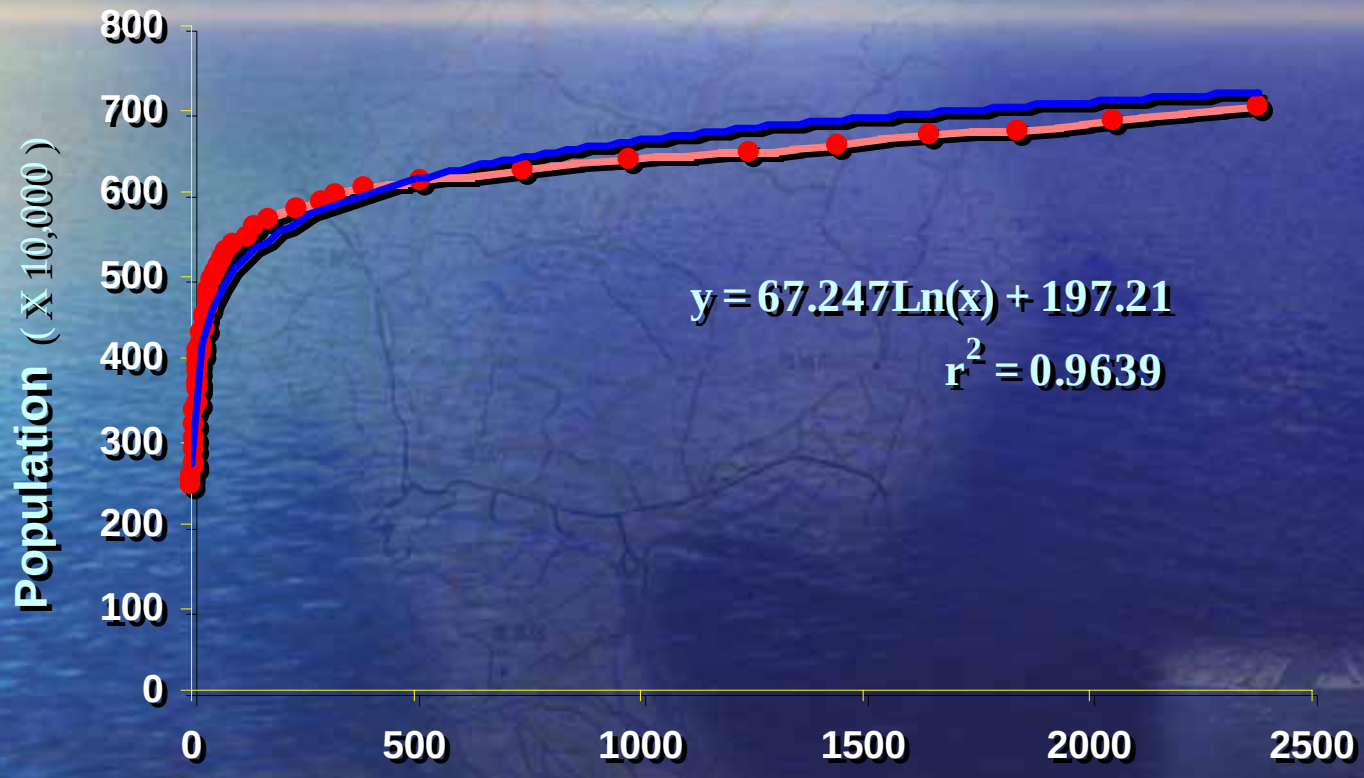
- **Total population**

  Nov 1, 2000: 9.94 million

  (floating population- 2.32 million)

- **Low birthrate and mortality- the 3rd stage**
- **High population density in the old town- decreases quality of life and that of the environment**

Moderate population size
GDP and population



Relationship of population size and GDP index

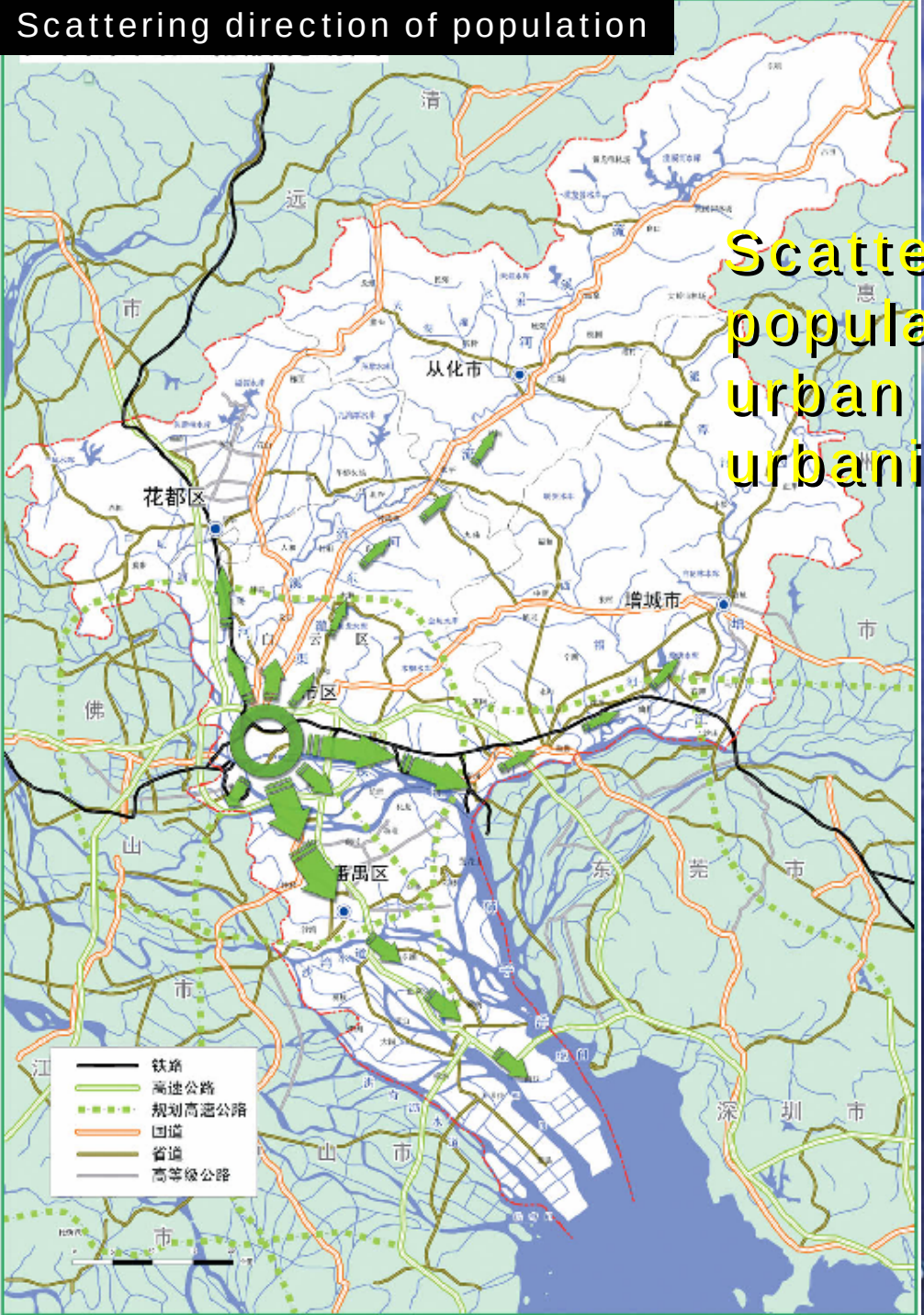
Moderate size of the population
Economic development and population

Growth Rate (2001-2010)	GDP Index (100 million yuan)	Population(x10,000)
10%	6172.15	784.067
11/%	6767.92	790.263
12%	7411.35	796.370
13%	8078.61	802.167
14%	8841.19	808.232
15%	9651.43	814.128
16%	10509.34	819.854
17%	11462.57	825.692
18%	12463.46	831.321
19%	13559.67	836.989
20%	14751.20	842.652

***GDP index is calculated at the 1990 rate

Distribution planning of population density

District Name	Area (km^2)	Planning of 2010				
		District		Built-area		
		Population	Density (people/ km^2)	Area (km^2)	Population	Density (people/ km^2)
Whole City	7434.40	8000000	1076	1020.5	5730000	5615
Town Area	1443.60	4835000	3349	555.00	4080000	7351
Liwan	11.18	354000	30000	11.18	354000	30000
Yuexiu	8.90	267000	30000	8.90	287000	30000
Dongshan	17.20	430000	25000	17.20	430000	25000
Tianhe	108.30	797000	7359	67.00	670000	10000
Huangpu	121.70	549000	4511	85.00	455000	7000
Haizhu	90.40	827000	9148	77.00	693000	9000
Fangcun	42.60	378000	8873	42.60	298200	7000
Baiyun	1042.70	1033000	991	265.50	912800	3438
Others	5990.80	3230000	539	485.50	1650000	3545
Panyu	1313.80	1091000	830	169.00	733000	4325
Huadu	981.10	847000	673	71.00	278000	3916
Conghua	1974.50	808000	307	75.00	260000	3467
Zengcheng	1741.40	888000	509	150.00	379000	2527



Scattering direction of population based on ecological urban space strategy for future urbanization

Ecological planning information system

Guangzhou should develop an ecological planning information system to integrate all of the data concerning environmental monitoring, ecological assessment and ecological planning simulation based on RS, GIS and GPS technology and computer network technology for the purpose of efficient urban development and management.

Thank You

The Marine Ecosystem of South East and the East Asian Seas

Porfirio M. Aliño
Deputy Director for Research
Marine Science Institute
University of the Philippines

The coastal ecosystems of the East Asian Seas contain some of the most diverse ecosystems in the world. Found in the Indo-west Pacific region, its coastal areas are home to at least 10 % of the world's population. The total contribution to the world's fishery of this region is estimated to be no less than 20%. This region has been an important tourism destination especially in relation to its beautiful beaches and coral reef areas. Its coastal ecosystems integrity as a typhoon buffer against erosion and other calamities has been highly underestimated, including its other ecosystem values. Human induced stresses pose the greatest threats to these ecosystems. Increasing population growth in many areas of major coastal development show that issues associated with these changes are habitat modification, overexploitation of its resources and pollution.

A synoptic summary of the coastal resource management problems associated with these ecosystems highlights some of the root causes showing conflicts of interests, access and tenure arrangements and inequitable resource allocations. Despite the highly political and social basis of the realties faced by the coastal ecosystems of East and Southeast Asia, the scientific and conservation challenges in the understanding and sustainable use of these ecosystems may hold one of the important keys to their solutions.

One of the major hotspots in the region that is highlighted is the disputed Spratly's area located in the South China Sea. Learning from the lessons derived from the cooperative arrangements in integrated coastal management initiatives of the coastal states of this region, indicate that engaging in joint marine scientific investigations and marine conservation efforts are promising future avenues.

The Marine Ecosystems of South East Asia and the East Asian Seas

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University of the Philippines
Diliman, Quezon City 1101
Philippines

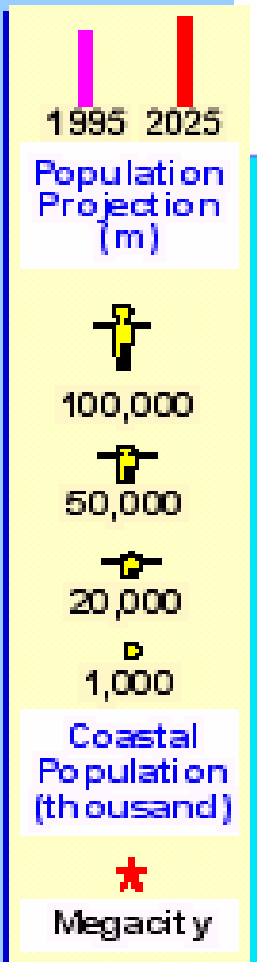
The People of East Asia

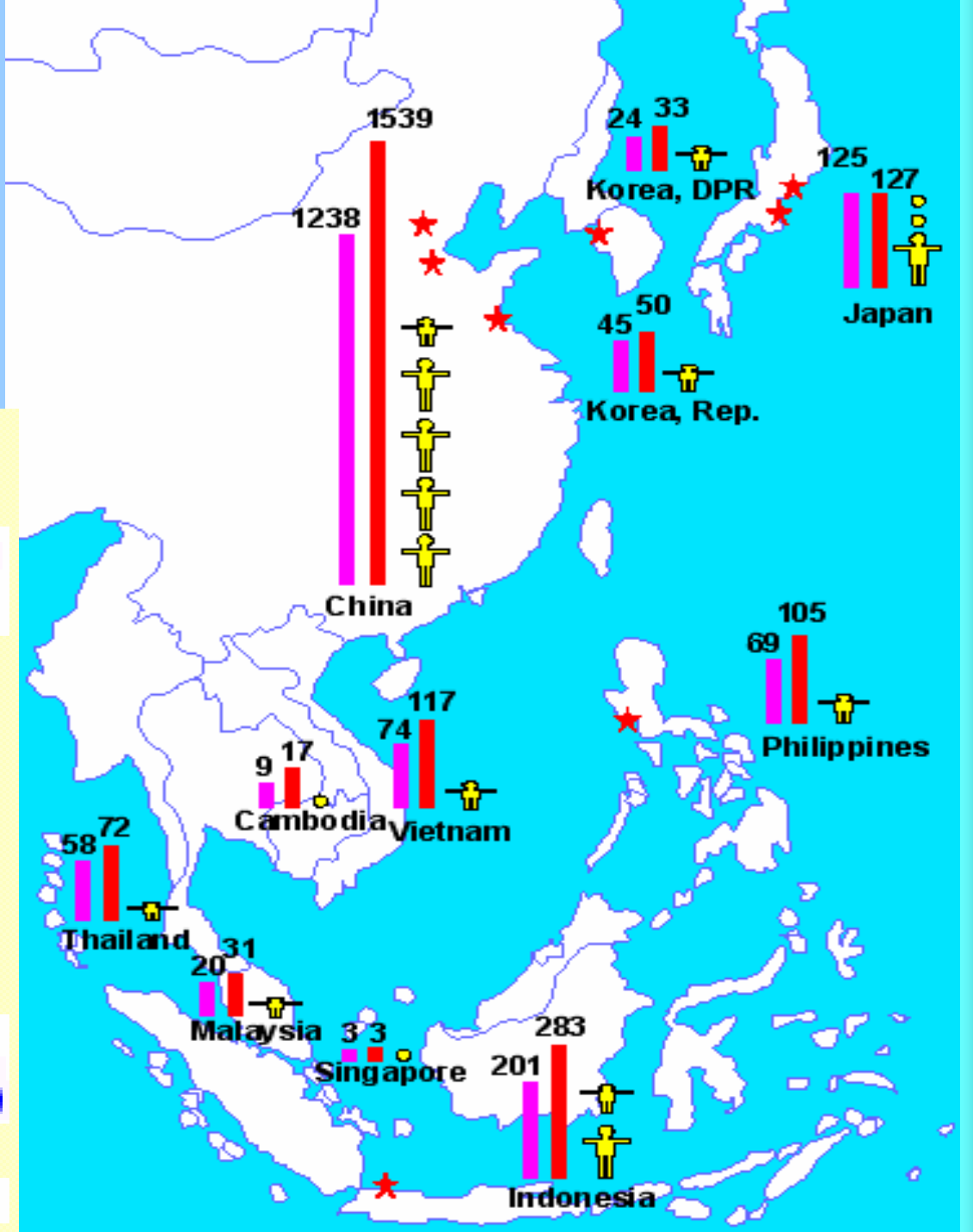
Diverse culture

- Ethnic composition
- Religion
- Political affiliation
- Socioeconomic conditions

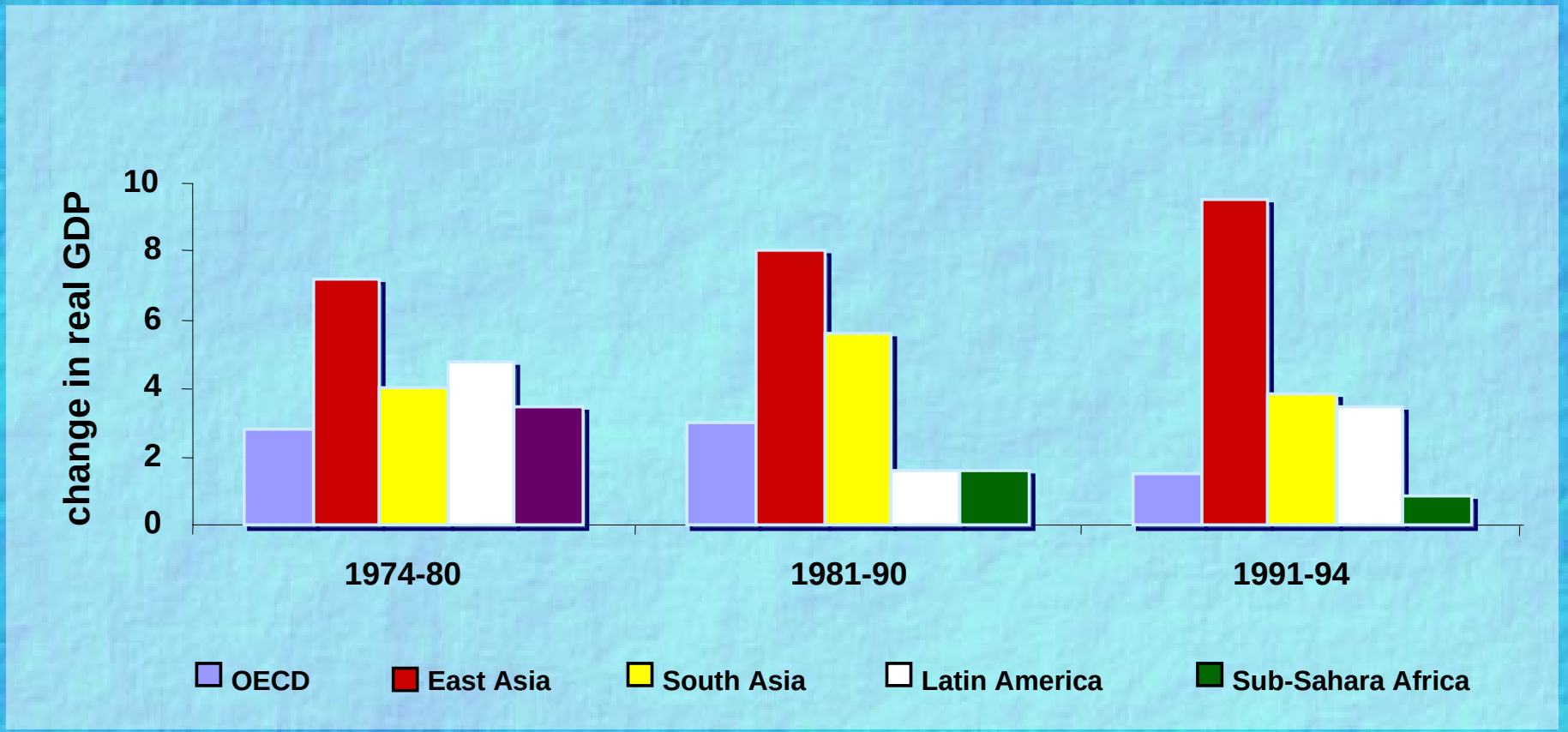
Population Structure of East Asia

City	Population (2000) (millions)	Rank
Tokyo	28.0	1
Shanghai	14.2	6
Seoul	12.2	11
Beijing	12.0	12
Manila	10.8	16
Osaka	10.6	18
Tianjin	10.2	20
Jakarta	9.8	21



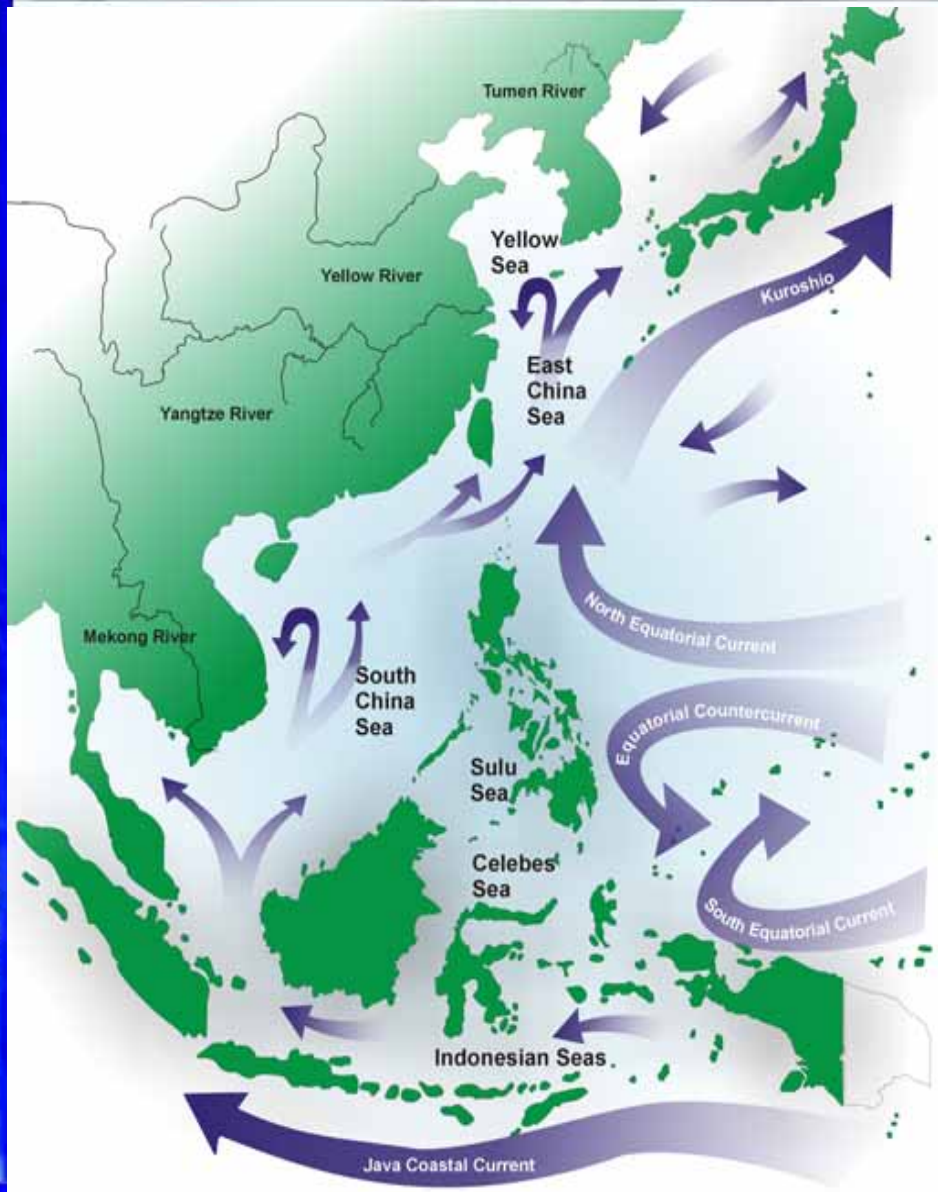


World Growth Summary, 1974-1994



World Bank, 1998

The Seas of East Asia



Five semi-enclosed seas / large marine ecosystems

- Yellow Sea
- East China Sea
- South China Sea
- Sulu-Sulawesi Sea
- Indonesian seas

Riverine systems

- Mekong River
- Yangtze River
- Yellow River

Major ocean currents

Partnerships in Environmental Management for the Seas of East Asia

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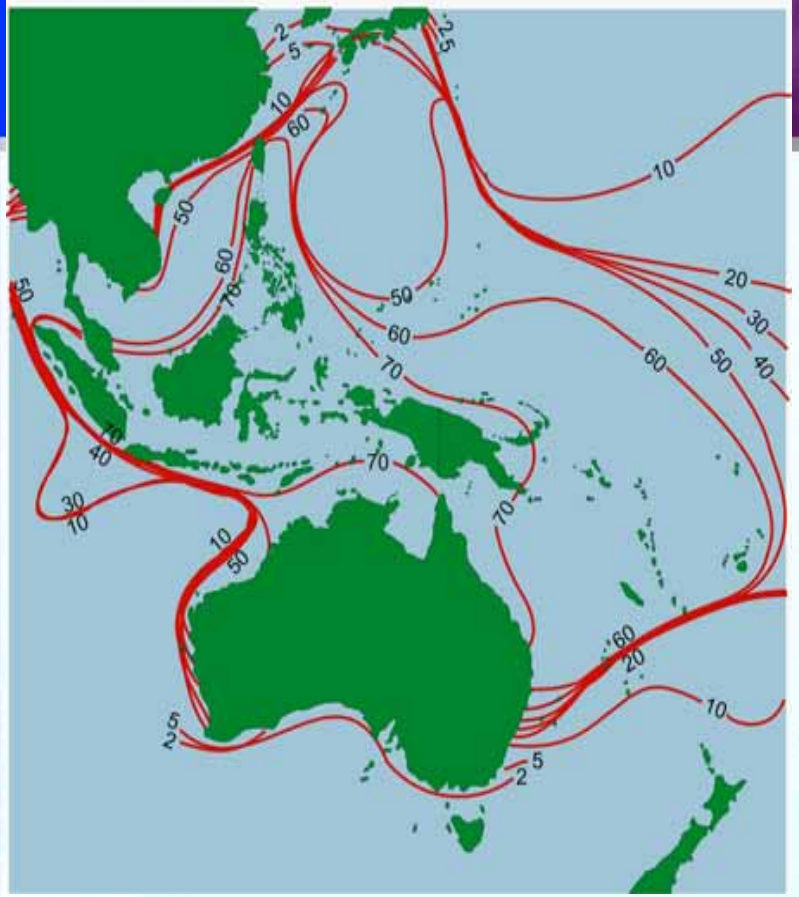
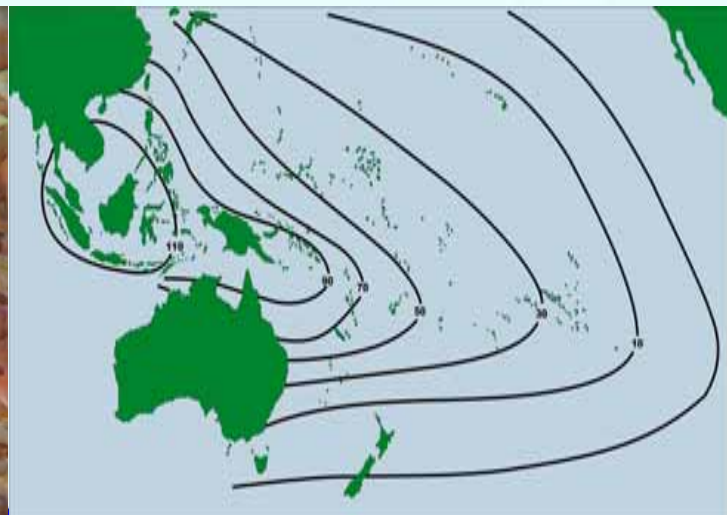
Biodiversity



	Marine Fish Species Diversity	Hard Coral Species Diversity
South East Asia	2,500	400-500
Great Barrier Reef	1,500	395
Caribbean	500-600	100-200

Photo credit: Resources 12(5):1990

Sources: Chou 1997; Veron, 2001; and Williams, 2001.



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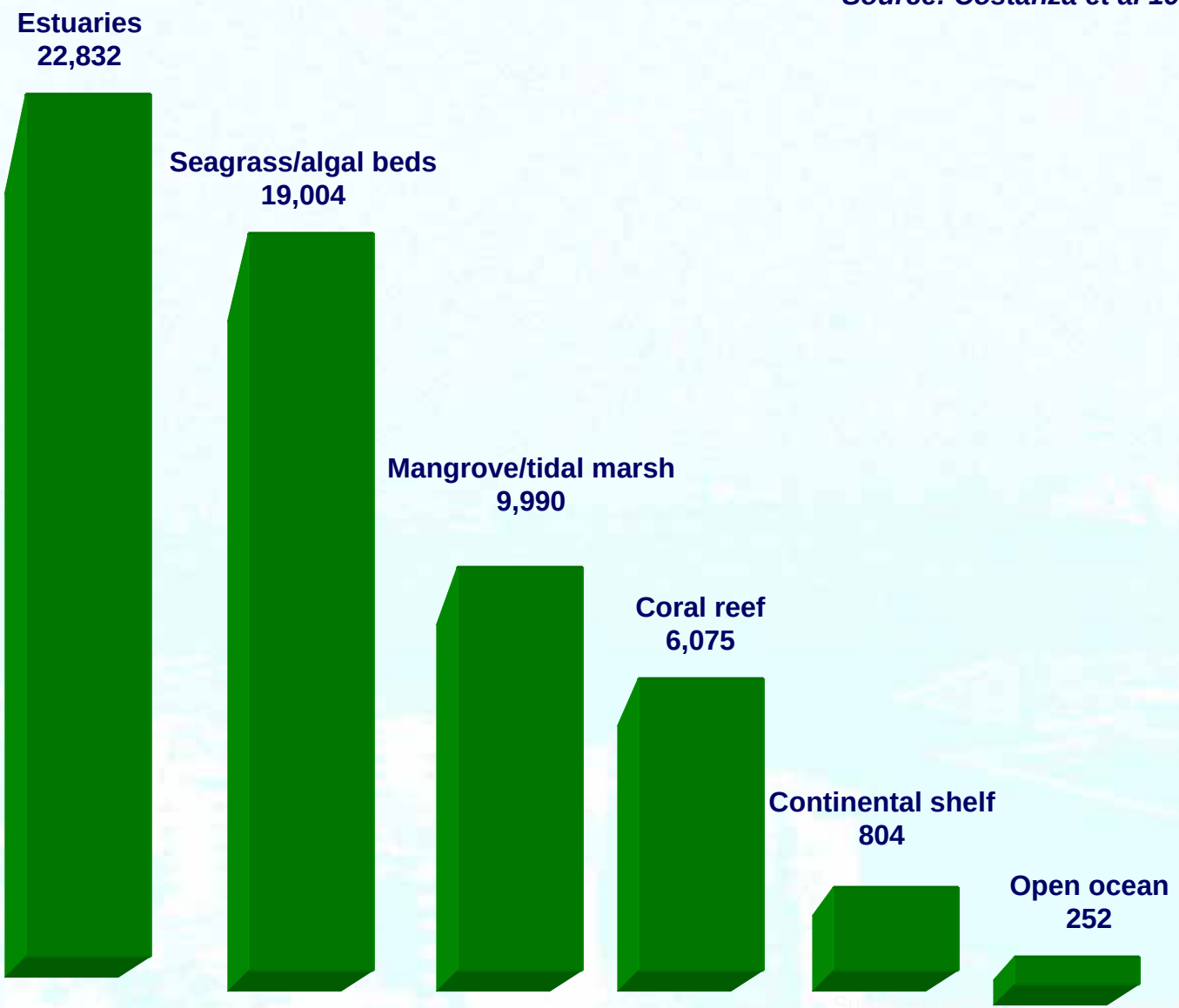
Estimated mean value of some marine biomes

Source: Costanza et al 1997



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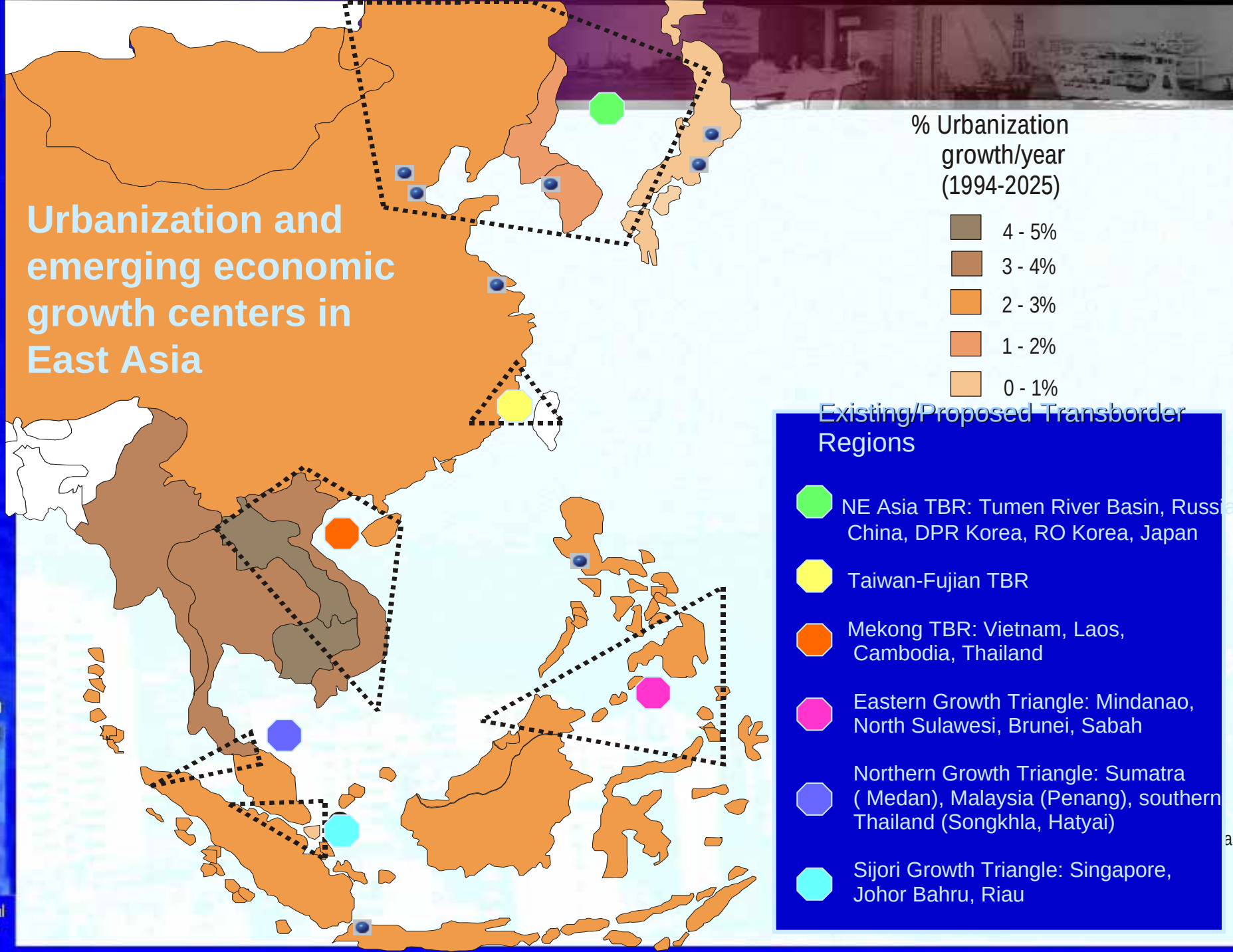
Urbanization and emerging economic growth centers in East Asia



PEMSEA

Partnerships in Environmental Management for the Seas of East Asia

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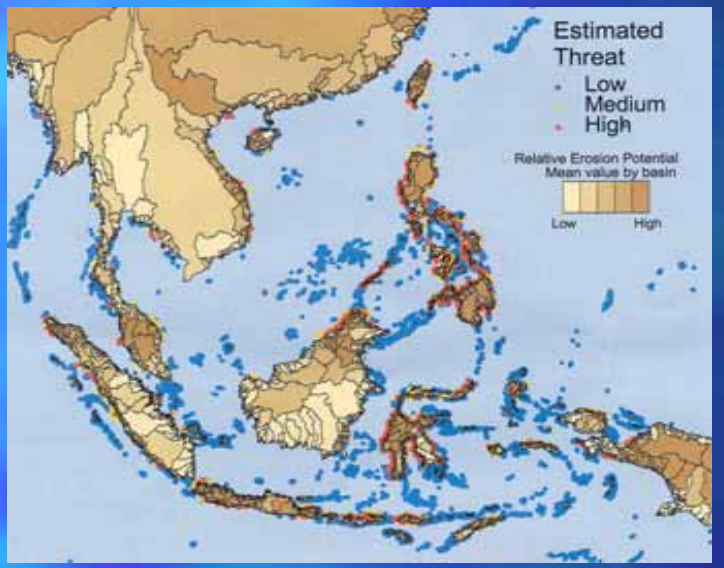
The Coastal and Marine Areas of East Asia

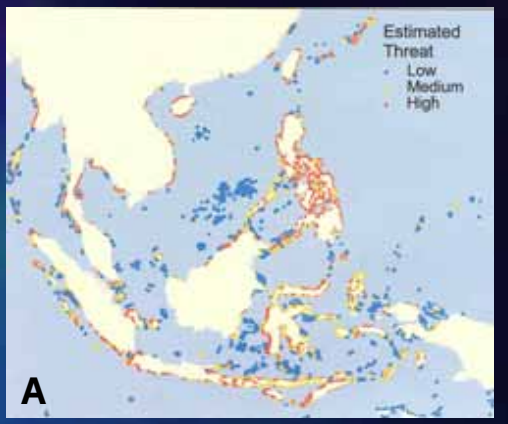
- Concentration of economic activities
- Home to >0.5 billion people
- Multiple use

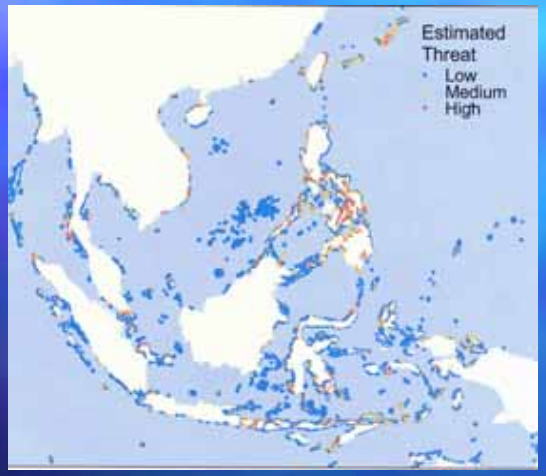
Mangroves

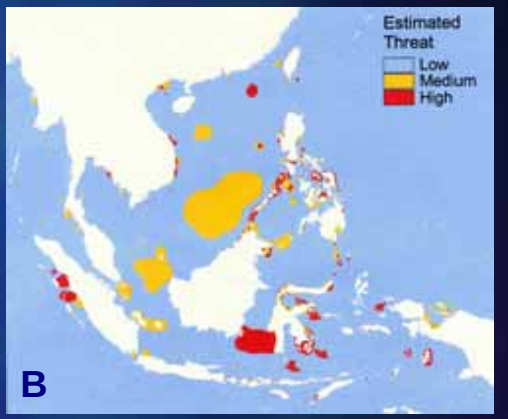
- Mangrove loss in the ASEAN region range from 20 - 75 % of its original cover
- Source: UNEP 2000

- In many countries of SE Asia, conversion to shrimp and fishponds used to be one of the major threats to mangroves







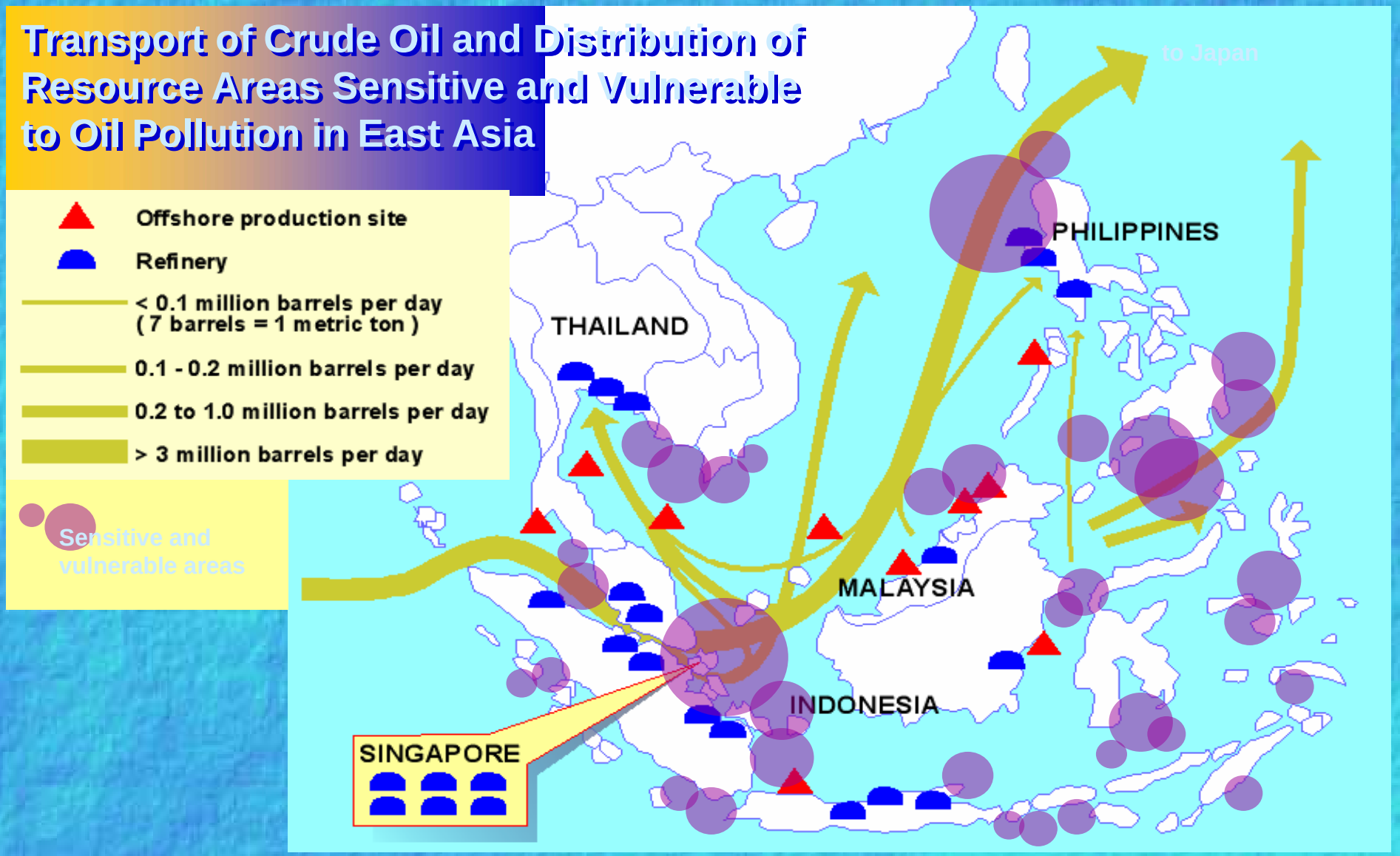


- The reefs of Southeast Asia are at greatest risk

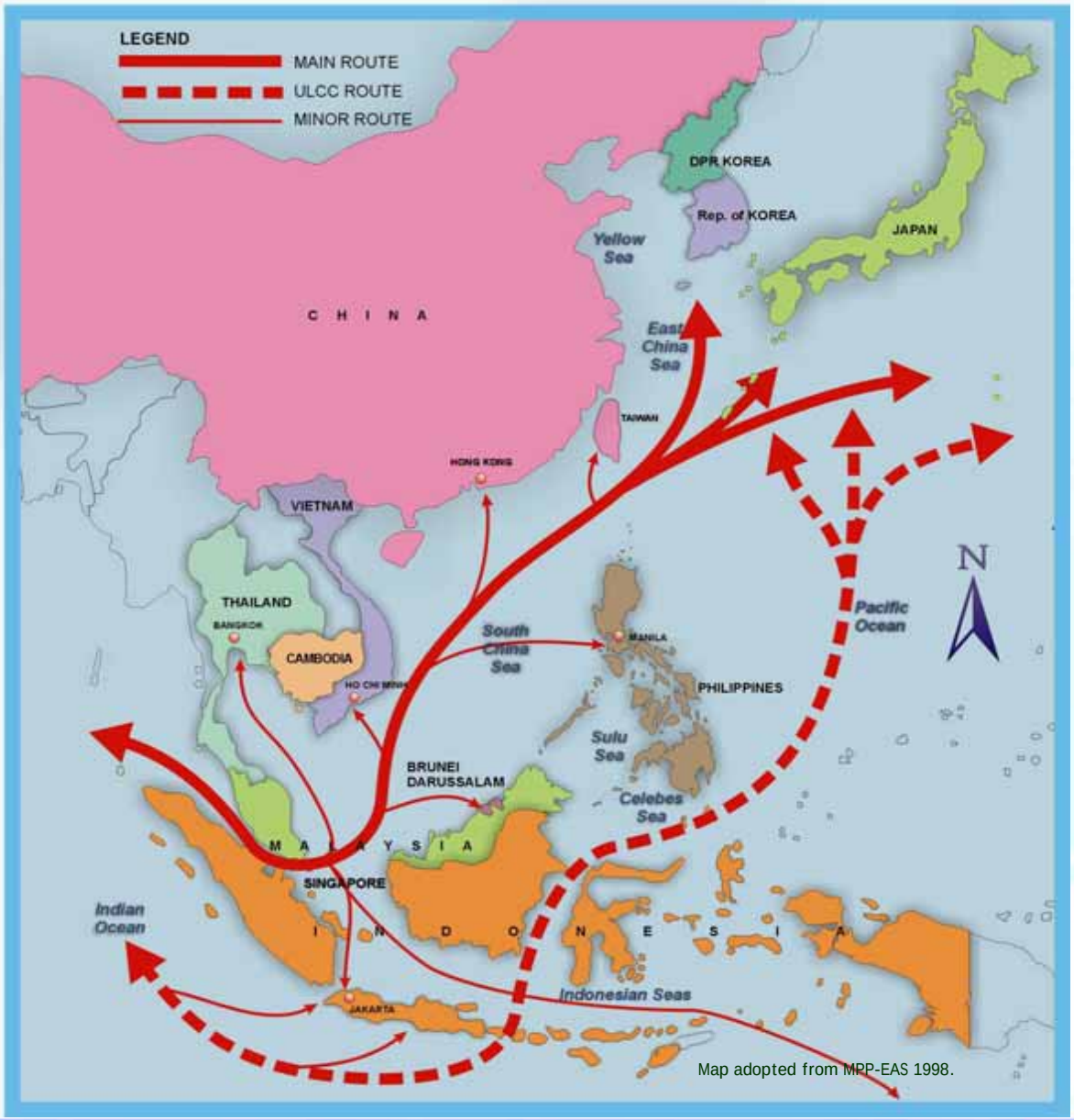
- Sedimentation, coastal development and overfishing (including destructive fishing) cause the most severe risks to coral reefs

- Source: Burke et al. 2000

Transport of crude oil and distribution of resource areas sensitive and vulnerable to oil pollution

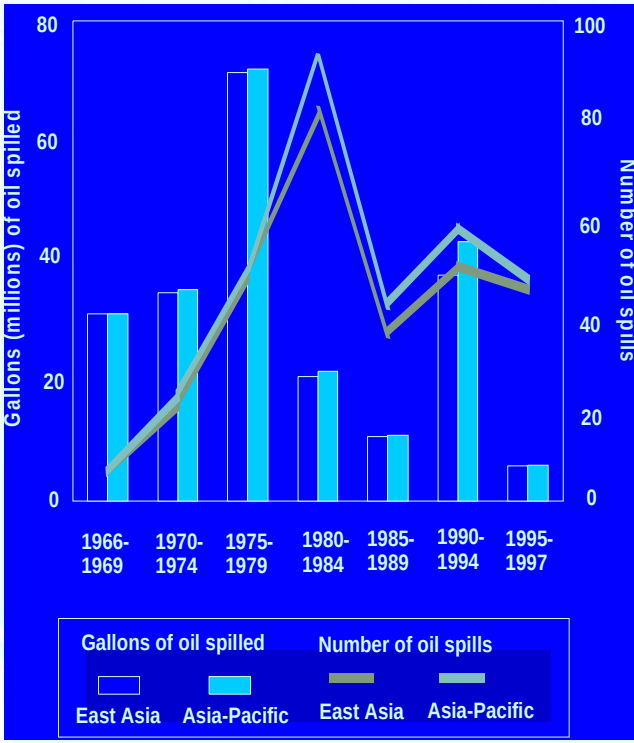


Major Threats to the Marine Environment



Map adopted from MPP-EAS 1998.

Oil Tanker Routes and Oil Spills in East Asia



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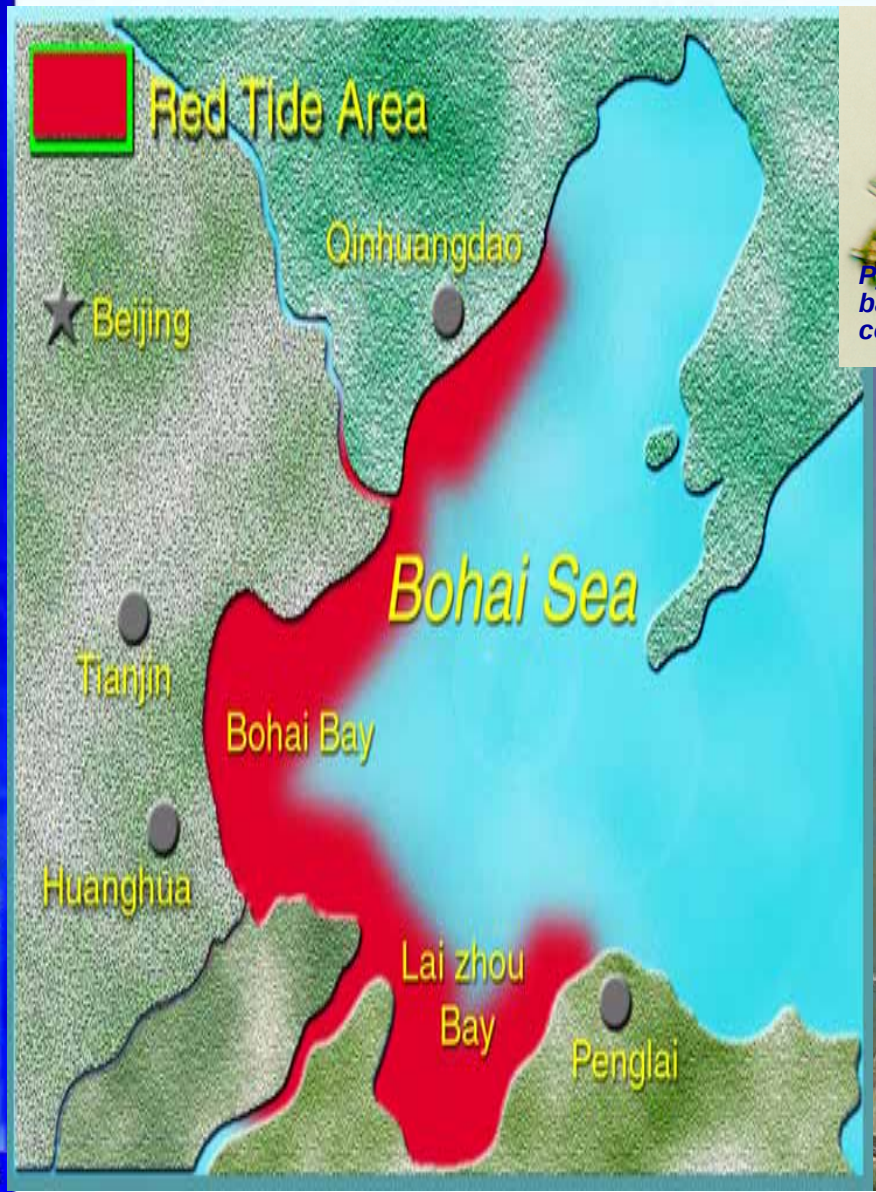
Red tides



Pyrodinium bahamense var compressum

Bloom of phytoplankton in a Japanese coastline

Suisan Aviation Scientific American Presents

Partnerships in Environmental Management for the Seas of East Asia

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The South China Sea: a strategic and significant region

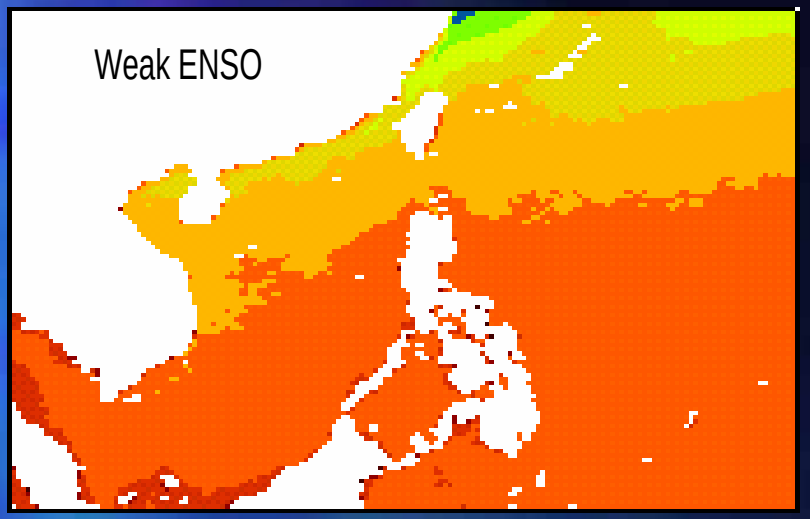
- High marine Biodiversity
- Important life support system
- Strategic sea lane
- Scientifically crucial for understanding the ecology and evolution of the region
- Cooperation is urgently needed

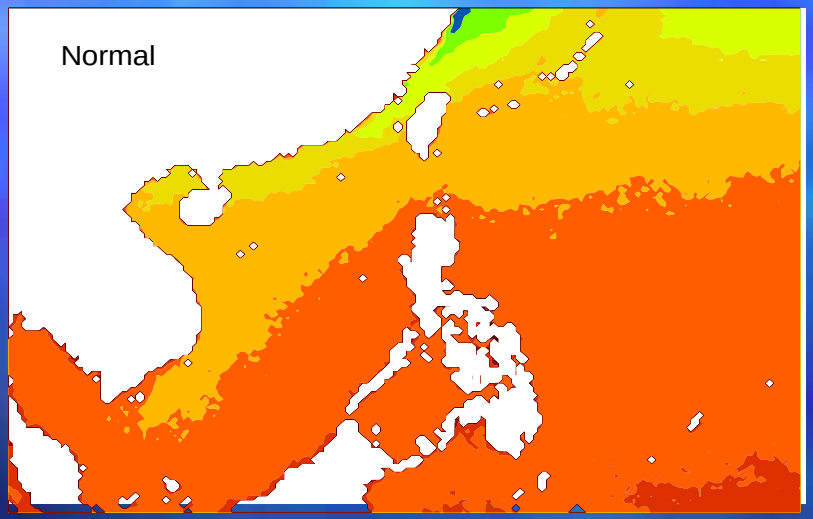
Questions and objectives

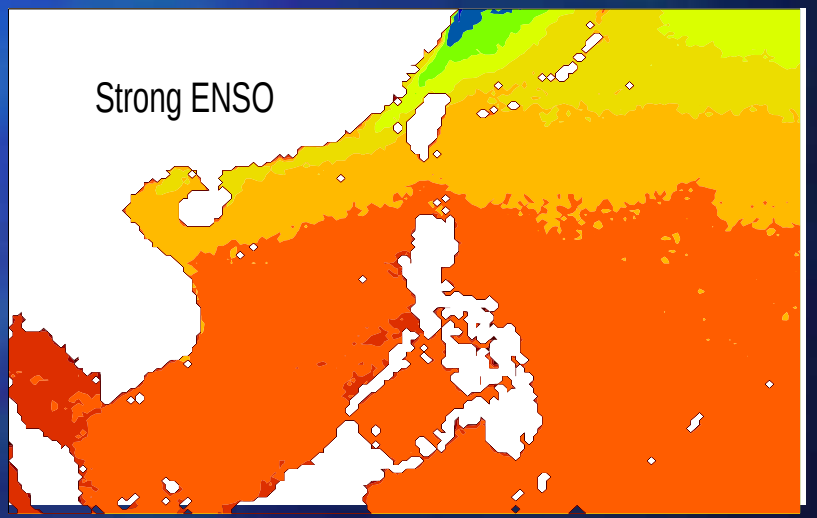
(asked during the Symposium on the Marine Biology of the South China Sea, Alino and Juinio-Menez)

- What can we learn from understanding the biodiversity of the SCS
- Can we initiate adaptive management such as CoME and MERFs?
- Are the urgent needs going to be addressed by science?
- How do we address overexploited transboundary fisheries?
- How do we enhance the effectiveness of Strategic Environmental Plans?

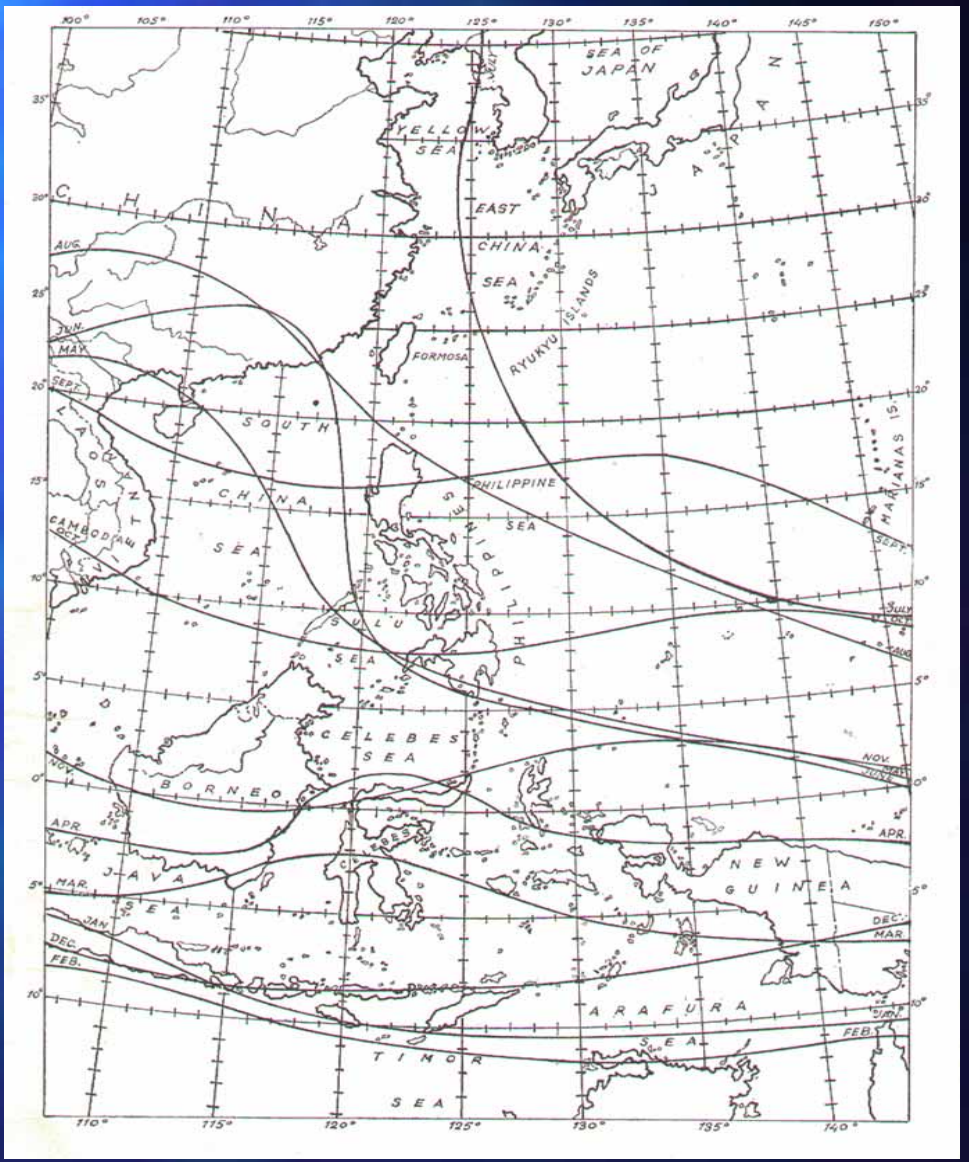
El Niño Southern Oscillation (ENSO)
Sea Surface Temperature Anomalies





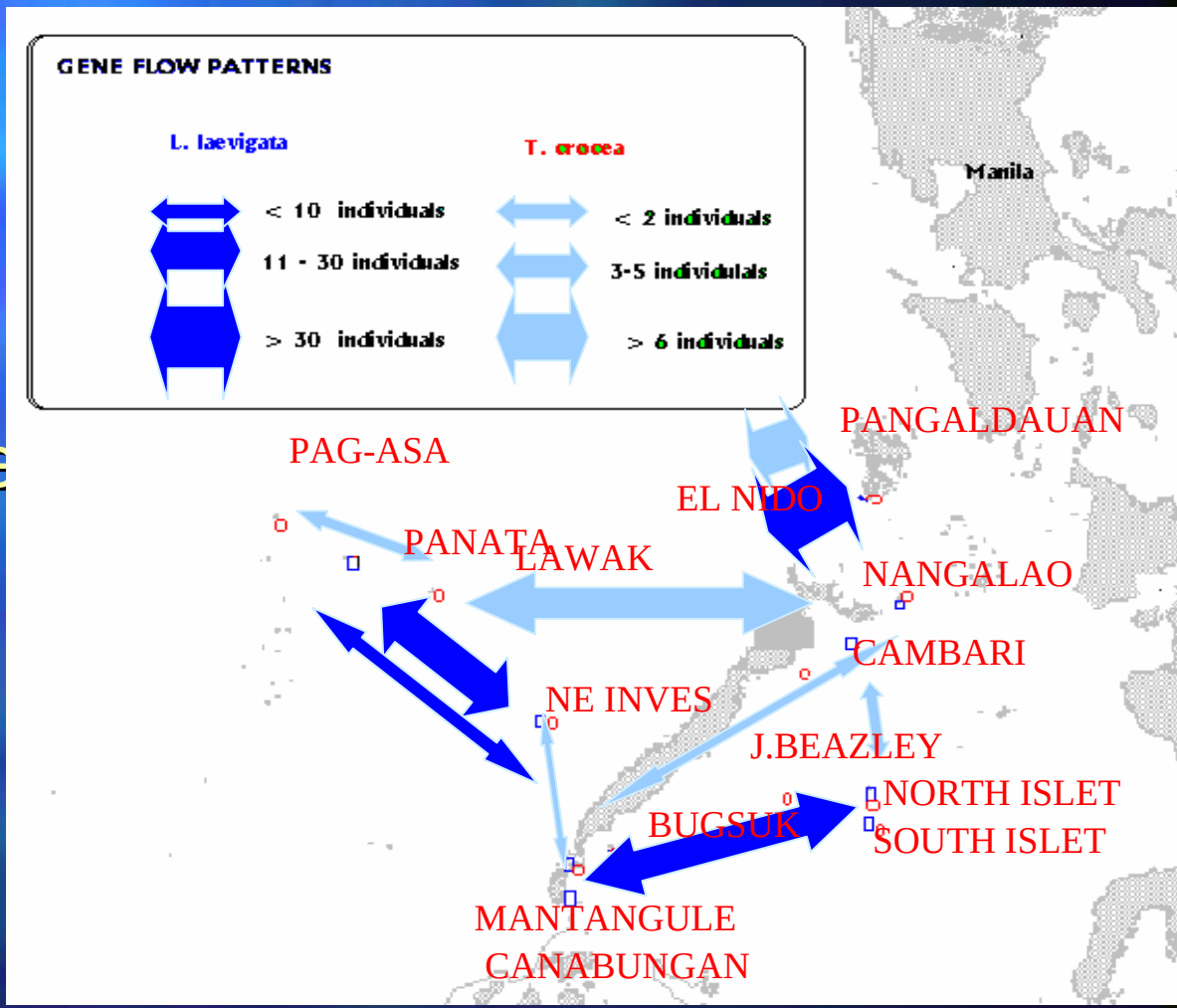


Circulation, Storms and El Niño



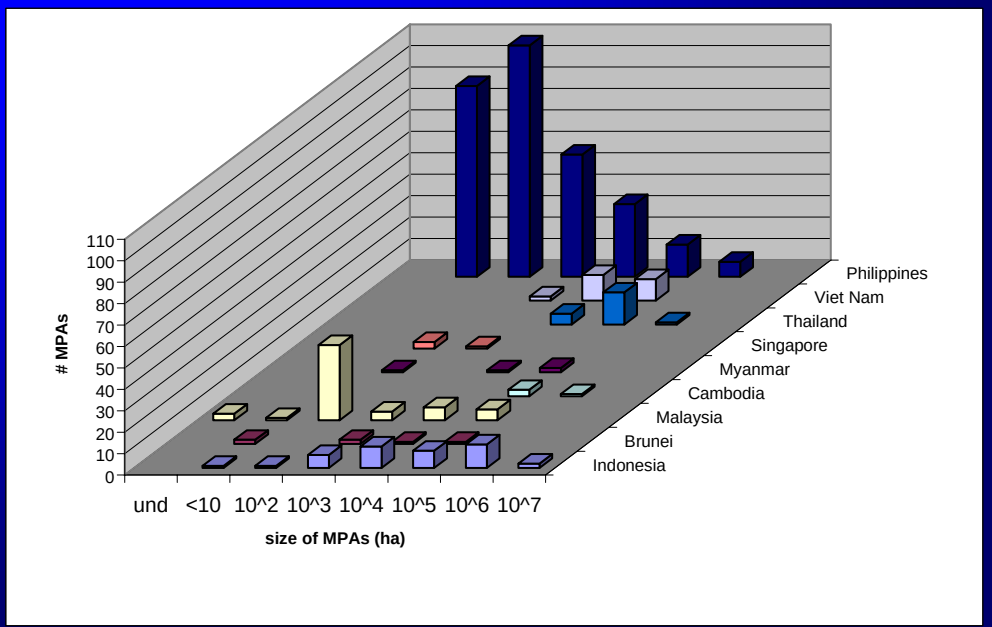
Reef Connectivity

- Concordance of circulation and larval dispersal
- Larval duration & geographic proximity are consistent with genetic affinities
- Diversity patterns not always consistent



Mortality and Replenishment

- Pre-settlement and post-settlement mortality affects community structure and diversity
- Differential effects of mortality needs sources of replenishment from less disturbed areas



Acknowledgements

- IMO - PEMSEA (Dr. Chua Tia-Eng and Ms. Nancy Bermas)
- The Community Ecology Lab of UPMSI
- EMECS Organizing Committee
- The Department of Science and Technology

State of Water Pollution and Habitat Degradation in the Gulf of Thailand

Piamsak Menasveta
Director, Marine Biotechnology Research Unit
Department of Marine Sciences
Chulalongkorn University

The Gulf of Thailand serves as a major marine resource for Thai people for a long time. However, recently due to industrialization and community development exert considerable stress on the marine environments and habitat degradation. The following pollution problems in the Gulf have been prioritized and discussed in details: - 1) Untreated municipal and industrial waste water were considered to be the most serious problems of the country due to limited waste water treatment facilities in the area. 2) Eutrophication is an emerging problem in the Gulf of Thailand. Fortunately, the major species of phytoplankton that have been reported as the cause of red tide phenomena were non-toxic species such as *Noctiluca sp.* and *Trichodesmium sp.* 3) Few problems have been documented from trace metals contamination in the Gulf of Thailand and public health threat from seafood contamination does not appear to be significant yet. 4) Petroleum hydrocarbon residue contamination has not been a problem, although few spills from small oil tankers have been recorded. Rapid decrease of mangrove forest, coral reefs, and fisheries resources due to mismanagement have also been discussed.

STATE OF WATER POLLUTION AND HABITAT DEGRADATION IN THE GULF OF THAILAND

VORAVIT CHEEVAPORN
PIAMSAK MENASVETA

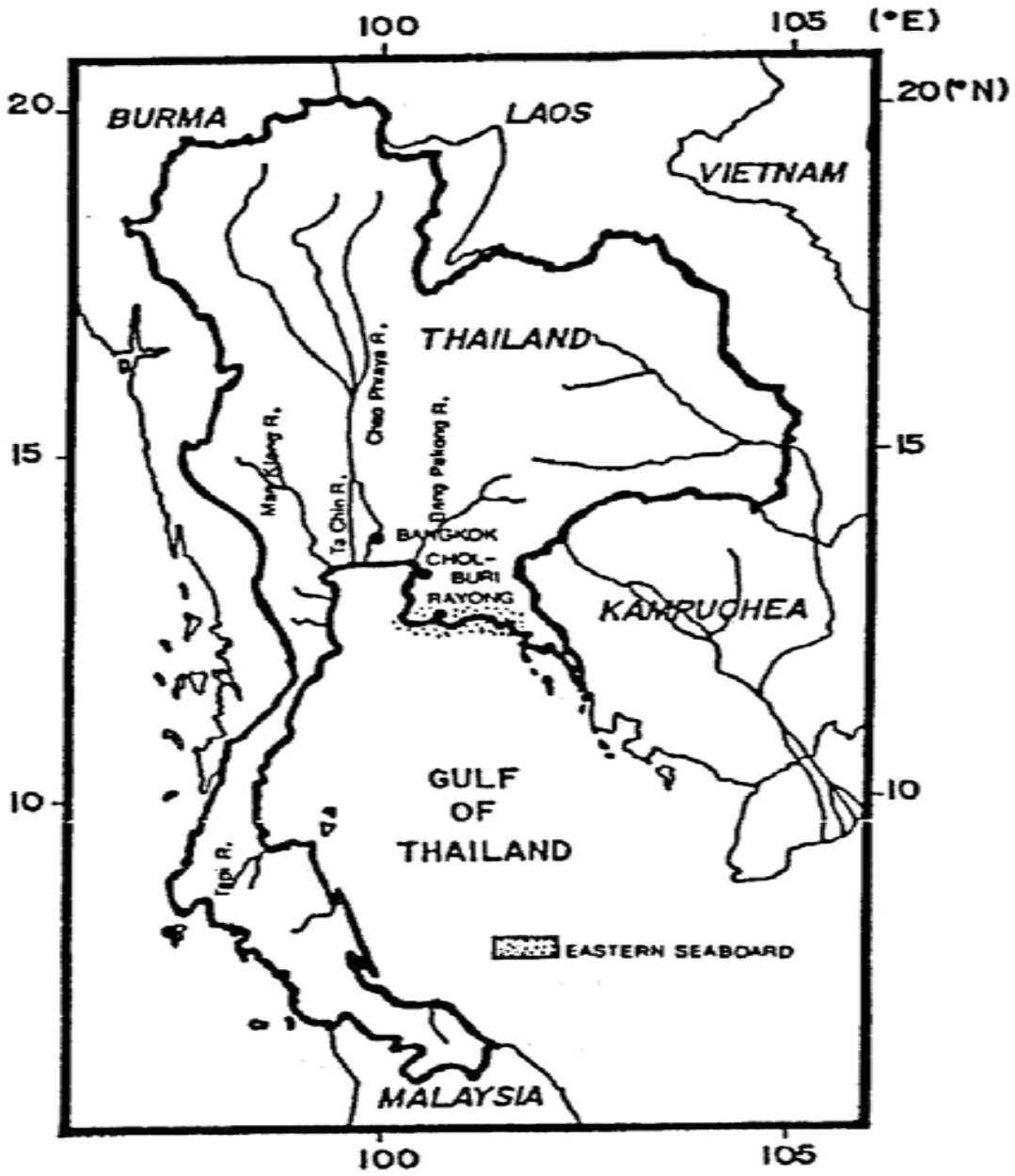
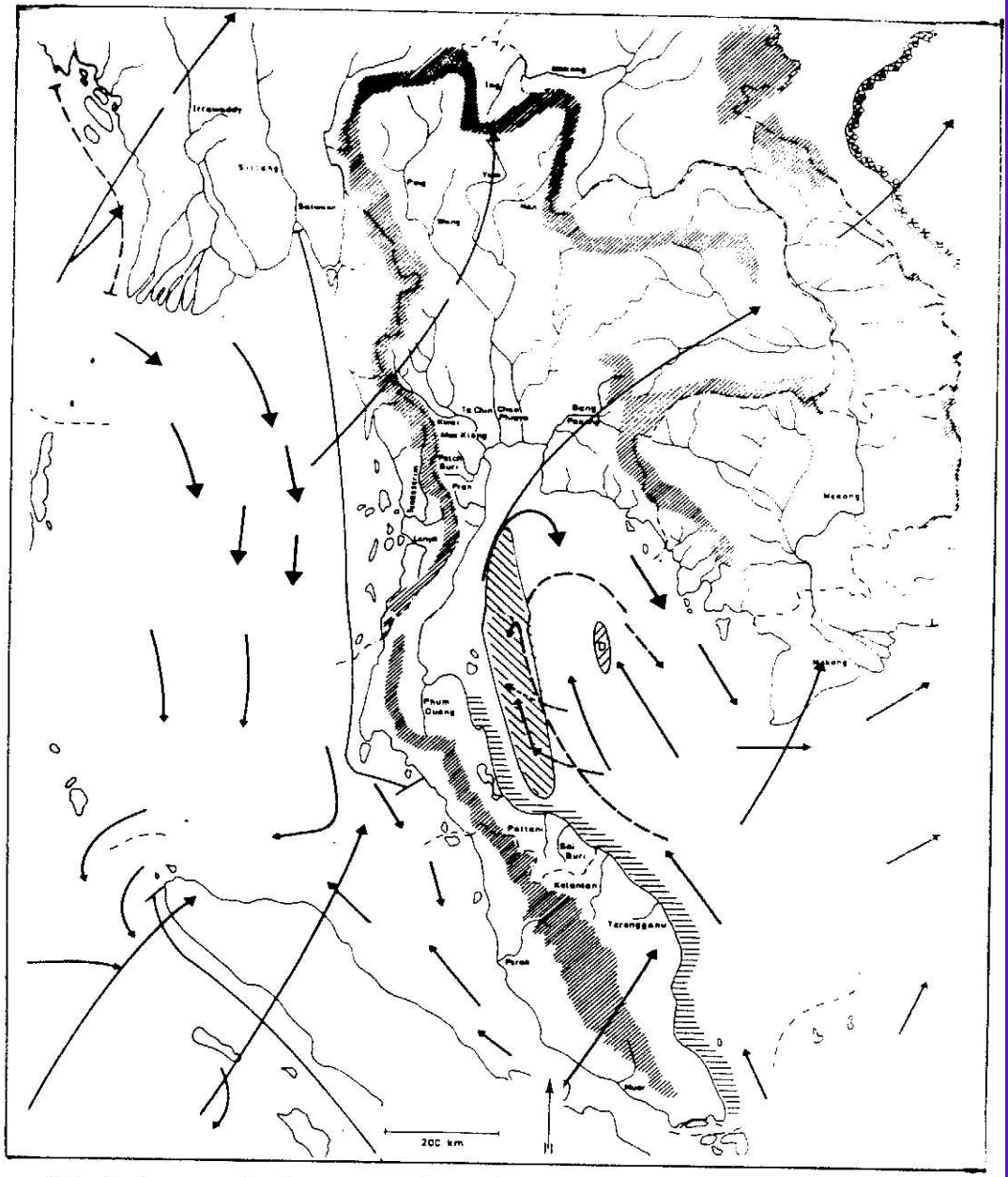


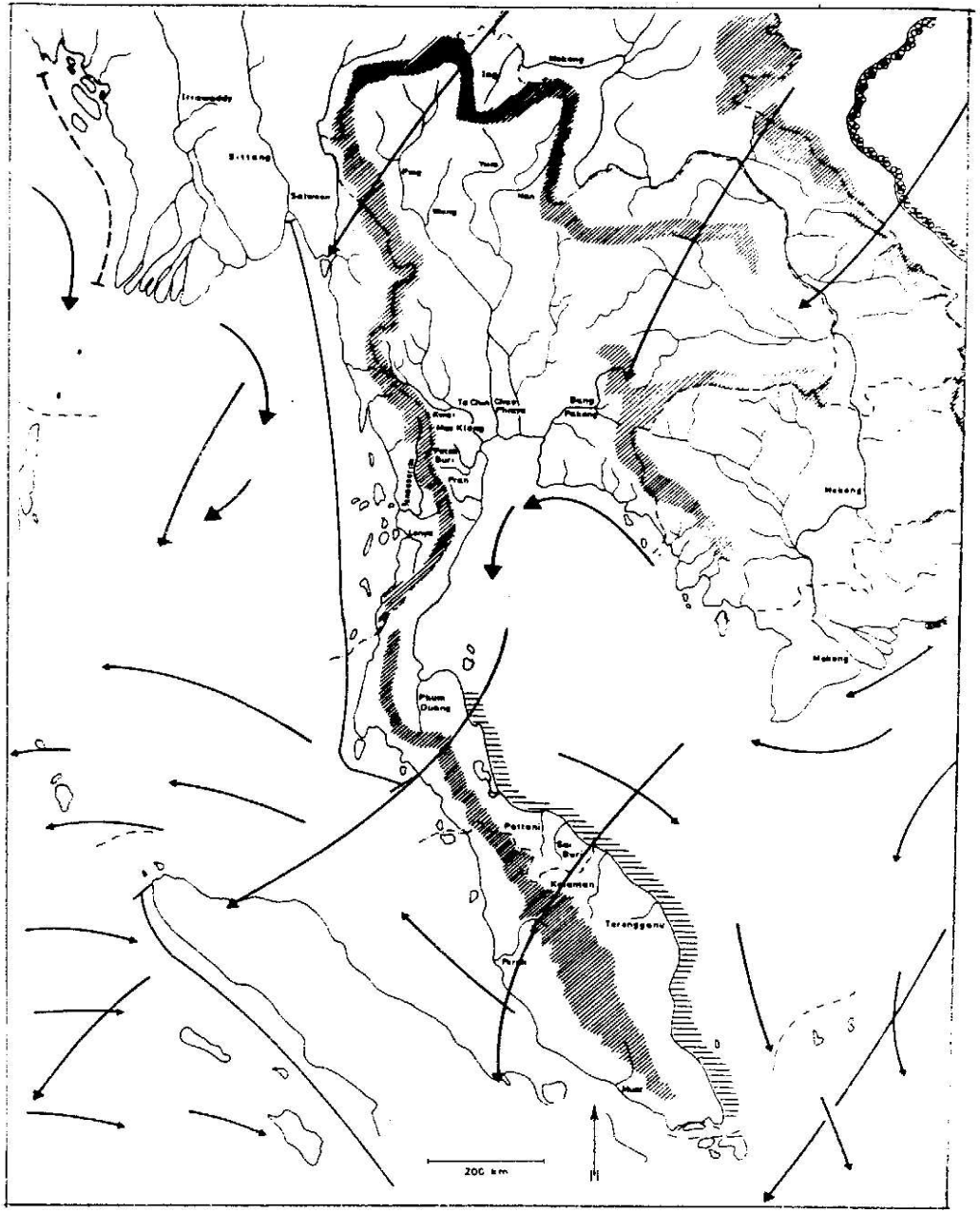
Fig. 1 location of Thailand.



Map 5.2 a Winds, currents and major rivers: August. Legend p.55

Source: Piyakarnchana, Twesukdi (1980); Swan, Bernard (1979); US Navy (1976); World Ocean Atlas, Vol. II (1977); Atlas of the Oceans (1977).

Southwest monsoon

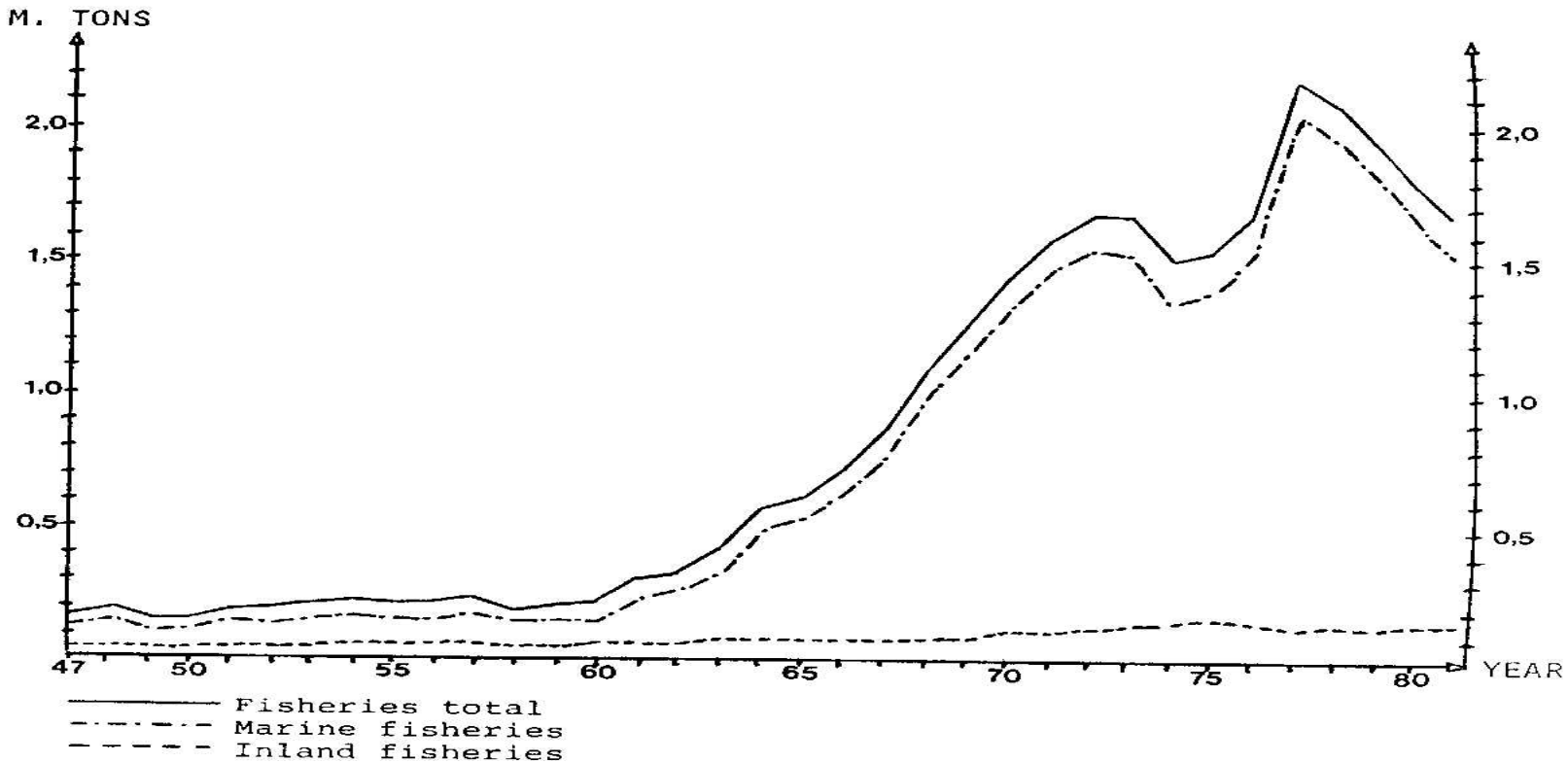


Map 5.2 b Winds, currents and major rivers: February.

Sources: Piyakarnchana, Twesukdi (1980); Swan, Bernard (197
US Navy (1976); World Ocean Atlas, Vol. II (1977);
Atlas of the Oceans (1977).

Northeast monsoon

- Gulf of Thailand serves as a major marine resources for Thai people for a long time. Particularly serve as a major source for fisheries and aquaculture.

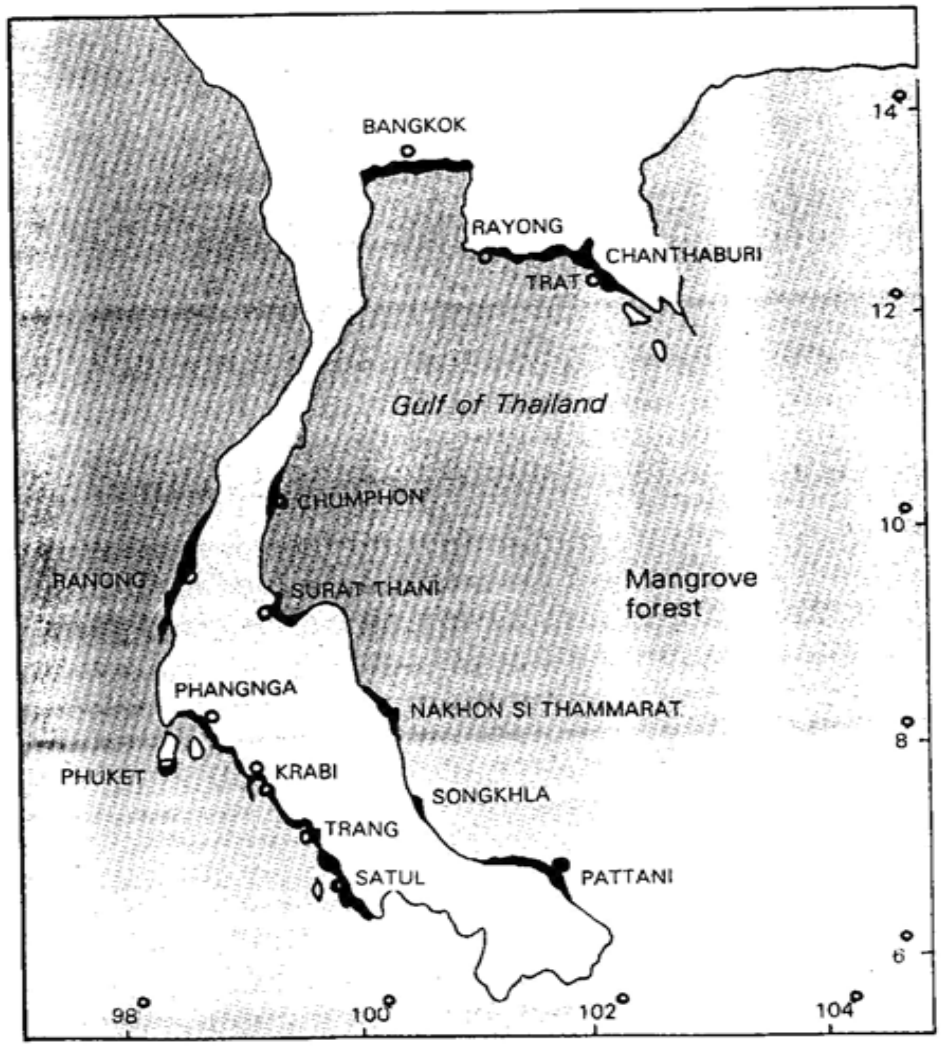


Fisheries production: Thailand 1947-1981.

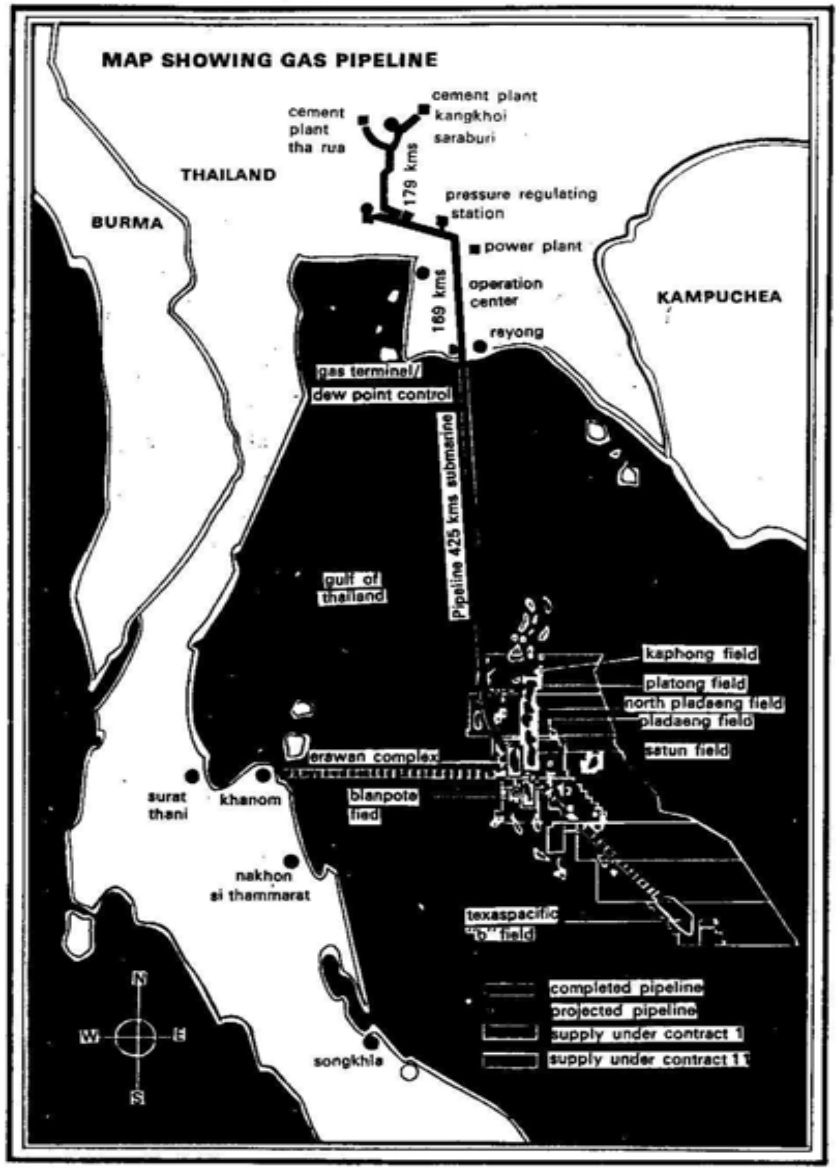
Sources: Fisheries Record of Thailand 1981. Department of Fisheries;
South China Sea Programme 1982;
FAO Yearbook of Fishery Statistics 1981, Vol. 52.

- During 1977-1980 fisheries production hit the maximum yield of 2.0 million metric tons.

Distribution of Mangroves in Thailand
(Klankamsorn and Charuppat, 1982)



Mangrove area 268,694 ha.


MAP SHOWING GAS PIPELINE
cement plant kangkhoi saraburi
cement plant tha rua
THAILAND
179 kms
pressure regulating station
power plant
BURMA
operation center
169 kms
KAMPUCHEA
rayong
gas terminal / dew point control
Pipeline 425 kms submarine
gulf of thailand
kaphong field
platong field
north pladaeng field
pladaeng field
satun field
erawan complex
surat thani
khanom
bianpote field
nakhon si thammarat
texaspacific "b" field
completed pipeline
projected pipeline
supply under contract 1
supply under contract 11
songkhla
N
W
E
S

Due to industrialization and community development of the country in the past three decade exert considerable stress on the marine environment. The pollution in the Gulf can be prioritized as follows

1. Untreated municipal and industrial wastewater
2. Eutrophication
3. Trace metal contamination
4. Petroleum hydrocarbon residue

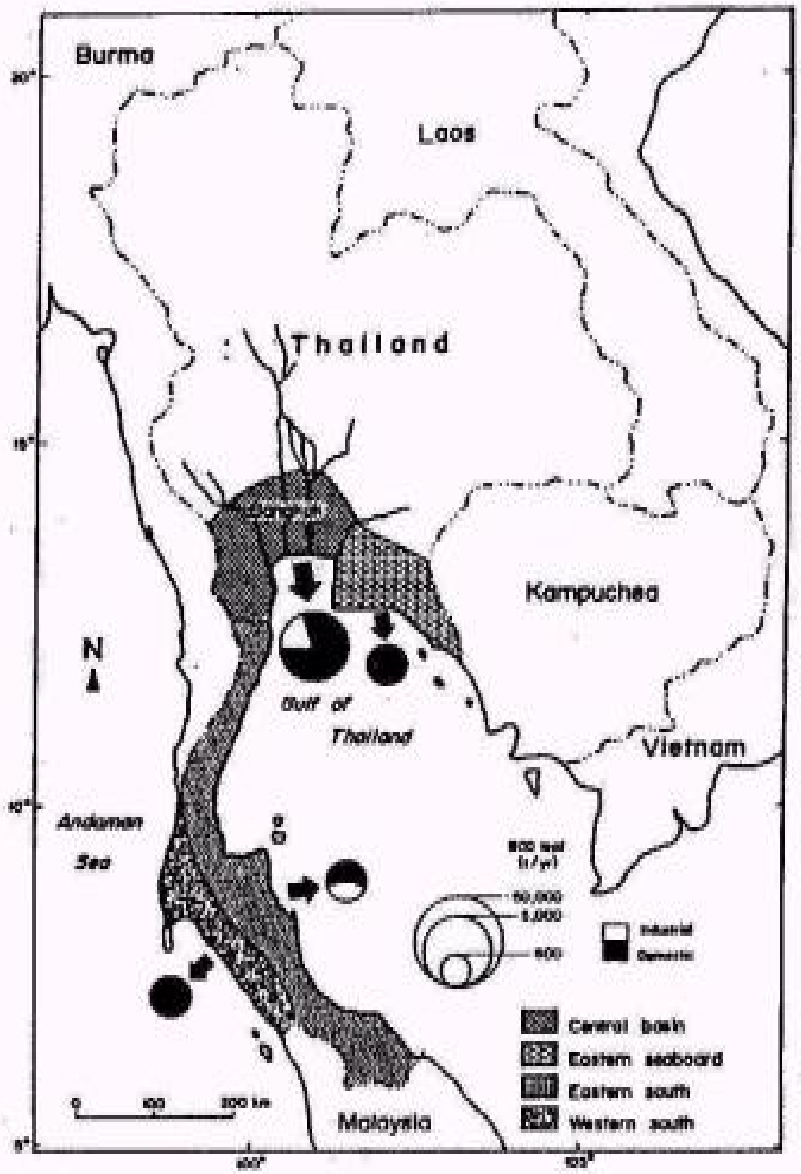


Fig. 2 The major coastal zones of Thailand and their BOD loads in 1986.

Source : Taranatham (1992).

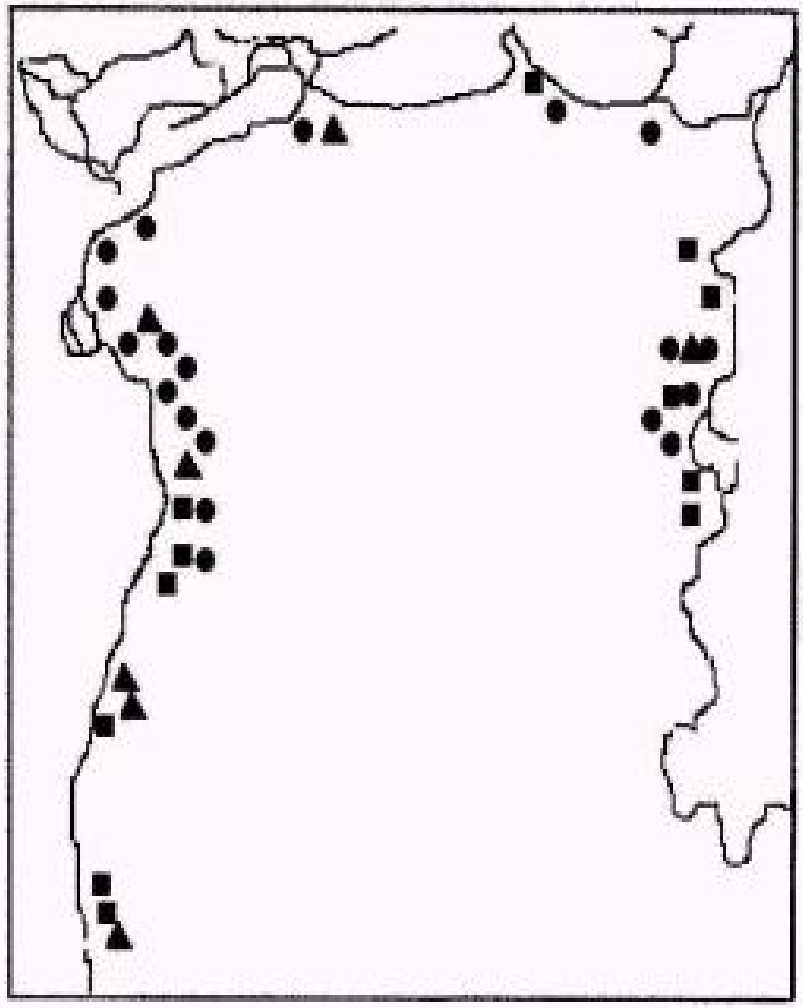
- **The untreated municipal waste water appear to be the major source of water pollution in the Gulf.**
- **The central basin which is crowded by large cities and dense population, contributes highest BOD load with 34,376 t/year, of which 29,033 t/year (85%) are from domestic sources and 5,343 t/year (15%) are from industrial sources.**

2. Eutrophication

- **Eutrophication is an emerging problem in the Gulf of Thailand. This due to nutrient enrichment of coastal water as a consequence of disposal of untreated wastewater.**

- **Most of the species found to bloom most frequently is non-toxic species i.e., *Trichodesmium sp..,* and *Noctiluca sp.* However, these red tide cause heavy losses and mass mortality in fish ,shrimp, and shellfish farms in the area.**

- **There is just only one record of toxic PSP in 1985. However, firm evidence is elusive.**



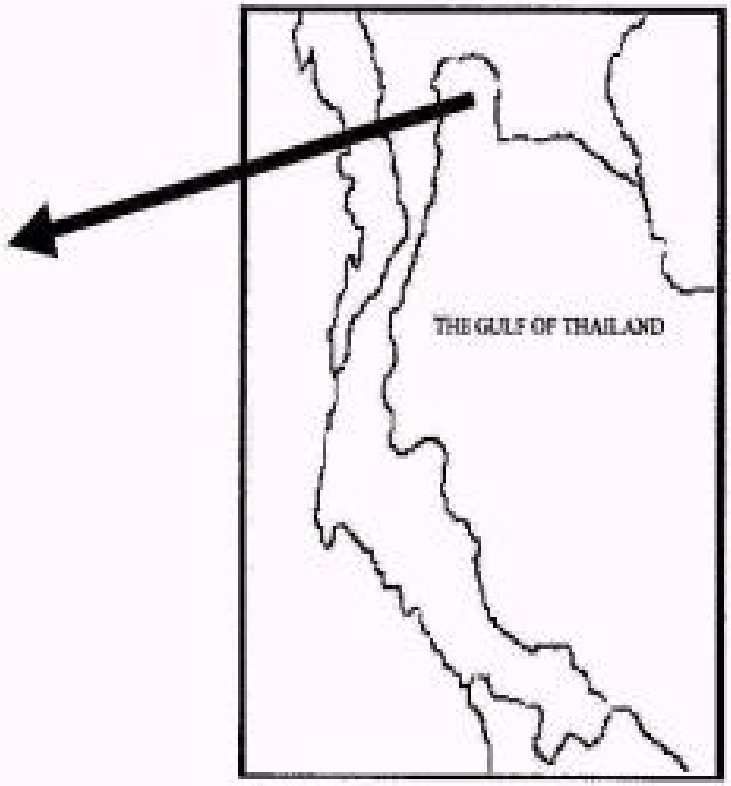
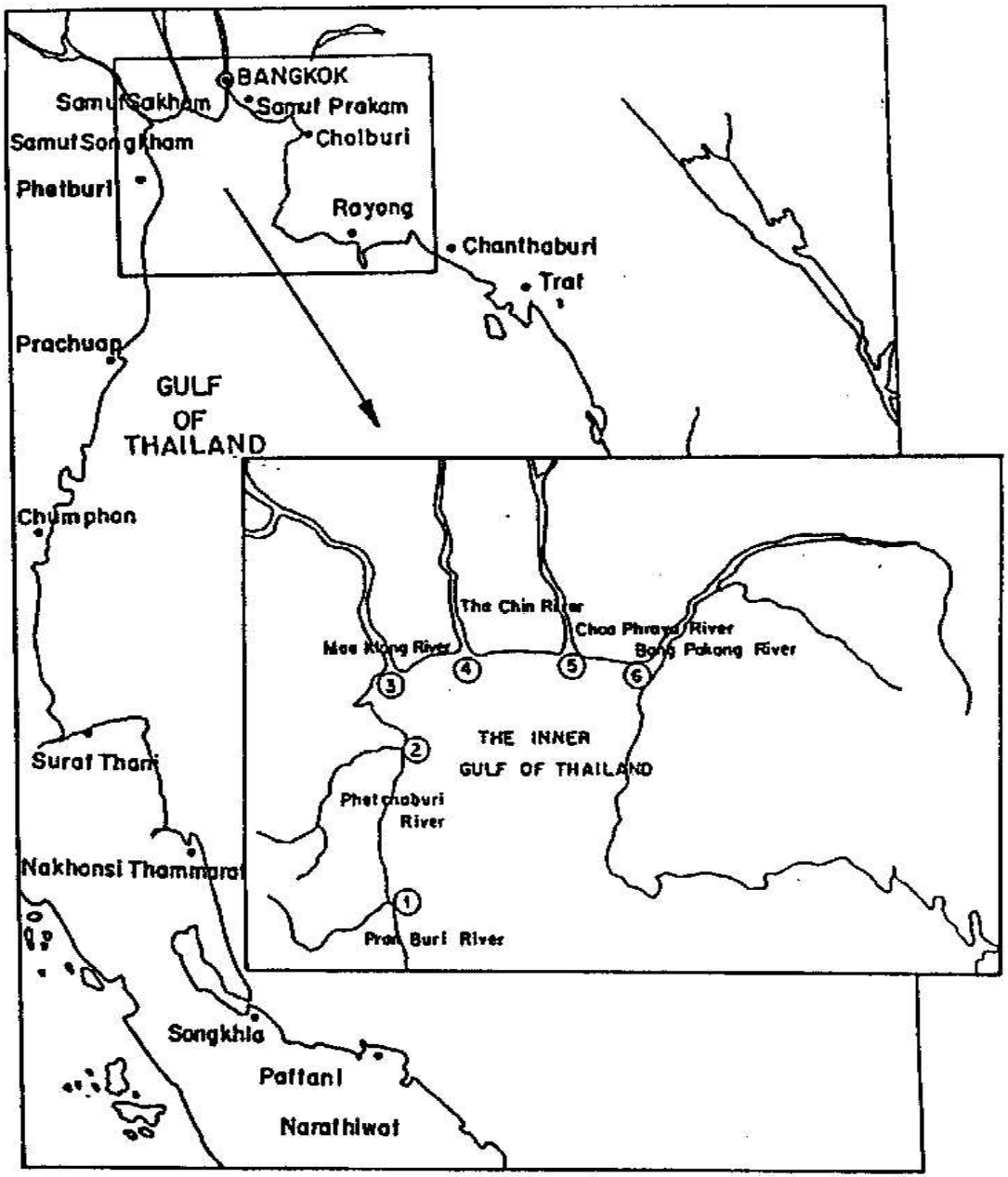


Figure 2 The Inner Gulf of Thailand and occurences of red tides

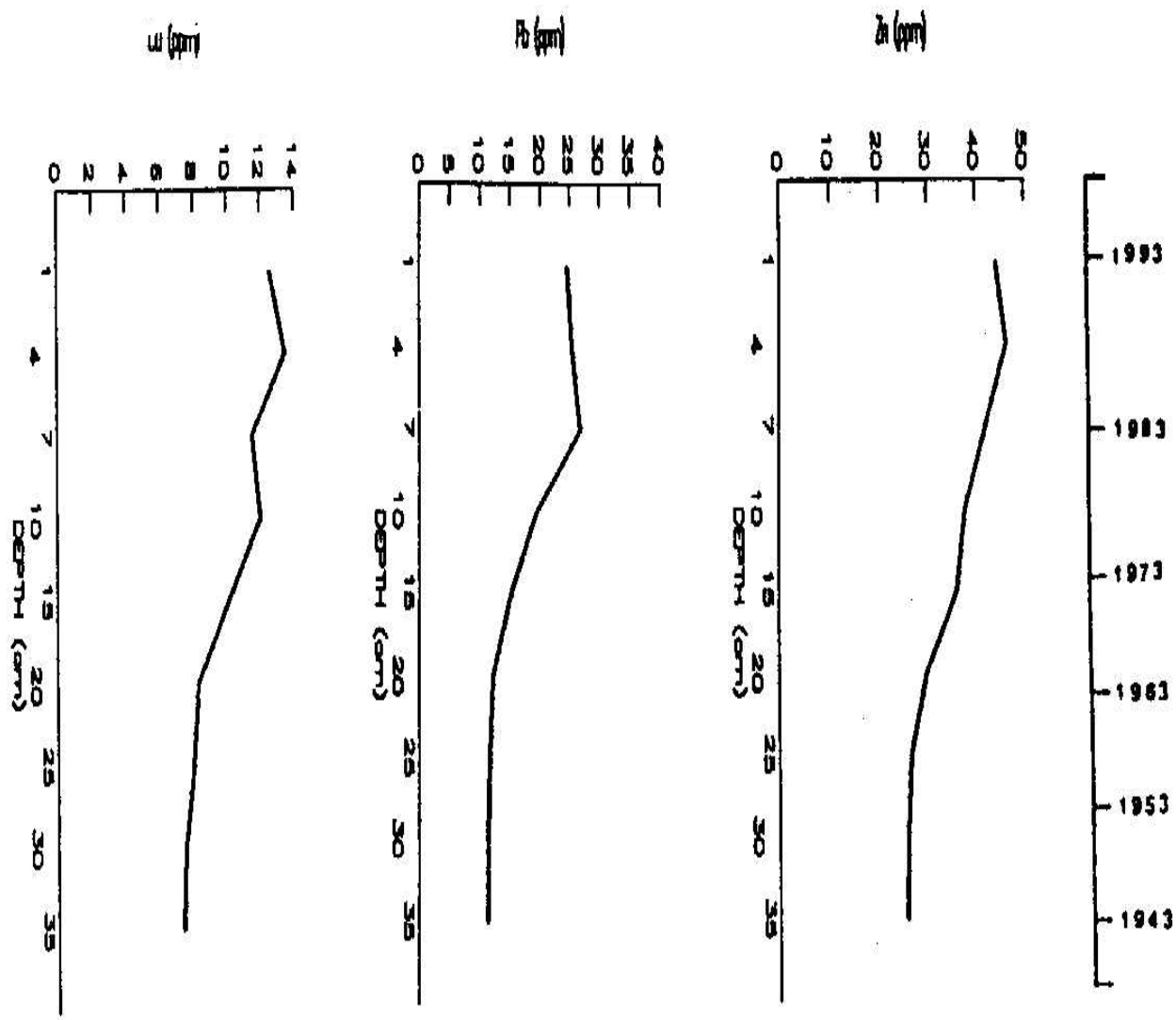
(▲ : 1991 , ■ : 1992 , ● : 1993)

Year	Number of Occurrence
1991	7
1992	12
1993	19

3. Trace metal contamination



Pb Zn


Zn (ppm)
0
10
20
30
40
50
1
4
7
10
15
20
25
30
35
DEPTH (cm)
1993
1983
1973
1963
1953
1943
Pb (ppm)
0
5
10
15
20
25
30
35
40
Cu (ppm)
0
2
4
6
8
10
12
14

- Mercury contamination found in the middle Gulf of Thailand was due to natural gas production.
- It was found that mercury in fish (cobia)(*Rachycentron canadus*) caught from the natural gas production area was significant higher than the concentration detected in cobia of the coastal area and the Andaman sea.

4. Petroleum

Table 6

Perroleum hydrocarbons in seawater, sediments, and biota of the Gulf of Thailand in 1983.

In sea water (Upper Gulf)	April – May		0.380-5.646 μg l^{-1}
		mean	1.305 ± 1.724 μg l^{-1}
	September - November		0.059 - 6. 095 μg l^{-1}
		mean	0.782 ± 1.148 μg l^{-1}
In sediments			
	April-May	0.064 – 2.164 μg g^{-1}	(wet sediment extraction)
		0.047 - 1.820 μg g^{-1}	(dry sediment extraction)
	September-November	0.059 – 6.095 μg g^{-1}	(wet sediment extraction)
	Mean	0.096 ± 0.55 μg g^{-1}	
In tissue of marine organisms (analysis made on freeze-dried tissue)			
Fish	*Polynemus* sp.	0.117 μg g^{-1}	(dry wt)
	Cynoglossus sp.	0.598 μg g^{-1}	
	Parastramateus sp.	0.415 μg g^{-1}	
Bivalves	*Paphia undulata*	0.462 μg g^{-1}	
	Perna viridis	0.059 μg g^{-1}	
	Anadara granosa	2.376 μg g^{-1}	

Mangrove Forest

- Mangrove forest is a productive ecosystem and natural barriers against storm and strong wind.

- Mangrove forest in Thailand has been decrease more than 50 % in he past decade. The decrease was due to several causes such as timber, mining, salt production, shrimp farming, and urbanization.

Coral Reefs

- As a consequence of human activities such as dredging, dynamite fishing, pollution and removal of mangrove forest put a tremendous impacts on the status of the coral reefs.

- In 1992 ONEB reported that only 36 % of the coral reefs were remain in good condition, 33 % remain in fair condition and 30 % in poor condition. It is expected that the destruction of the coral reefs will be more severe if the preventive measures are not promptly taken.

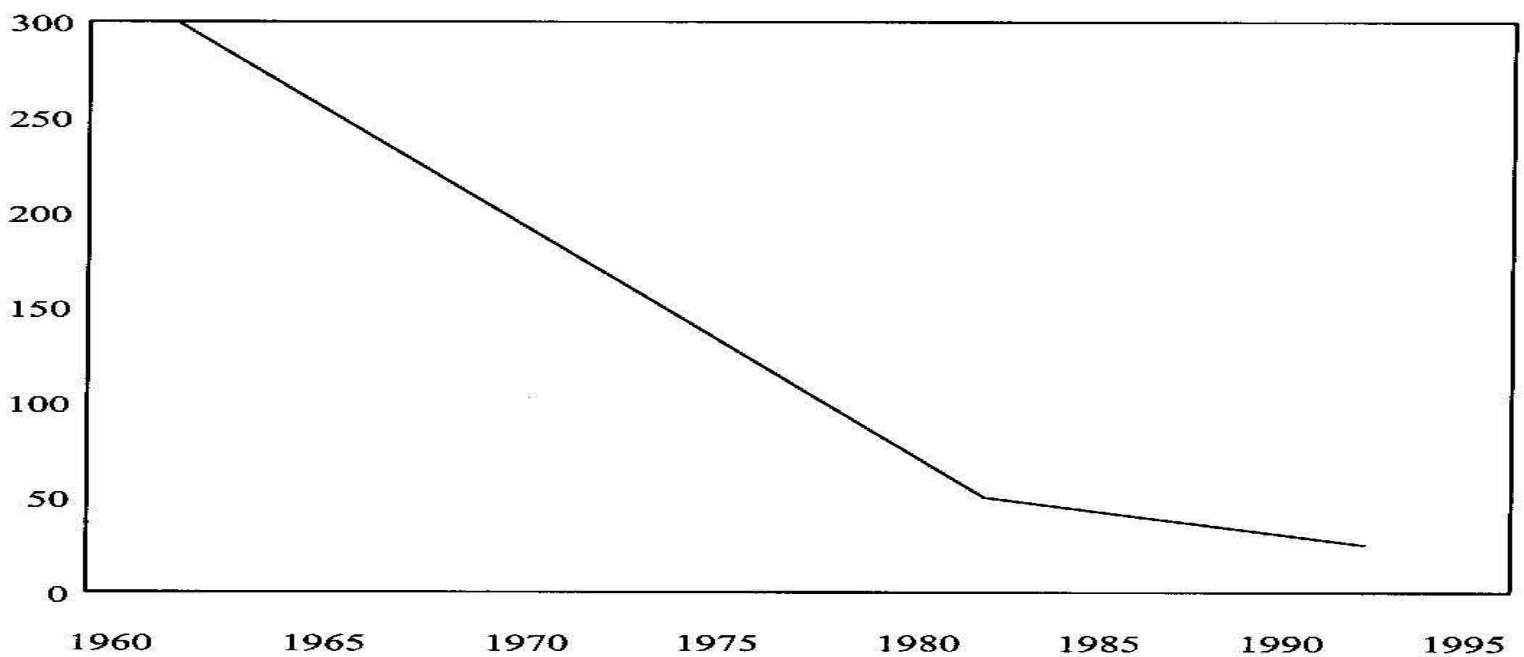
Fisheries resources

- The rapid expansion of the fisheries industries since 1960, due to the modernization of fishing gears has put a tremendous pressure on the available fishing stock in the Gulf of Thailand. The exploitation of fishery resources has exceed maximum sustainable level and cause adversely affect on fishery stock in the Gulf. Therefore drastic decrease of fishery production is obviously cause by over-fishing.

Over-exploitation

- One of the clear scenario about the over-exploitation was shown in this figure. Catch per hour of dermersal

Figure 4. Catch per hour of demersal fish in the Gulf of Thailand



Conclusion

- Rapid population growth, community expansion, and industrialization have brought about resources degradation and a declining of environmental quality.
- Such a situation also happening in many coastal areas of Philippines, Indonesia, Malaysia and so on.
- A program on marine pollution control has been implementing in the Gulf of Thailand. However, certain components are need to be emphasized. Integrated and sustainable management plan should be established and implemented as soon as possible.

Prediction of Marine Environment for Coastal Area Management

Dong-Young Lee
Director
China-Korea Joint Ocean Research Center

For the management of coastal and ocean area scientifically, the marine environmental information needs to be produced along the coast of a regional seas by means of coastal and ocean prediction models. Each coastal project of the coastal countries needs the incident information coming into their coastal area generated from the offshore, which should be prepared by ocean models covering the whole regional seas. Detailed information for the local areas of interest needed in solving various coastal problems can be obtained by means of combination of regional scale and local coastal models. An efficient way of providing coastal and ocean environmental information is to establish a well designed coastal and ocean monitoring and prediction system in regional scale with cooperation among the neighboring countries.

In this presentation, many problems in the coastal waters commonly occur in this region would be shown and the way of producing the information of marine and coastal environment needed to solve the problems would be discussed. Example of the a coastal information system along the coast of Korea established by the Coastal and Harbor Engineering Research Center of the Korea Ocean Research and Development Institute (KORDI) would be introduced and the regional cooperation for the coastal monitoring system would be discussed.

Prediction of Marine Environment for Coastal Area Management

Dong-Young Lee

KORDI, Ansan, Korea
CKJORC, Qingtao, China

Proper management of coastal zone

Proper control of human activities
. to maximize the benefits
. to minimize the conflicts and harmful effects

Governance to manage coastal development must be based on Science & Technology

Prediction of responses to Different Action Senario

Based on understanding of coastal processes

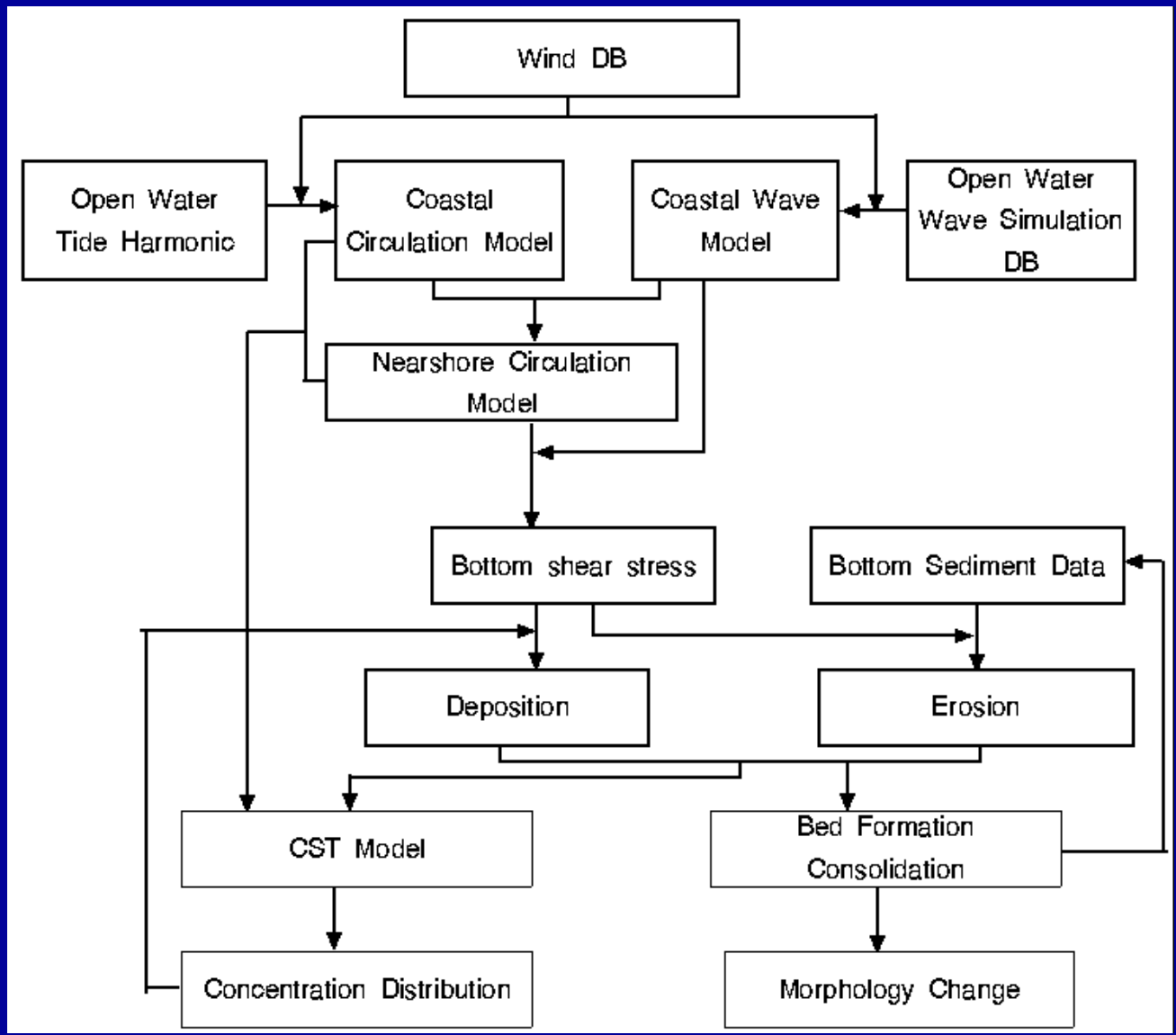
Need of Marine Environmental Information for Community

- Coastal Hazard Mitigation
- Coastal Development
- Coastal and Ocean Services
- Oil Spill and Search and Rescue (SAR)
- Sediment Transport and Beach Erosion.
- Marine Pollution and Harmful Algal Bloom
- Fisheries and Mariculture
- Marine Transportation
- Recreation
- …..

Example of coastal environmental information needed for ocean service

Activities or Problems	Marine Environmenatal Parameters needed	Type of Information
i) Disaster Mitigation	Waves, Storm Surge, High Tide, Typhoon wind	Long-term Statistics Nowcasting and forecasting
ii) Fisheries and Mariculture	Temperature, Salinity, Nutrients, Current	Nowcasting and Forecasting
iii) Coastal Development	Wave, Tide, Storm surge	Long-term Statistics
iv) Marine Pollutionand Red-tide	Coastal-circulation, Nutrients Pollutants	Long-term Statistics Long-term forecasting
v) Oil Spill and Search and Rescue (SAR)	Wind, Tide, Current, Wave	Nowcasting and forecasting
vi) Vessel Traffic System (VTS)	Tide, Current, Wave, Wind	Nowcasting and forecasting
vii) Coastal erosion and shoreline change, harbor siltation	Wind, Wave, Storm surge, Tide	Long-term statistics
vi) Recreation	Temperature, Wave, Wind, Tide, Tidal current	Nowcasting and forecasting

Example of Integration of Coastal Env. for Modelling of Mud Transport



Problems of Coastal Development and Management

Unorganized, Duplicated, Independent, Temporary
Coastal Monitoring & Prediction
For each Stage of each Development Program

- **Development planning**
- **Env. Impact Analysis**
- **Designing stage**
- **Construction stage**
- **Operational stage**
- **....**

Predictive Method for Marine Env. And Ecosystem was not Satisfactory

How to Sove that ?

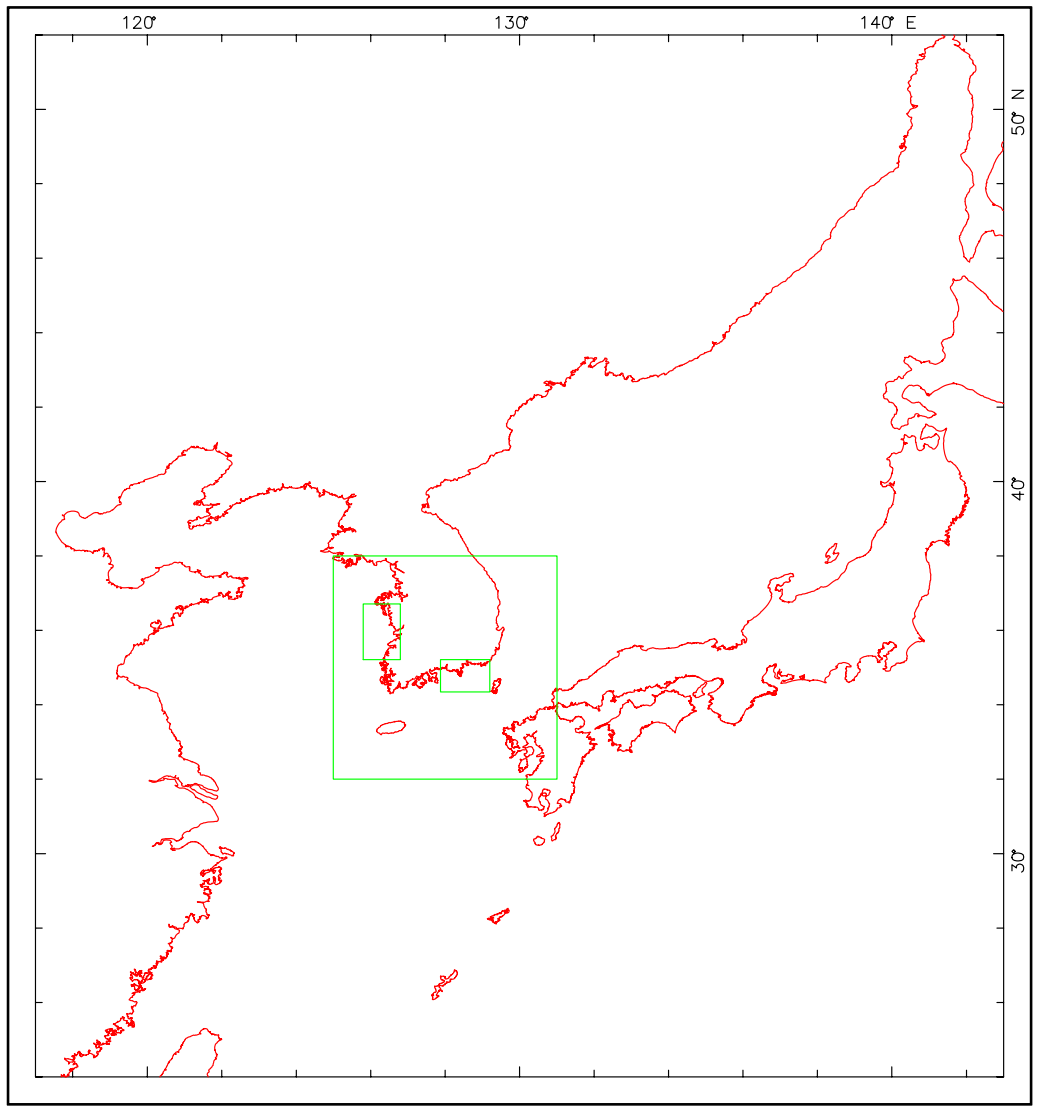
Coastal Environmental Prediction

- Coastal Models
- Boundary Conditions
  . **Off-shore** <- **Regional Monitoring/ Modeling**
  . **Air-Sea Interface** <- **Meteorological Prediction**
- Initial Conditions <- Monitorng System

Regional Coorporation in

- Marine Env. & Ecosystem Prediction
  . Data Base
  . Monitoring System
  . Modelling Technology <- Training Program

Example of nesting grid from regional scale model for local marine env. Information

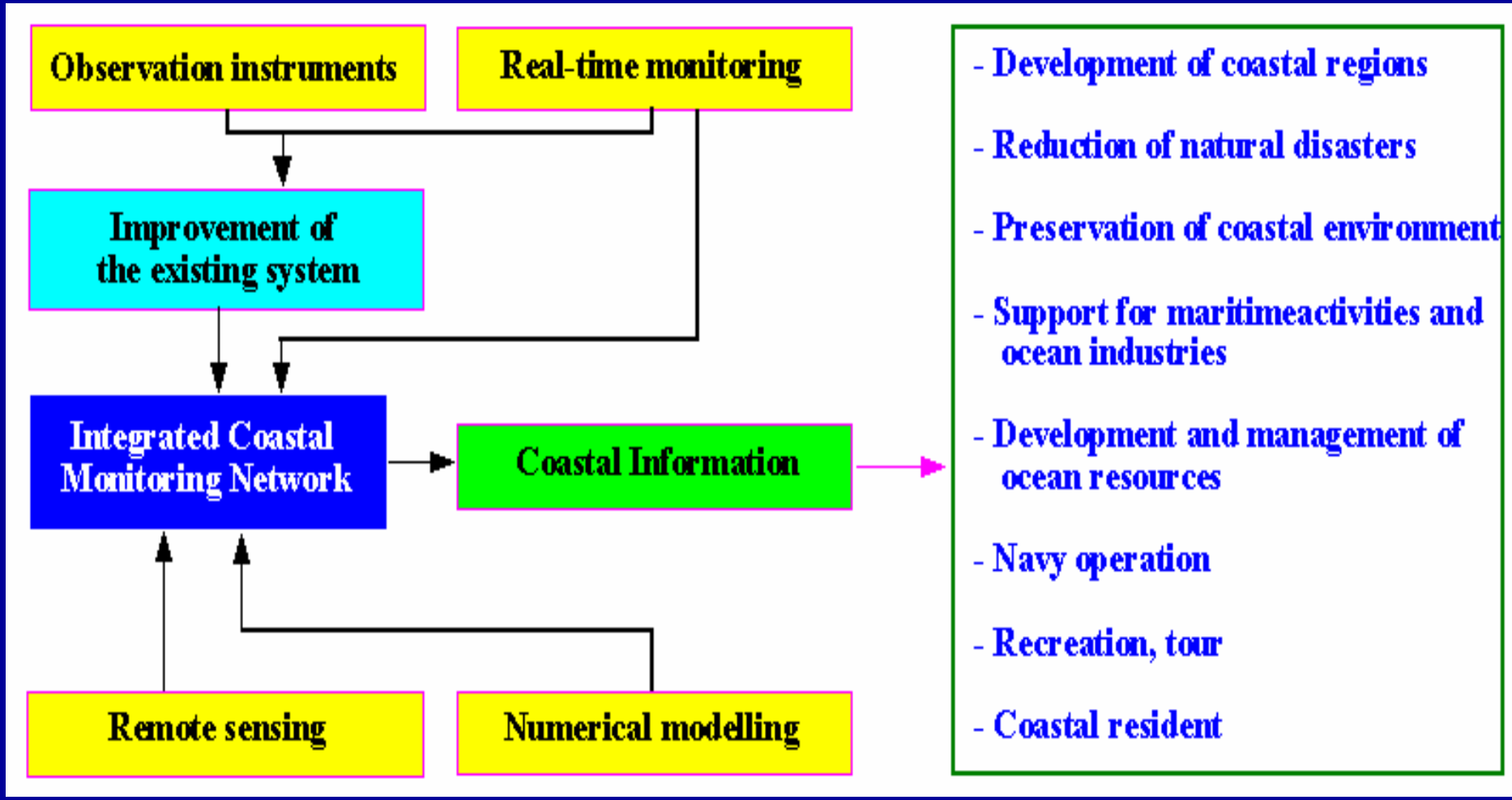


Problems of in situ. Measurement

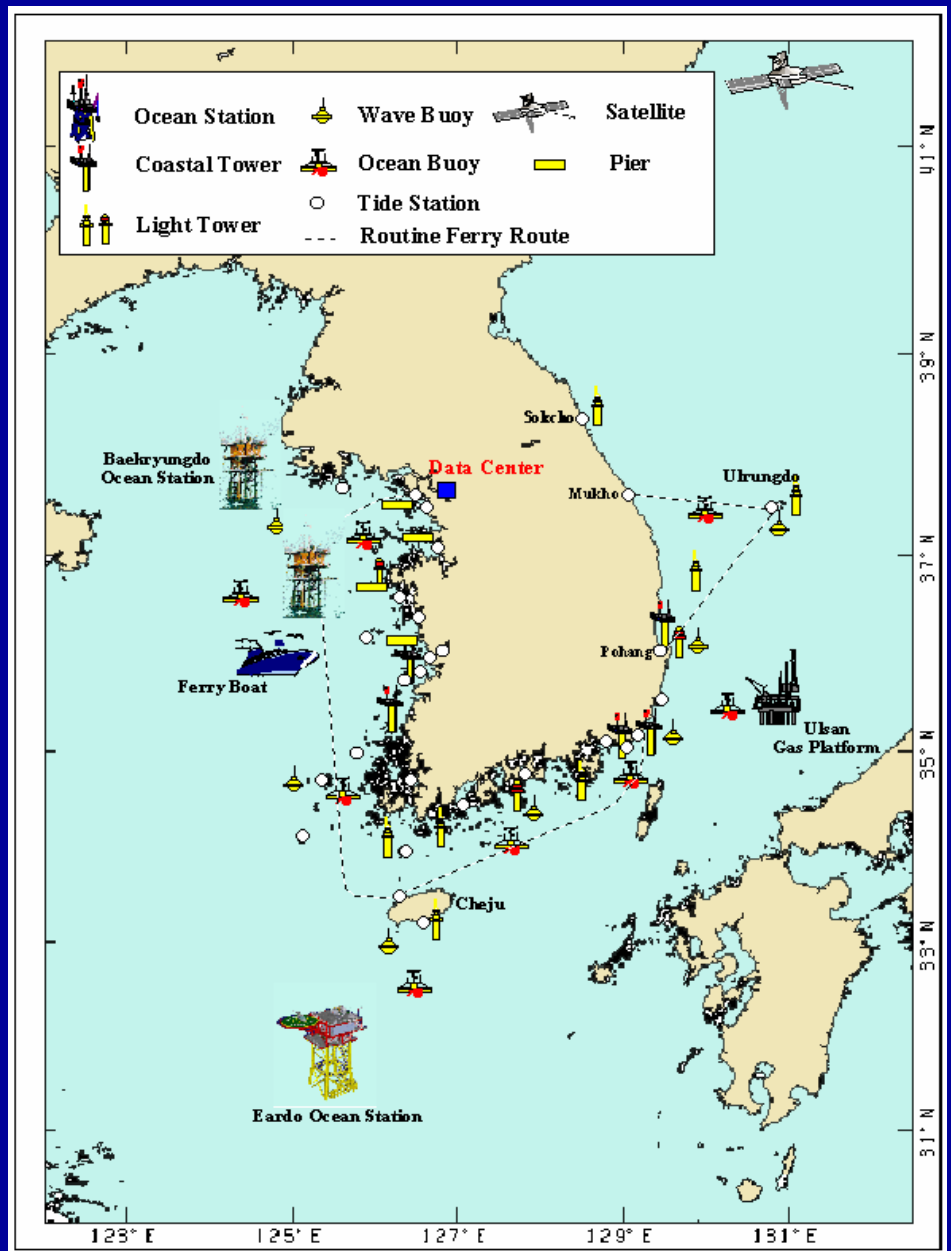
- Cost, Risk, - Limitation in Space and Time

Solution

Integrate with Indirect Methods of Remote Sensing and Numerical Modelling(Nowcasting, Forecasting, Hindcasting)

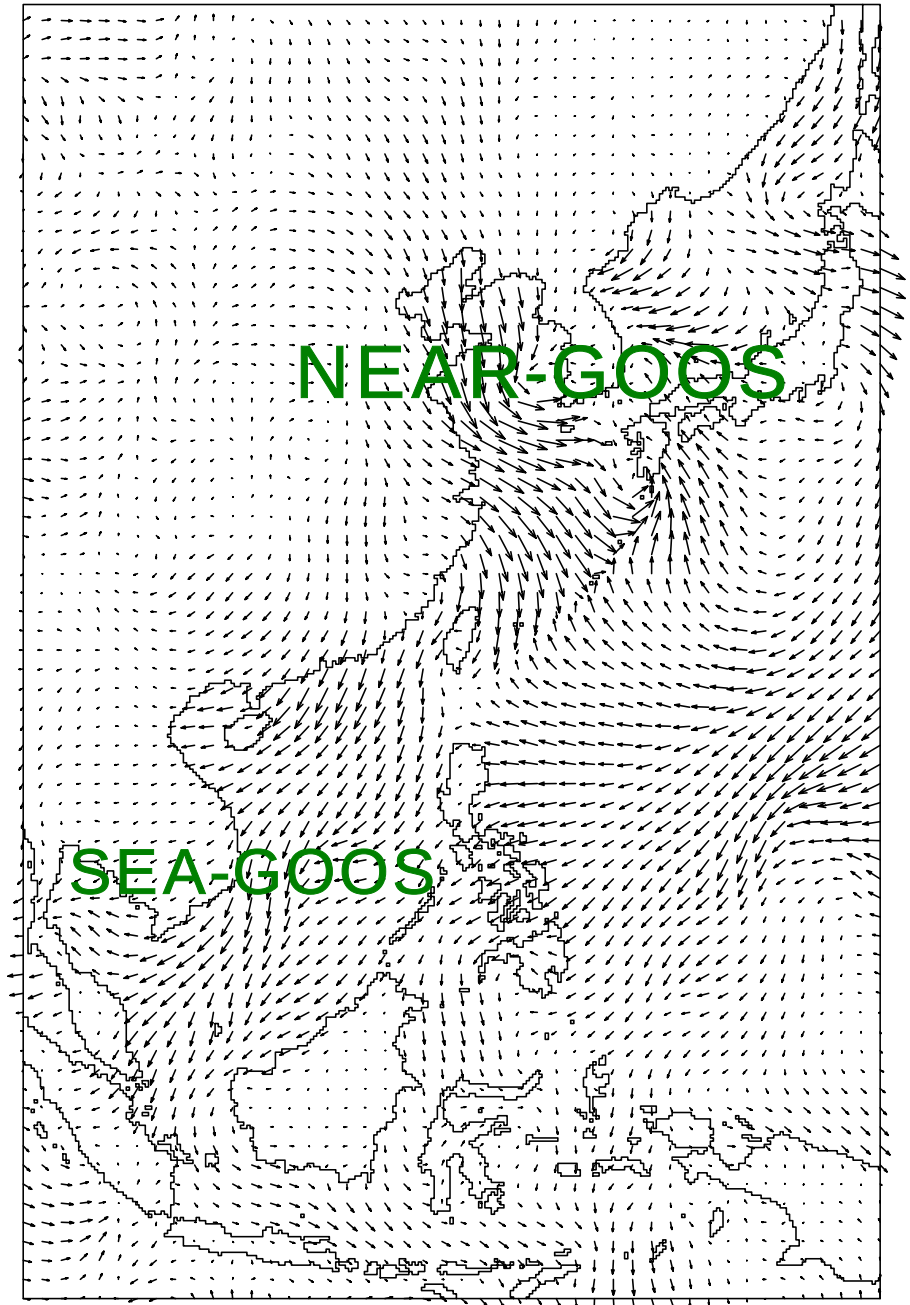


Plan for Real-time Marine Env. Monitoring System in Korea



Regional Global Ocean Oberserving System

- NEAR-GOOS
- SEA-GOOS



Example of Plan of Korea-China Cooperation 2002-2

=>need to be extended to regional scale coope

- Cooperation on Ocean Observing System for Yellow Sea (Buoy, Ferry boat marine monito Satellite remote sensing, …)

- Development of Marine Env. / Ecosystem Predic

- Training on Coastal Modelling Capacity Building for Scientific Management of Coastal Zone

- Establishment of Data Base for the Yellow Sea essentail for marine env. and ecosystem modell

Summary and Suggestion

- Marine Science and Technology Inportant for Proper Coastal Zone Management

- Regional Cooperation is Necessary for
  . Coastal Env. Monitoring and Modelling
  . Prediction of Marine Env. and Ecosystem

- Linkage of Experts in the Region

- Establishment of Data Base

Future Scenario of the Coastal Zone in Asia

Sanit Aksornkoae
Professor, Faculty of Forestry
Kasetsart University, Thailand

Unique challenges face the coastal zone in Asia due to the great length of coastline in many countries of the region, especially Indonesia, Philippines, Vietnam, India and Thailand. In the coastal zone there is a concentration of human population, but also great treats from natural disasters e.g. typhoons and floods, increasingly made worst by destructive human activities e.g. cutting of mangrove forests. The coastal zone is also a focal points for economic development in many countries, based on logging, fisheries and aquaculture, shipping and trade, and tourism to name a few examples.

In terms of the future treats to the coastal zone in Asia, the following are some key issues:

- Population pressure
- Destruction of natural habitats and resources
- Coastal zone reclamation
- Massive sedimentation from uncontrolled upland development
- Sea level rise

Regarding the probable future strategies and solutions to create sustainable socio-economic conditions in the coastal zone, which are also sensitive to environmental limitation, the following can be suggested:

- Stronger and more implementable legal framework
- More adoption of zoning to reduce conflicts between coastal resources users
- More compliance-based management e.g. codes of conduct/best management practices (e.g. for coastal shrimp farming)
- Mangrove and other marine products to carry 'ecolabels' e.g. charcoal, shrimp, to demonstrate non destructive production methods.
- Future technology to restore mangroves, coral reefs (seeding of young corals, culture of many coral species (e.g. aquarium fish and molluscs) including seagrass beds.
- Less dependence on coastal natural resources directly (e.g. less cutting of mangroves, and destruction of coral reefs). More indirect uses and values recognised e.g. aquaculture and tourism to increase.
- More appreciation of conservation values (recreation, education, fisheries habitat support, storm and flood protection).
- Establishment of National Plan of CZM from top-down but also bottom-up via coastal communities.
- Closed International Cooperation on CZM among Asian countries

FUTURE SCENARIO OF THE COASTAL ZONE IN ASIA

by

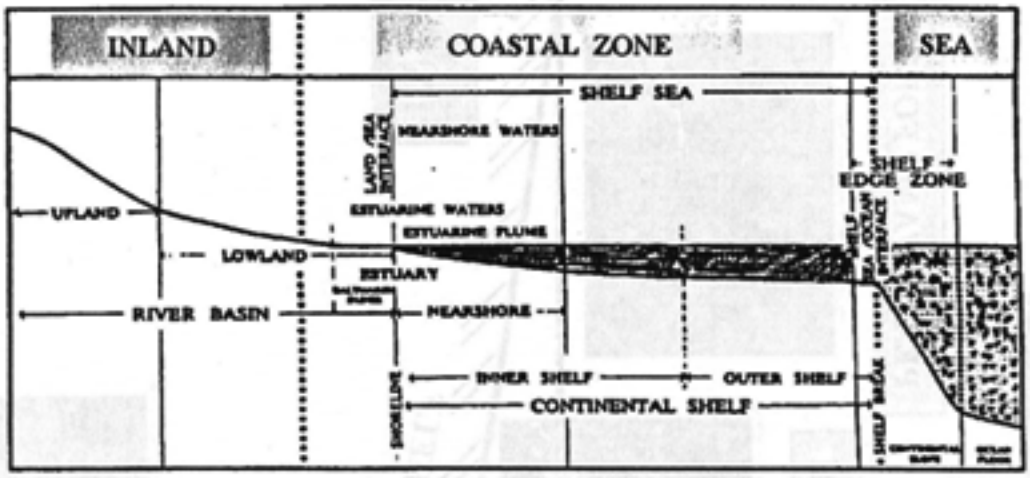
DR. SANIT AKSORNKOAE

Professor, Faculty of Forestry, Kasetsart University
Bangkok Thailand

OUTLINE OF PRESENTATION

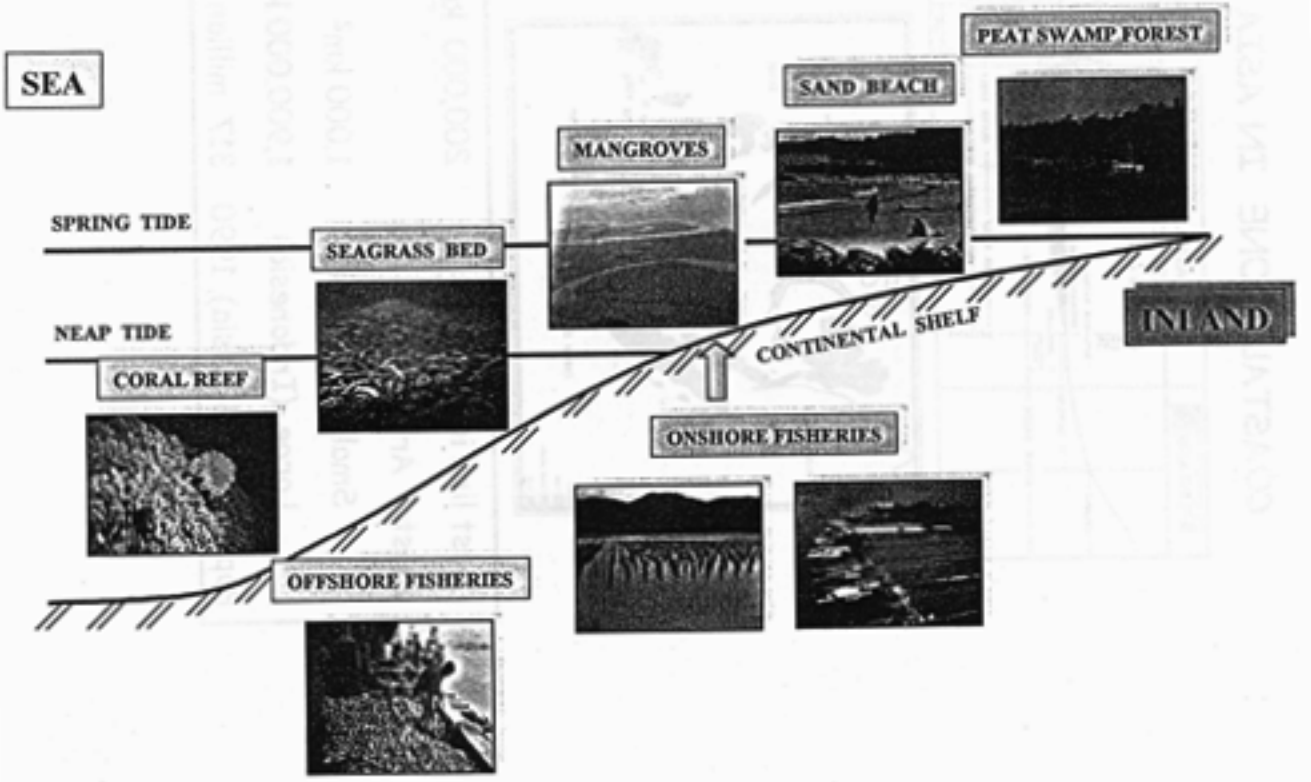
- Background on Coastal Resources in ASIA
- Coastal Resources and Their Significances in ASIA
- Future Treats to Coastal Zone in ASIA
- Future Strategies and Solution to Create Sustainable Management of Coastal Zone in ASIA

COASTAL ZONE IN ASIA



Coast line in ASIA	200,000 km²
Coastal Area	
Small (Sigapore)	1,000 km²
Large (Indonesia)	1,900,000 km²
Population (SE Asia), 1990	317 million

COASTAL RESOURCES



SIGNIFICANCE OF COASTAL RESOURCES IN ASIA

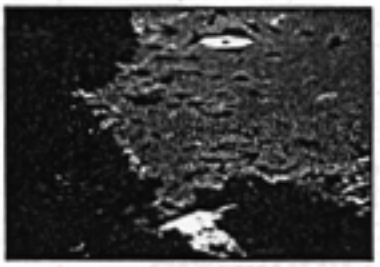
FIREWOOD & CHARCOAL

BIODIVERSITY

LOCAL FISHING

AQUACULTURE

CAPTIVE FISHEY



TOURISM

EDUCATION

BEACH

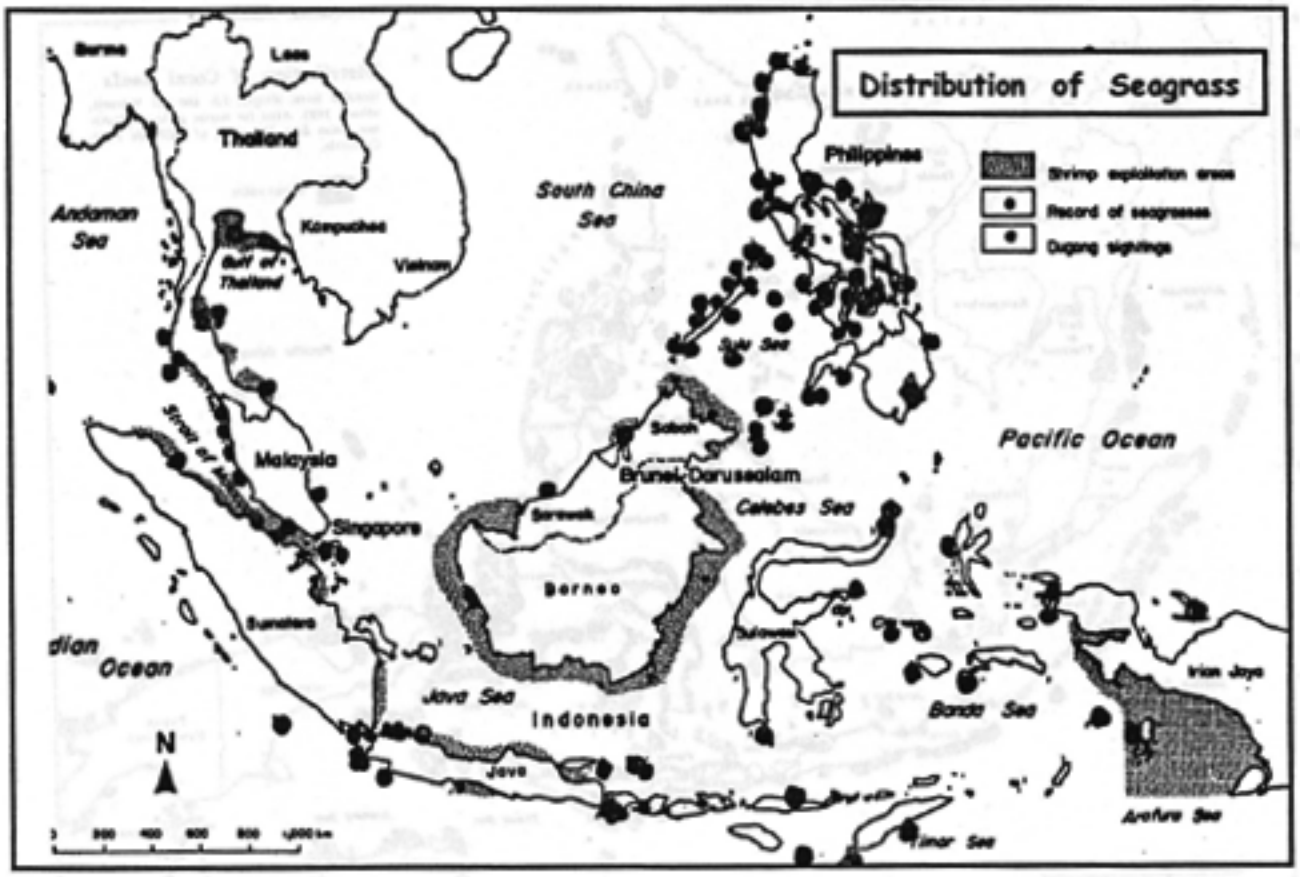
VILLAGE

AREAS OF MANGROVE FOREST IN ASIA

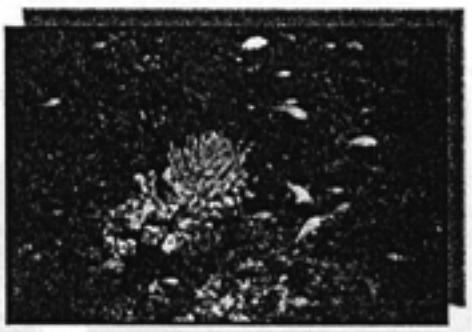
COUNTRY	MANGROVE AREA (ha)	YEAR OF ESTIMATED
Bangladesh	405,000	1983
Brunei	18,400	1995
China	67,000	1983
India	356,500	1983
Indonesia	4,250,000	1993
Japan	400	1983
Kampuchea	25,000	1995
Malaysia	641,000	1993
Mynmar	428,500	1990
Philippines	246,700	1983
Pakistan	249,500	1983
Srilanka	63,000	1986
Thailand	174,000	1993
Vietnam	252,000	1993
Total	7,177,000	

MANGROVES IN ASIA = 40 % of the total world mangroves (18,000,000 ha)

SEAGRASS BEDS IN COASTAL ZONE IN ASIA



CORAL REEFS IN COASTAL ZONE IN ASIA

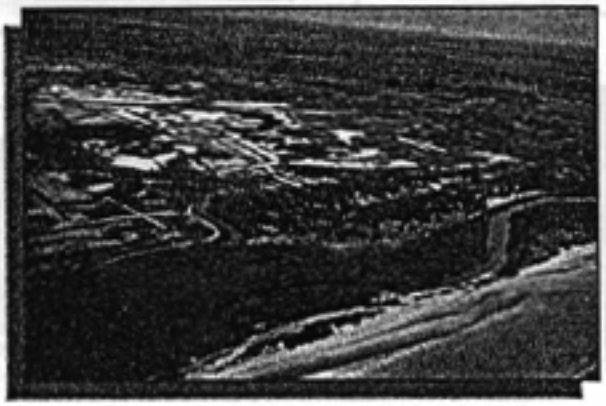


FUTURE TREATS TO THE COASTAL ZONE IN ASIA

- Population pressure
- Destruction of natural habitats
- Coastal land reclamation
- Massive sedimentation from uncontrolled upland development
- Sea level rise
- Massive volcano activities

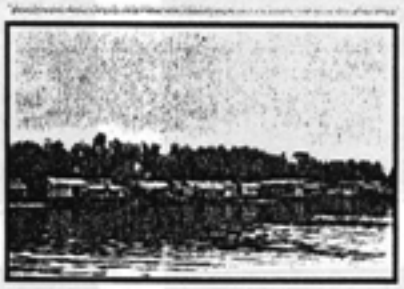
POPULATION PRESSURE IN COASTAL ZONE IN ASIA

COASTAL LAND RECLAMATION AND MASSIVE SEDIMENT OF UNCONTROLLED UPLAND DEVELOPMENT

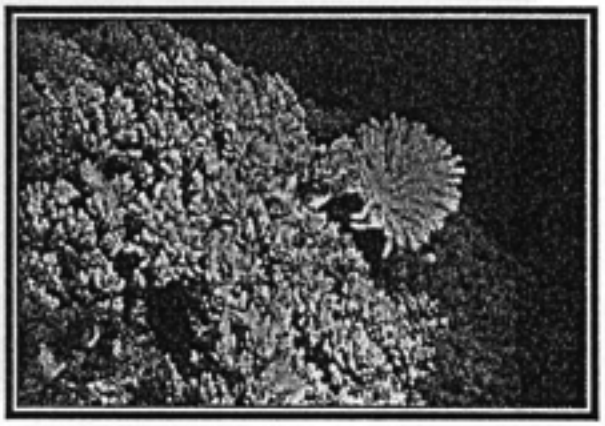


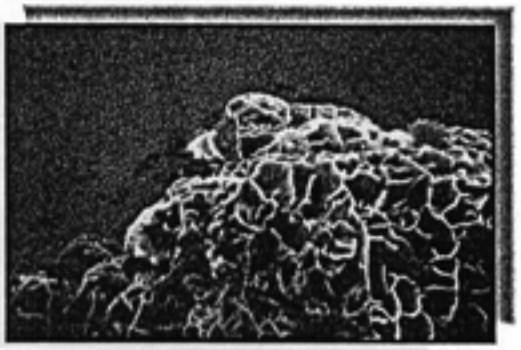
DESTRUCTION OF NATURAL HABITATS IN COASTAL ZONE IN ASIA

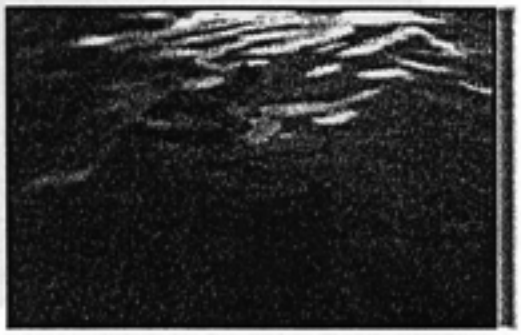
MANGROVE DESTRUCTION

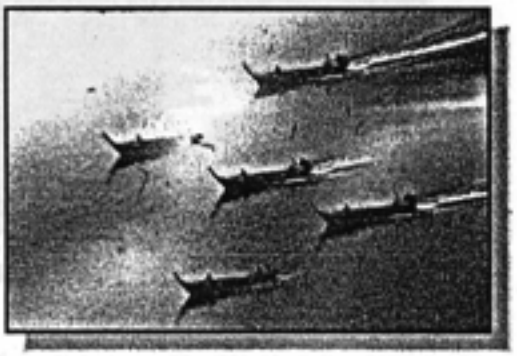


CORAL REEF DESTRUCTION IN ASIA









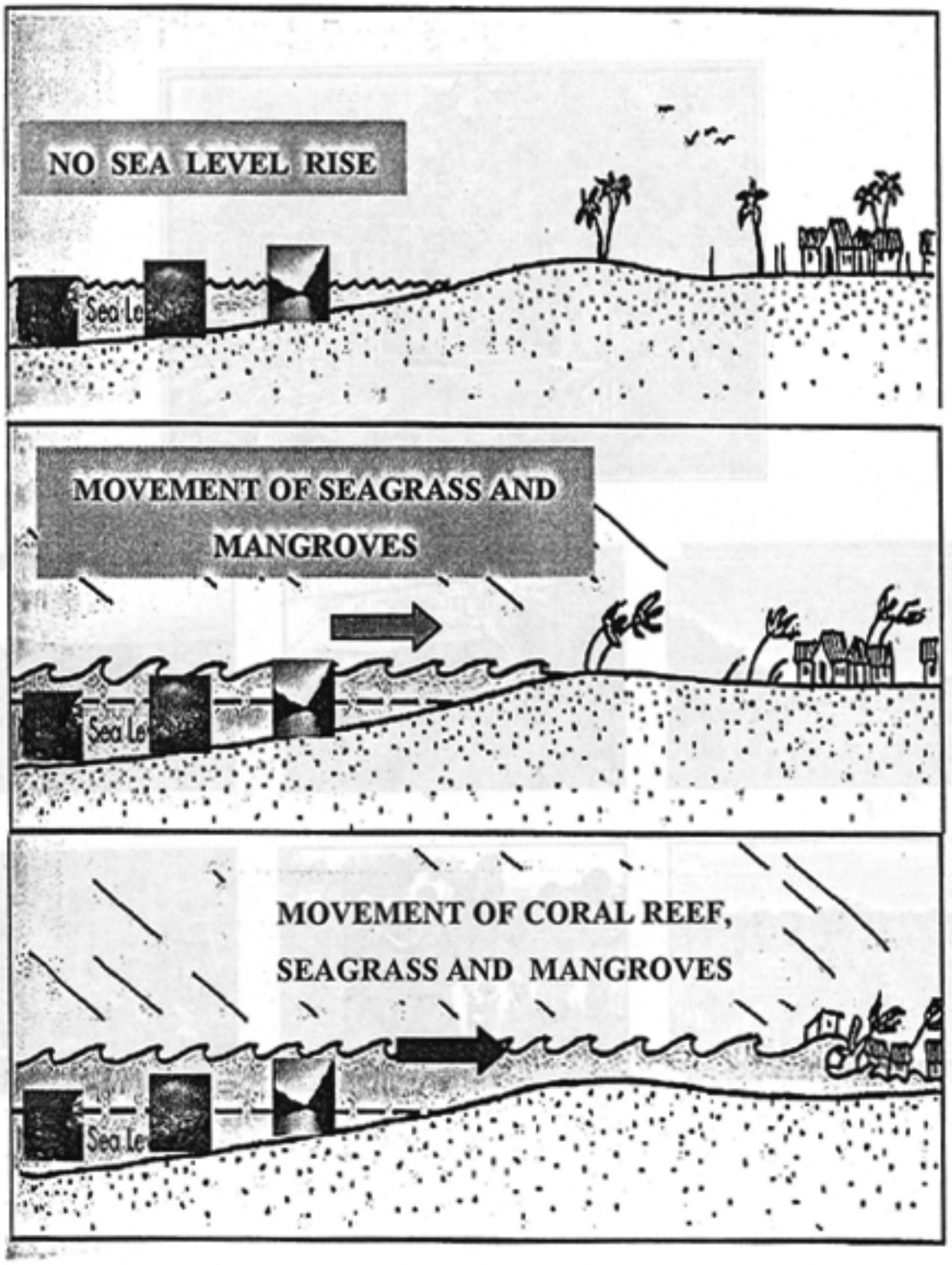
SEAGRASS DESTRUCTION IN ASIA

SEA LEVEL RISE

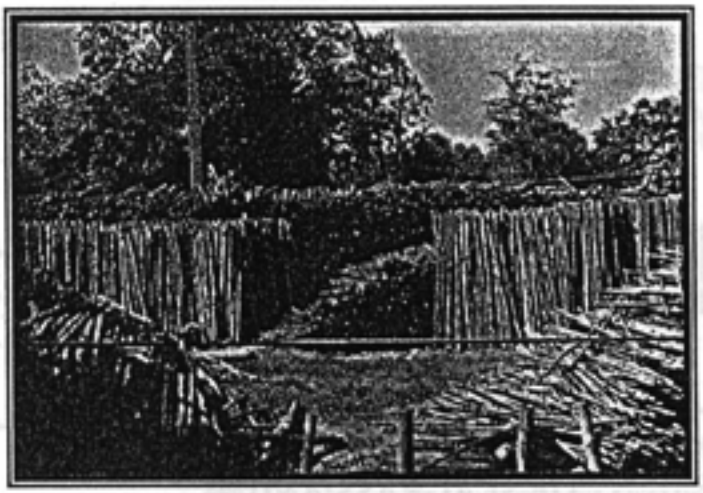
The last 2000 years sea level rise 1-2 mm/yr

3700-4100 years B.P. sea level rise 10 mm/yr

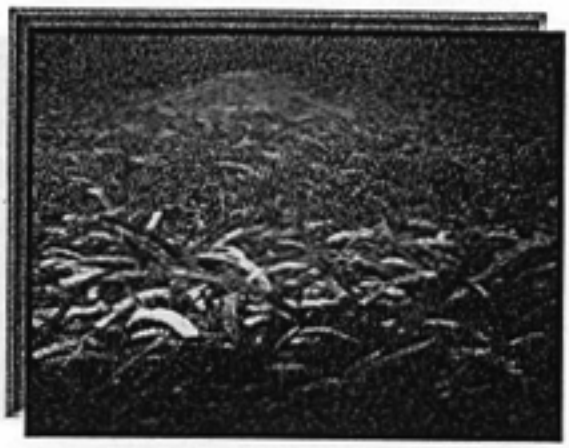
6150 years B.P. sea level rise 1 m. above MSL

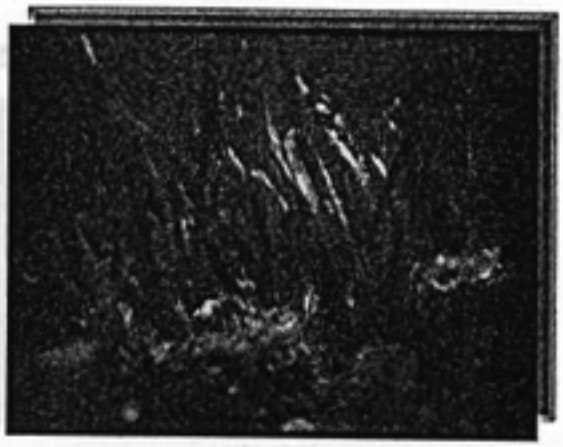


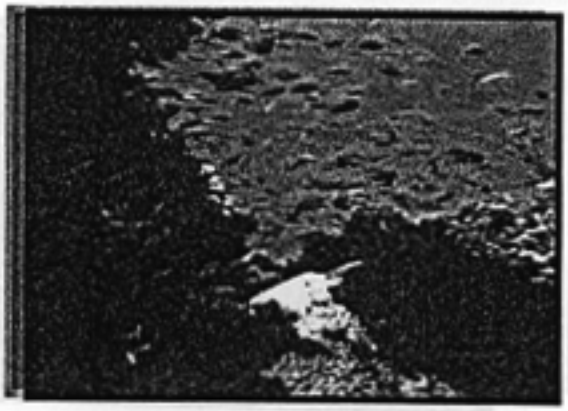
FUTURE DEVELOPMENT FOR MANGROVE IN ASIA

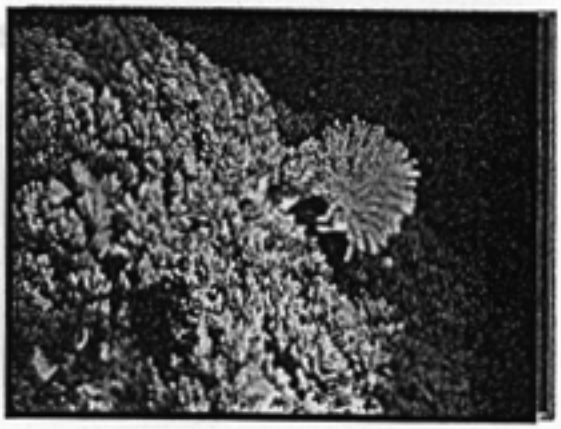


FUTURE DEVELOPMENT OF SEAGRASS, CORAL REEF AND OTHER RESOURCES

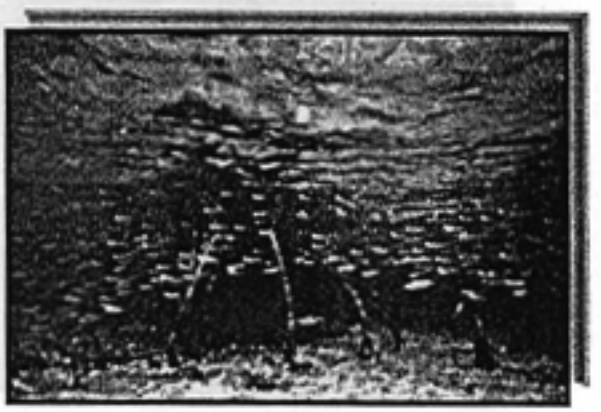




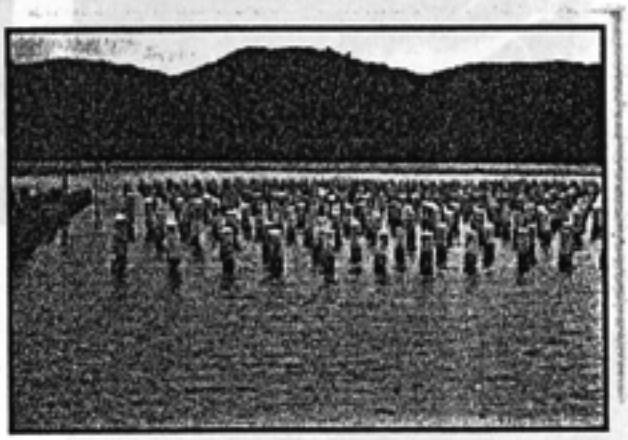




FUTURE DEVELOPMENT FOR COASTAL FISHERIES



FUTURE DEVELOPMENT FOR AQUACULTURE

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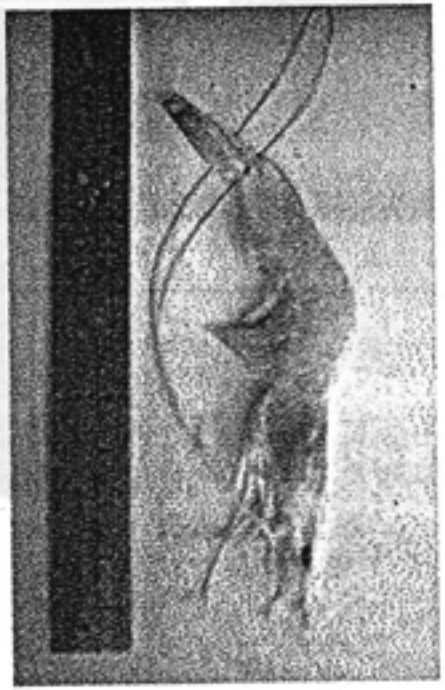
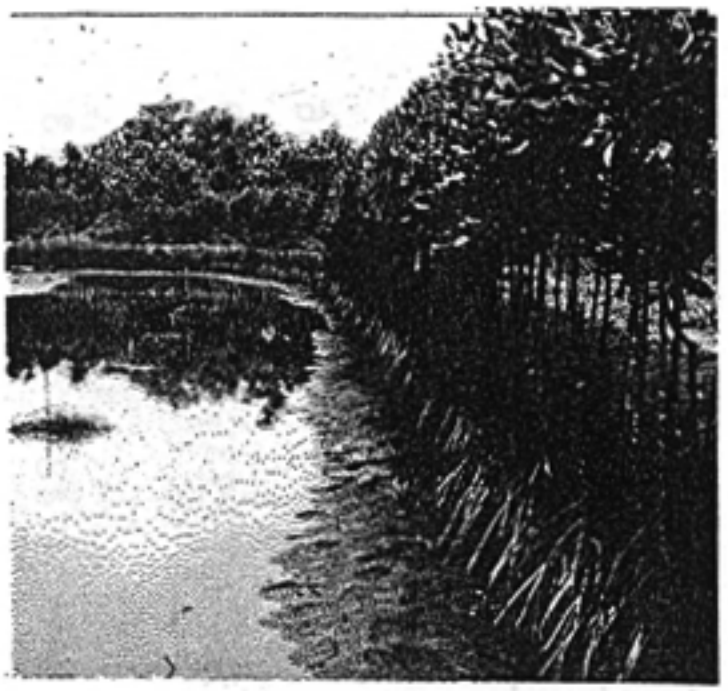
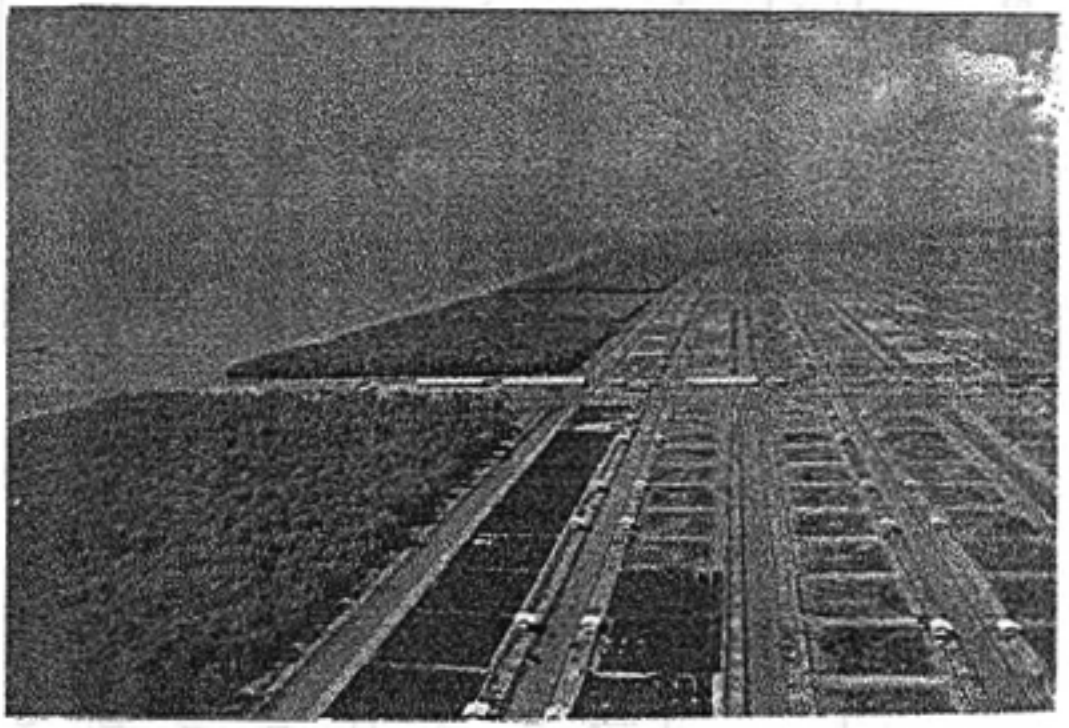


Export of Shrimp (metric ton) to USA and Japan

Contries	USA		Japan	
Export	1998	1999	1998	1999
Thailand	92,455	114,727	17,779	19,320
Equador	64,682	50,500	-	-
India	20,182	21,864	50,411	52,756
Indonesia	15,318	16,045	53,693	50,619
China	7,000	8,864	-	-
Bangladesh	6,318	8,773	3,748	5,513
Vietnam	5,045	8,091	26,697	30,253
Others	105,091	103,545	86,578	88,853
Total	316,091	332,409	238,906	247,314



Gambar 5. Penghijauan Tambak di Desa Curah Sawo, Kab. Probolinggo, Jawa Timur



Gambar 6. Unit Tambak Berwawasan Lingkungan dengan Jalur Hijau yang Memadai

THAI-JAPAN COOPERATION ON MANGROVE PLANTING IN THAILAND

Future Strategies and Solutions to Create Sustainable Socio-economic Conditions in the Coastal Zone, with the environmental limitations in ASIA

- Stronger and more implementable legal frameworks
- More adoption of zoning to reduce conflicts between different coastal resource users.
- More compliance - based management e.g. codes of conduct / best management practices (e.g. for coastal shrimp farming).
- Mangrove and others marine products to carry 'ecolabels' e.g. charcoal, shrimp, to demonstrate non destructive production methods.
- Future technology to restore mangroves, coral reefs (seeding of young corals, culture of many coral species (e.g. aquarium fish and molluscs) and seagrass beds.
- Less dependence on coastal natural resources directly (e.g. less cutting of mangrove and destruction of coral reefs). More indirect uses and values recognised e.g. sustainable aquaculture and tourism to increase.
- More appreciation of conservation values (recreation, education, fisheries habitat support, storm and flood protection).
- Formulate national policy on integrated coastal zone management with emphasis on public participation.
- Promotion of International cooperation on coastal zone management.

PANEL DISCUSSION

PANEL DISCUSSION

Prof. Mimura: Now I'd like to start the panel discussion. The purpose of this panel discussion is to respond to your questions and comments from the floor, and after that, we'll focus on some interesting subjects. I want to make this panel discussion as frank and friendly as possible, so please don't hesitate in giving us questions and comments.

Questioner: My name is Kusumita Jai. I am from the Southeast part of India. I am involved in integrated coastal zone management education. This is mainly the training of the decision makers in integrated coastal zone management. In so doing, I worked under the collaboration with a UK institution in about the last 2 years. What we found were important difficulties in educating; transferring knowledge to the decision-makers such as the specifics of the scientific research we are doing on the coast. So, the problem is how can we communicate with the decision-makers, how can we adapt our methodology and modules to transfer the information. We have collected a lot of information using remote sensing, DES, DPS, everything. But when we take this information to the decision-making level it should be in a very simple and meaningful format. We should have a proper linkage between the scientists and the policy-makers. How can this be done? How can this output be taken to the policy-makers? That is the first question. And then, when we are doing that, many countries in the Asia-Pacific region are doing similar research. How do we share this information, and how do we interact with these different institutions in the same area? And, who will supervise these interactions, and how can we form a network to make such interactions work? These are the two questions from my side.

Prof. Mimura: Whom do you want to ask? Could somebody respond to him?

Dr. Lee: Since I mentioned a little bit about training in my talk, I think I could comment. Up to now a lot of concerns regarding training programmes are being addressed so as to improve the decision-making process in social science-related fields, but we feel that training for scientific technologies, actually for transfer technologies that are essential for coastal management, is very helpful. A couple of months ago Dr. Kullenberg in IOI (International Oceans Institute) visited Qingdao and he discussed the importance and necessity of this kind of training, so we agreed to organise such a programme; for example coastal modeling technologies or coastal zone management. It's a different kind of training from the coastal management that we mentioned, but we are trying to organise that sometime next year if we can find the proper sponsors. We feel that these two approaches are both necessary. Another thing is how to organise a lot of interaction. Maybe we need to organise inside the countries first as there are many agencies and people in each country. We need some kind of clearly organised interaction inside the countries themselves in addition to between the countries in the regions. Maybe those agencies should be involved in technical organisations for international activities in the regions inside the country. I think there are some kinds of indications to organise that.

Prof. Mimura: Are there any other responses please?

Prof. Aksornkoae: Regarding the question of how scientists can work in cooperation with the policy-makers, I think that many countries in Asia have some conflict among scientists and politicians or policy-makers. But so far, now in Thailand I think that the scientists and the policy-makers can work together very smoothly after they understand. Because formerly, the policy-makers, Ministers or politicians complained that scientists write everything in a science so difficult to understand, because they have no scientific background. So, we are now trying to accommodate and most of the cabinet or the Ministers in Thailand now have many scientists as advisors. And, from past experience, I think that in many countries the policy-makers managed the coastal resources without any scientific background, so they are well aware that if we manage without background knowledge, the management cannot be sustained. The politicians or policy-makers understand and now they are trying to move to work closely with the scientists. That is the other way. So, we have to work together.

Prof. Mimura: Professor Menasveta, you have something to say?

Prof. Menasveta: Yes, regarding how to share the information and data, I think that there's a need for us to set up something like a network for a database, because now we can communicate by email which is quite easy. So, if we can assign a certain international organisation or agency like EMECS or APN to do the job, that would be easier. And, I think that organisations in countries in these regions also have their own web site, which is a compilation of all their information and data. If they can share that information through international web sites, then this will be a way to access any countries regarding their environmental management of coastal areas. This can be something like a concept of one-stop shopping: there's no need to access several web sites, which is very hard to do. We could just go to one web site and then go to the other existing web sites. I think that this will be the way and means to share information and data. Regarding how to make the decision-makers understand our scientific findings, I think that that should be the political view of the politicians. I think most of them know that sometimes they have a policy and it depends on the budget available, so with this limitation, some politicians try to deviate from what they think or want to do. Sometimes this is a problem, especially during this period because we have a bad economy right now and not enough budget. They want to do something, but they cannot deny, so they try to pretend that they don't understand, but I think that in fact they understand very well. So, it also depends on the situation of the world economy. I think that if we have money, there'd be no problem. For example in Japan, I remember when I came here in 1970 I dropped by in Tokyo on the trip to my studies in the States, I could see polluted canals near Haneda airport. On the way back this time I stopped in Tokyo again in Haneda airport, and it has changed; now I could see the same canals with people fishing. The water quality is good, because in that period Japan put out a lot of money and invested in solving their pollution and environmental problems. They had the money and the political view to do it, so within a short period of time, only four, five years, they could manage it. Tokyo Bay used to have alga bloom and red tides before 1970, but after having set up the water treatment system – wastewater treatment system – the problem has decreased to the minimum. So, everything depends on the economy, on money. If you have money, and if you have people who have knowledge, you can

solve the problem. This is my reaction to your first comment.

Prof. Mimura: Another important question is about regional cooperation, so our rapporteur Dr. Yatsu, who is Director of the Asia-Pacific Network for Global Change Research, might have something to answer.

Dr. Yatsu: I think in terms of the regional cooperation on coastal zone management, maybe the International EMECS Center – the secretariat of this forum – could have the potential to be a kind of center of excellence for the various types of activities with regard to coastal zone management. But from the scientific research viewpoint, we, APN (Asia-Pacific Network for Global Change Research) have put higher priority on coastal zones among the four priority areas, including climate and biodiversity, and we also put higher priority on coastal zone management. And actually, we funded several research projects on coastal zone management, for example, the impact of climate change on coastal zones in the Asia-Pacific region. So, we will certainly be continuing these kinds of activities in the future, and APN can collaborate with other international organisations like the International EMECS Center, or others like the joint organisation of this Asian forum.

Prof. Mimura: Now I'd like to invite another question or comment.

Prof. Ghosh: Mr. Chairman, I am Professor Santosh Ghosh of the Center for Built Environment, Calcutta, India. Now we the experts, if we can call ourselves experts, have some problems. We know our subject very well, but we know very little about the area and the people who live on the coast. This difference of knowledge always surfaces in all our discussions. This morning we had very nice presentations, some put out little information for some reasons, but some appeared very contradictory to me, or there was the absence of a few items. Firstly, we'll start with the last one. It was a very good presentation but does it talk about the prawn or shrimp culture in terms of economic benefit? The speaker didn't say whether it is good or bad, but only mentioned it. Now in India, the Supreme Court of Justice has banned this income source because it destroys the ecology of the area. It is a very contradictory thing. The second point is that most of the discussion focused on the effects of something, like human activity, pollution, and so on, and not on the causes of these. One of the major factors of the coastal problems of any Asian country is the upstream/downstream problem; the problem starts upstream and comes downstream to the coastal area. This should have been focused on a lot more. Thirdly, which I mentioned in the beginning: How do we approach the coastal area people? These are not barren lands with birds and animals only. Millions of people live there for their livelihood, and most of the people in Asian countries are poor and live in coastal areas. They're diversified, they're doing agriculture on tidal swamp, and they're doing some other economic activities which are detrimental to the coastal environment. How can we convince them? What are the educational objectives? They have no Internet or e-mail access. So how will we reach them? Through television? Through public campaigns? Many countries have achieved something, but not enough. I think there are other issues that should have been focused on, and I'd like to have a discussion opened. If the experts throw some light on this issue, it will be beneficial.

Prof. Mimura: Thank you very much for pointing out those very important issues. I think some of the panelists want to respond to him, for example the upstream/downstream relationship with the coastal zone environment. So, is there anybody who would like to respond to him? Dr. Lee?

Dr. Lee: Actually it is true that there is a need to deal with upstream and downstream. Unfortunately, there are only a few examples, like for example in the Philippines or in the East-Asian Sea region, which deals in actual implementation of it. There are plans, like for example strategic environmental programs, which are trying to deal with that but they are not yet in actual implementation. Like, for example, linking the Mekong initiatives with the Palan Gulf, and there is a new program in the Philippines on ecological governance, also linking upstream and downstream effects, but as of the moment they are in their initial stages. Also, this bottom-up and top-down issue is also being dealt with in the Philippines, especially with the mediation of many NGOs. It depends I guess on the social structure of the societies which are in the region. In the Philippines there is a very strong NGO movement and participation, or enhancing participation, of the local communities, and the scientific community also plays an active role in this forum, but it depends, as I said, on the history of the area. For example, Indonesia is trying to learn the lessons that the Philippines are also learning in terms of how NGOs engage with the local governments and on national government levels. The others would be having various types of media to reach the actual stakeholders on the ground, and I guess this will also be dealt with further in this session and in the NGO forum.

Prof. Mimura: Professor Menasveta you have the floor.

Prof. Menasveta: With regard to the upstream and downstream effects, I would like to recommend you to read a comprehensive report, which is published by GESAM. GESAM stands for the Group of Experts for the Scientific Aspects of Marine Environmental Protection. It is not an agency; it is a group of experts that are supported by the UN system. They have set up a working group to study the impact of land-based activities concerning the cost of pollution, and they have published this publication summarising up-to-date information concerning the impact of land-based activities. For the trend that you mentioned, I agree that in India the Supreme Court has banned the shrimp culture, but in India the system you have for culturing shrimp is different from other areas. You are using what we call the tradition-type system requiring low-lying areas such as mangroves, which is evidently not good. But in some other countries like in Thailand, it's different. We are using what we call the intensive-type system in which there is no need for us to use mangroves anymore. It is true that in the past about 50% of mangroves have been destroyed, and shrimp culturing accounts for about 50% of the activities responsible for mangrove destruction. But now this is no longer a problem. We have changed shrimp farming from the traditional system into the intensive-type system, which needs an area of higher elevation above that of mangroves. With this system we can incorporate the cross-recirculating water system with the waste treatment system inside the shrimp farm itself. So with this system, only a very small amount of the waste

is discharged from the farm, and the water can be reused. We are using this responsible system right now.

Prof. Mimura: So, Professor Aksornkoae.

Prof. Aksornkoae: I am very shocked. I think that I agree with Professor Ghosh who mentioned two impacts on the coastal resources, one being upstream/downstream. I think that I had read an article in a Bangkok newspaper that mentioned one river along the Sundabang Bay called the Koa River. They had blocked fresh water upstream, and then the seawater went upstream and increased salinity; most of the marine animals disappeared because of the very high salinity. We also have many areas in Thailand where bans are imposed. I think that we need some very detailed studies, for example experience from the Koa River. I think that is very important. Many countries try to build dams to block fresh water going to the coastline. They need the water for rice cultivation. It's very dangerous. So, I think that this issue is very important. And, as for the shrimp farming in Thailand, one of the problems we are trying to solve is that we share traditional and intensive systems. Some farmers have changed from intensive to traditional; they plant the main crop and cultivate it together with the shrimp. I think I went to see it at Koa or somewhere and saw the same problem. I think that we need more study about these two issues.

Prof. Mimura: Dr. Hosokawa, I heard that the Japanese government is interested in the kind of watershed planning in relation with coastal zone management. Recently I heard that your institution is developing a research project to cover the whole river watershed area and coastal zone, focusing on the Tokyo Bay area. Could you share some of the Japanese experiences?

Dr. Hosokawa: Thank you Professor Mimura. I'm from the National Institute for Land and Infrastructure Management, and this institute has tried to make a comprehensive research project to manage the Tokyo Bay area from a wider viewpoint. This research project has tried to connect with the research product of the watershed study from another department. It's a very challenging project and it's not easy to find a solution, but we understand that the upstream/downstream affect on coastal areas or on water quality or sea sediment quality is very much affected by upstream human pressures. So, if you try to improve the coastal environment, we have to improve or we have to consider upstream conditions as many of the speakers mentioned in their excellent presentations. It's the first step, but we are trying to make comprehensive studies.

Prof. Mimura: Please, Dr. Lee.

Dr. Lee: I would like to comment on the cause of coastal environment change. The coastal environment is a very complicated process and still we don't have enough understanding so we have to base it on some kind of empirical basis. So, we need a good monitoring program to identify the cause of coastal environment changes. So, it is very important to have this coastal monitoring program. What I want to mention here is that there is a large difference in the economic level or science and technology standards

in this region. Different countries have different standards. It's important to keep a similar standard of data quality or data quality control in the same region, which is very important to identify or to evaluate many of the causes of environmental changes. Maybe this kind of problem is an international agency related problem. There needs to be more interest, more attention on updating similar standards of data quality control for monitoring programs.

Prof. Mimura: So, I'd like to ask or invite … please.

Mr. Hasegawa, Consultant: *(A question for Dr. Yu given by the speaker in Japanese and interpreted as follows):*
My name is Hasegawa and I am a consultant. Dr Yu is the only one who is not speaking. In the Guangzhou population in 2010 to 2020, there is a projected increase in the population of about 70%. This is not a natural increase, but there is a movement of the population from the local area to Guangzhou City. In order to live, we have to increase the numbers of plants, and the wastewater from plants and domestic waste will be increased in volume. If the population is increased, it is impossible to increase the numbers of plant and domestic waste treatment systems and therefore effluent will go into the bay. And then, the management of the gulf, in the occurrence of, let us say, a red tide, or if there is a dangerous signal to fish. If such a signal is emitted, then it will be sent to the policy-makers and actions are necessary. Even if you have a good database system, it will not work out very well. In China, the population is very large and one province has a very large population equivalent to a major city here in Japan. So, you cannot catch good fish or have a good quality environmental system and you just have to create a new system to cope with the increase of the population.

Prof. Mimura: Dr. Yu, could you respond to him?

Dr. Yu: Maybe the size of the population is a bit different according to the status data of 1999. The population was 8.6 million, and then around November 1, 2000 it reached 9.94 million. So, the population increased by about 1 million in a year, but the data in 1999 was not complete. In the 5th National Population Census, the government said that if you didn't register a population number in the future you couldn't get permanent residency like in Guangzhou. One year ago, maybe some people didn't want to register their family members, so if we prepared a family-hold population and non-family hold population we could easily find out the problem of population size. So, I think in our plan, we related the population size and economic growth rate, and we used 50-years of data to simulate population growth. I think population size won't cause a big problem. In our ecological planning, we have already made policy suggestions. Water resources are a big problem especially from domestic sewage and wastewater. In 2000, industrial wastewater made up 26% of total wastewater, and domestic wastewater made up about 74%. The Environmental Protection Agency of Guangzhou is conducting a plan to reduce domestic sewage and wastewater, which is under progress. From our study, I think the population growth in this plan won't cause a big problem.

Prof. Mimura: In my understanding, another important point of Mr. Hasegawa's

question is that if the population of Guangzhou increases, then there will be more pressure on the marine environment. So, if something dangerous happens in the coastal sea, can the government detect it very easily, and can they incorporate these danger signs into their policy? His question is whether there is such a dynamic feedback system between the real world and the policy-making process in your country. That is another important point of his question, so could you provide an explanation for them?

Dr. Yu: In our formal planning maybe scientists just make one big plan and then take a lot of documents and hand them to the government. No one reads the documents because there are too many and cannot be understood. In our plan, which is in progress now, we are developing an environmental information system that has a very easy-to-use interface. The staff of environmental agencies can operate it and can update by themselves. If the conditions change, they can put their data in the system, and then they can get policy suggestions immediately. I think that between scientists and the government, we must provide some easy interfaces that let the officers know what the scientists want to do, and how to use that kind of achievement of research.

Prof. Mimura: Now I'm afraid that there is very little time remaining. I'd like to ask for the last question from the floor. Would somebody like to give us a question or comment?

Questioner: *(questioner is not holding a microphone and therefore initial dialogue cannot be heard)* … in the report from Professor Aksornkoae of Kasetsart University. Your information and other ideas interest me and this is not a request. I would like to make a comment and ask for your ideas. This is the special occasion of the 5th EMECS conference to begin in the 21st Century. I would like to base on reports, that I think of the mangrove forest not only as a natural resource of the coastal zone, but the mangrove forest is our natural heritage. Because I understand your idea, your concept, that the mangrove forest is a natural habitat for many flora, fauna, and ecosystems. That is why I would like to hear from Professor Aksornkoae: Should the organization of mangrove sustainable management network belong to, or be under the umbrella of, EMECS, IGES, APN or others, not only in Asia, but over the world? Because I know that in Brazil, Costa Rica, and other tropical countries, the mangrove is our royalty and natural heritage.

Prof. Mimura: Prof. Aksornkoae, could you respond to him?

Prof. Aksornkoae: I think that's a very good question. I think everybody agrees that the mangrove is very important, and maybe is part of our world heritage. As for the network, there is now a regional network, because we have a UNDP/UNESCO project on the Asian and Pacific islands. We have about 14 countries in the network, and in every country they have a national mangrove committee. We have to connect each country by working through what we call NATMANCOM (National Mangrove Committee), in the regional community and also in the global community. I'm not sure if you're aware of it, but we also have ISME (International Society for Mangrove Ecosystems), which has about 80 member countries. Many Japanese scientists have become members, and the

headquarters are in Okinawa at Ryukyu University. We have now set four regions in a network for information: one center for Asia in India, a second center for the Pacific Islands in Fiji, for Latin America in Brazil, and for Africa in Ghana. So, we have four substations for collecting data for the mangrove, and this is sent to the headquarters in Okinawa. So, ISME plays a very important role in connecting countries globally. We also have GLOMIS (Global Information Mangrove Institutes). From GLOMIS you can get information on the Web at www.glomis.com, and here you can get information on what is going on in mangroves in the world. This is our link between the regional and global areas. So, you are encouraged to register as a member of ISME and then you will learn a lot about the global mangrove network.

Prof. Mimura: Before closing I'd like to give the panelists the opportunity to say some remaining words if they have any. Is there anything that you would like to add?

Prof. Aksornkoae: I would like to have the last word. I think that so far in the coastal area we know exactly what the problems are. We need action. We need cooperation. In the future we should have very good planning. No more talking about problems. No more concept - but action! So, why don't we work together to serve our coastal resources in the future? Thank you very much.

Prof. Mimura: This is a very encouraging message from Professor Aksornkoae. This Asian forum is the first session of this EMECS 2001 conference, and I'm sure that this is a very successful and fruitful session. I want to point out just four points as a kind of conclusion for this session. Firstly, we have the present situation of the Asian coastal zones, and the problems associated with our coastal zones. We can recognize again that the coastal zone is a precious common asset for the Asian region and on the basis of this coastal zone many people are living, and extending their activities. So we can understand again that the coastal zone is a precious foundation for the well-being of the human beings in the Asian region – of course not only for Asians, but also for people in the world. Secondly, although the coastal zone is a precious asset for us, it's facing serious problems and there is some commonality in the problems of the region. We hear about problems like water pollution, degradation of mangroves, coral reefs, and sea grass beds in many places from various speakers. We can recognise that the Asian coastal zone faces common problems. Many of the problems are caused by human pressure including population growth and land-based activities of the people. Thirdly, I received a quite bright message from our session that many presenters indicated to us some trials to solve the present problems. Dr. Lee indicated the importance of the scientific and technological approach of integrated coastal zone management, and Dr. Yu showed us the quite systematic approach for the ecological design of the mega-city of Guangzhou. Also, Professor Aliño indicated some existing trials of the adaptive measures to solve the present pressures, and many other presenters also indicated many examples of the solutions for the problems including the education and cooperation of local people. One feature of our session is to examine not only the present problem, but also the direction of the future solution of our problem. My fourth point is that although we had a very active discussion and heard very comprehensive presentations, I have the impression that I can't get the whole picture of the situation of our coastal zones. What

is the concrete and comprehensive problem in our region? And what is the most desirable approach to solving that problem. We need such a kind of comprehensive or whole picture in our zone. Regarding this subject, I already introduced in my opening address that the International EMECS Center has a plan to do a comprehensive environmental assessment for the Asian coastal zone. This is a project to edit and publish a kind of white book of the Asian coastal zone environment. The discussion given in this session is a good basis to start this project and after this Asian forum we will work to realize this project in the future. Fortunately, the next EMECS conference in 2003 will be held in Thailand, and I want to hear the continuing discussion toward developing this kind of comprehensive assessment of the Asian coastal zones. Lastly, I really appreciate the very interesting presentations and active participation in the discussions, and would like to convey my thanks. I would now like to close this session. Thank you very much.

CLOSING REMARKS

CLOSING REMARKS

The Asian Forum started as the first session of the EMECS 2001 Conference and achieved great success. We had five very interesting presentations focusing on the marine ecosystem, water pollution, coastal development and the environment, and the future perspective of environmental protection in the Asian region. We also held an active Panel Discussion Session. Through this Forum, we were able to recognise that coastal zones are precious assets to the people of Asia although they are facing serious problems. There have been good practices to address the problems, placing an importance on science and technology to support policy-makers and raise people's awareness, the systematic approach of ecological urban planning in coastal cities, education and cooperation with local communities. It was also stressed that the promotion of education and training on integrated coastal management in Asian countries is essential. An important initiative derived from the Asian Forum is the proposal of a Comprehensive Environmental Assessment for the Asian Coastal Zones, which will act as a blueprint to create positive linkage between scientists and policy-makers, and other stakeholders, for action. The follow-up activities for the assessment are expected to bridge the 5th EMECS Conference in Kobe and the 6th EMECS Conference in Thailand, in 2003.

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