


Policy Development on Eco-DRR (Ecosystem-based Disaster Risk Reduction) and EbA in Japan after the GEJE

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Great East Japan Earthquake, 11 March 2011

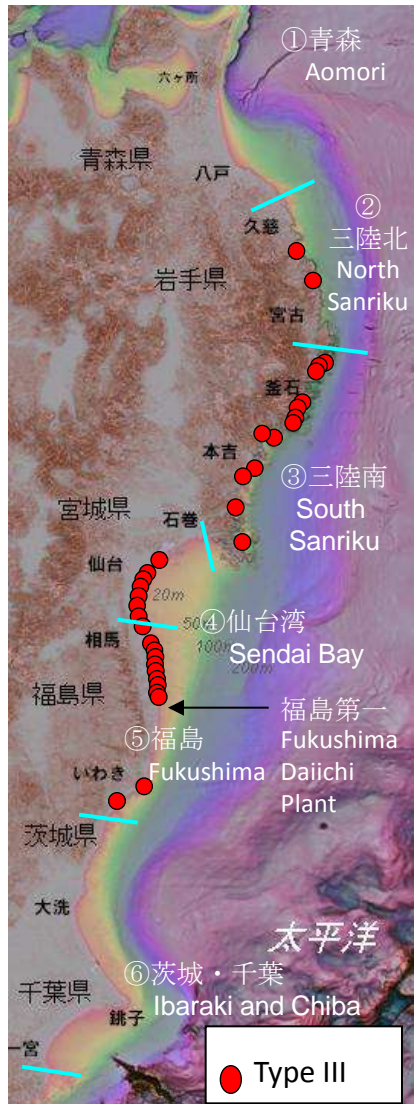




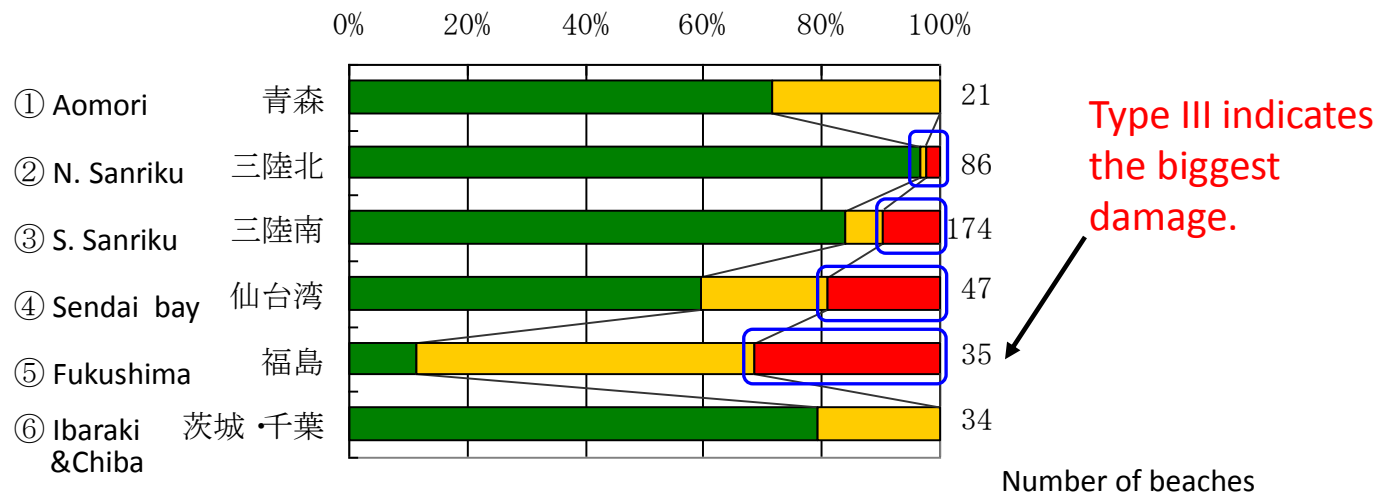
仙台市上空

Changes in Natural Environments caused by the Disaster

MOEJ's 2012 Survey



- Type I: Stable (including “almost no change”)
- Type II: Shoreline retreat
- Type III: Coastal levees were broken, and shoreline retreat & sandy beach loss were observed.



■ Alien species in the tsunami-inundated areas

	Before GEJE	After GEJE
Amorpha fruticosa	0.00 km ²	0.23 km ²
Robinia pseudoacacia	0.76 km ²	2.30 km ²

Monitoring Survey along the Tohoku Coastal

1. Survey

○Vegetation Survey (570km²)

○Comparison with old survey

○Ecosystem Monitoring Survey

- Tidal flats : 16
- Zostera beds : 6
- Seaweed beds : 5
- Seabird breeding sites : 4

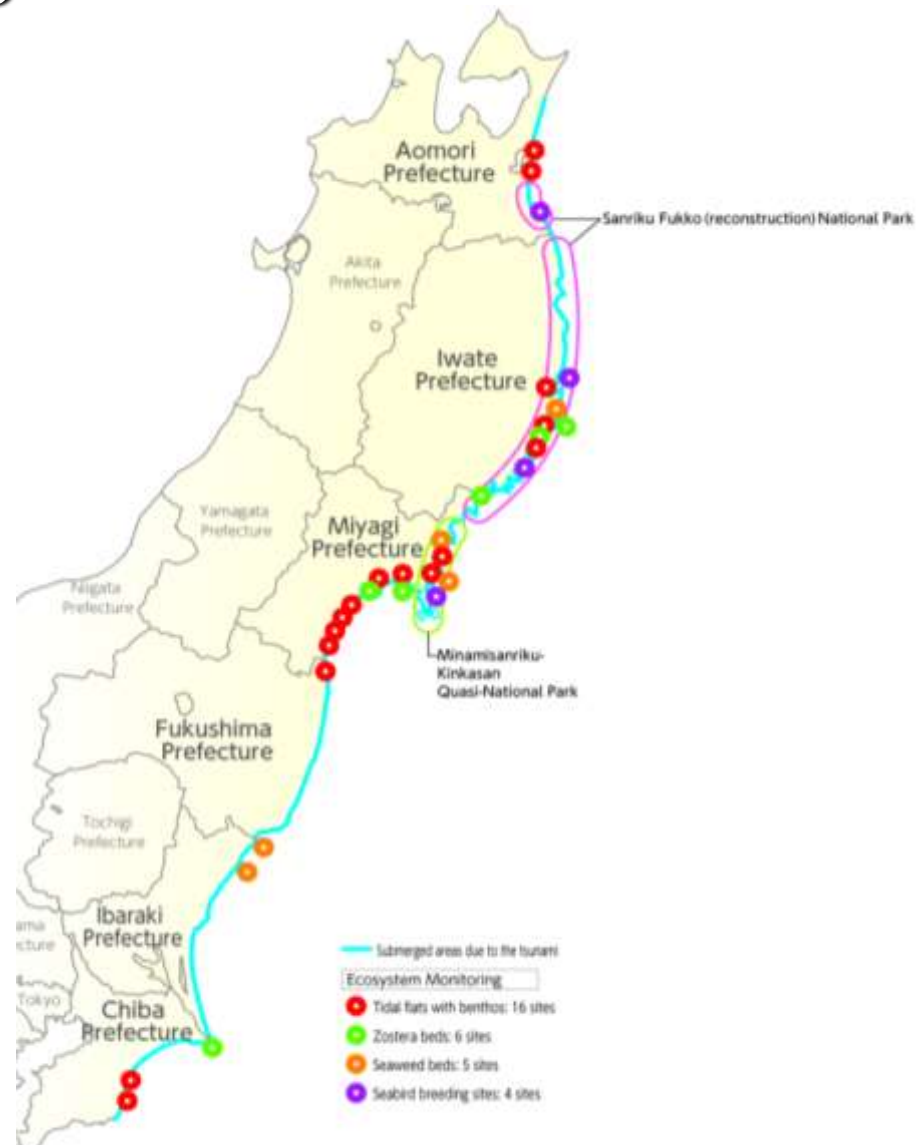
○Important Wetlands Survey

2. Information sharing

- Communication materials
- Report to municipalities
- Website

3. Identification of important natural sites from the survey

Regions



Changes in natural environments caused by the disaster (Gamou tidal flat, Miyagi Pref.)



Before tsunami: March 2009



After tsunami (1): March 2011



After tsunami (3): August 2013



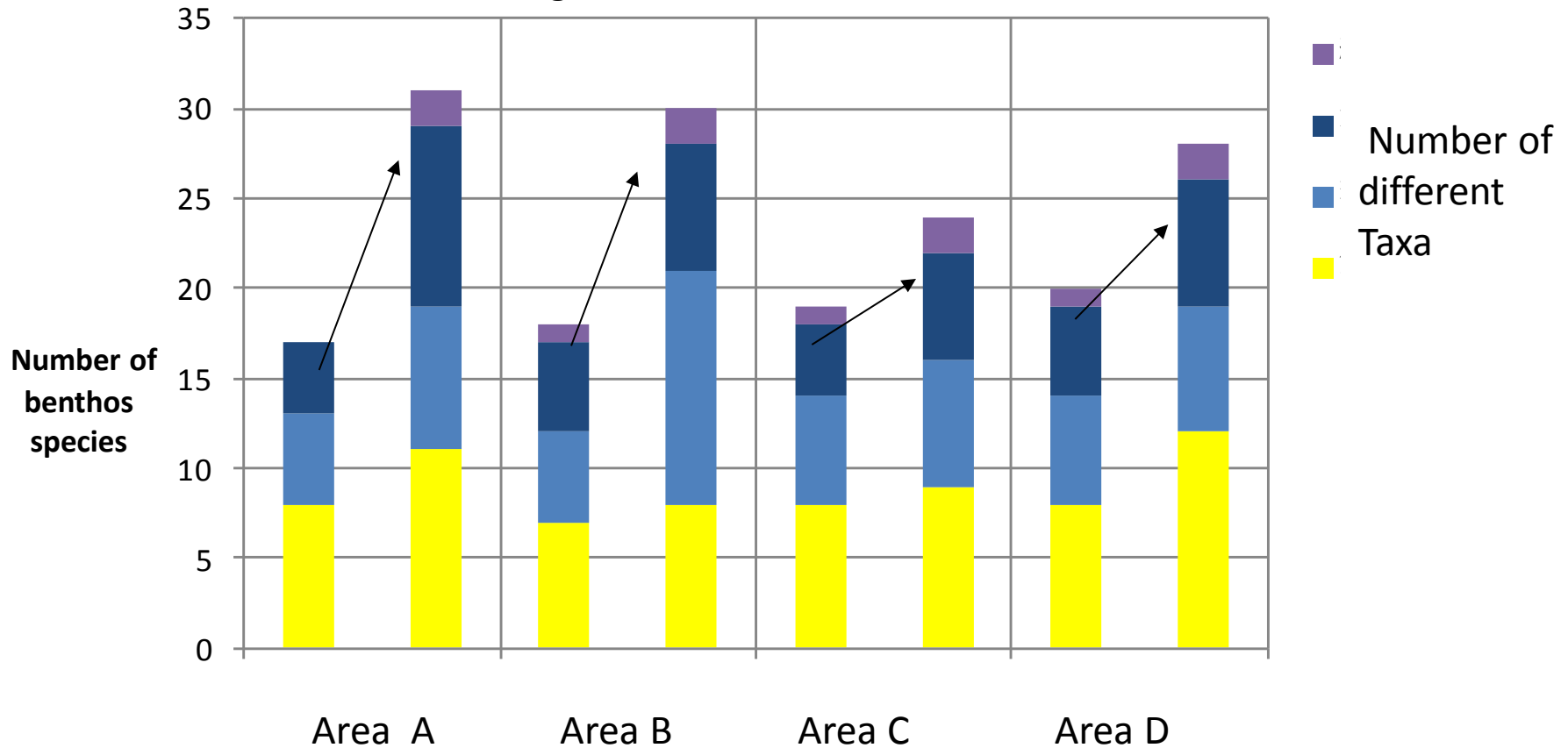
After tsunami (2): Sept. 2011



Tidal Flats Survey

Tidal Flats Survey

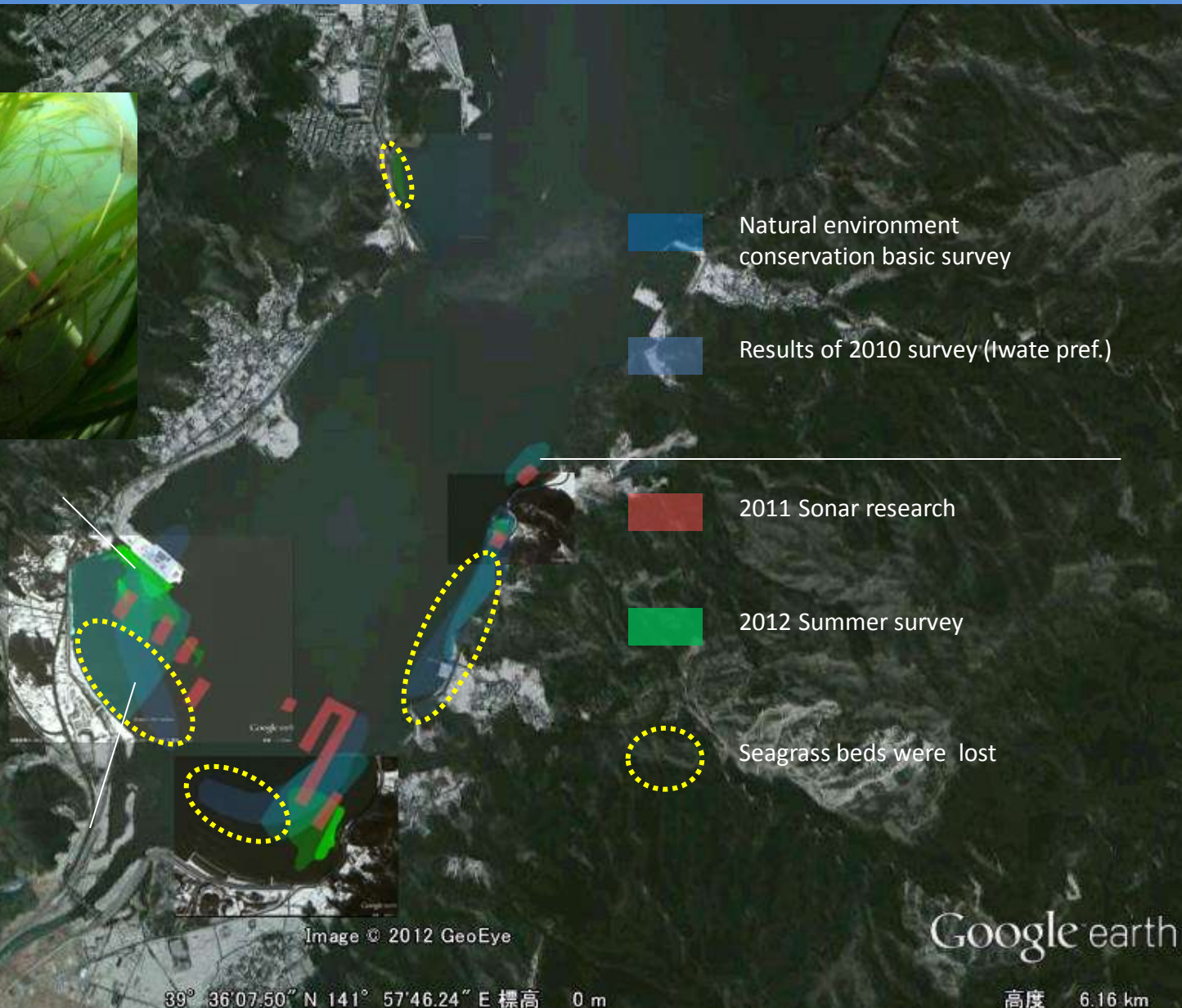
After GEJE, the number of benthos species is increasing and the tidal flat environments are being stabilized as a whole.



(Lesson Learned) Coastal ecosystems may have high resilience to recover after natural disturbance by disaster or climate change if there remain sound natural system and sources.

Seagrass beds in Miyako Bay (now and then)

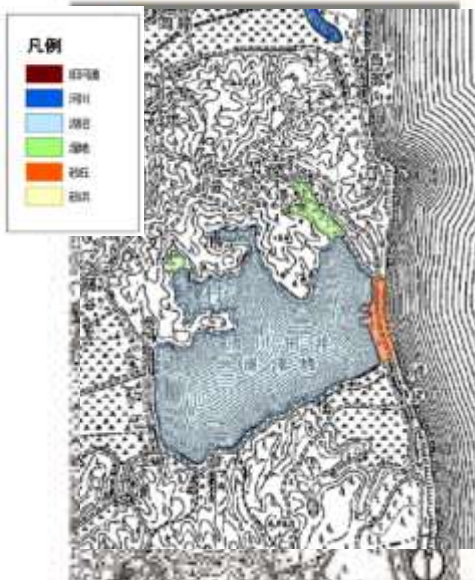
MOE's 2012 Survey



Comparison with 100 years ago

After comparing current land use map and maps measured in 1903 and 1917 by GIS, it was revealed that ecosystems in some area have recovered after GEJE to the original ecosystems and land use in 1903 and 1917 before their development.

(Example) Idogawaura (Fukushima Pref.)



Idogawaura used to be a marshland.



Since 1929, the place has been developed as rice paddy fields.



After GEJE, the place has become a marshland again.

August 2012



After one year from GEJE, it still has a marshland.

Land Use Planning of Areas with High Disturbance

❑ Otomoura, Rikuzen-Takada City, Iwate Pref.



■ Tidal flat has appeared again after the GEJE at the claimed area where used to be a tidal flat. Local city is now planning to restore the place as tidal flat.

→ Broken natural systems have recovered by massive natural disturbance

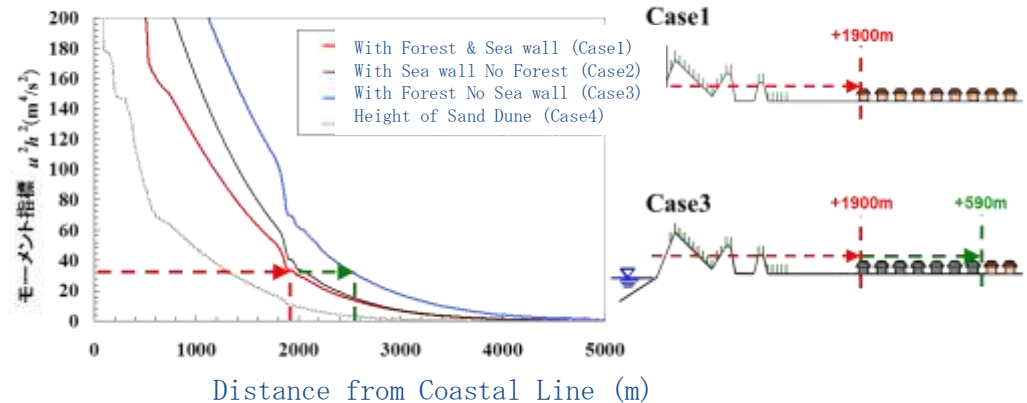
→ Ecosystem services would be maintained and enhanced if the artificial land use is avoided from the area with high stochastic rate of natural disturbance

(Lesson Learned) Areas with high disturbance should be maintained as original ecosystems in land use planning.

Evidences of Eco-DRR

□ Coastal Forest along Miyagi Pref.

Experiments of Moment Indicator of Tsunami revealed that sea walls reduced the washout of houses for some 590m, and the coastal forest reduced for about 110m during the GEJE.

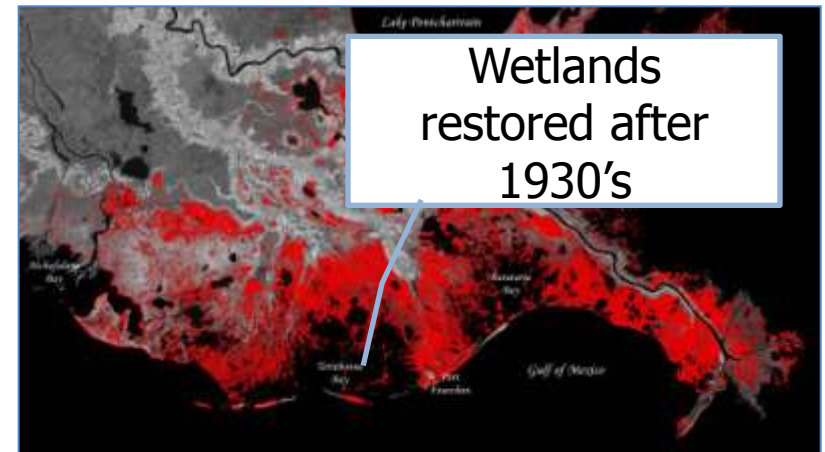


(Tanaka et al. 2012)

□ Wetlands in Southern Louisiana, U.S.

It is revealed that the restored wetlands has mitigated the effect of Hurricane about 1m by 1km of wetland.

By restoring all the wetlands, it would be possible to rescue more than 1,000 live from the disasters like Hurricane Katrina and save some 60 billion USD compared to present.



(Earth Economics 2010)

What is the “Ecosystem-based Disaster Risk Reduction”?

< Eco-DRR >

Ecosystems have functions of disaster risk reduction. For example, wetlands act as flood control and mangrove forests mitigate the effect of high tide. Eco-DRR is a concept of utilizing the function for disaster risk management while conserving biodiversity and adapting to the climate change.

(Case study)

It is estimated that economic losses would be more than 800 billion USD at maximum due to natural disasters such as high tide if all coastal wetlands are lost. (Katie K. A. *et al.* 2013)

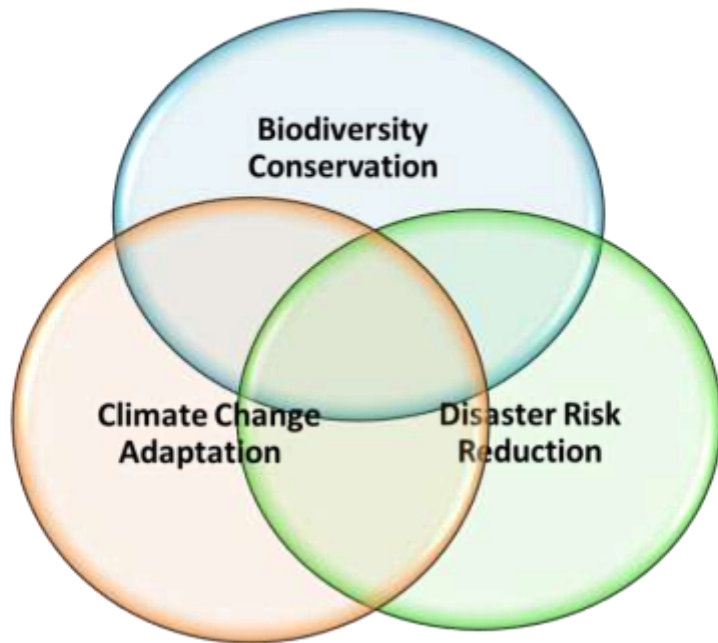
Table. Cost-benefit analysis of Eco-DRR (PEDRR 2011)

	Natural Disaster	Estimated Economic Value for DRR (USD)
Coral Reefs of the World	Tsunami, Storms	189,000USD/ha/year
Coastal Wetlands in U.S.	Hurricane, Storm	8,240USD/ha/year In total 23 billion USD/year
Wetlands in Czech	Inundation	11,788 USD/ha/year
Forest in Switzerland	Avalanch	In total 170,000 USD/year



Multiple Benefits of Eco-DRR

Co-benefit of Eco-DRR



<Multiple benefits of Eco-DRR>

1. It is cost-effective and sustainable measure for disaster risk management.

2. It contributes to the biodiversity conservation and climate change adaptation
Eco-DRR = EbA(Ecosystem-based Adaptation)
=Green Infrastructure ?

3. It offers other ecosystem services including water and food provision, recreation, forestry and fisheries during normal conditions which strengthen the local livelihood and resilience.

Case Study in Japan: Restoration of Floodplain

□ Matsukawa river, Saga Pref.

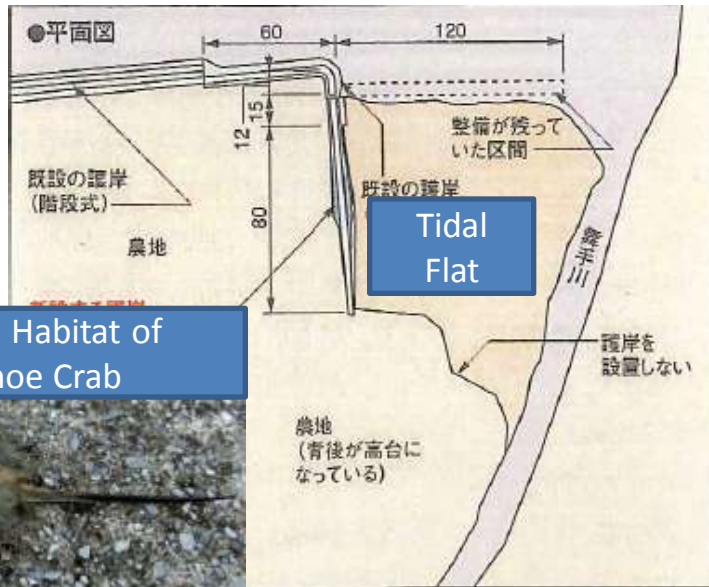


- Azamenose area is located in 15km from river mouth along Matsukawa river.
- This area once suffered from floods and needed river development. But the area was purchased by government and used as the floodplain without developing levees.
- Ecosystems have been restored to provide multiple function including agriculture, environmental education and recreation.



Case Study in Japan: Coastal Levee

□ Nakatsu tidal flat, Oita Pref.



Remaining Habitat of
Horseshoe Crab



- Levee setback from coastal line
 - Protect farmlands from high tide
 - Conserve wetlands while keep connectivity between land and sea
 - Use tidal flats as shields from high tide.
 - Land is purchased by local government
- Development cost has become half compared with levees along coastal lines.

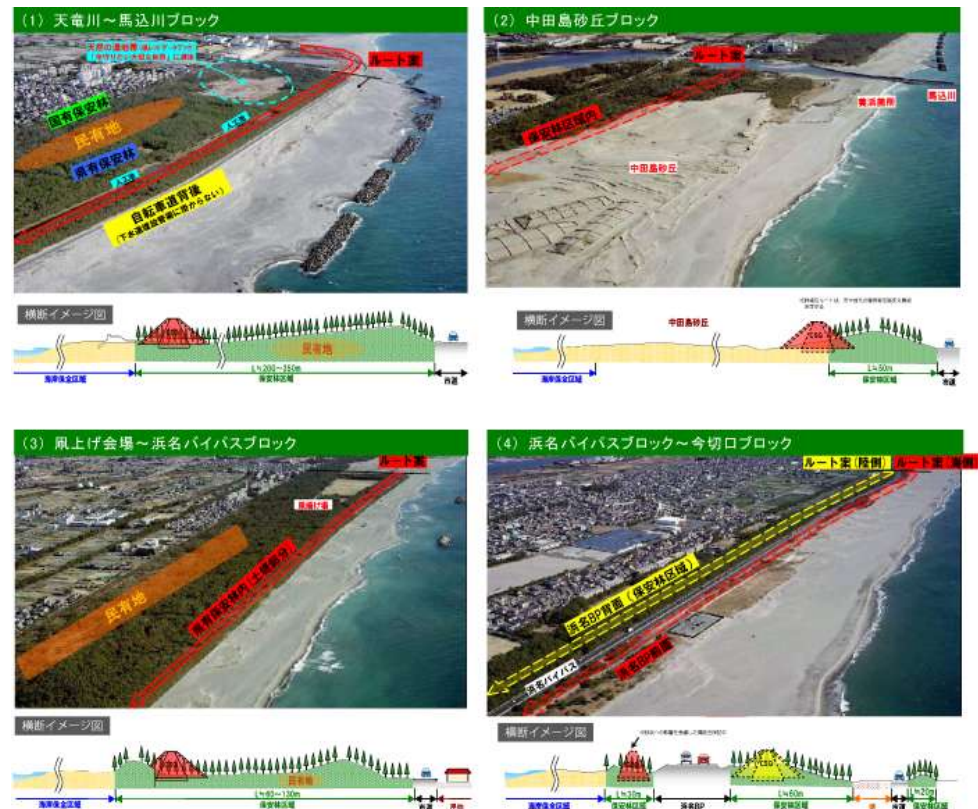
Case Study in Japan: Coastal Levee

□ Coast Areas along Hamamatsu city, Shizuoka Pref.

- In the coastal areas along Hamamatsu city, Coastal levees are carefully planned to avoid the impact on coastal ecosystems including habitats of loggerhead turtle and it is being developed without using cements.
- It is estimated to reduce 80% of economic loss from Tsunami.



Loggerhead Turtle



Public Involvement

Landscape Committee

Ecosystem Committee

Forest Committee

Contribution from Private Sector

Mainstreaming EbA in Japan

Developing Climate Change Adaptation Plan for Biodiversity

**Climate Change Impact Assessment
on Ecosystems and Biodiversity**

A Working Group consists of 12 specialists
Review existing literatures and analysis

2014



2015



**Consider Adaptation Plans
for biodiversity**

A Committee consists of several specialists

**Adaptation Plans
for Biodiversity**

**National Adaptation
Plans of Japan**

for Water Resource

for Natural Disaster

for Agriculture,
Forestry and Fishery

Mainstreaming Eco-DRR in Japan

Dec
2013

Basic Act for National Resilience Contributing to Preventing and Mitigating Disasters for Developing Resilience in the Lives of the Citizenry



June
2014

DRR in harmony with nature, importance of Eco-DRR
http://www.cas.go.jp/jp/seisaku/kokudo_kyoujinka/index_en.html

Fundamental Plan for National Resilience



Promote Eco-DRR and assess the disaster risk reduction of ecosystems such as coastal forest and wetlands and other ecosystem services under usual condition

- Formulate a guideline to promote Eco-DRR locally
- Evaluate ecosystem services including DRR
- Promote Conservation and Restoration of Ecosystems

Mainstreaming Eco-DRR Internationally

- ❑ Japan has been taking a leading role in mainstreaming Eco-DRR internationally. To further enhance the collaboration among related countries and organizations, Japan is planning to launch the international partnership for Eco-DRR in 2015.
- ❑ Integrating Ecosystem-based approach into both Climate Change Adaptation and Disaster Risk Reduction is effective and no-regret policy

