Strengthening Tsunami Preparedness and Mitigation Strategies

Examples from JAPAN

International Symposium on Tsunami Disaster Mitigation

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Banda Aceh, Indonesia

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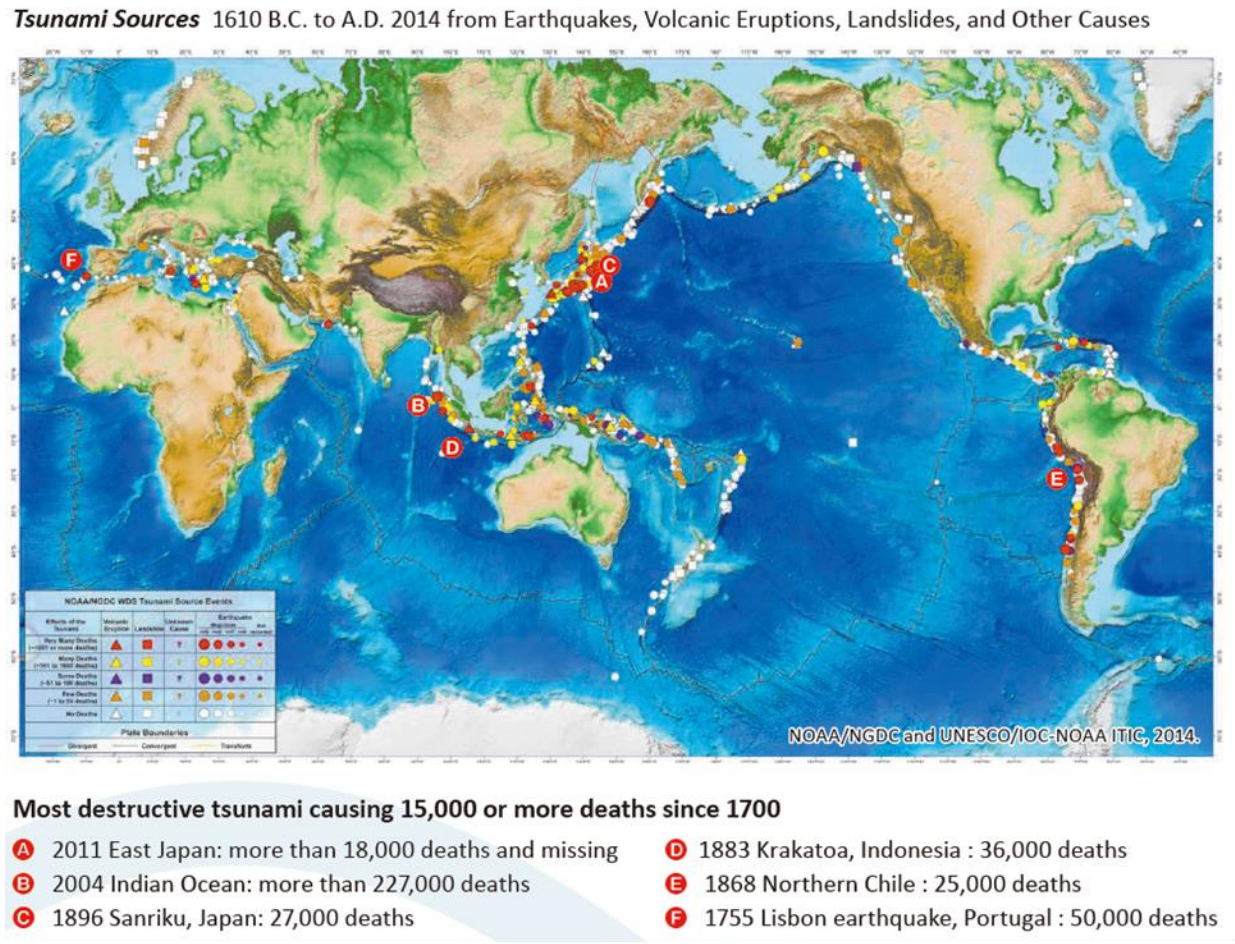
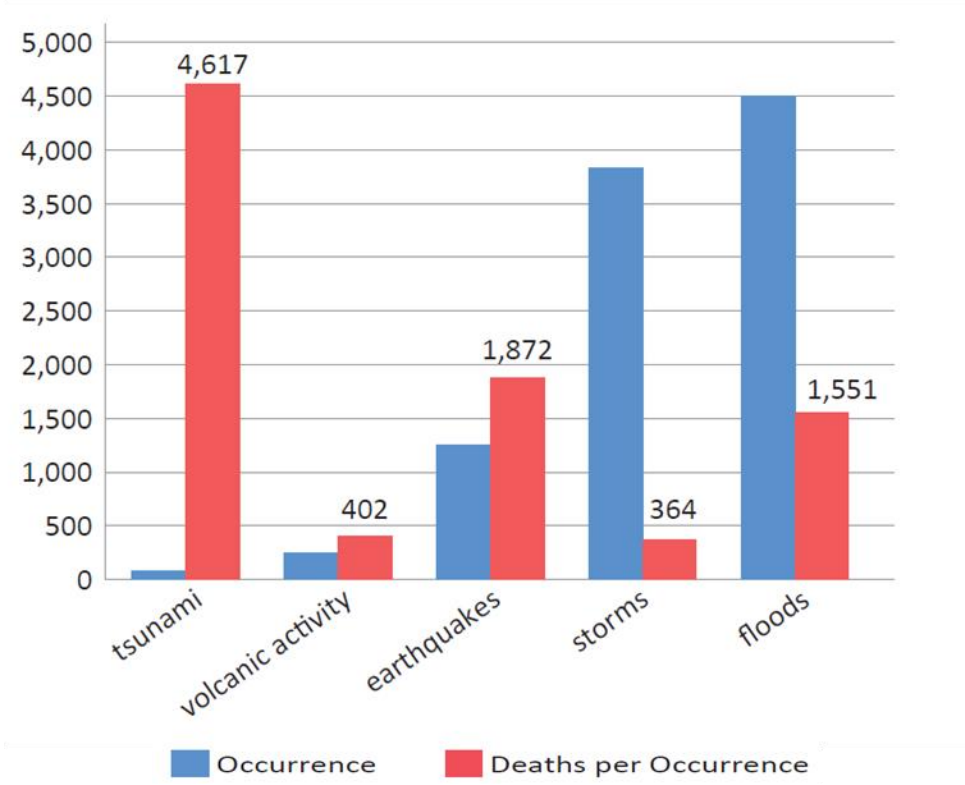
Background

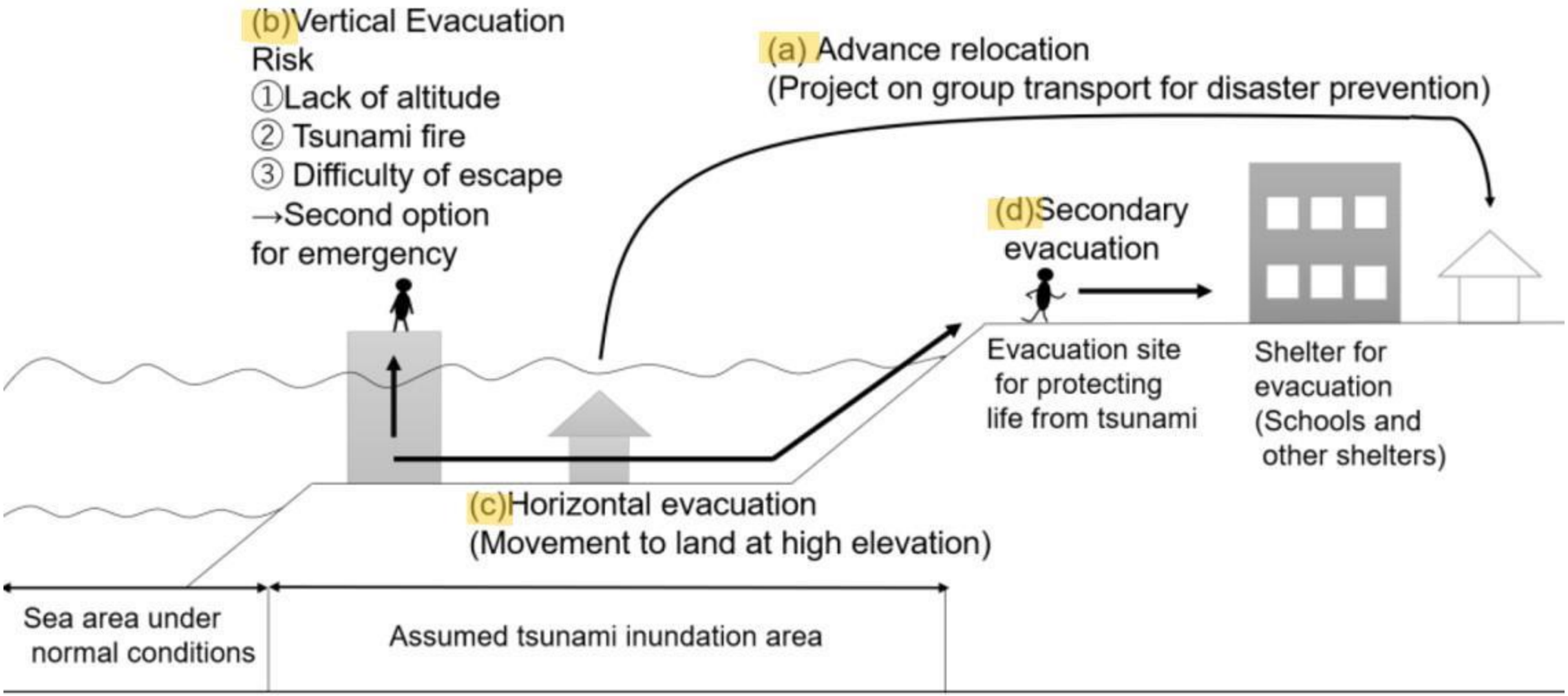




Tsunami death toll compared with other disaster types
1900 – 2014 (EM-DAT, 2023)

Source: https://www.mofa.go.jp/mofaj/files/000126145.pdf

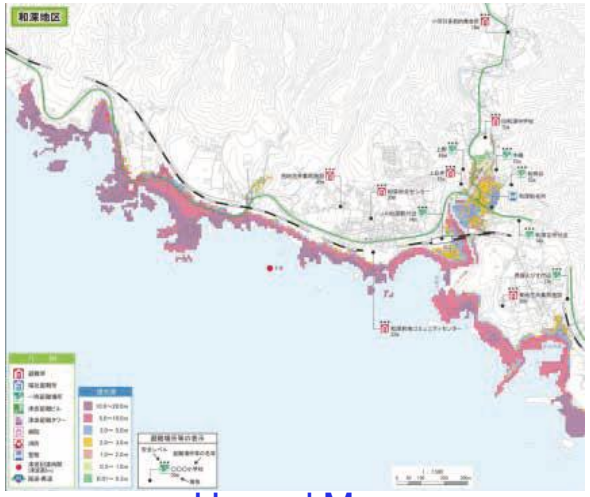
Basic Concept 1: Prepare to Escape from Tsunami



Source: https://www.adrc.asia/acdr/2020_tsunami/documents/ppt/3rd_Dr_Ohtsu.pdf

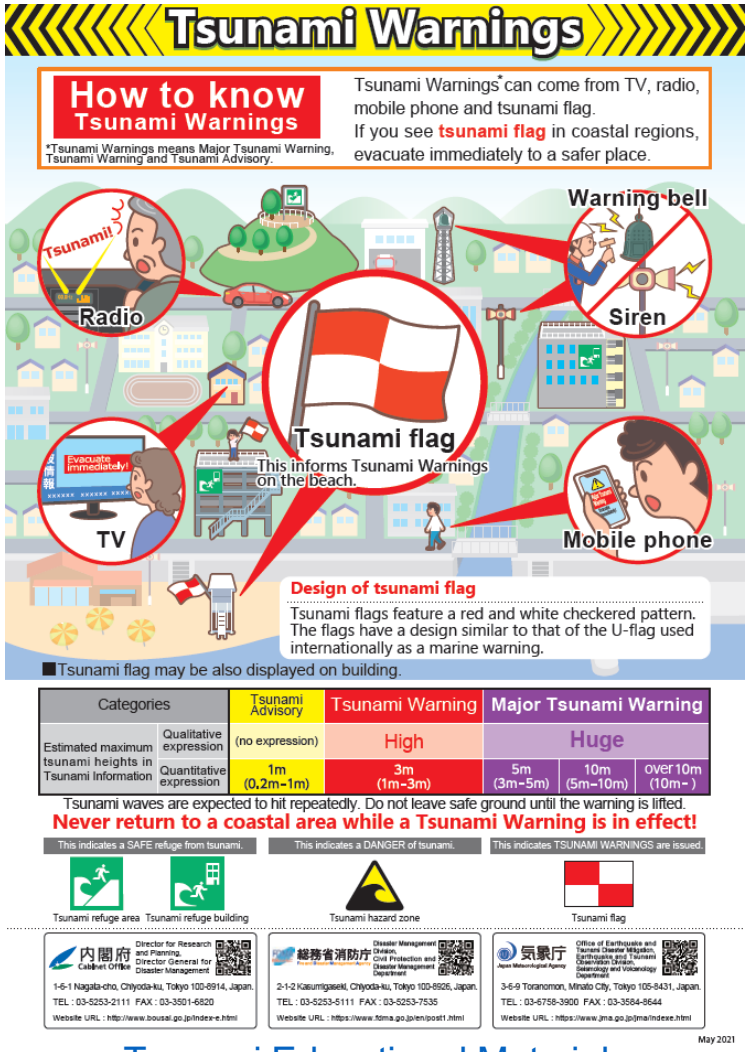
Awareness Raising

- Deepen our scientific understanding of earthquakes and tsunamis
- Cooperation with mass media (e.g., television, radio, and newspapers) and social media (e.g., TikTok, WhatsApp, X, and Facebook)



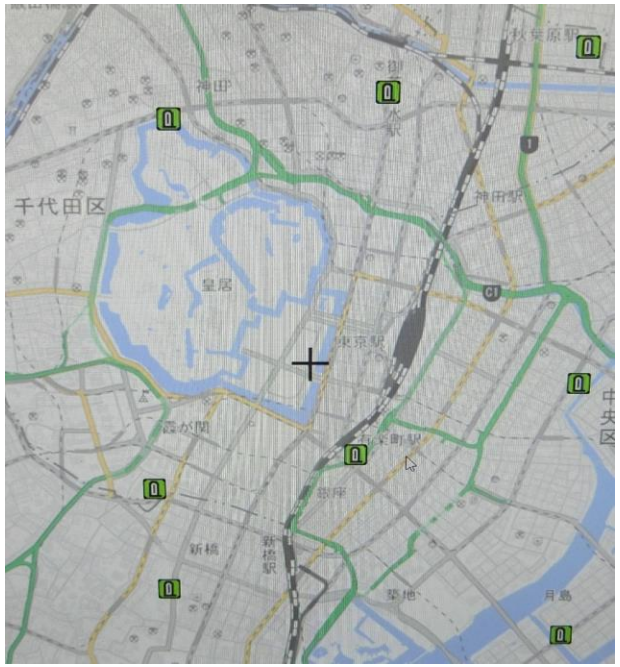
Hazard Map

Tsunami Signs



Tsunami Educational Materials

'Tsunami stones' are ancient warnings written on stone tablets, some over 600 years old, that lie along the northeastern coast of Japan. One that was placed in Aneyoshi after a 1933 tsunami reads: 'Do not build your homes below this point.' The entire village survived the tsunami disaster of 2011.



Tsunami monument symbols put on maps by the Geospatial Information Authority of Japan (GSI)

Source: https://www.japantimes.co.jp/news/2024/04/23/japan/japan-disaster-monument-map/

Source: https://www.data.jma.go.jp/eqev/data/tsunami_bosai/img/leaflet01_en.png

Evacuation

Vertical evacuation at Arahama Elementary School, Sendai during 3.11

Regular Tsunami Evacuation Drill

Tsunami evacuation route, Natori City

Tsunami Tower

Reducing the time required for evacuation

Equipment to carry vulnerable people

Rollator Transport chair Wheelchair Cart

Drill date and assumptions

Date	17 January 2015	17 January 2016
Supposition	Great Nankai Trough Earthquake has occurred.	
Magnitude	9	
Seismic intensity	6 (Nagata ward, Kobe city)	
Warning	Great Tsunami Warning (along Setonaikai sea in Hyogo prefecture)	

Experiment on equipment to aid vulnerable people

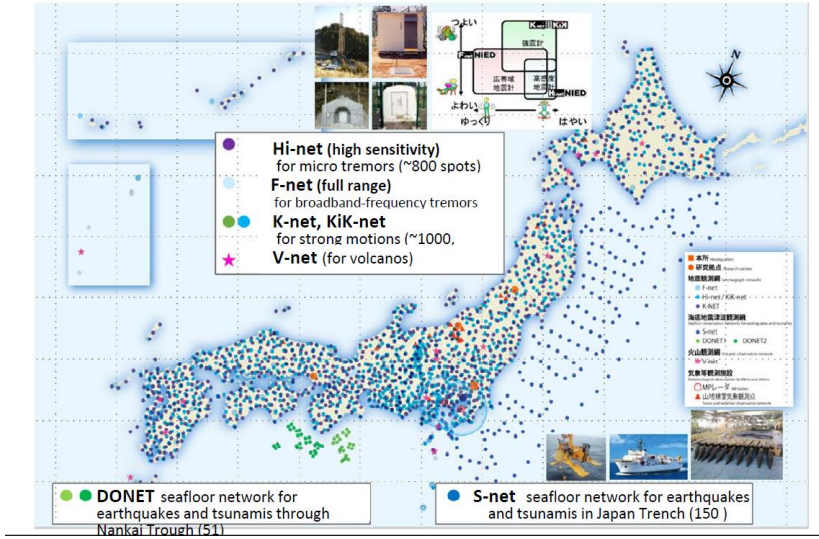
Artificial Hill in Rikuzentakada

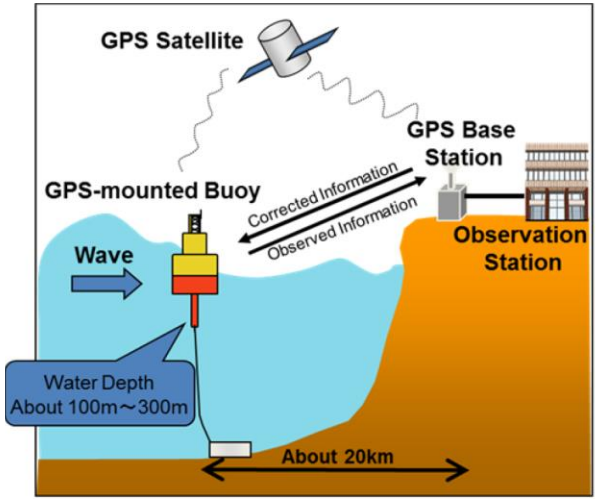
Source: https://www.adrc.asia/acdr/2020tsunami.php

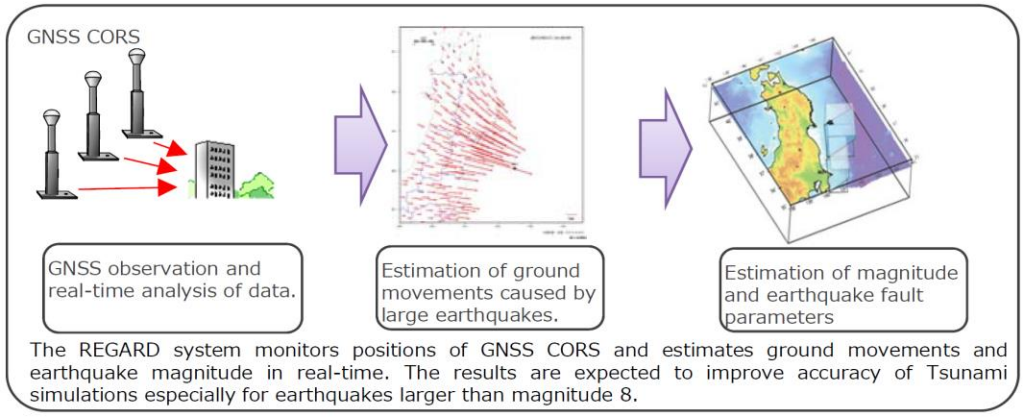
Early Warning System

Monitoring of Waves on Land and Seafloor (MOWLAS)

- MOWLAS is a monitoring network that covers the lands and seafloors all over Japan, and can immediately and accurately observe hazard phenomenon of earthquakes, tsunamis and volcanic eruptions in Japan. The observed data is utilized not only for research on natural disaster mechanisms but also for disaster reduction as it is directly provided to central government, local governments and private companies.

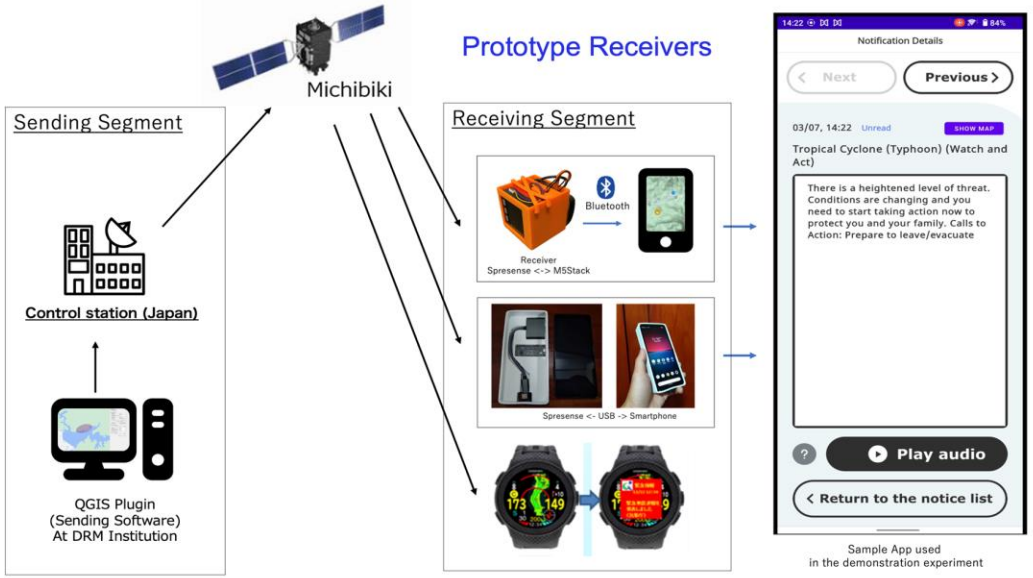






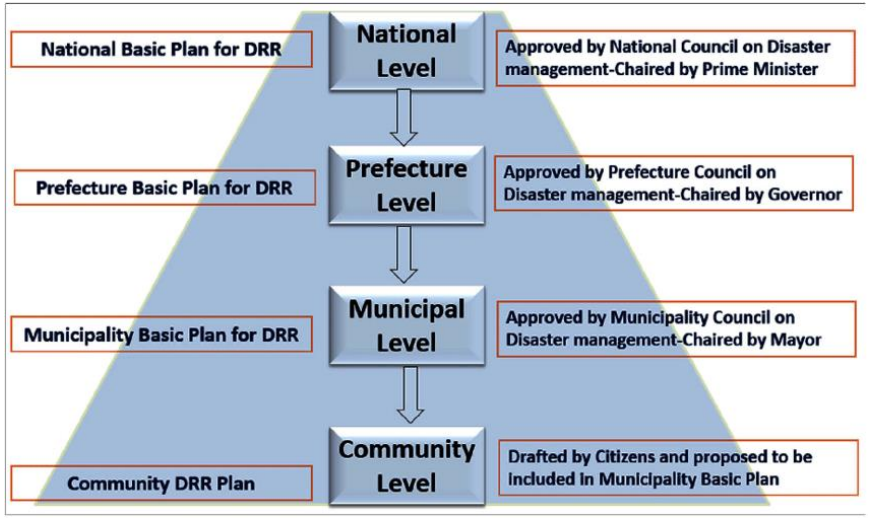
The REGARD system monitors positions of GNSS CORS and estimates ground movements and earthquake magnitude in real-time. The results are expected to improve accuracy of Tsunami simulations especially for earthquakes larger than magnitude 8.

Report for disaster and crisis management



Source: https://www.bousai.go.jp/kaigirep/catalog/pdf/Guide_to_Japanese_tech_EN.pdf

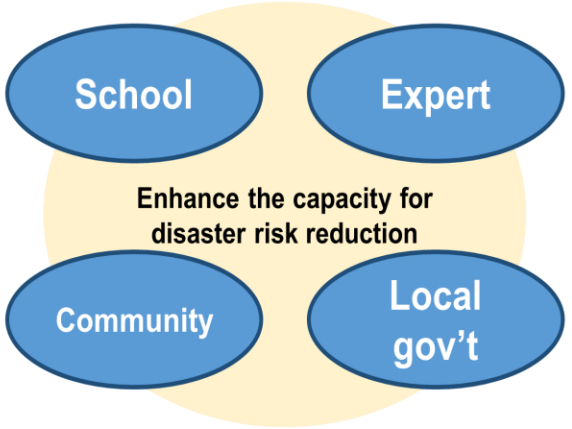
Response Planning



Source: Japan White Paper on Disaster Management 2021

Collaborative model

Uncertainty | Diversity in needs | Active participation



Okitsu community, Shimanto Town, Kochi Prefecture.

"Gurumi Group" ("gurumi" means "among all.")

Okitsu Community Voluntary Disaster Prevention Organization (Local residents).	Okitsu Primary school	Shimanto town gov't	Kyoto University
• Promote DRR measures of the local community to protect the lives • Linking school, municipality and expert	• Educate students to protect themselves from earthquakes and tsunamis. • Promote their proactive learning through DRR education • Encourage exchange between students and community	• Carry out infrastructure improvements taking into account the opinions of schools and residents. • Provide specialized information on seismic and tsunami disaster risk	• Provide specialized information on seismic and tsunami disaster • Support DRR education in school and community

Keywords: Collaborative model / School-centered disaster risk reduction activities / Disaster risk reduction education

Source: https://www.adrc.asia/acdr/2020_tsunami/documents/ppt/3rd_Dr_Ohtsu.pdf

Basic Concept 2: Mitigate the Impact of Tsunami

Source: https://www.city.sendai.jp/koryu/foreignlanguage/en/earthquake/documents/plan20english.pdf

Breakwaters and Water Gates

Breakwater in Kamaishi, Iwate

Watergate in Fudai, Iwate

Control forest in Rikuzentakata, Iwate

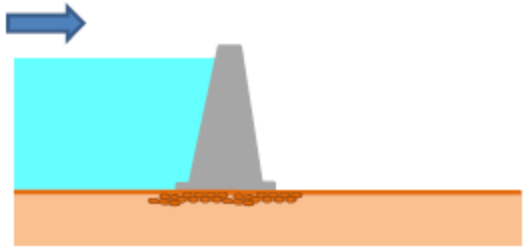
Automated and remote control closure of flood gates and inland lock gates

Source: https://www3.nhk.or.jp/nhkworld/en/shows/2090034/

Source: https://www.adrc.asia/acdr/2020_tsunami/documents/ppt/1st_Dr_Anawat.pdf

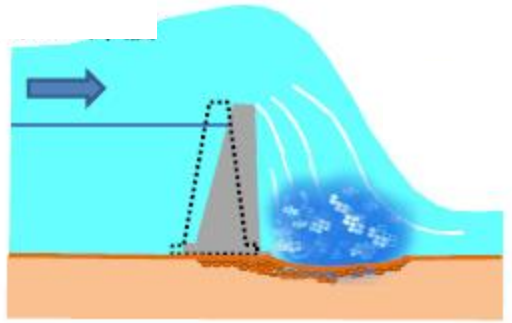
Level 1 & Level 2 Tsunami

Level 1:
High frequency (30-200 years) but small to moderate tsunami.
Community should be mostly protected by coastal defense structures.
Height of coastal structures were decided by past Level 1 tsunami events

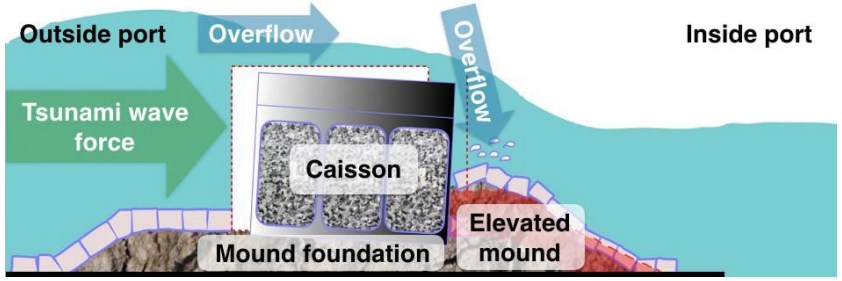


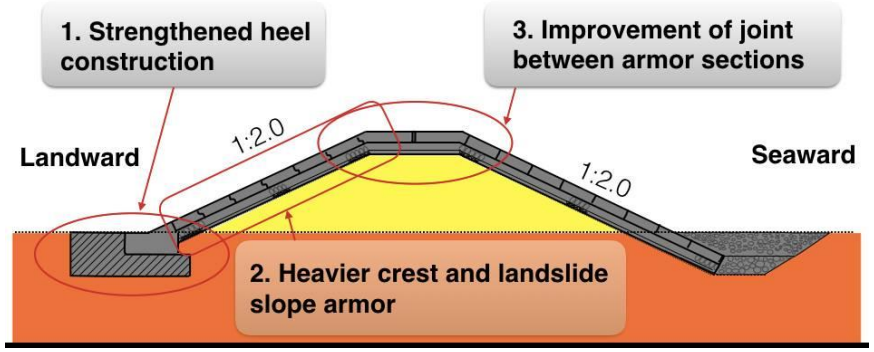
Level 1

Level 2:
Low frequency (200-1,000 years) but very high tsunami.
Forget about properties but secure evacuation routes for safe evacuation.
Coastal structures should be strong enough even in case of the overtopping.



Level 2





Source: http://www.bousai.go.jp/kaigirep/chousakai/tohokukyokun/4/pdf/2-2.pdf

Elevated Roads, Highland Residence

Elevated Roads in Sendai

Source: https://www.japan.go.jp/kizuna/2023/01/promoting_the_bosai_spirit.html

Related reference: https://www.reconstruction.go.jp/10year/en/photo.html

Highland residence in Toni-Hongo, Kamaishi

Source: https://www.adrc.asia/acdr/2020_tsunami/documents/ppt/1st_Dr_Anawat.pdf

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