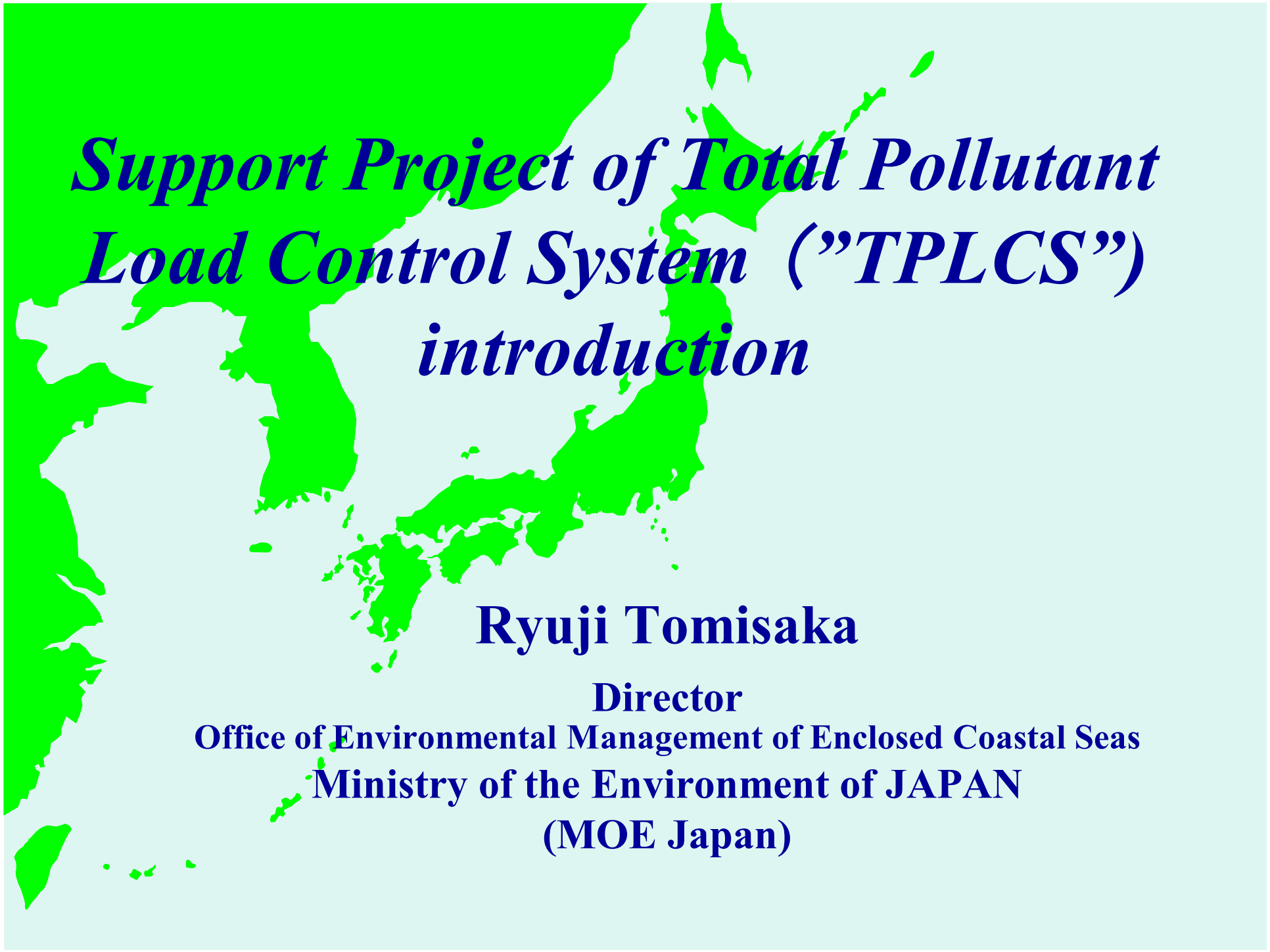


Support Project of Total Pollutant Load Control System ("TPLCS") introduction

Ryuji Tomisaka

Director

Office of Environmental Management of Enclosed Coastal Seas

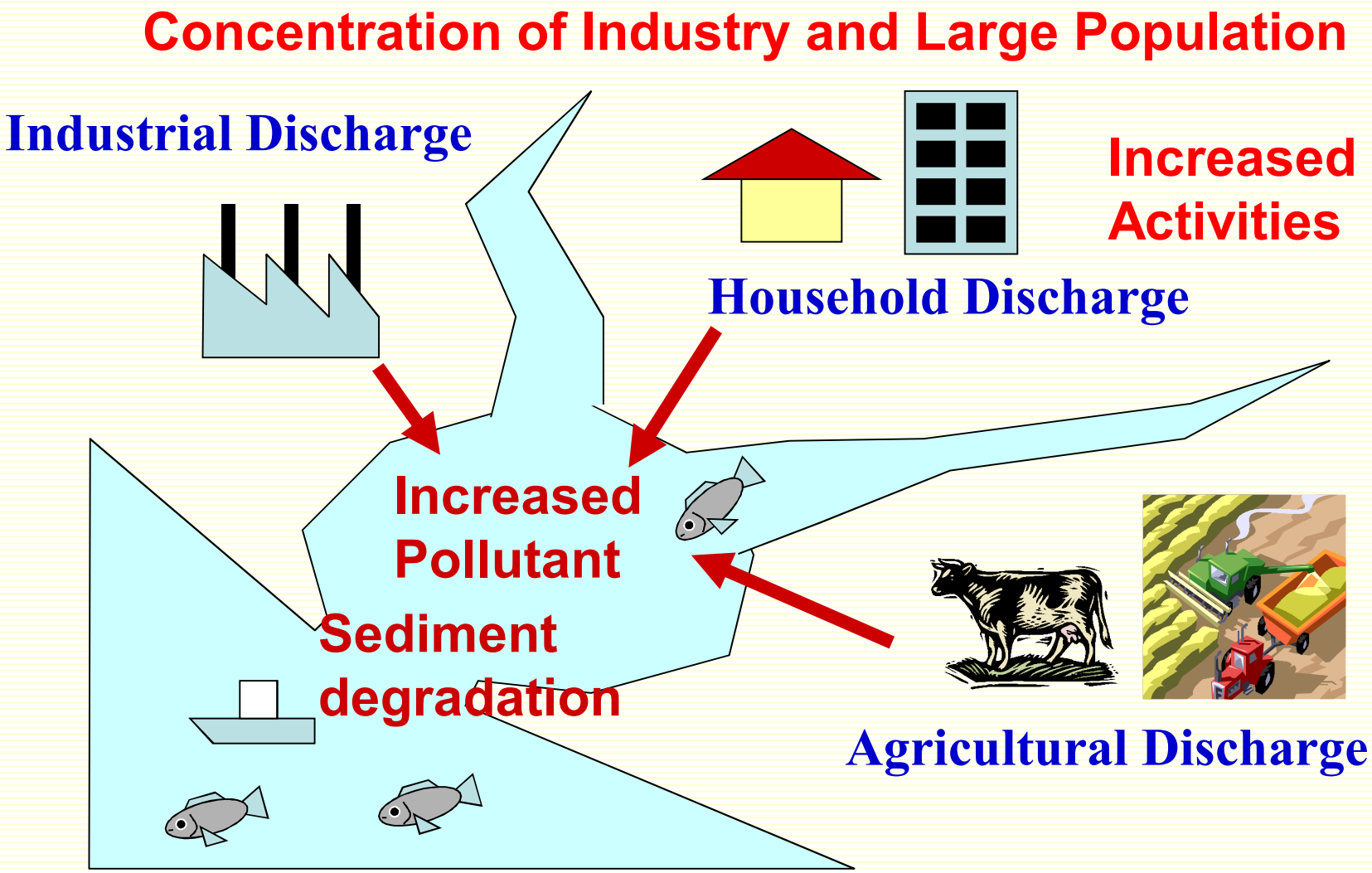
Ministry of the Environment of JAPAN

(MOE Japan)

CONTENTS

1. What is the TPLCS ?

Character of Enclosed Coastal Seas



Issue of Enclosed Coastal Seas (1)

□ Red Tide (Bloom of some kind of Phytoplankton)

It usually cause damage on the aquaculture industry.

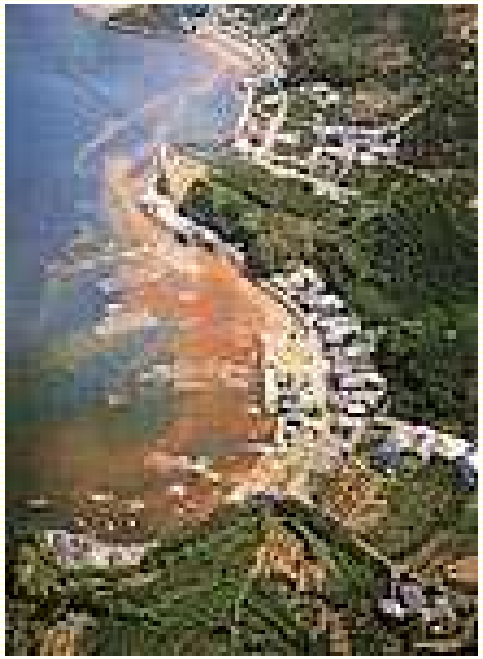
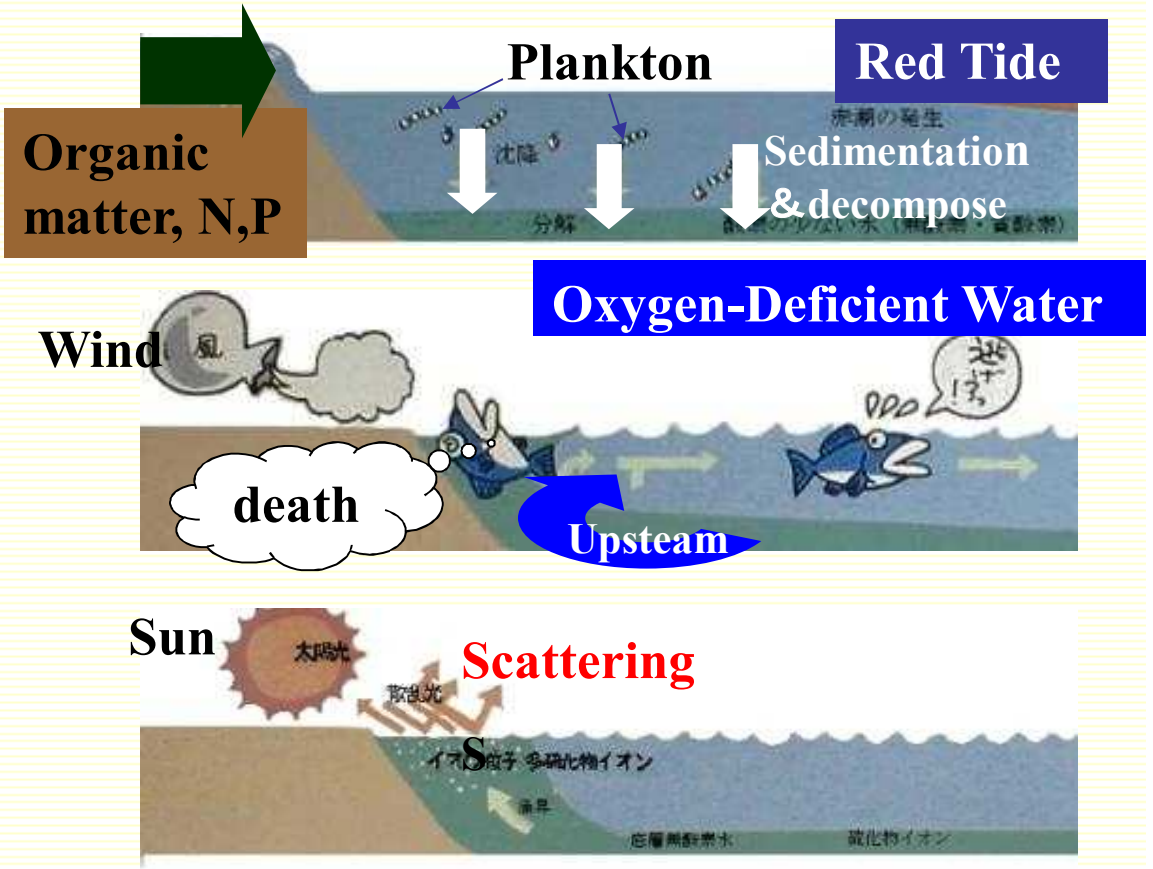


Photo: Mass mortality of Yellow-tail by Red Tide (Kagawa prefecture)

Issue of Enclosed Coastal Seas (2)

☐ Anoxic Water Mass (Blue Tide)

Photo: Mass mortality of shellfish by anoxic water (Chiba NGO sanbanze.com)



Mechanism of Blue Tide

Features of the TPLCS

The TPLCS is a regulative discharge control system to reduce the total pollutant load that flows into the target water area;

- **by setting the target item (COD, N, P)**
- **by setting the water quality goal**
- **by setting the total pollutant load at the target year**
- **by setting effluent levels for each dischargers**

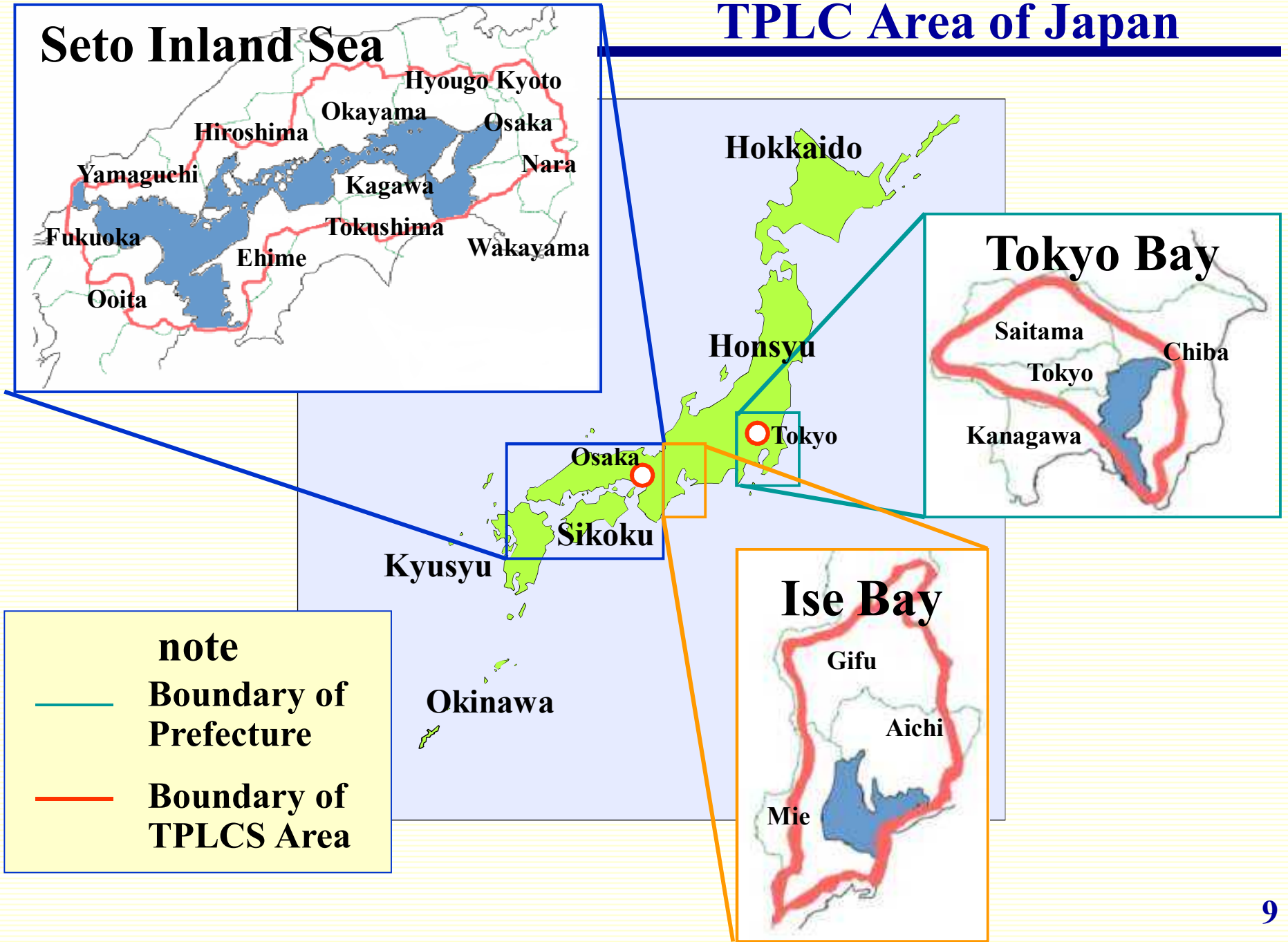
The TPLCS requires rationality, fairness, feasibility etc. to be accepted by society at the initial phase.

The TPLCS requires a lot of efforts to manage it.

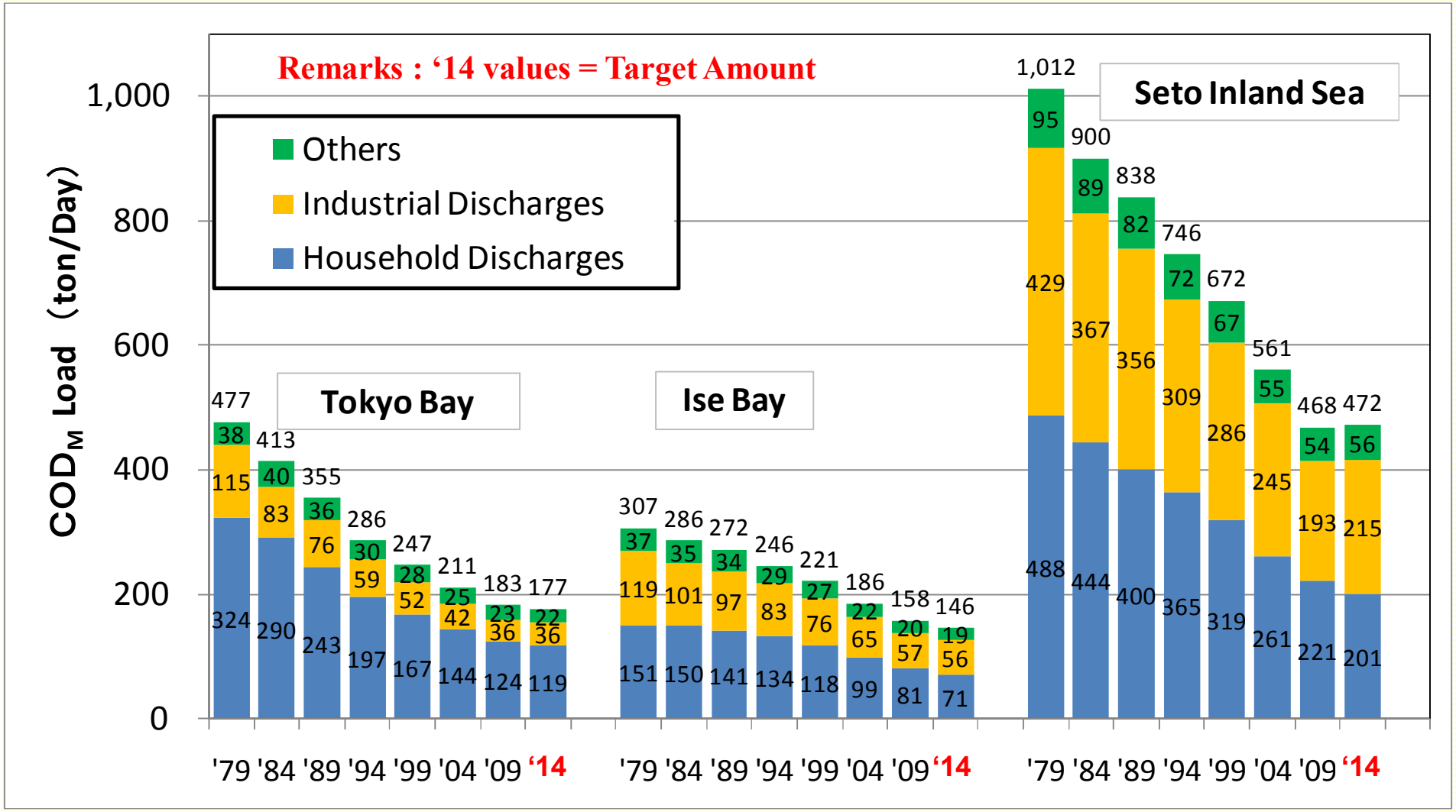
Expected Effect of the TPLCS

- **Promotion of the waste water treatment facilities.**
  - To **Industry**; individual treatment system, etc.
  - To **Household**; sewerage system and Johkasoh**.**
- **Reduction the land-based pollutant load.**
- **Improvement of water quality related to eutrophication**
- **Moderateing the damage to fishery by Red tide, etc.**

TPLC Area of Japan

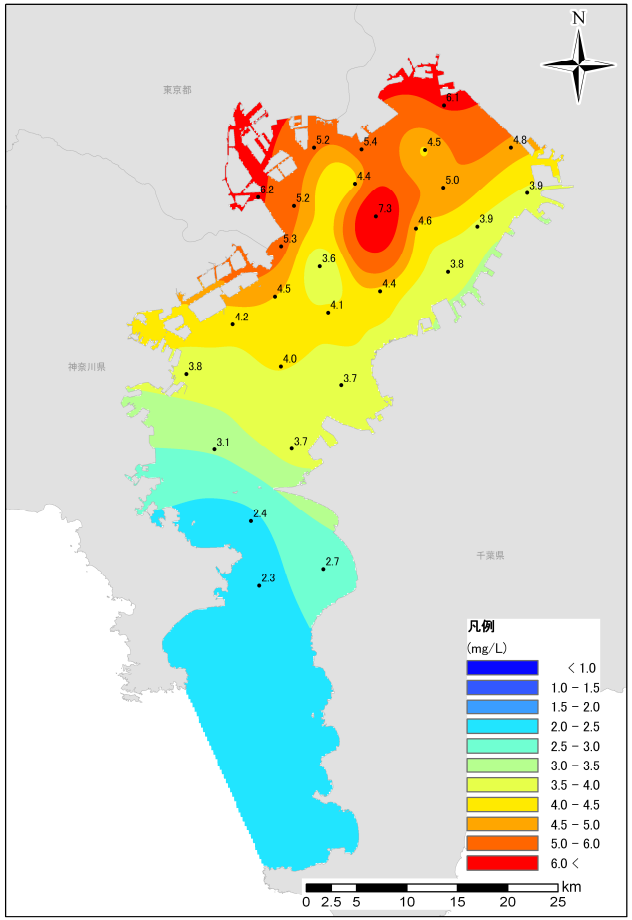


Pollutant Load (COD_{Mn})

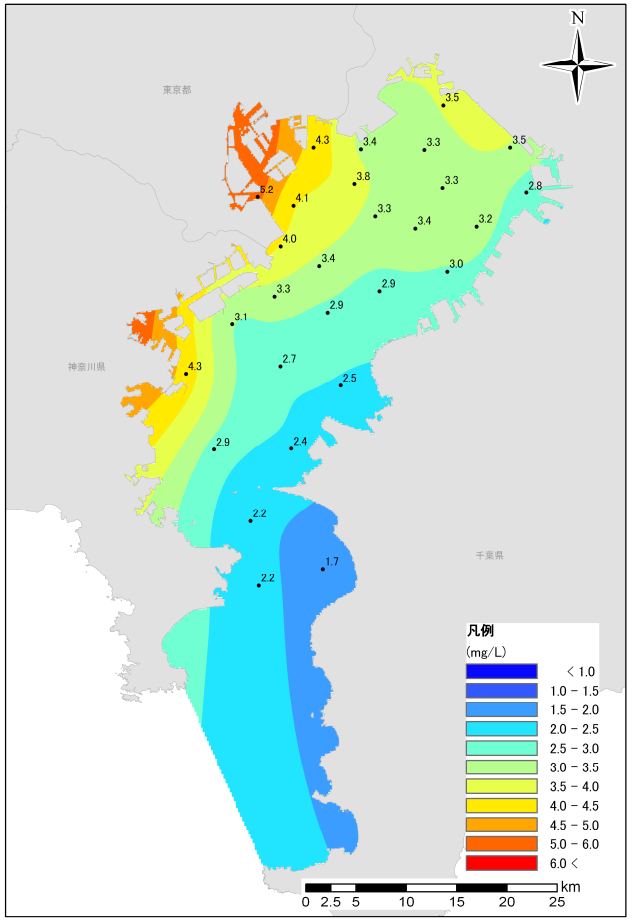


TPLCS(COD) put into practice in 1980

COD_{Mn} Distribution (Tokyo Bay)

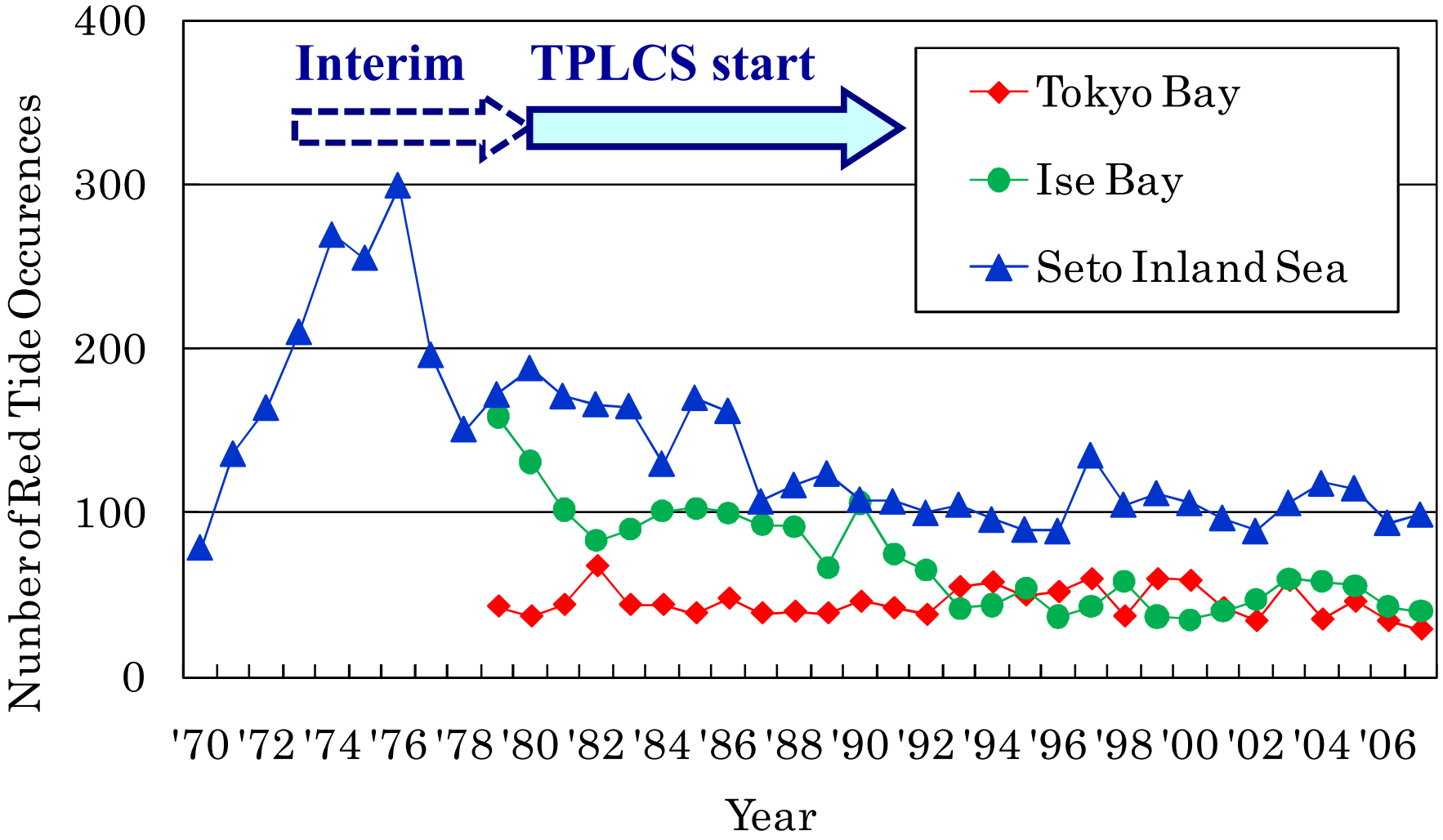


1982～1984 av.



2006～2008 av.

Occurrence of Red Tides



2. How to Introduce the TPLCS ?

Outline of the TPLC system

Step 1. Screening Process

- **Preliminary Survey**

  Assess the need of TPLCS

  Eutrophic area?

  Damage to fishery, human, etc.?

  Impact Analysis

- **Designate the TPLCS Area**

  Designate the water area need TPLCS.

  Specify the catchment basin.

Step 2. Planning

The Contents of the Reduction Plan

- Water Quality Goal
- Target Year
- Pollutant Load (current, future)
- Regulatory Standard for Reduction
  (Reduction Goal for Each Sources; each industry sectors)
- Methods for Pollutant Reduction

Step 3. Implementation

Execution of the Reduction Plan

- Compliance
- Support Program

  Financial & Technical Support

Step 4. Monitoring

Execution of the Reduction Plan

- Pollutant Load by each dischargers

  pollutant concentration

  effluent flow

- Water quality in targeted water

Step 5. Review & Revise

Review of the Reduction Plan

- Analysis & Evaluation the Efficiency of the Reduction Plan
- Revise the Plan Periodically

3. Formulation of Middle-Long term Vision for Enclosed Coastal Sea

Middle-Long term Vision for Enclosed Coastal Sea

Hypothesis

Water environment improvement takes much time

Providing a picture of the future goal & its load map is necessary for facilitating public consensus

Desirable water environment target

Matters that should be considered for setting target

- water usage, geographical characteristic

Requirements

- Easy index for public to understand etc.

Simulation based on Middle-Long term scenarios

New index : Bottom layer DO, Transparency

Formulation of Middle-Long term Vision for Enclosed Coastal Sea

Outline of the simulation model

- ***Ecosystem model : unsteady calculation (water quality, biomass etc.)***
- ***Elution model : interaction between bottom sediment and seawater***

1. Target calculation areas = TPLCS introduced area in Japan

2. Calculation Period

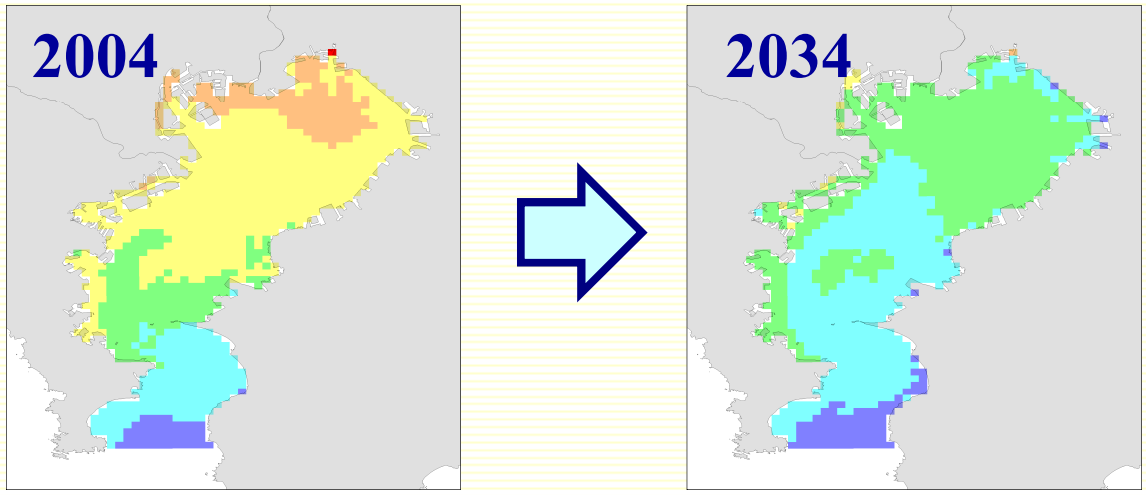
	Tokyo Bay	Ise Bay	Seto Inland Sea
Current reproduction	1979～2003	2000～2001	2004
Future forecast	2004 (current year)～2034		

3. Calculation items

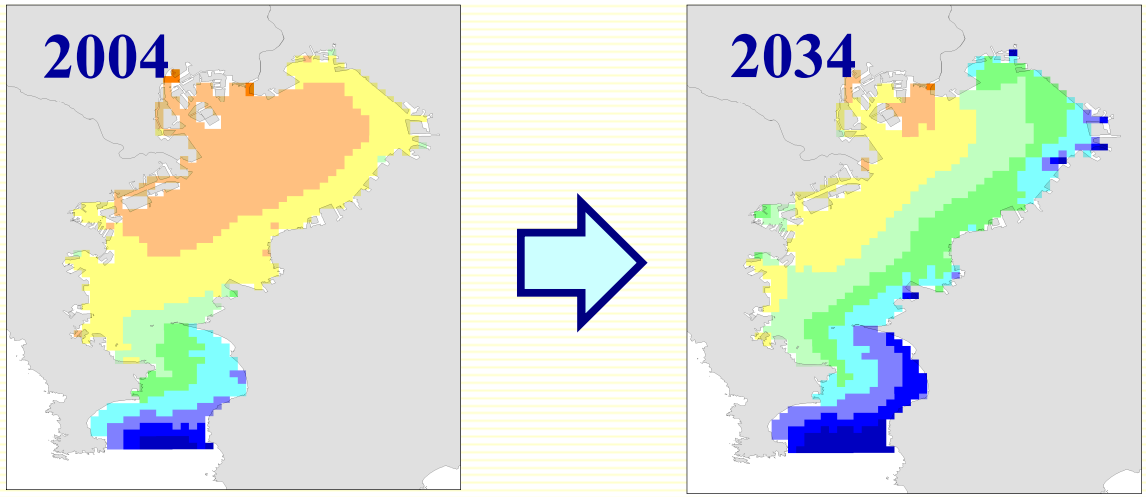
Phytoplankton (dinoflagellate, diatom)	Nitrogen (DON, PON, NH_{4+}, NO_{3-})
Zooplankton	Dissolved Oxygen (DO)
Carbon (DOC, POC)	Silica
Phosphorus (DOP, POP, PO_{4-})	Suspended Solids (SS)

Output of the simulation (Tokyo Bay)

【COD_{Mn}】

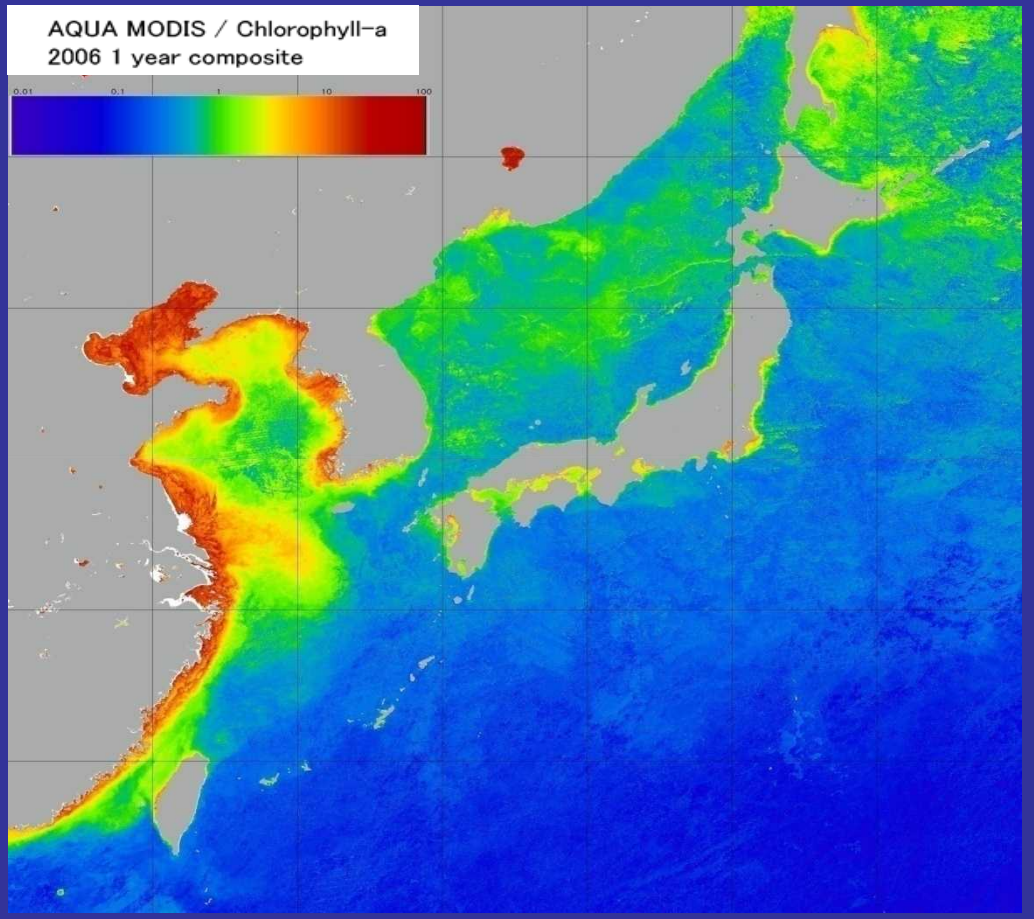


【 Transparency 】



4. Support Project for introducing the TPLCS by MOE

Concentration of Chlorophyll-a at North-western Pacific Area



Project aimed to Support Implementation the Total Pollutant Load Control System (TPLCS) to East Asian Country

Serious water pollution problems in East Asia

To improve the water quality

Introduce and Implement the TPLCS

2009～2010 Japan-China collaborative research on the TPLC (N, P)

Development of the Guidance for Implementing the TPLCS

Promoting the application to East Asian country

Outline : Guidance for Implementing the TPLCS

1. Importance of the TPLCS

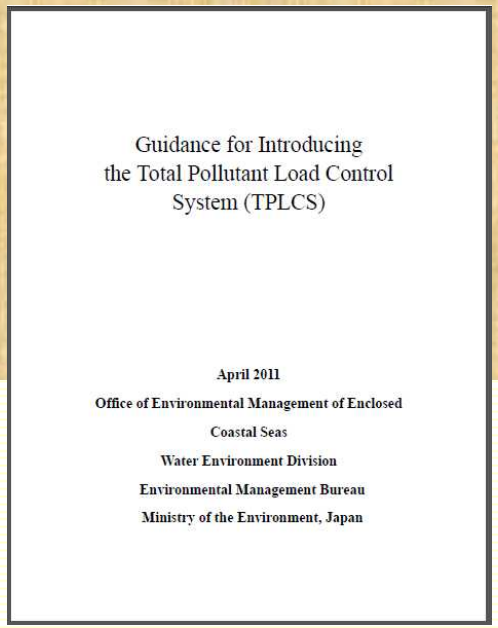
- What is the TPLCS ?
- Importance of implementation of the TPLCS etc.

2. Execution procedure of the TPLCS

- Outline of the TPCLS, Individual operation etc.

3. Introduction of systems for operating the TPLCS more efficiently

- Collaboration and coordination among interested parties
- How to facilitate pollutant reduction and its compliance


Guidance for Introducing
the Total Pollutant Load Control
System (TPLCS)

April 2011

Office of Environmental Management of Enclosed
Coastal Seas

Water Environment Division

Environmental Management Bureau

Ministry of the Environment, Japan

■ **Download**

http://www.env.go.jp/en/water/

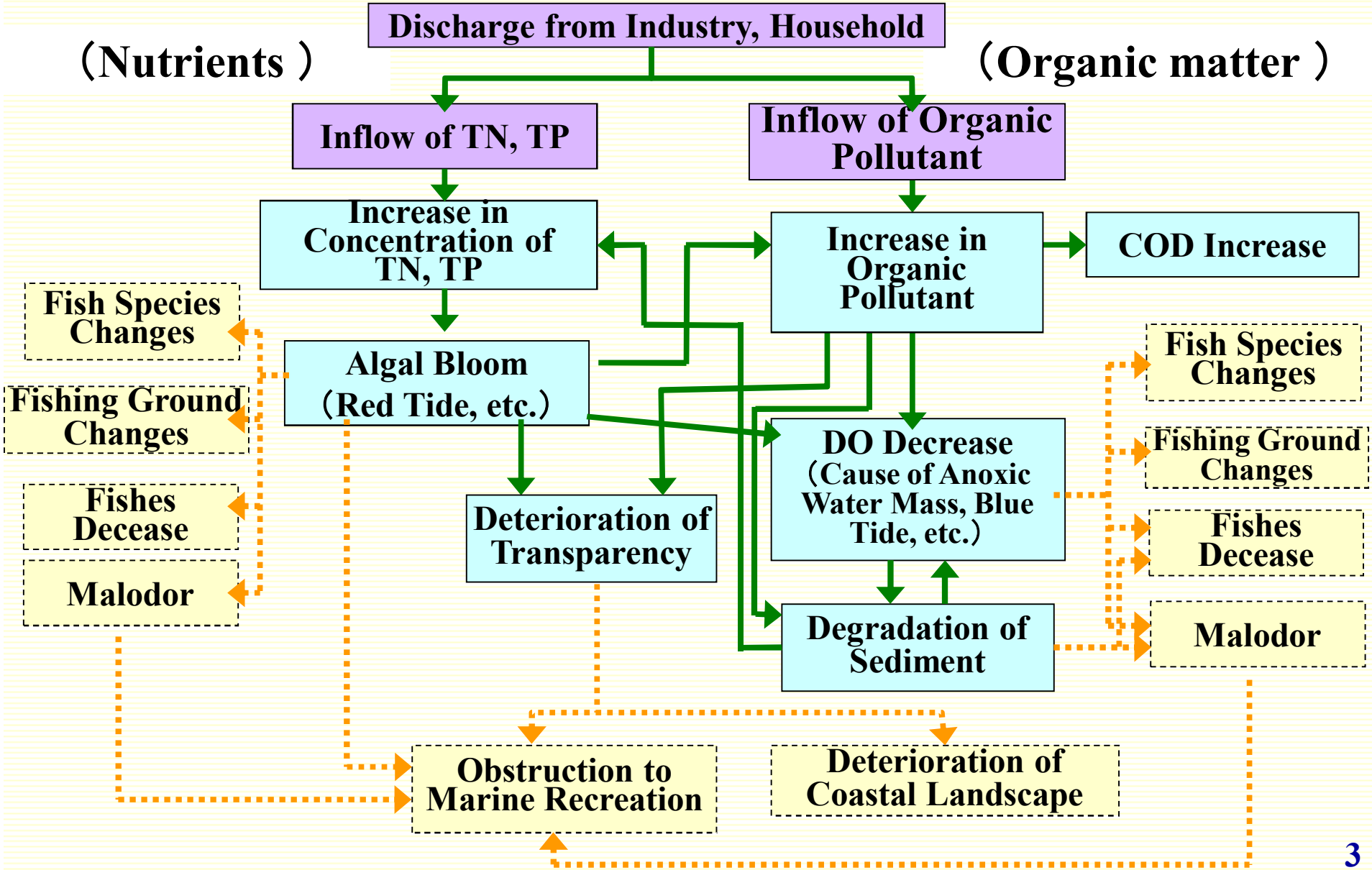
Conclusion

- **TPLCS is effectual countermeasures for the east Asian countries that continue the economic development to control the water pollution problem by eutrophication.**
- **On the other hand, the implementation and execution of TPLCS will be thought to face to many problems.**
- **MOE developed *TPLCS Implementation Manual* in the support project.**
- **We expect to revise the manual better reflecting the comments and suggestion from many experts.**
- **We expect to start joint research for implementing the TPLCS if possible.**


Thank you for your listening.
MOE is waiting for your comments to;
mizu-hesasei@env.go.jp

Reference

Eutrophication of Enclosed Water



Two Types of Effluent Control Measures

	Effluent Concentration Control	Total Pollutant Load Control
Objective of Regulation	To prevent adverse effect caused by water pollutant near the discharge point.	To control water quality of the enclosed water that is end point of waste water.
Target Substance	All pollutants including hazardous substances for human health like heavy metals, VOCs, etc.	Mainly causative substances of eutrophication
Pros	Easy to implement to control the point sources.	Combination of adequate measures for each sites' situation.
Cons	There is a case that this measure is not suitable for country situation.	More effort is necessary to monitor both the quality and quantity of effluent.

Scheme of Total Pollutant Load Control System

TPLCS Policy（Minister of the Environment）

Basic matters regarding to reduction schedule, reduction amount, etc.

- Water Pollution Control Law Article 4.2
- Hearing to the Prefectural Governors
- Consult to Conference on Environmental Pollution Control

Total Pollutant Load Reduction Plan

（the Prefectural Governor）

Reduction method and amount for each sources; households, industrial and others.

- Water Pollution Control Law Article 4.2
- Minister's agreement with an advise of Conference on Environmental Pollution Control

Standards of Regulation

- Maximum Allowable Loading＝ Concentration ×Volume of specified effluent (for specified facilities that' s daily volume of effluent is more than 50m^3)

Reduction Guidance

- Guidance for small size and unregulated facilities.
- Guidance for agriculture and livestock industry

Project Execution

- Maintain the Sewarage and Johkaso system.
- Sophistication project of Sewage Treatment.
- Countermeasures for degraded sediments.

TPLC Plan of Japan (1)

- **Water Quality Goal**

  Achievement of EQS of COD_{Mn} (1979-)

  Achievement of EQSs of T-N, T-P (1992-)

- **Target Year Every 5 years**

TPLC Plan of Japan (2)

◆ Target Amount of Reduction

Target Amount of Pollutant Reduction (Ton/Day)

	2009			Reference (value as 2004)		
Tokyo Bay	CODMn	T-N	T-P	CODMn	T-N	T-P
Household	128	130	9.5	144	136	10.4
Industry	41	29	1.7	42	29	1.8
Others	24	40	2.7	25	43	3.1
Total	**193**	**199**	**13.9**	211	208	15.3
Ise Bay	CODMn	T-N	T-P	CODMn	T-N	T-P
Household	84	50	4.4	99	52	5.2
Industry	63	24	2.8	65	26	2.9
Others	20	49	2.4	22	51	2.8
Total	**167**	**123**	**9.6**	186	129	10.8
Seto I.S.	CODMn	T-N	T-P	CODMn	T-N	T-P
Household	237	152	11.6	261	159	12.4
Industry	247	116	7.7	245	117	8
Others	53	197	10.2	55	200	10.2
Total	**537**	**465**	**29.5**	561	476	30.6

TPLC Plan of Japan (3)

- **Methods of Pollutant Reduction**

+ Promote the implementation of various waste water treatment facilities/equipments.

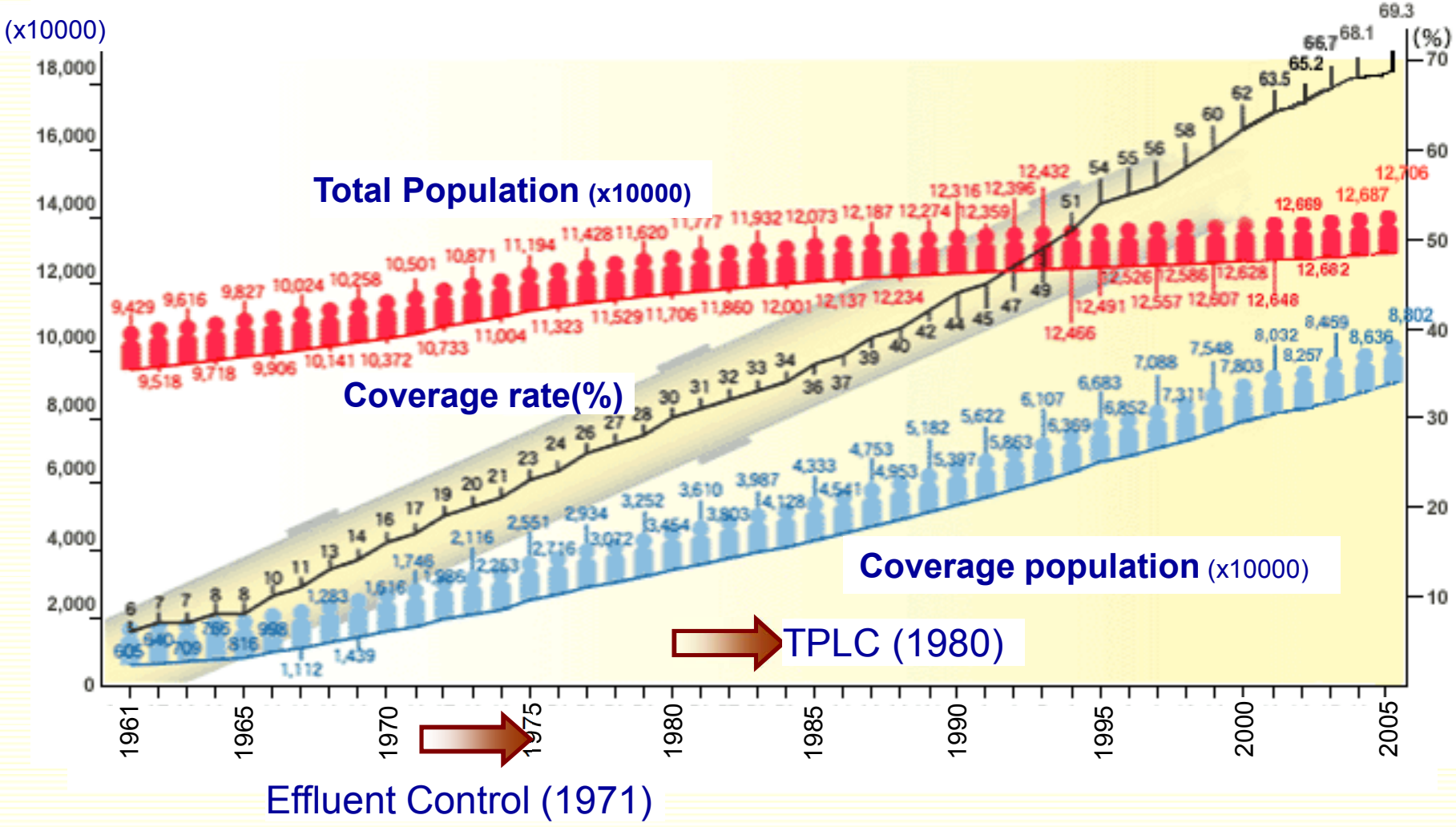
+ Ensure the compliance of the regulated point sources with standard of total pollutant load.

+ Develop the waste water guidance for unregulated small-scale facilities, agriculture, the livestock waste and feedings.

+ Promote the dissemination and the communication on the TPLCS.

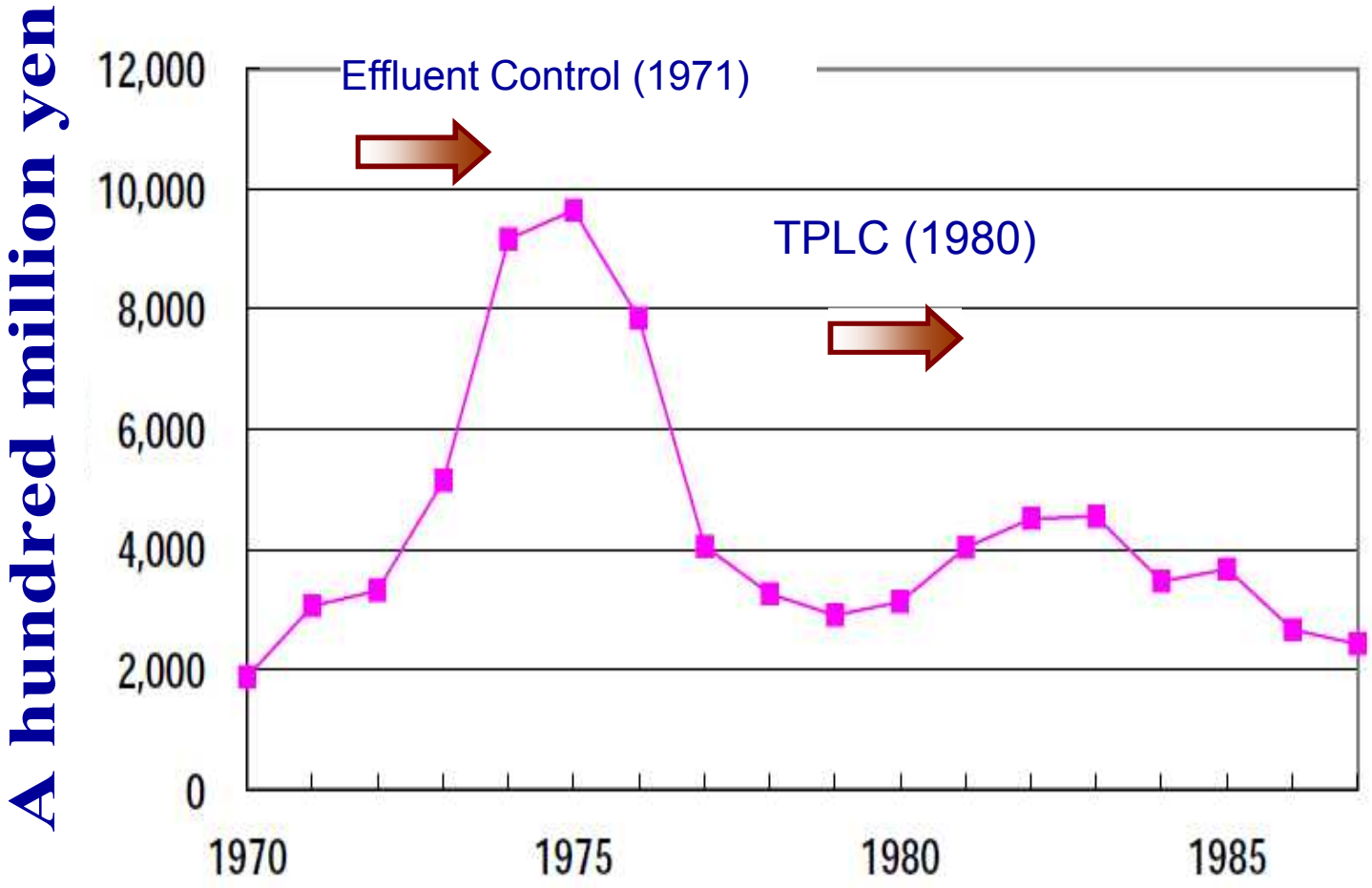
+ Reinforce the self-purification capability of water by constructing artificial flat, etc.

Coverage Rate of Sewerage System in Japan

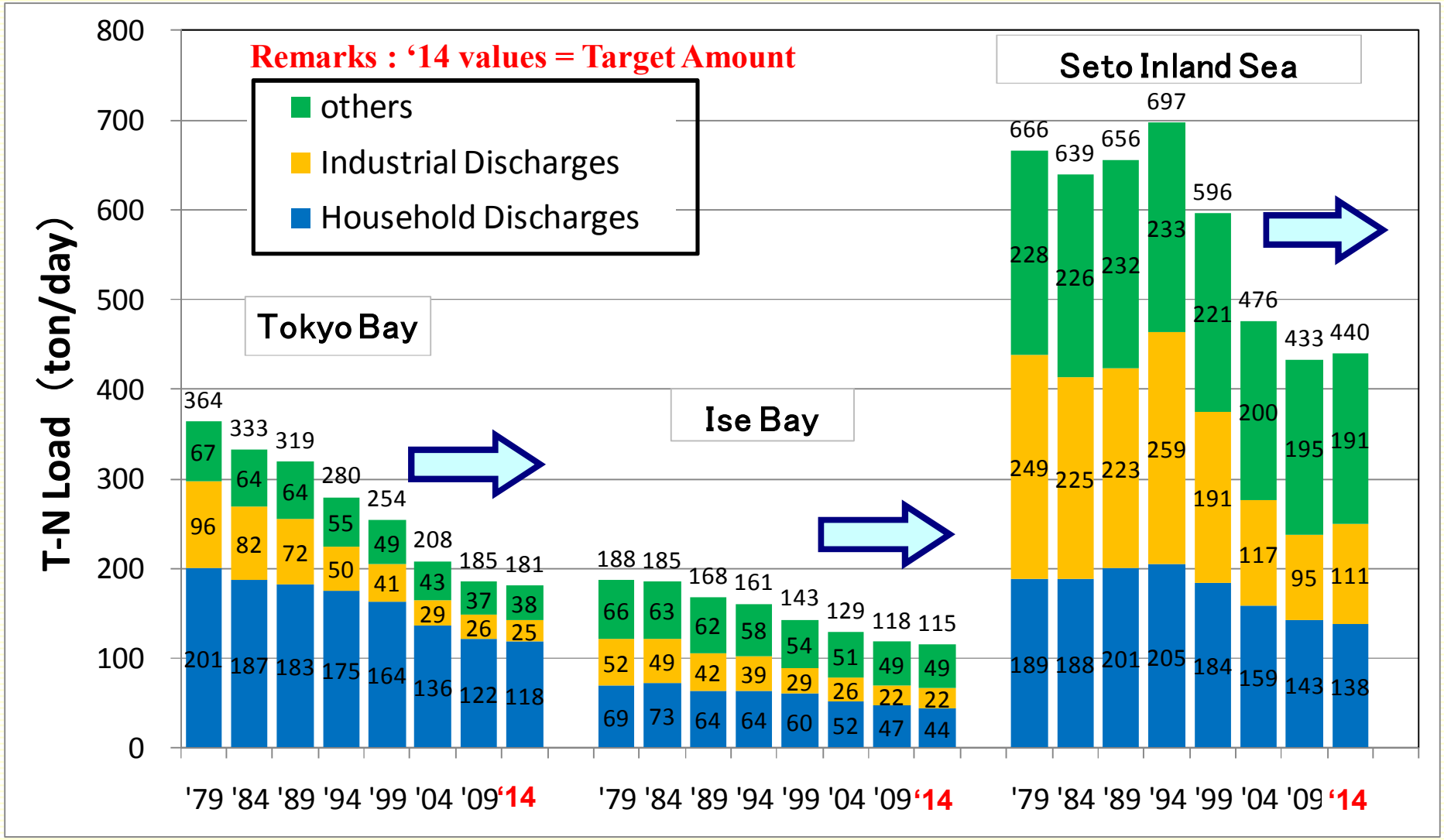


Change of Investment Cost for Pollution Control Equipment

Record of Investment cost for Anti-pollution of Private Company (Manufacturing)

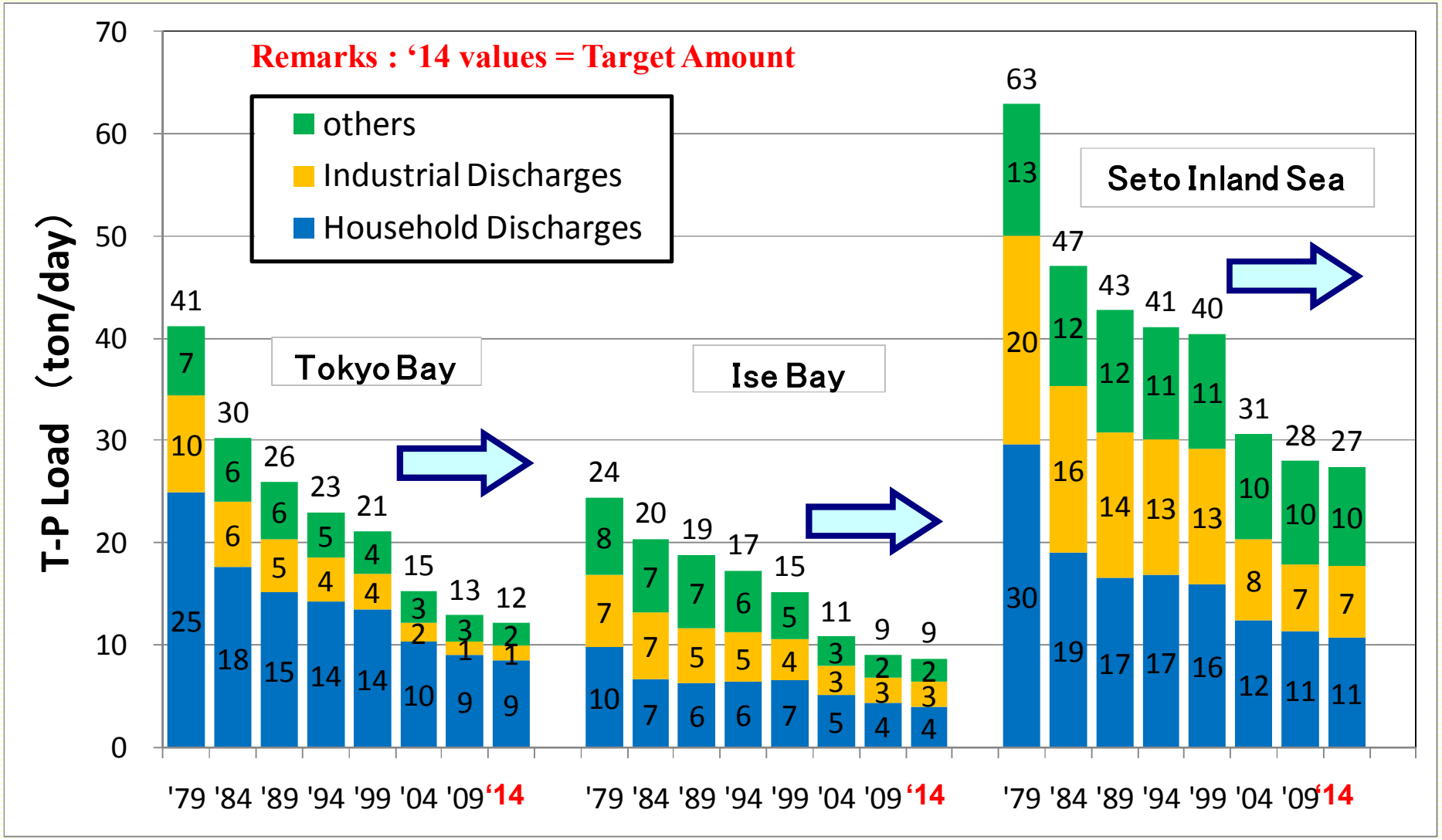


Pollutant Load (T-N)



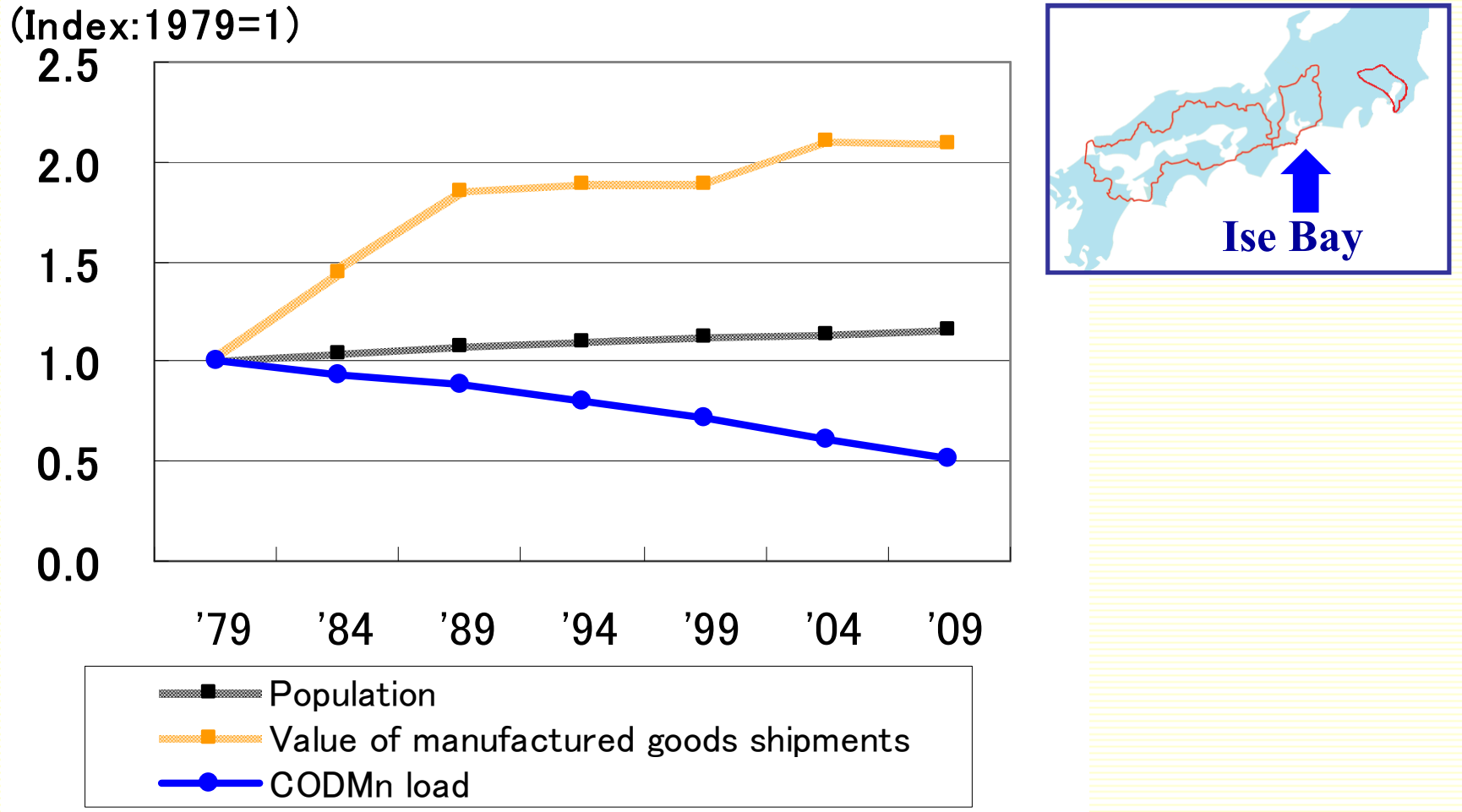
TPLCS(T-N) put into practice in 2001

Pollutant Load (T-P)



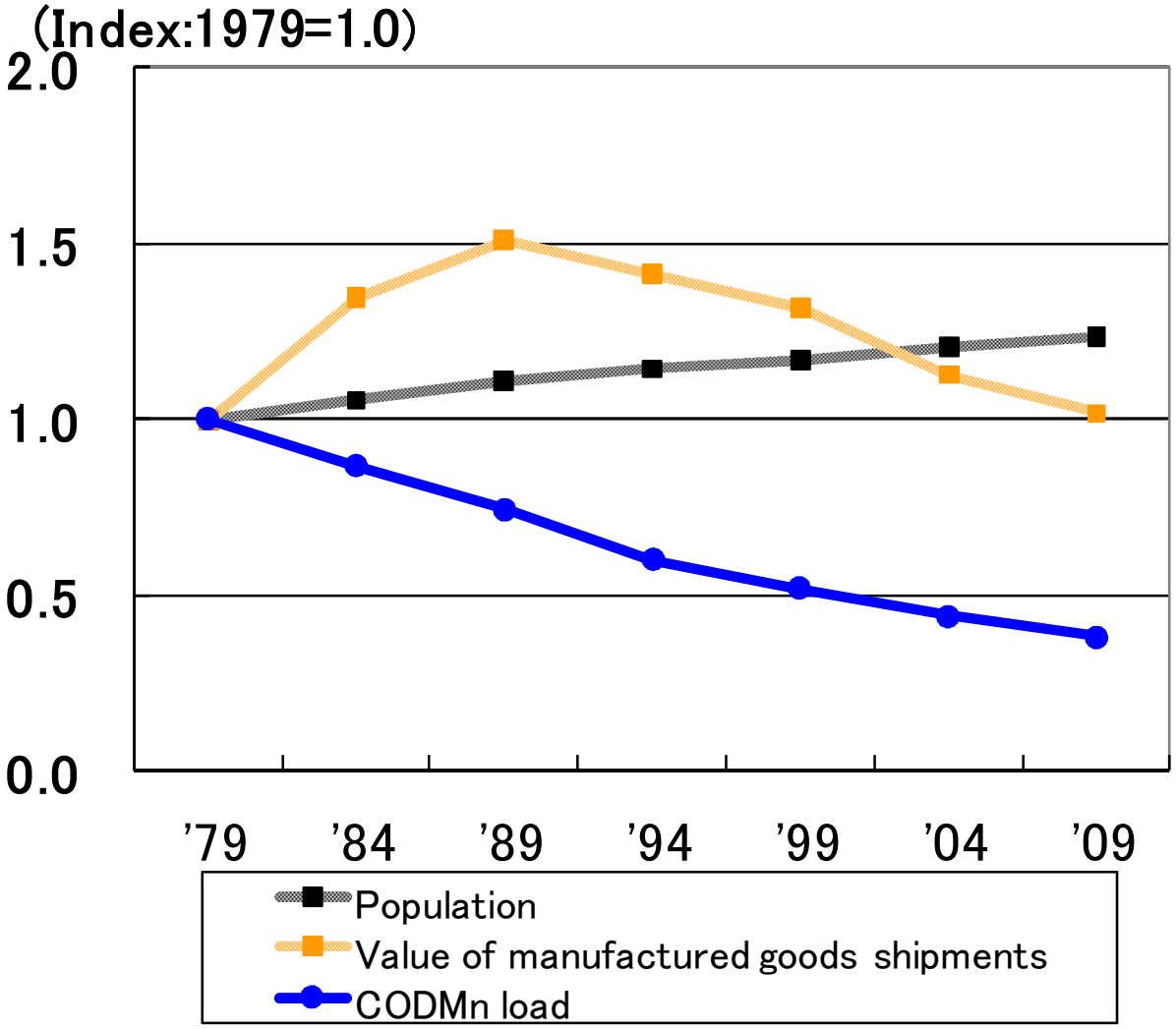
TPLCS(T-P) put into practice in 2001

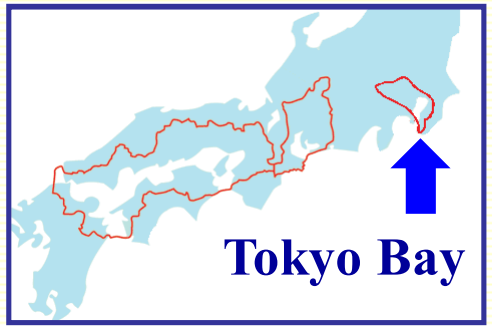
Change of Industry, Population and COD_{Mn} Load



Transition of population, industry and pollutant load after starting the TPLCS (Ise Bay)

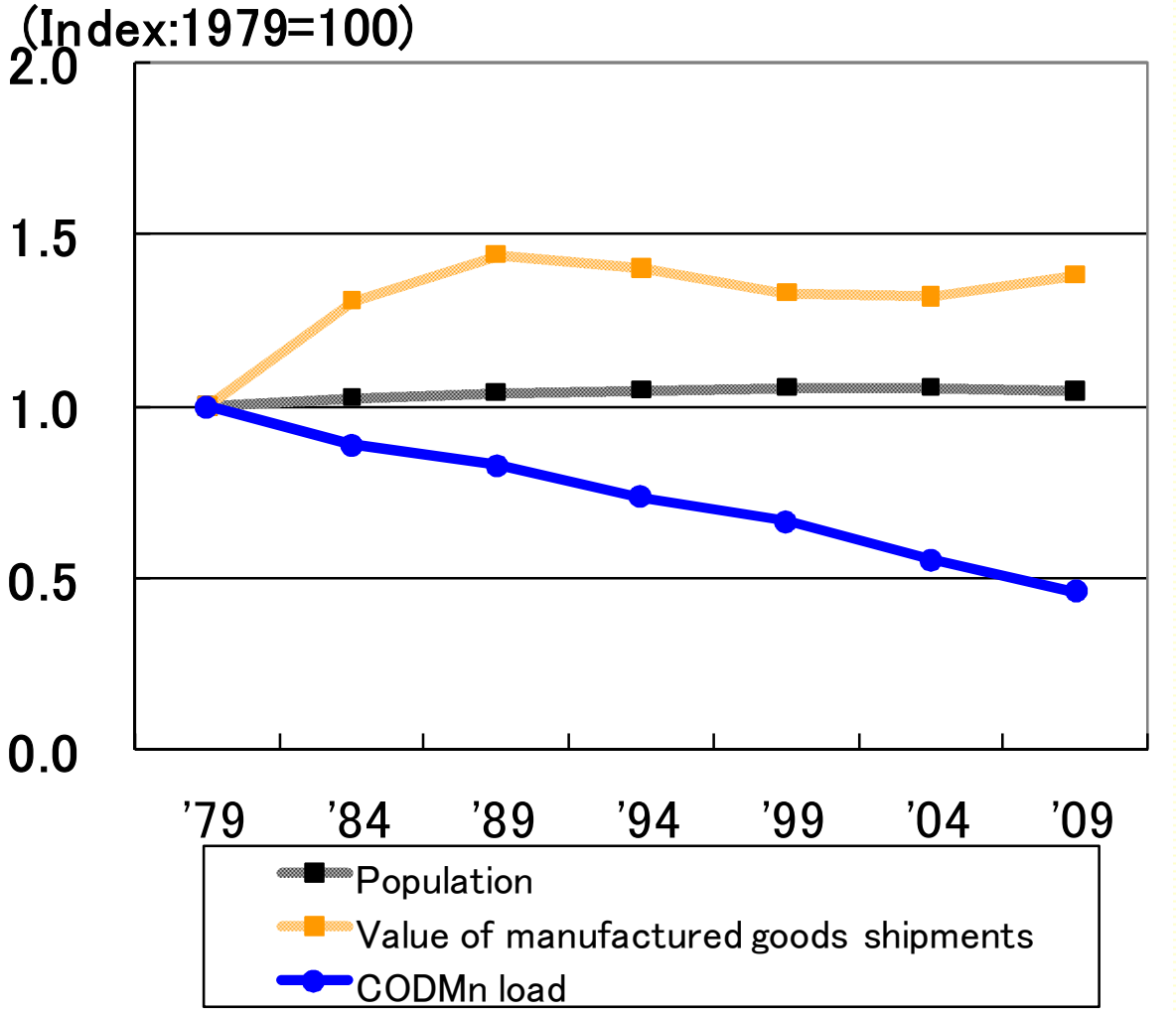
Change of Industry, Population and COD_{Mn} Load





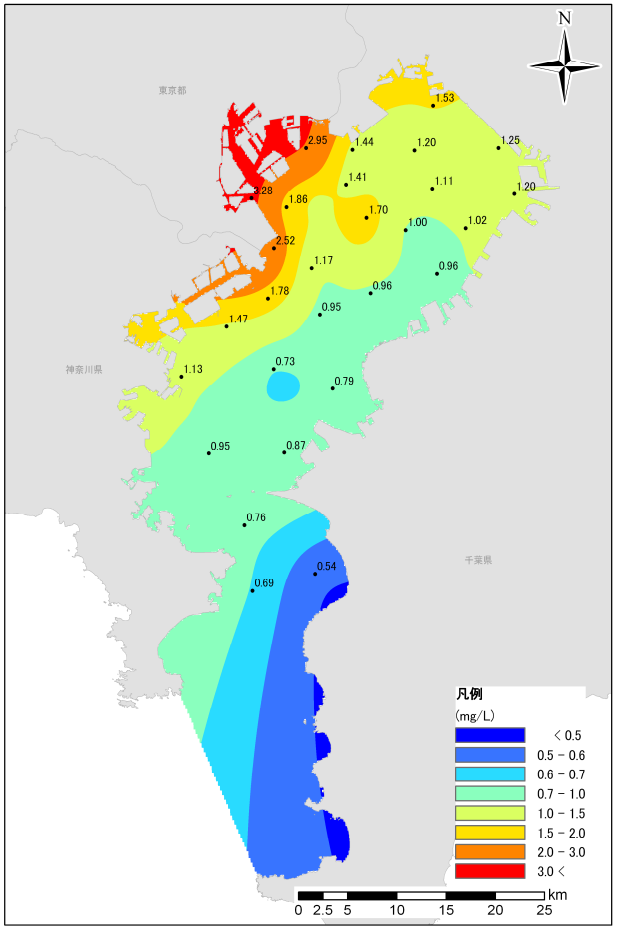
Transition of population, industry and pollutant load after starting the TPLCS (Tokyo Bay)

Change of Industry, Population and COD_{Mn} Load

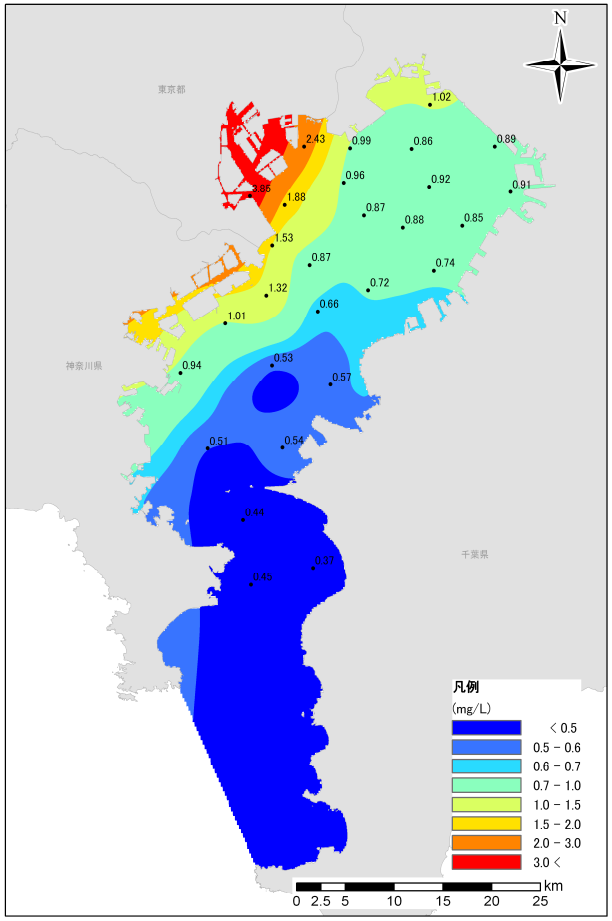


Transition of population, industry and pollutant load after starting the TPLCS (Seto Inland Sea)

T-N Distribution (Tokyo Bay)

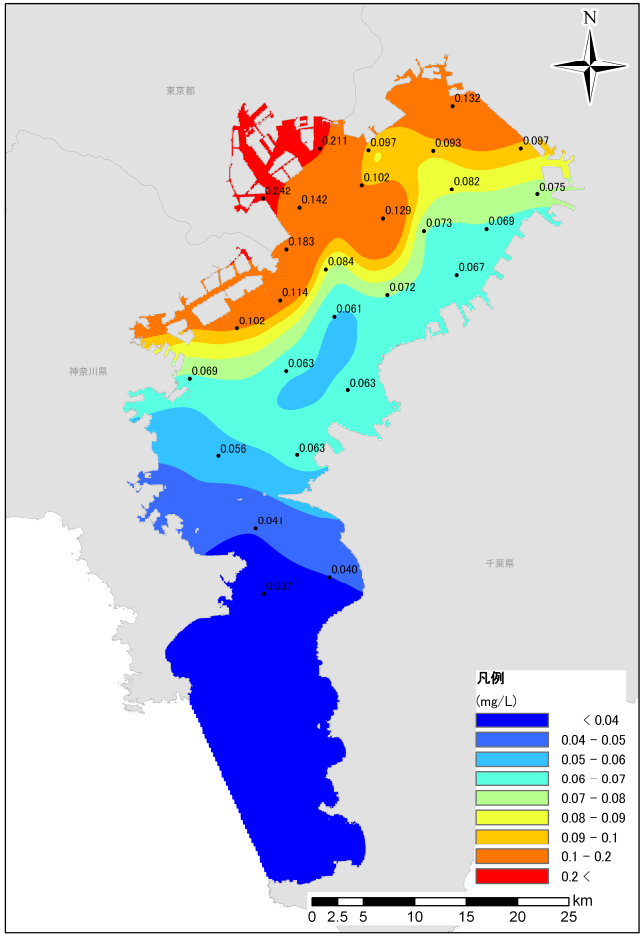


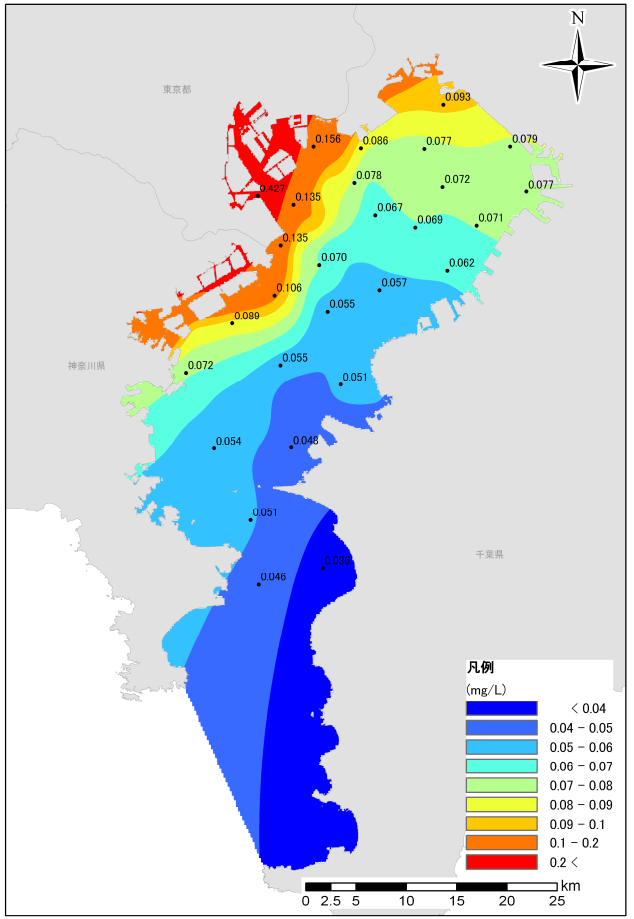
1982～1984 av.



2006～2008 av.

T-P Distribution (Tokyo Bay)

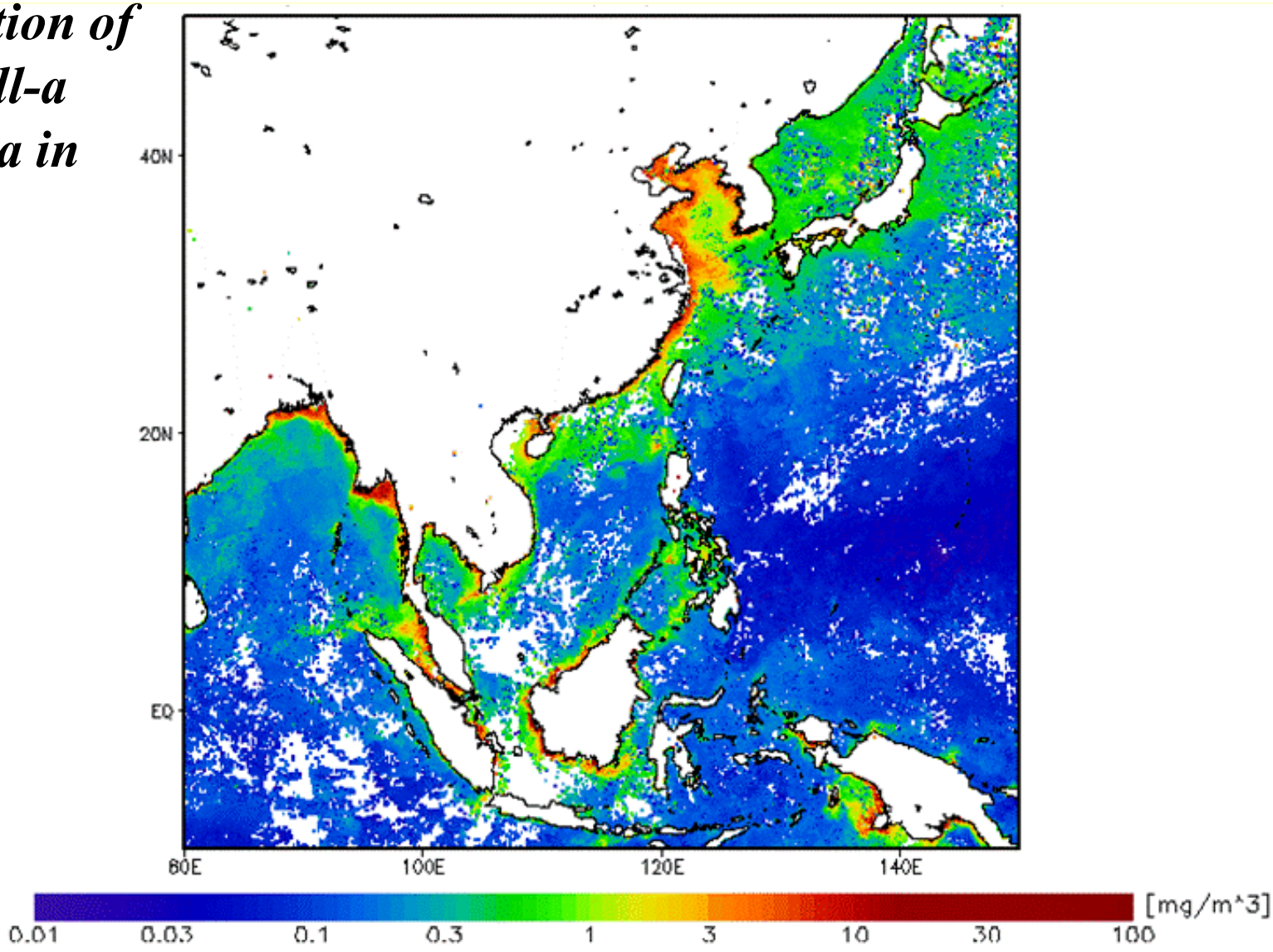




1982～1984 av.

2006～2008 av.

Concentration of Chlorophyll-a at East Asia in 2004
(©JAXA)



Japan-China Joint research on the TPLC (N, P)

Japan's Experience

- More over 30 year TPLC (COD)
- From 2001, TPLC(N,P) started

China's Experience

- Execution TPLC(COD) from Eleventh Five-Year(2006~)

Japan's Experts

- Developed Guidance for Implementing the TPLCS
- Provide information about laws, history and know-how
- Capacity Building for China's administration official

China's Experts

- Research on Japan TPLCS
- Study on problems and enforcement policy on the TPLCS(N,P)
- Feasibility Study in model water area

Share information exchange opinions

Joint Research

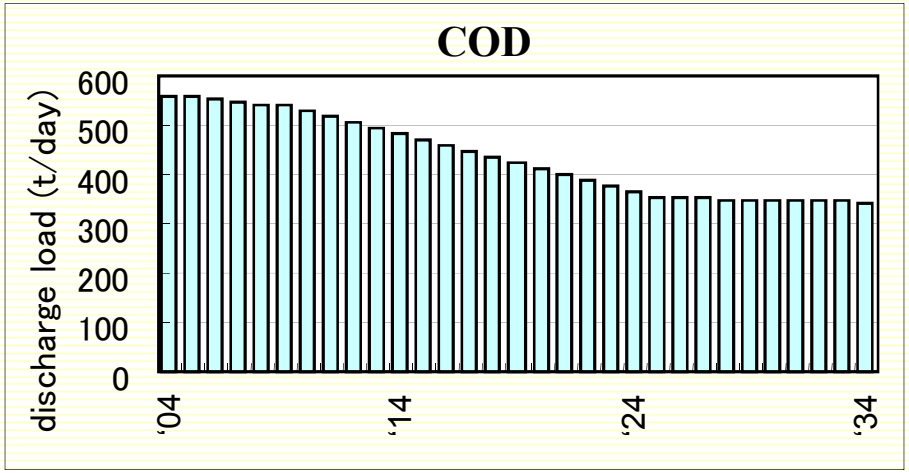
Reporting on the Japan –China Joint research on the TPLCS

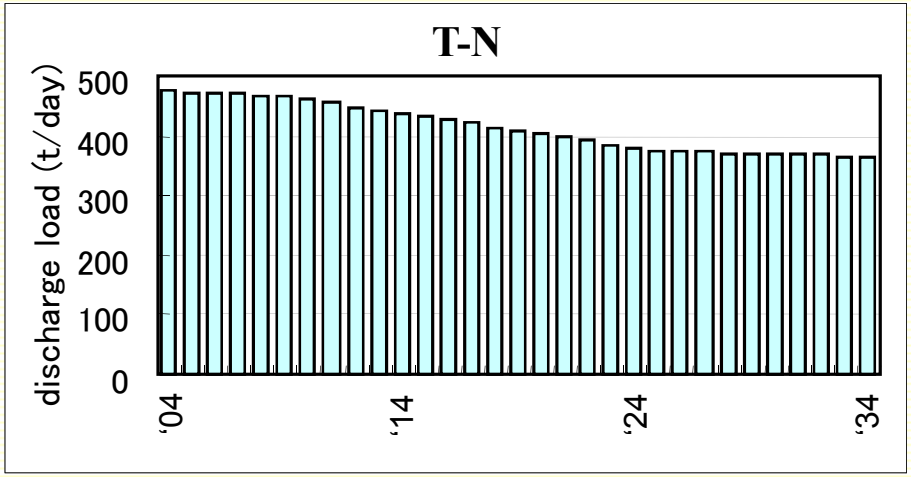
China

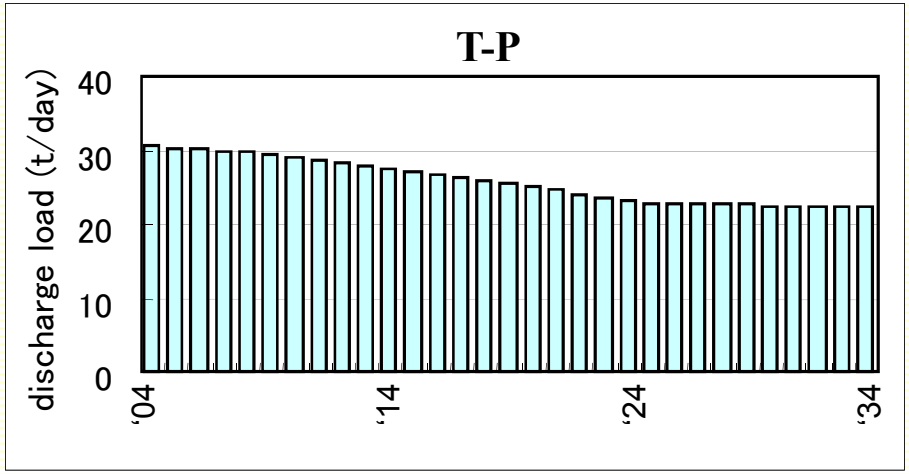
Execution TPLC(N,P) from Twelfth Five-Year Plans(2011 ~)

Improvement of eutrophication for target water area

Input of the change of discharge load (Seto Inland Sea)







Reproduction using the simulation

September in 1977

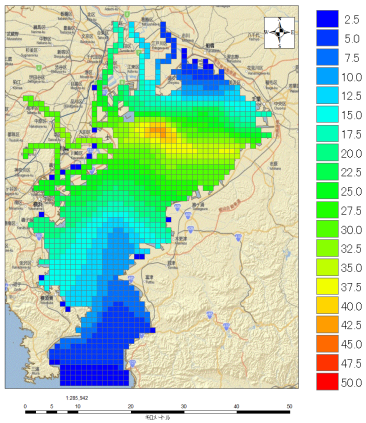
August in 1994

August in 2002

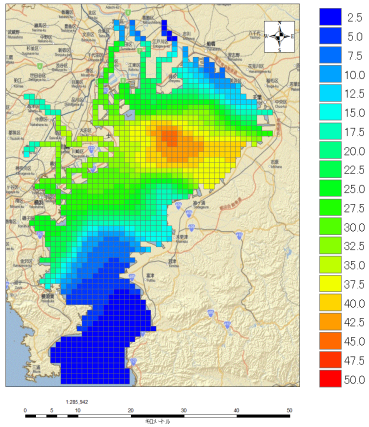
(The National Institute for Land and Infrastructure Management (NILIM) , 2002)

Change of Bottom sediment CODdistribution（measured value ：mg/g）

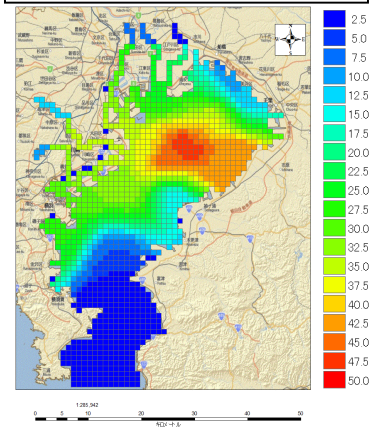
April in 1979



August in 1994



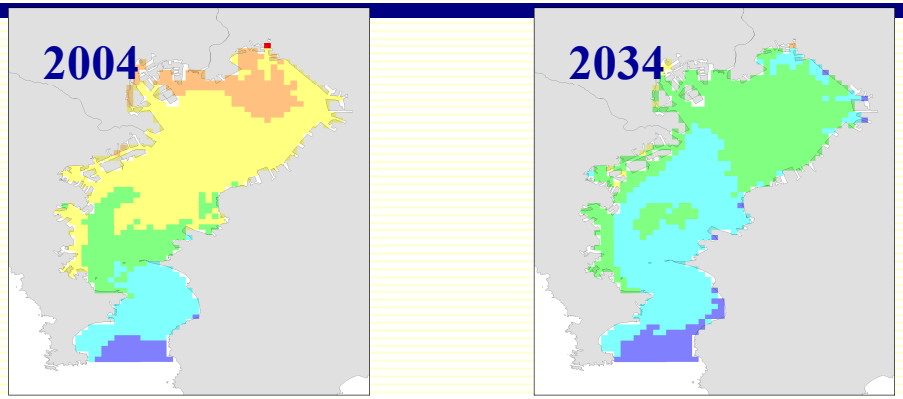
August in 2002



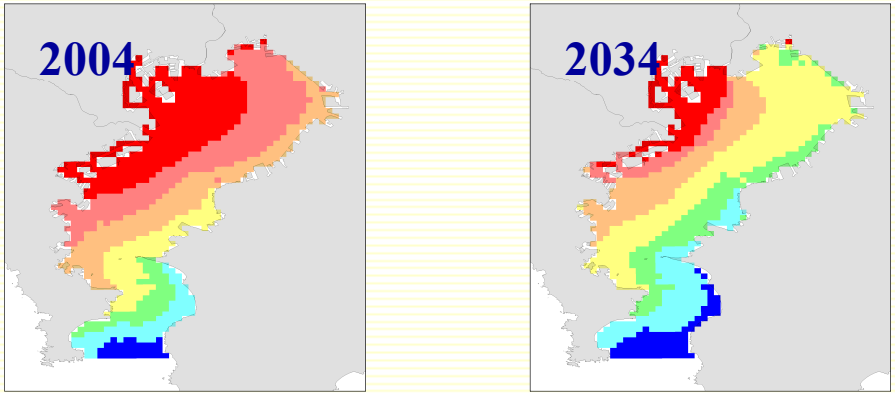
Change of Bottom sediment CODdistribution（simulation value ：mg/g）

Simulation output（Tokyo Bay）

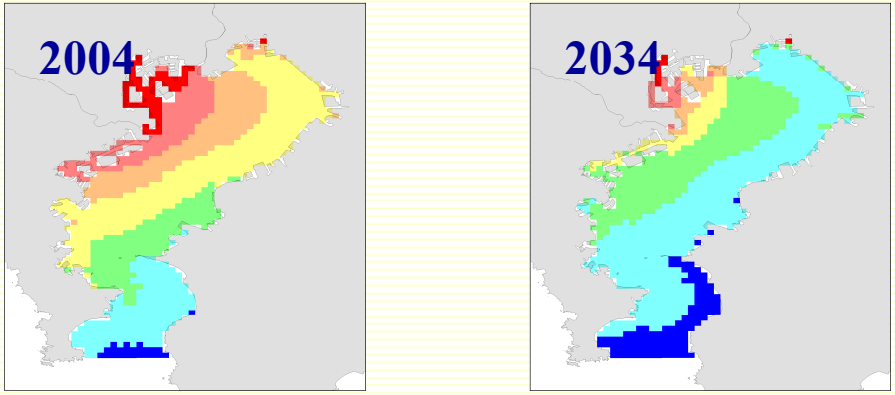
【COD_{Mn}】



【T-N】

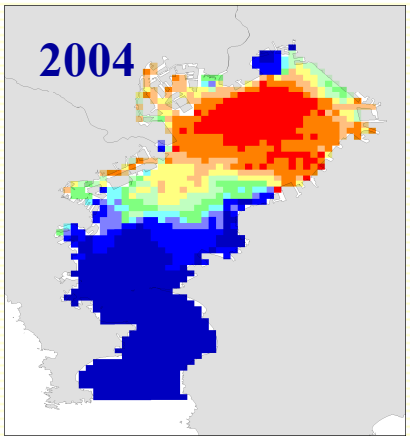


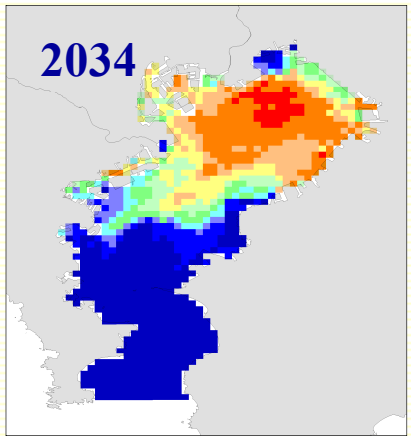
【T-P】

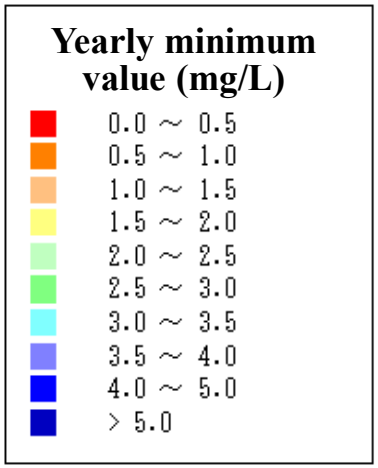


Simulation output（Tokyo Bay）

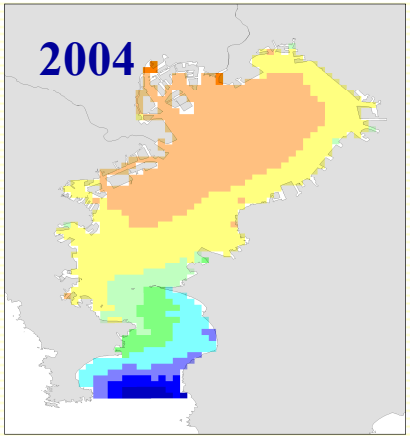
【Bottom layer DO】

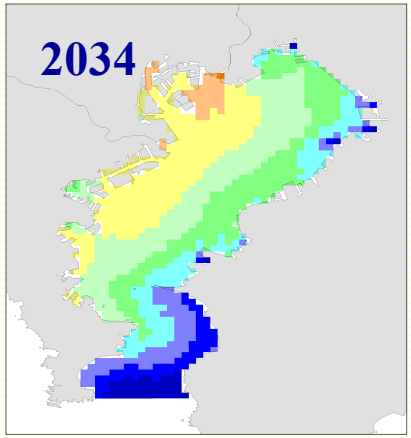


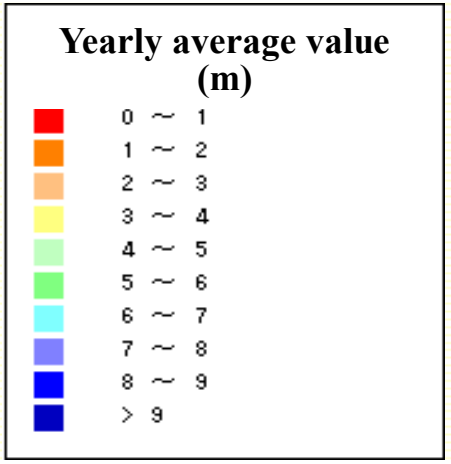




【Transparency】

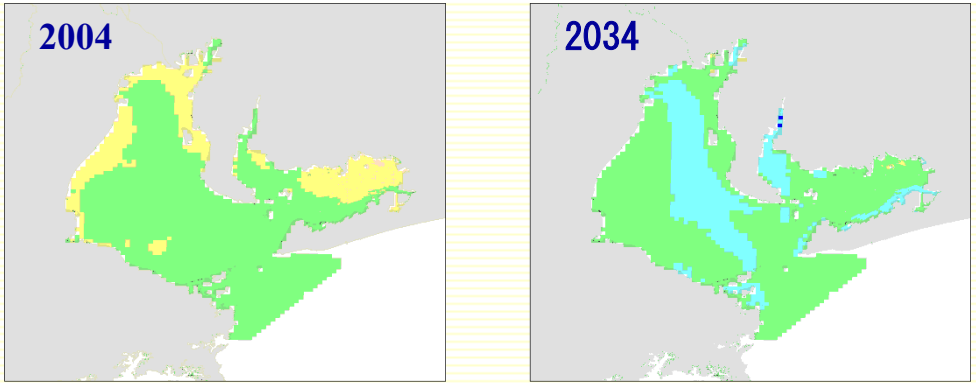




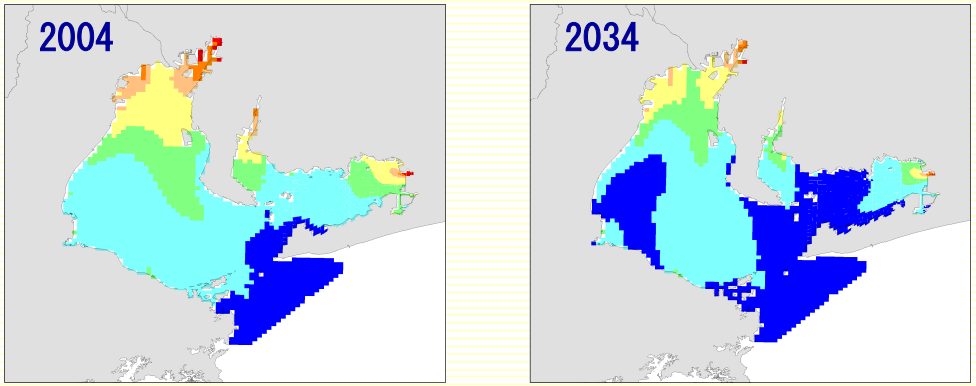


Simulation output（Ise Bay）

【COD_{Mn}】



【T-N】



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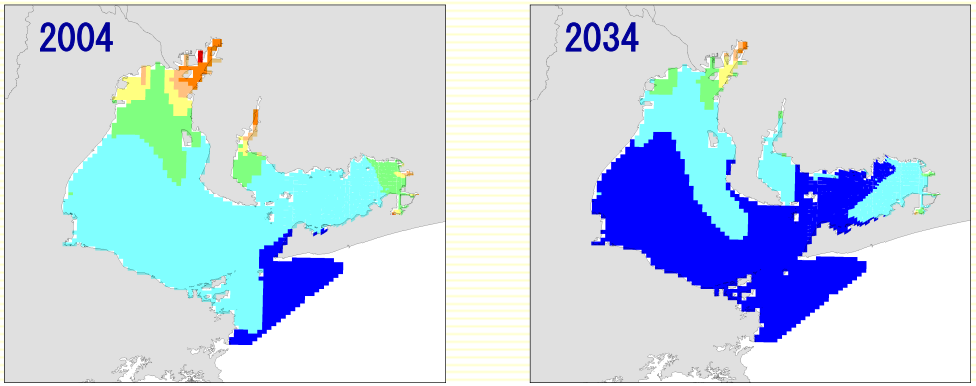
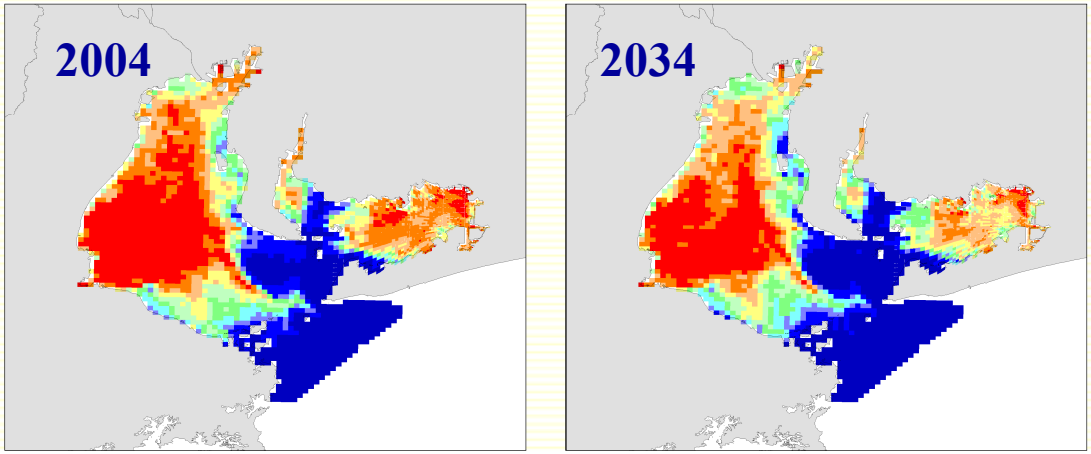
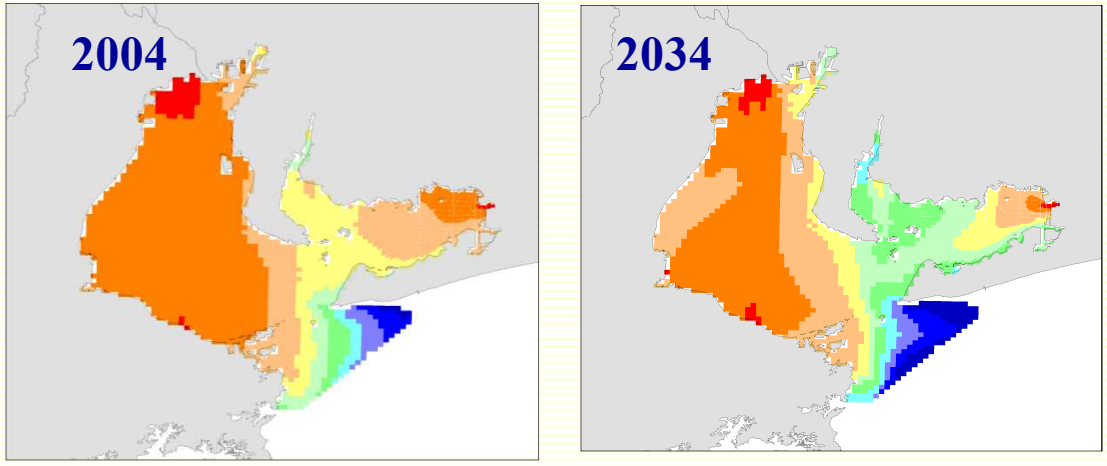


Simulation output（Ise Bay）

【Bottom layer DO】

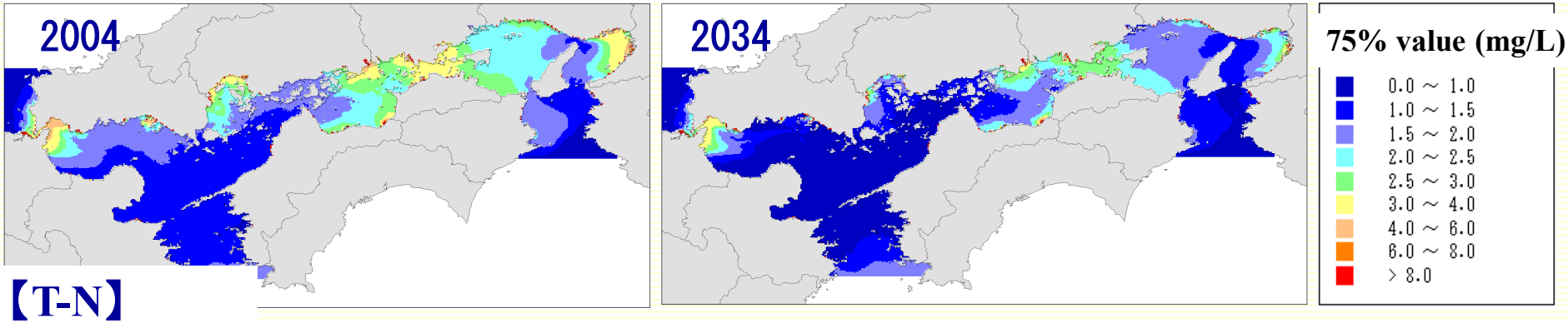


【Transparency】



Simulation output（Seto Inland Sea）

【COD_{Mn}】



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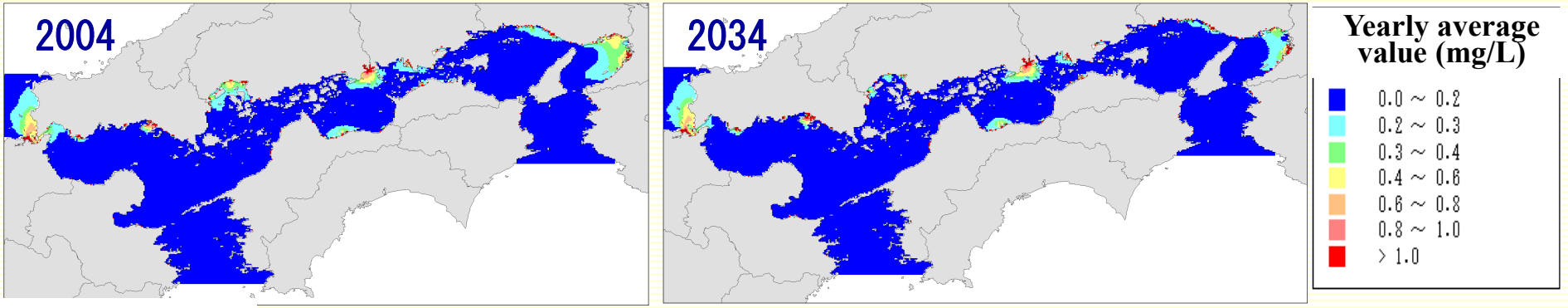

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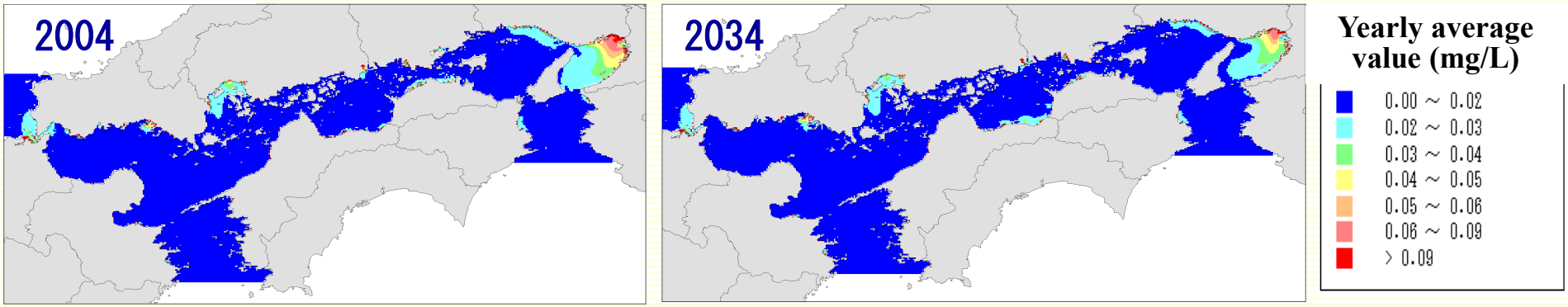
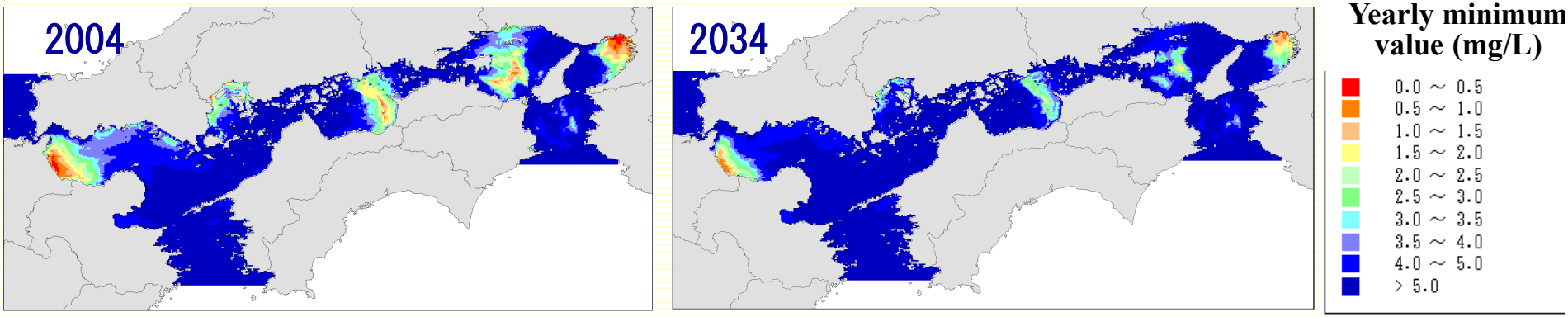


Simulation output（Seto Inland Sea）

【Bottom layer DO】



【Transparency】