

New Marine Environmental Assessment Method for Toyama Bay, Japan

Takafumi YOSHIDA

Northwest Pacific Region
Environmental Cooperation Center
(NPEC)



26 April, 2011
Indicators of Status and Change within
North Pacific Marine Ecosystems:
A FUTURE Workshop

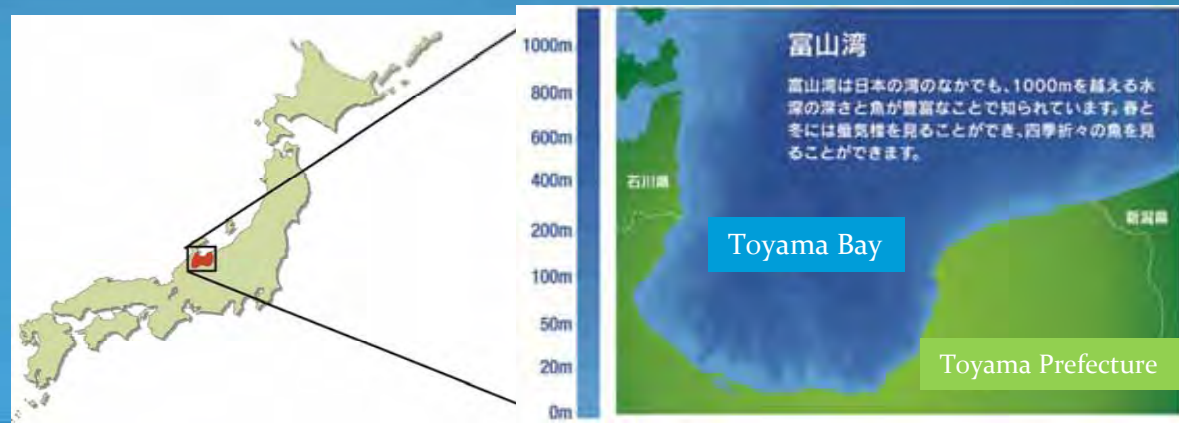
Outline of the New Assessment Method

Objective

To contribute to create the healthy marine environment in order to conserve marine ecosystems and to restore the damaged ecosystems

Basic assessment concepts

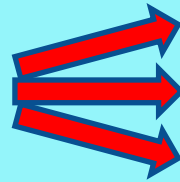
- To assess comprehensively using indicators related to marine ecosystems
- To create a favorable environment for marine life based on the conservation of marine ecosystems



Assessment Methodology

Impact assessment

Indicators of
human activities on land



Strong

Moderate

Weak



Achievement Assessment

Current situation of
marine environment,
marine life



Future desirable vision
(Target value)



Comprehensive assessment



Recommendation to stakeholders

Assessment Indicators

Category	Indicator
Category I (Impact from the land)	Change in population
	Land use
	Number of dam
	Change in sewage improvement
	Number of livestock
	Use of fertilizer
	Amount of use of synthetic agricultural chemicals
	Meteorological information
	River flow rate

Assessment Indicators

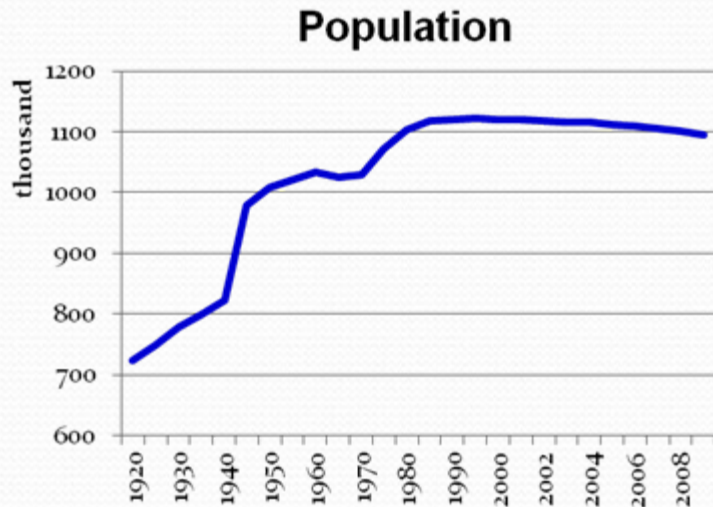
Category	Indicator
Category II (Marine environment)	Change in the coast
	Natural coast and manmade coast
	Distribution of seagrass and seaweed beds
	Water temperature
	Sea bottom substrates and sediments
	Submarine groundwater discharge
	Eutrophication
	Enter of foreign ships in major harbors
	Enter of alien species accompanied by planting and aquaculture
	Marine litter

Assessment Indicators

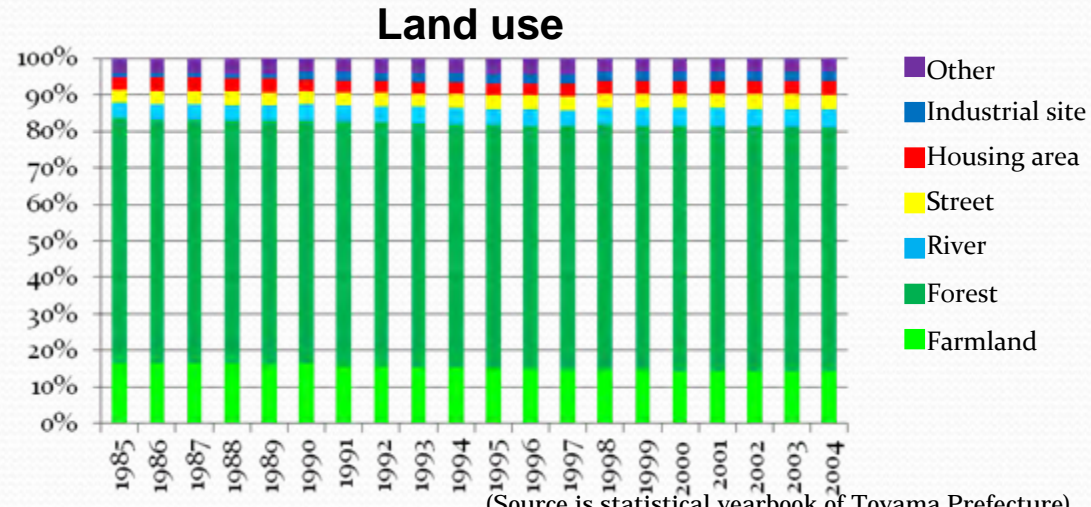
Category	Indicator
Category III (Marine life)	Fish catch
	Distribution of benthos
	Phytoplankton
	Zooplankton
	Occurrence of red tide

Impact Assessment from Land Population and Land Use

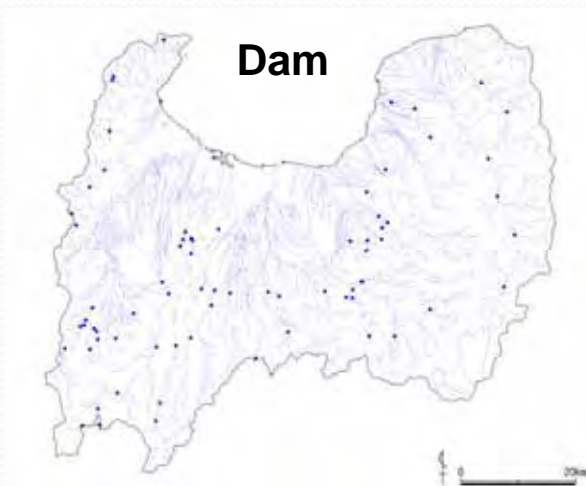
Impact: *Weak*



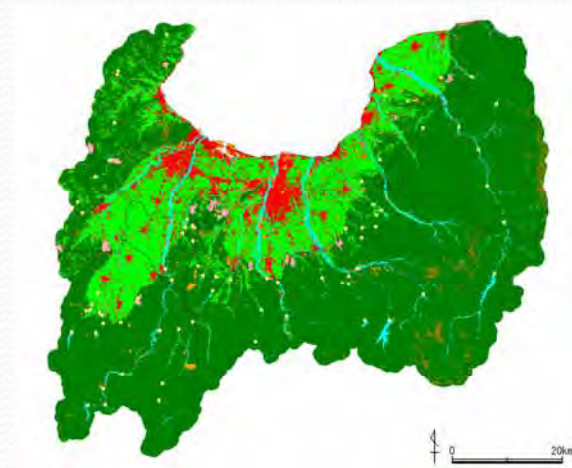
(Source is statistical yearbook of Toyama Prefecture)



(Source is statistical yearbook of Toyama Prefecture)



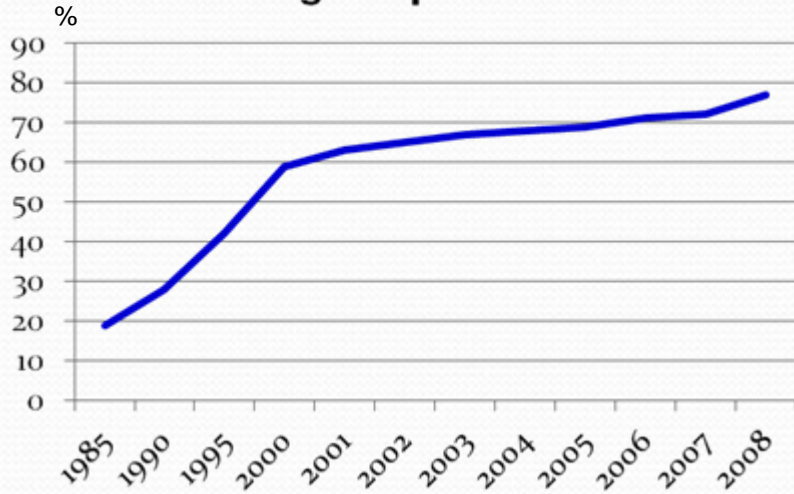
(Source is GIS of Ministry of Land, Infrastructure, Transport and Tourism)



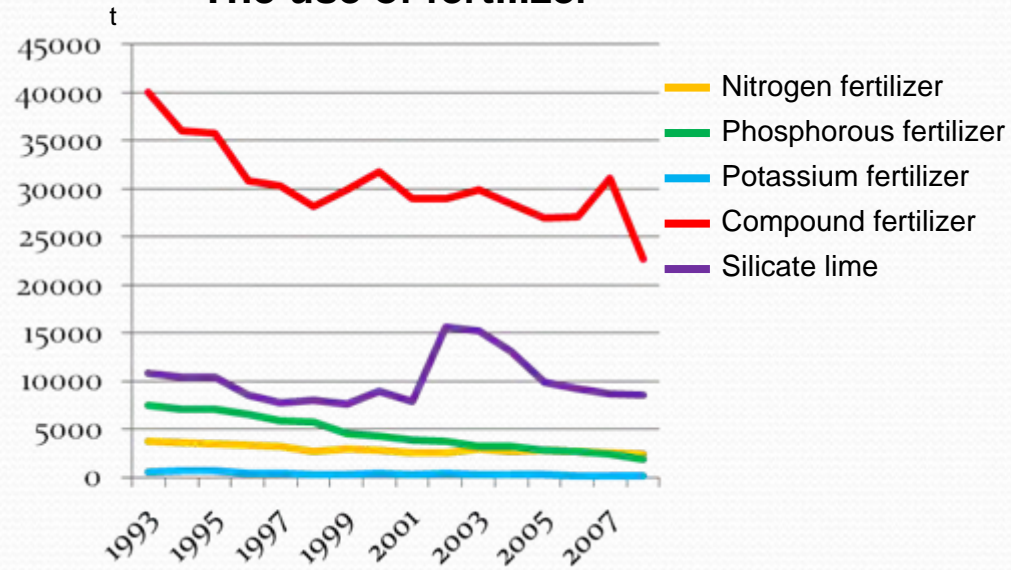
Impact Assessment from Land Nutrients Load

Impact: *Weak*

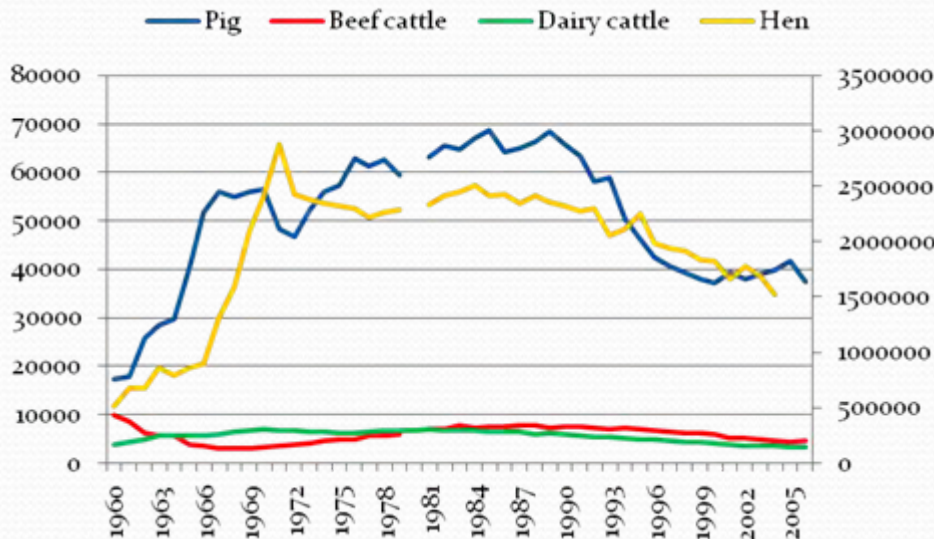
Sewage improvement



The use of fertilizer



Livestock



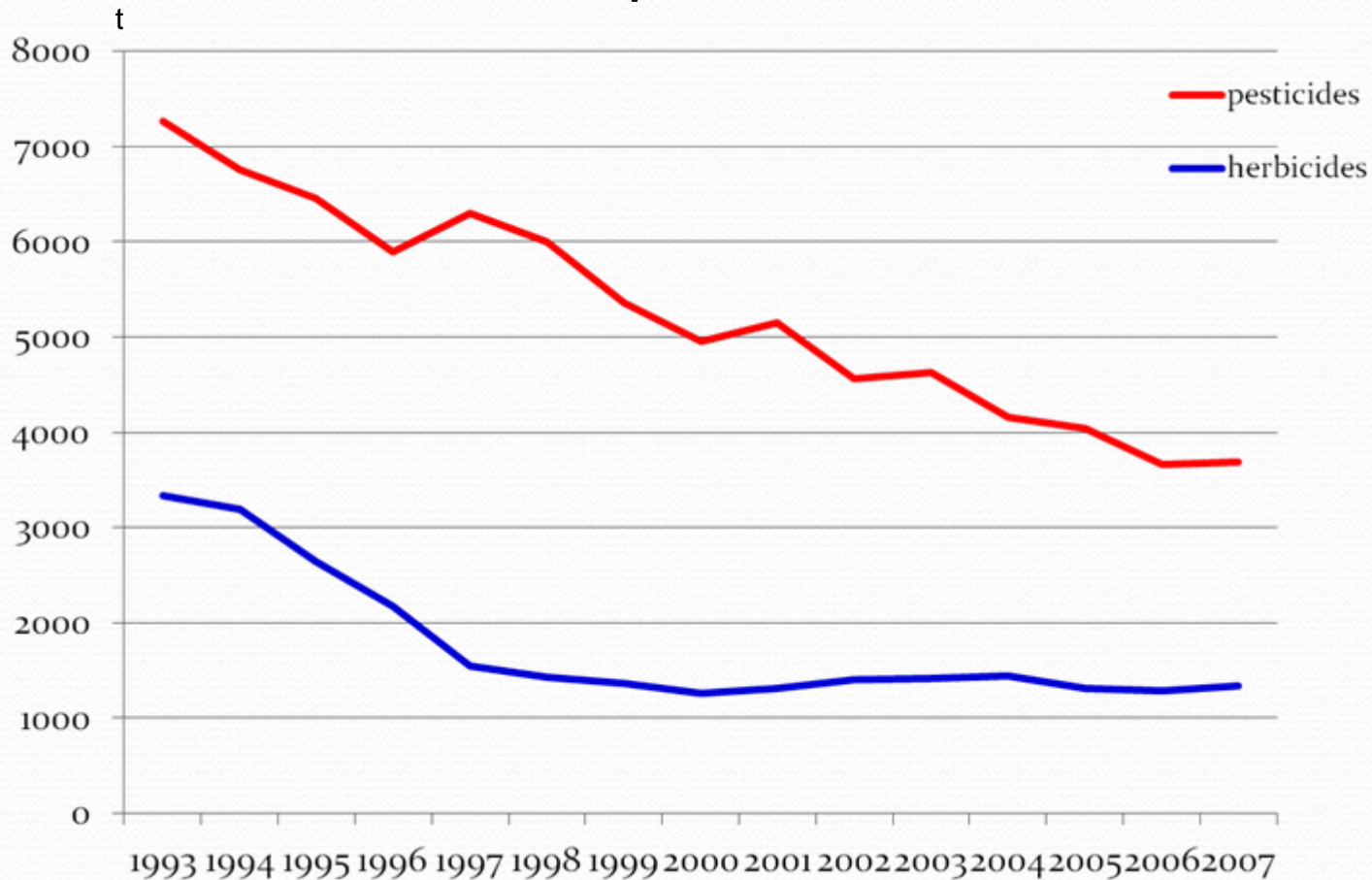
(Source is statistical yearbook of Toyama Prefecture)

Impact Assessment from Land

Other Chemicals

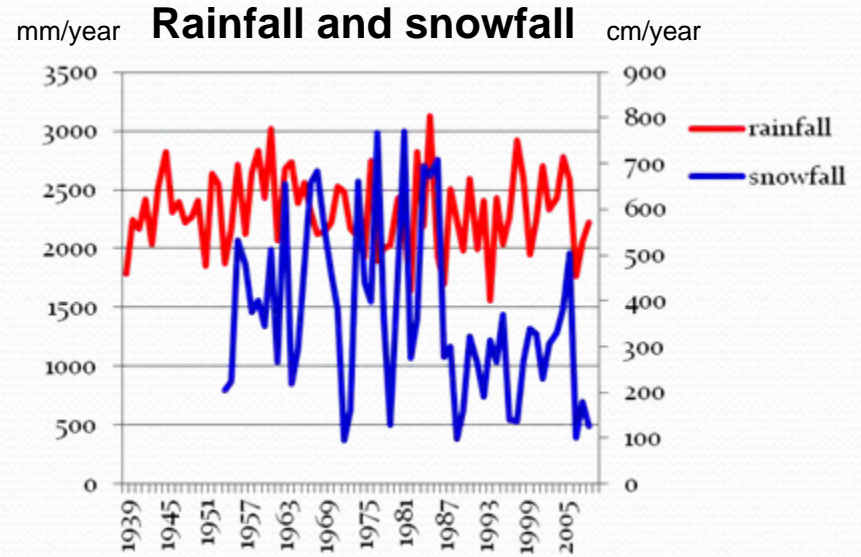
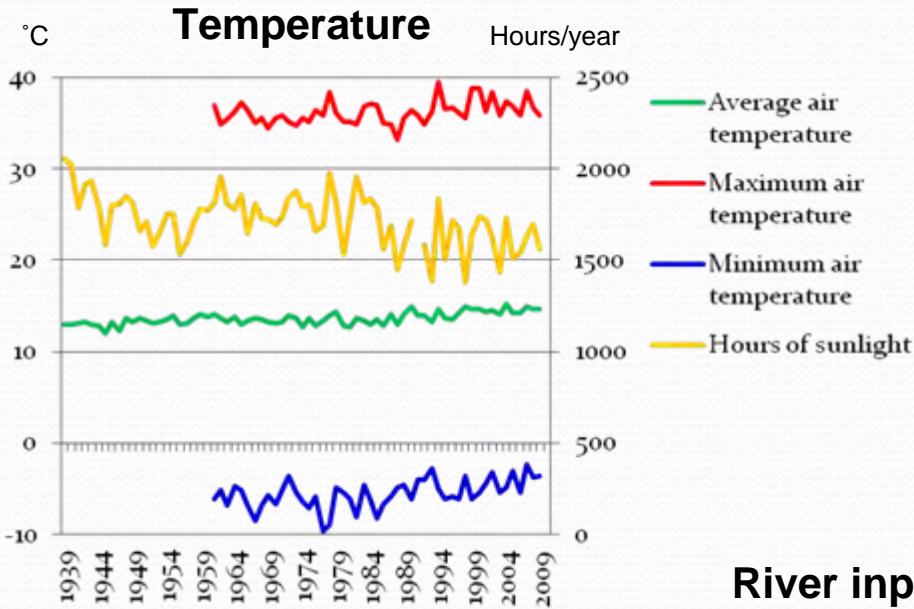
Impact: **Weak**

The use of pesticide and herbicide

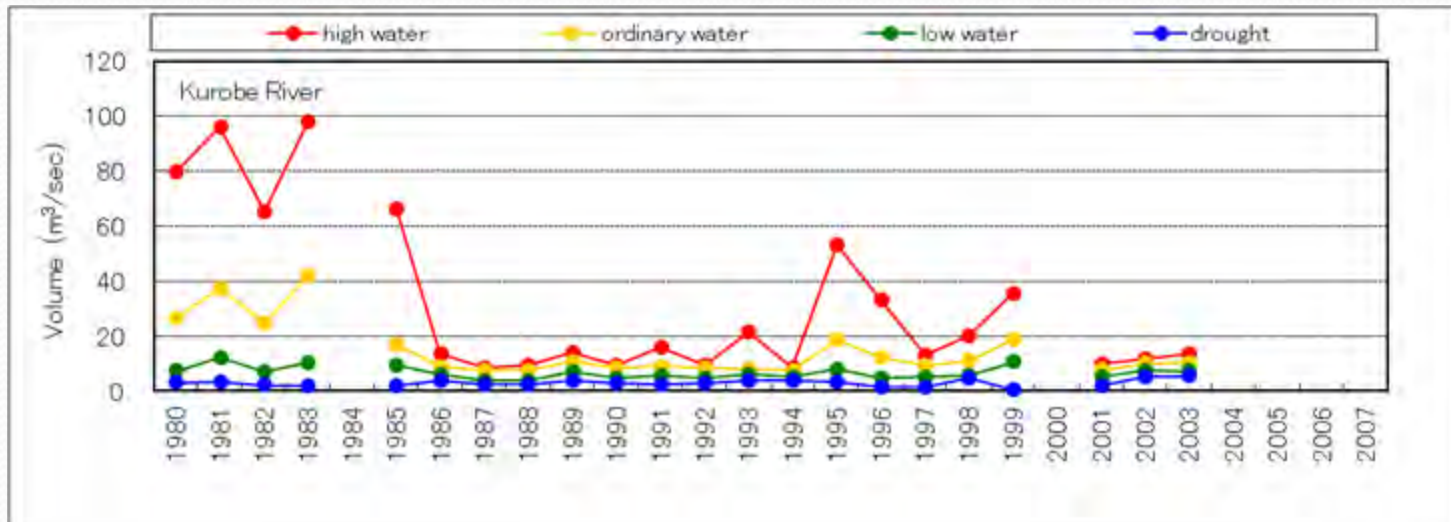


Climate Condition

Impact: **Weak**

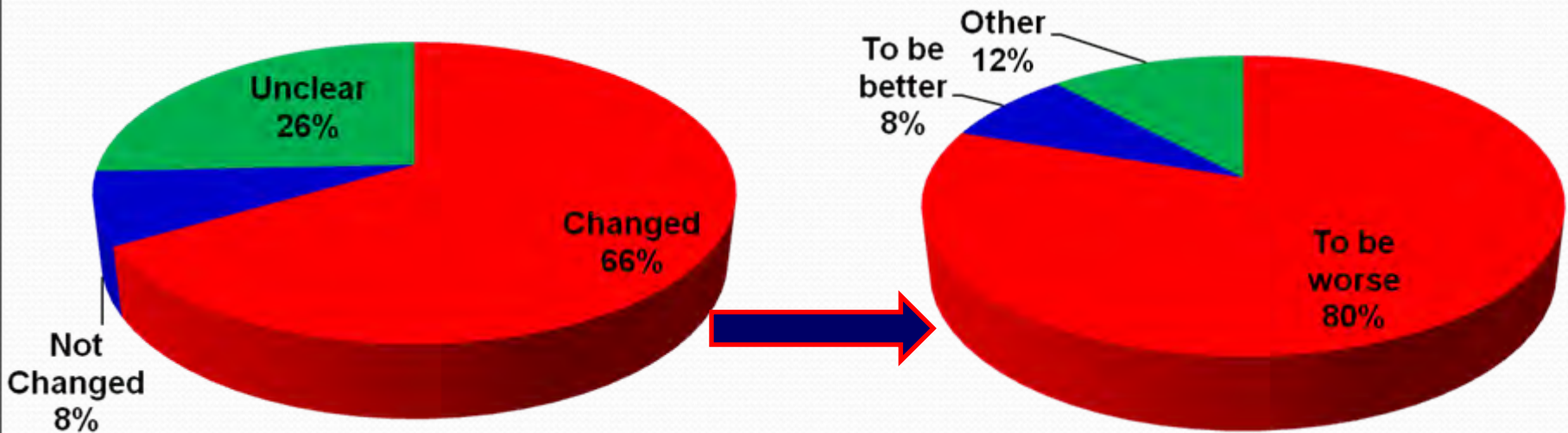


River input



For Designing the Desirable Future Vision of Toyama Bay (Target Value)

Did the environment of Toyama Bay change?



What is future desirable vision?

- Natural sand beaches
- Clean water
- Wide seaweed bed areas
- Diversity of marine species

Future Desirable Vision of Toyama Bay

Questionnaire
Interview
Council of advisers



- Creation of desirable environment for marine life based on natural material cycle and marine ecosystem
- Keep current state or change to better condition on marine life (fishery level)



Achievement assessment

Creation of Favorable Habitats for Marine Life

Achievement: 35%

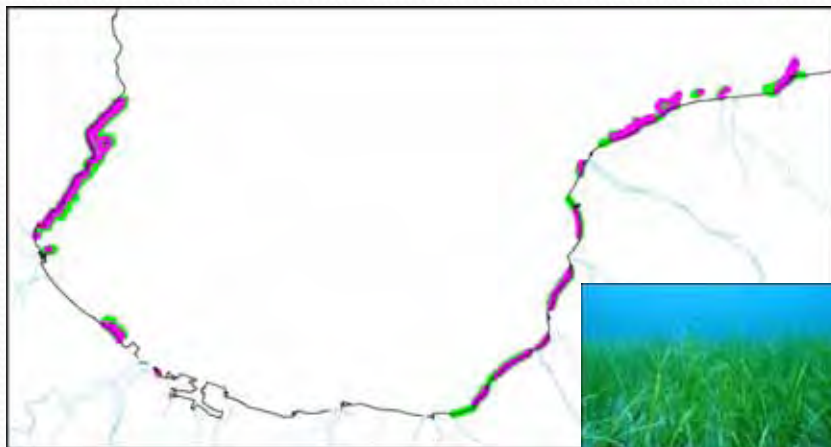


Coastline

Favorable vision: All seawalls are renewed by ecological friendly structure



Achievement: 0%



Seaweed bed

Favorable vision: The area of seaweed bed is recovered to past level

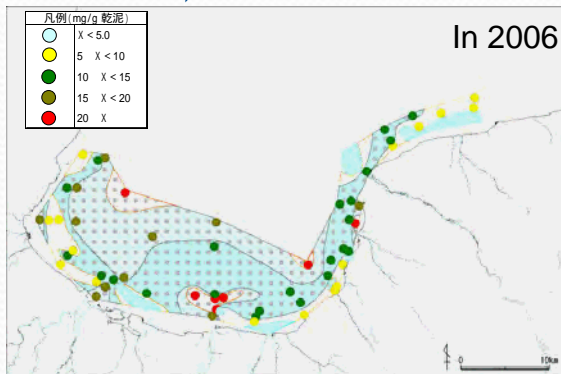


Achievement: 70%

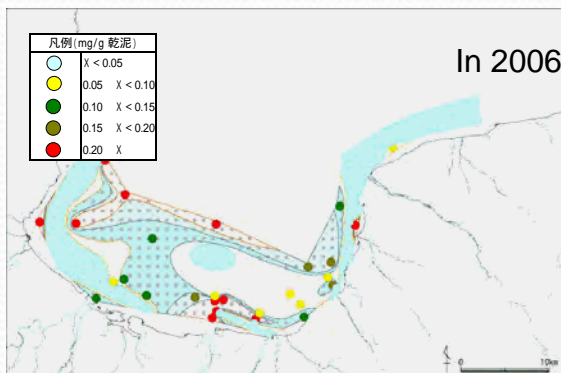
Creation of Favorable Marine Environment for Marine Life

Sea bottom environment

Favorable vision: There is no area over the standard value
 value → Achievement: 90%

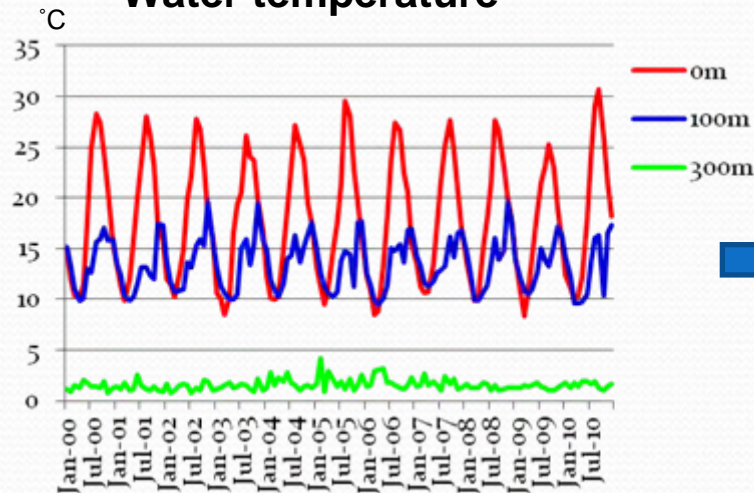


COD in bottom sediment



Sulfide concentration in bottom sediment

Water temperature



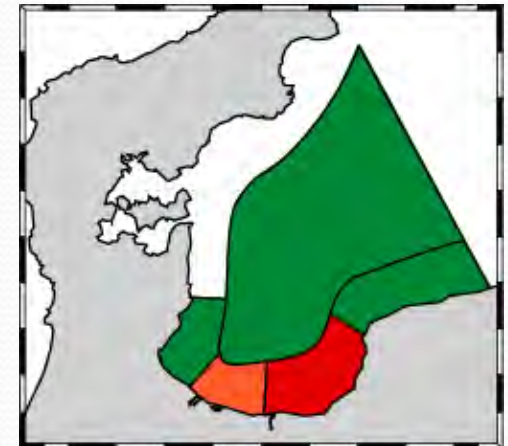
Favorable vision: No trend of increase

→ Achievement: 100%

Eutrophication

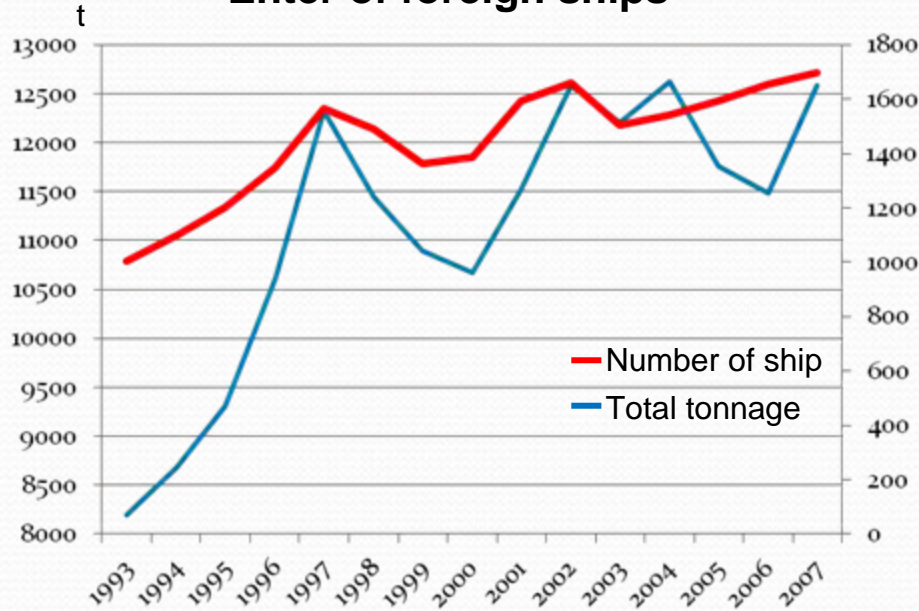
Favorable vision: Lower level of nitrate and phosphate concentration than standard value

→ Achievement: 30%



Lowering of Threat to Marine Life

Enter of foreign ships



Achievement: 50%

Number of collected marine litter



Favorable vision: No damage on marine ecosystem by alien invasive species
(Effectuation of International Convention for the control and management of Ship's Ballast Water and Sediments)

➡ Achievement: 0%

Favorable vision: No damage on marine ecosystem by marine litter

➡ Achievement: 50%

Enter of alien species by accompanied by aquaculture

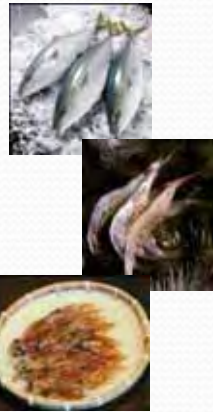
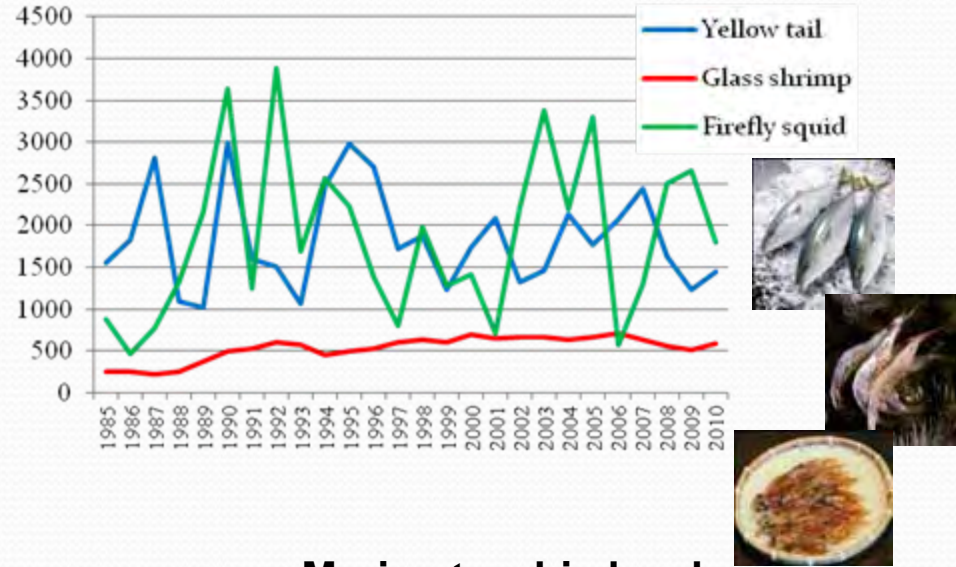
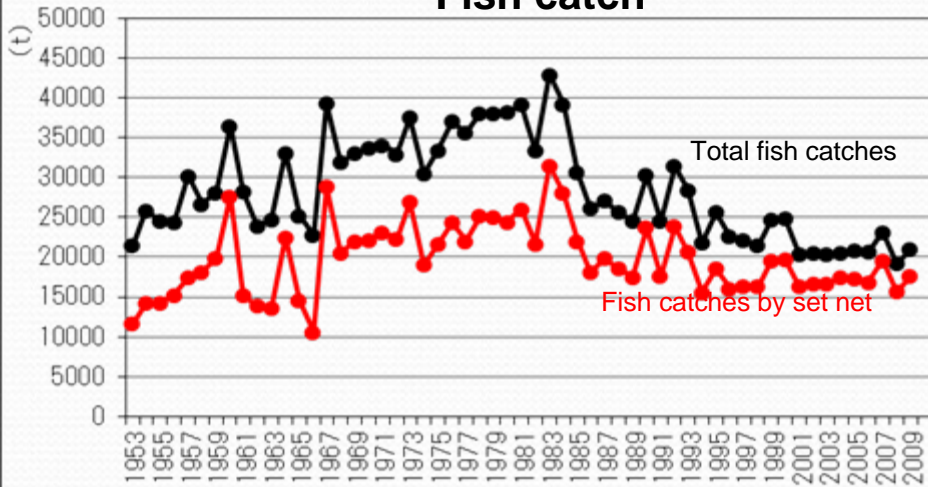
Favorable vision: No change of ecosystem by alien species

➡ Achievement: 100%

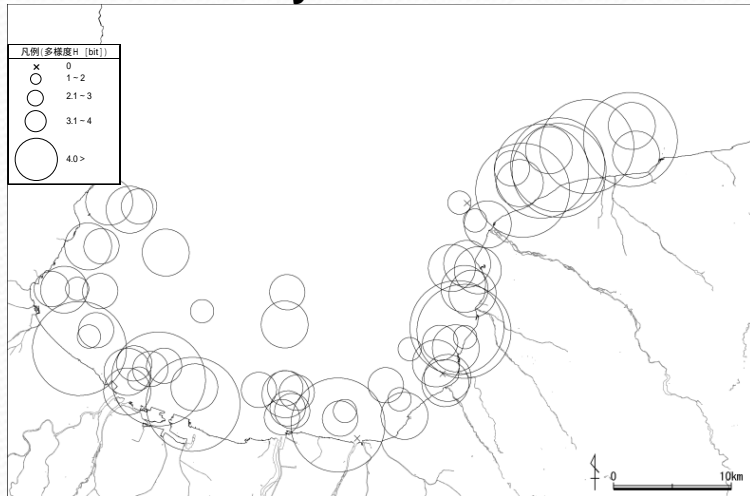
Marine Ecosystem

Achievement: 100%

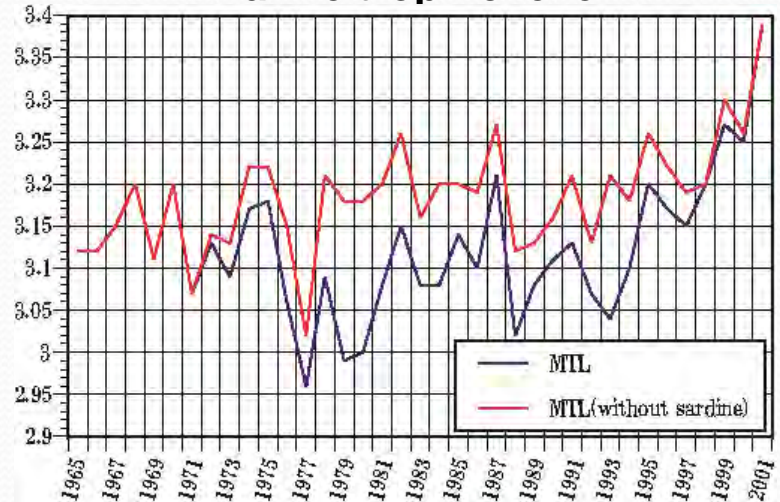
Fish catch



Biodiversity index of benthos



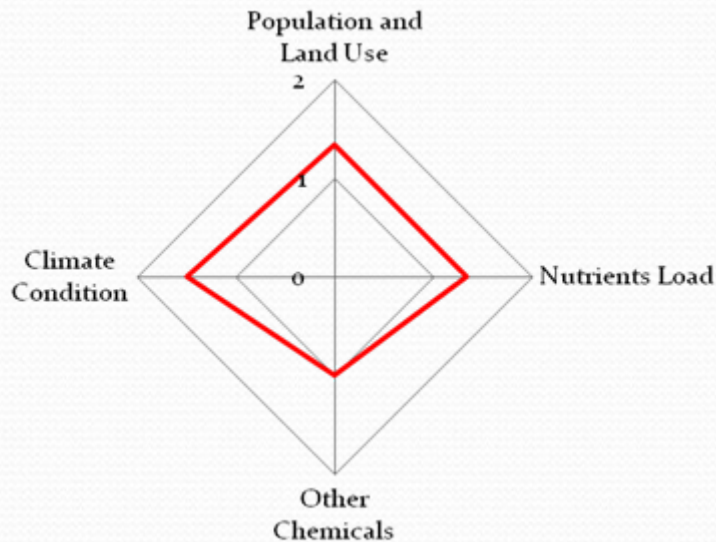
Marine trophic level



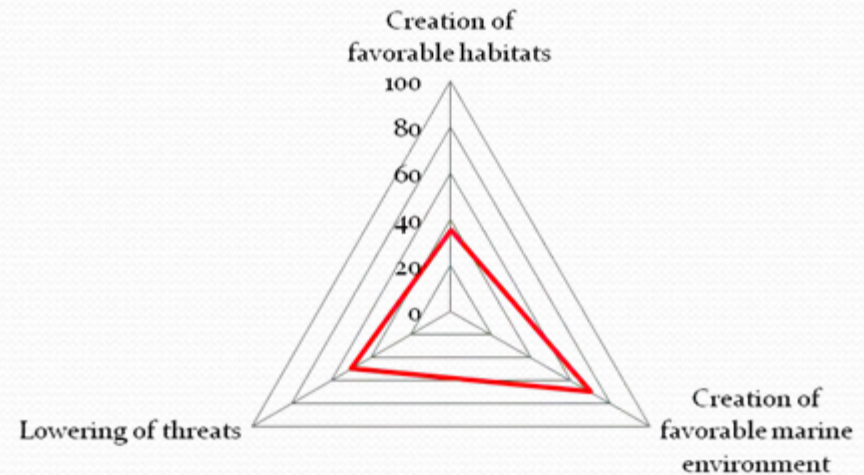
Favorable vision: Maintaining current level

Comprehensive Assessment

Impact assessment



Achievement assessment



Recommendation for improvement of the current situation

- 1.Reduction of nutrients load
- 2.Restoration of coastal environment
- 3.Lowering of threats to marine life
- 4.Collection and accumulation of more biological data