TEAMS:
Cooperation between science and regional communities towards better restoration of coastal lives and fisheries

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Time-series of earthquake epicenter and Magnitudes

March 11, 2011, 7:00〜22:00

- M3
- M5
- M7

- 〜15 min
- 〜1 hour
- 〜1 day
- 1 day 〜

防災科学技術研究所Hi-net
Off Tohoku Earthquake and Tsunamis

March 11, 15:56

Tsunami inundation heights sometimes reaches at 40m high in altitude and destroyed coastal infrastructures and wash everything out.

They also strongly disturbed coastal to offshore ecosystems of the Northeast Japan.

dead  15,894
missing  2,562
total  18,456

99% were dead by Tsunamis
Tohoku Ecosystem-Associated Marine Sciences (TEAMS) 2012-2021 supported by MEXT

Tohoku University

Studies on the mechanisms of ecosystem change on the seafloor and coastal-offshore area

AORI

The University of Tokyo

Studies on the Mechanisms of marine ecosystem change

JAMSTEC

Scientific evaluation of the effects of the earthquake and tsunami on the ecosystem by conducting field research and modeling.
Clarifying the way to restore fisheries


Construction of database and open the scientific information

Tokai Univ.
Task of TEAMS

Carry out *monitoring researches* of disturbances and recovery processes of coastal environments and ecosystems by earthquake and tsunamis,

transfer scientific knowledge and results to fishermen, citizens and stakeholders *for better restoration of their lives and regional economy (=fishery) !*
Learn from civil engineering

Disaster Risk Managements flow chart
(Prevention, Reduction, Mitigation and Restoration)

Inter-disciplinarity

Stakeholders

Science activities

Trans-disciplinarity

Social Application of Scientific results
(ex. Coastal ecosystem managements, socio-ecological restoration, advanced fisheries and others)

* Application of TEAMS results for restoration of damaged fisheries and coastal societies need knowledge of either liberal arts or social sciences. We have started series of dialogue among TEAMS, social science community and regional stakeholders.
Data and observations → share data with stakeholders

Draw offshore topographic maps by MBES (2011 ~ 2017)
Observation of the damage for coastal ecosystem by diving
Seaweed communities are getting back to the original. However, sea urchins was born in large quantities, it is going to be a rocky shore crisis. In order to achieve both production and environmental protection, sea urchins are collected and culture separately.

Real time information of the marine condition

Development of the new fishing gear for reconstruction of Sakhaline surf clam fishery in Yamamoto town.

Genetic analyses of the damage on divergence level
Coastal ecosystems consist of multiple and mosaic distribution of various habitats (ex. Otsuchi Bay).
Changes in density distribution of *Corbicula* clam after Tsunami at Natori River

Aug., 2009  
before disaster

Aug., 2011  
After 5 months from disaster

Apr., 2012  
After 1 year from disaster

Aug., 2013  
After 2-y 5 months from disaster

After Tsunami, the distribution area change to upstream area (about 1 Km) because of app. 1m land subsidence at coastal area by GEJE
Coastal oceanic monitoring system (ex. Otsuchi)

Real time information available for local people via cellphone

Real time Images
Water temp
Nutrients
Wave

Meteorological information

work together with fishermen
Coastal ocean forecast toward establishing sustainable fishery

Long-term planning

Accumulation of real-time physico-chemical oceanographic data

Cold water invasion is fatal for aquacultures. Coastal ocean condition forecast is useful for avoiding daily risk.

Sea water circulation in Otsuchi Bay

Physical oceanographic simulations → coastal ocean forecast
Various data

- Research data storage, archiving and provide them to the public
- Collect Information and release
- Data flow system construction and others

Monitoring and researches

Various data

Scientists

(Research Teams)
Tohoku U., Kitasato U., AORI, Univ. Tokyo, Tokyo Univ., Mar. Sci. and Tech., Iwate U., JAMSTEC, Tokai Univ., and others

Systems management: Unit 4
TEAMS has been carried out over 100 lecture meetings and a debrief session not only for fishermen, local governments, but for young students and general citizens. Also TEAMS has been published over 100 scientific papers, regarding to the situation of marine environments and ecosystems affected by GEJE.
Transfer and /or share knowledge with other countries: Joint workshops

Date and Time: 6/15/2016, 13:30 ~ 18:00

We will have series of workshops / symposia with countries that are potential to experience of natural hazards, in particular to Earthquake and Tsunamis.

June 2017, Chulalongkorn Univ., Thailand;
November 2017, World BOSAI Forum@Sendai for Disaster Risk Reduction. We try to take action plan for establishing coastal eco-DRR together with scientists from hazardous countries, such as Chile, Indonesia, Thailand and others.
Summary of TEAMS activities

Restoration of coastal livelihood and economy (fisheries) with viewpoint from ecosystem-based disaster risk reduction

- Make research on disturbance and recovery of coastal Ecosystems and Environments and share scientific knowledge with stakeholders (citizens, fishermen and government)
- Design eco-DRR (recovery of natural environment and ecosystems for keeping coastal ecotone; green and blue coast)
- Establish Coastal Ocean Management Systems for promoting sustainable fisheries, local economy, and for creating better coastal livelihood