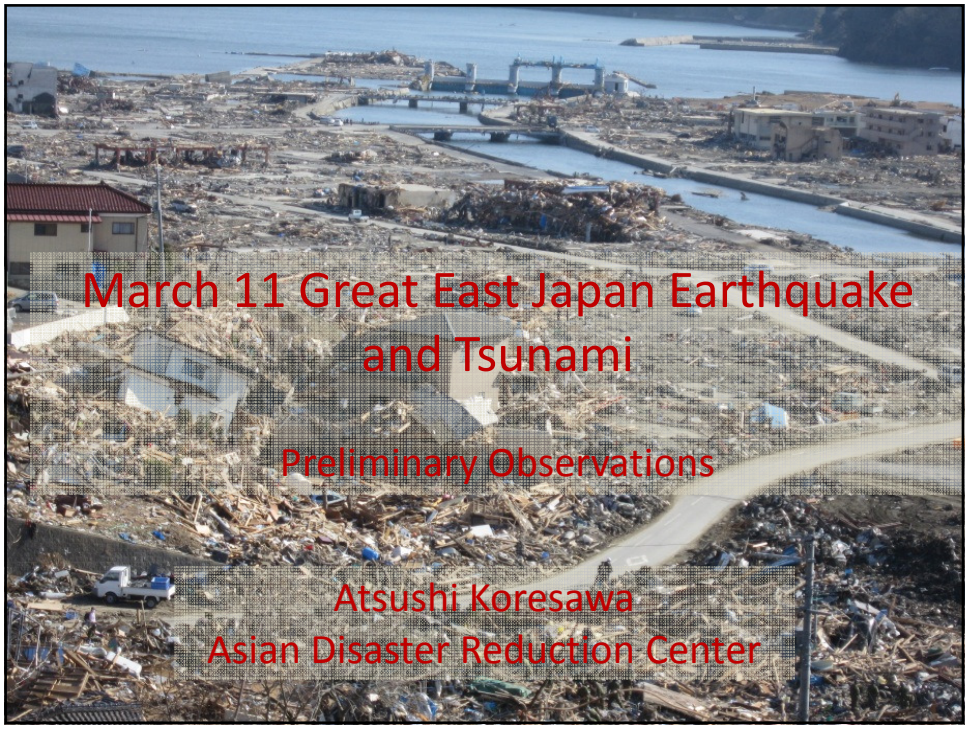


March 11 Great East Japan Earthquake and Tsunami

Preliminary Observations

Atsushi Koresawa
Asian Disaster Reduction Center

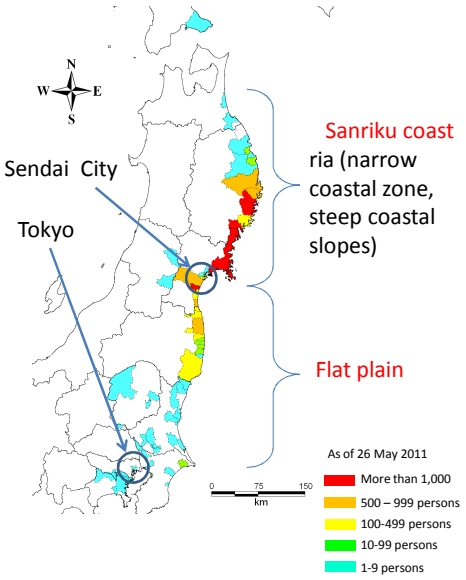
What is tsunami?

津	波
tsu	nami
↓	↓
harbor	wave

Casualties and Damages

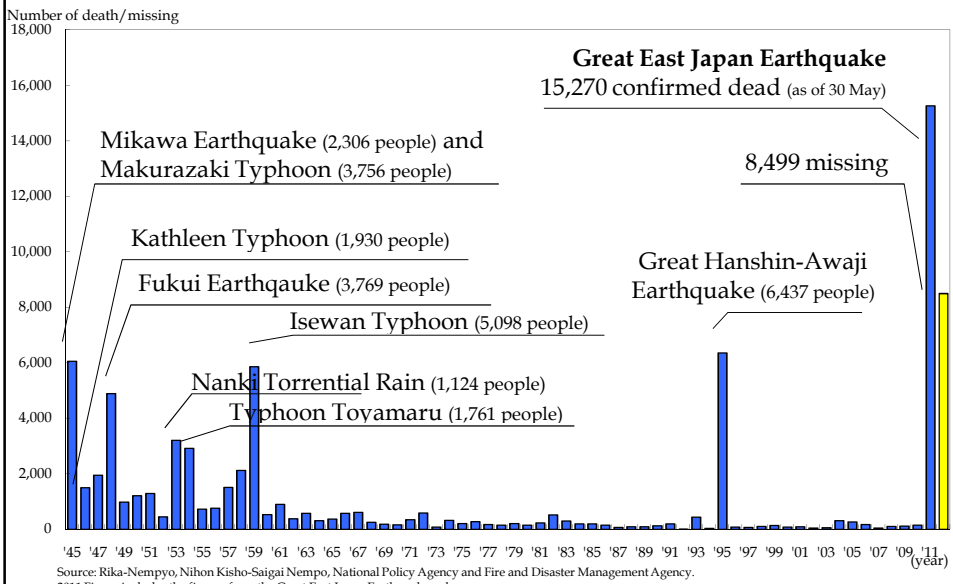
As of 6 June 2011

- 15,373 people confirmed dead and 8,198 people missing
- 111,044 buildings completely destructed, approx. 400 thousand buildings half or partially destroyed
- 561 square kilometers inundated
- Damages to stock in 7 prefectures estimated: 16 – 25 trillion JPY
  - c.f. Hurricane Katrina 125 billion US$
    Kobe earthquake 100 billion US&



Source: Cabinet Office (data taken from the webpages of prefectural governments and the National Policy Agency)

The Death Toll Diminishes Past Disasters



Source: Rika-Nempyo, Nihon Kisho-Saigai Nempo, National Policy Agency and Fire and Disaster Management Agency.
2011 Figure includes the figures from the Great East Japan Earthquake only.

Entry Points

The Sanriku coast is known to be most vulnerable to tsunami and most advanced in terms of tsunami prevention and preparedness.

Prevention and preparedness systems and tools: Were they effective?

- Structural measures (breakwaters, seawalls, dykes, evacuation routes, evacuation sites, tsunami shelters, etc.)
- Non-structural measures (tsunami education, people's awareness, exercises, hazard maps, etc.)

Warning system to alert people and prompt their evacuation (from JMA to people through different channels):

- Did right information reach people right in time?
- Why some people escaped safely but others failed to do so?
- Were vulnerable people (the elderly, children physically handicapped, etc.) disproportionately affected?

Entry Points

Did experiences and lessons learned from the past remain useful and effective?

- relocation of settlements on higher ground
- People's behavior to respond to an earthquake and tsunami:

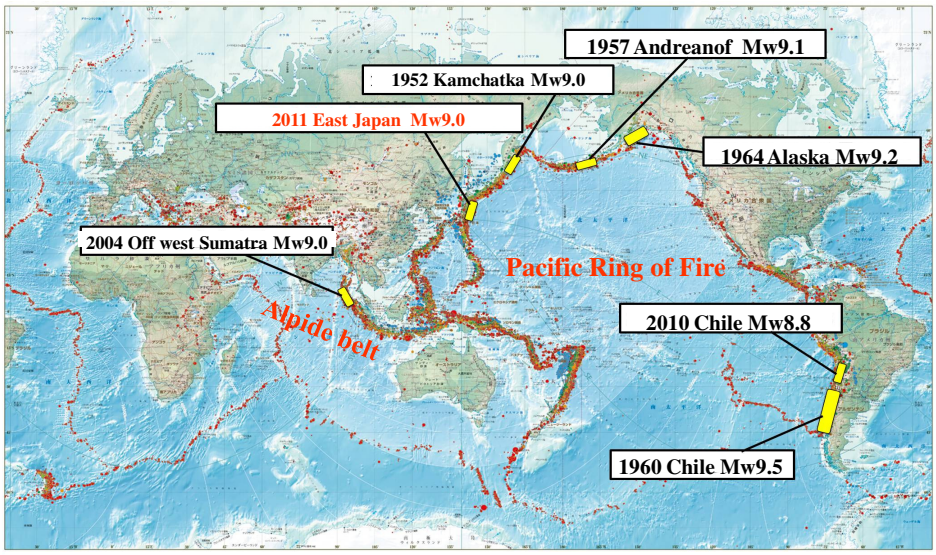
How and why did "sequential crisis" and "synchronous failures" happen?

- Fukushima nuclear power plant accident,
- interrupted supply chains, power shortage, network and transportation disruption, and widespread socioeconomic impacts

How will those gaps be addressed in recovery and reconstruction phases?

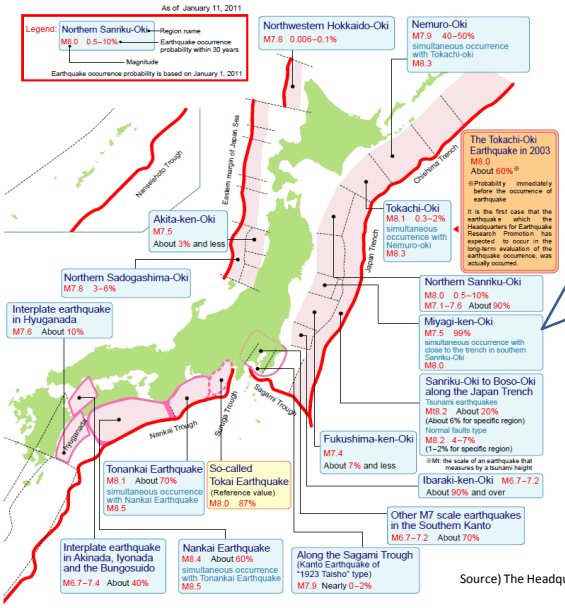
How will the entire system of disaster/emergency management be improved at each level of government, the private sector, local communities?

Seismicity of the world



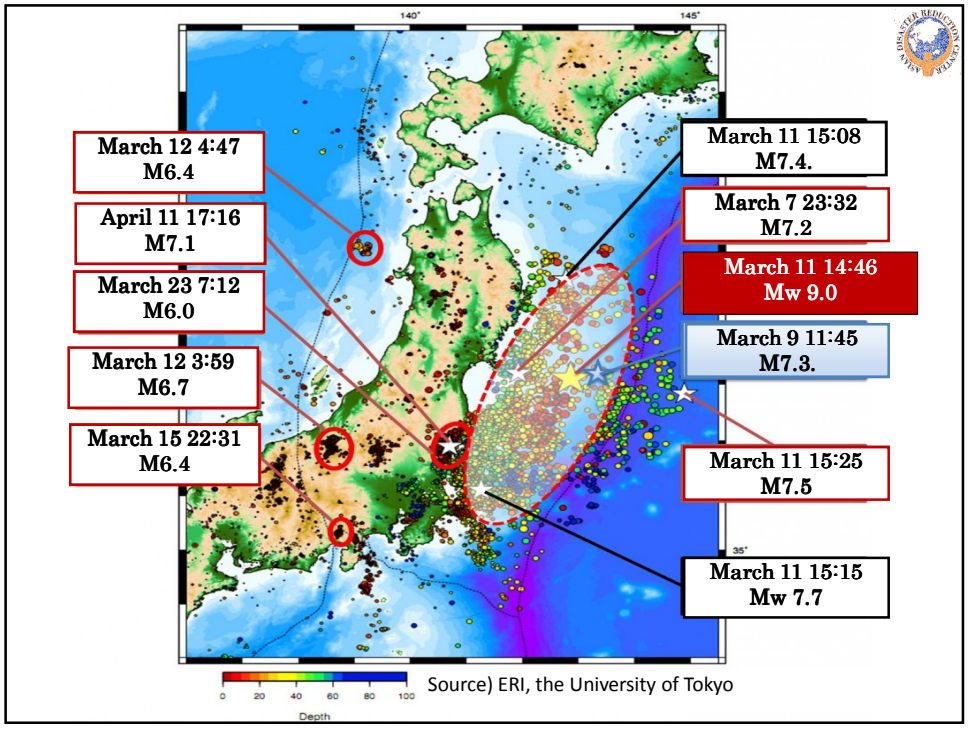
Source) ERI, University of Tokyo

Evaluation of subduction earthquakes



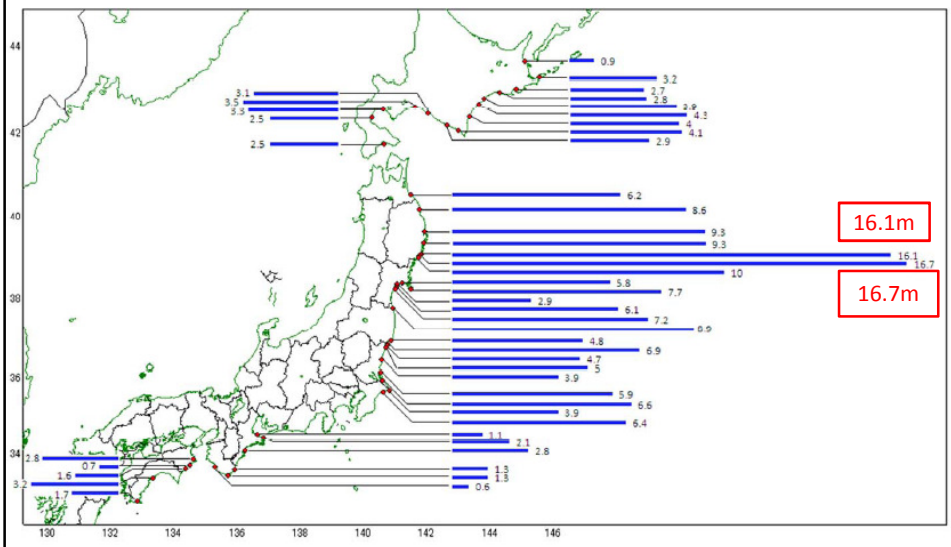
Miyagi-ken-Oki
M7.5 99%
simultaneous occurrence with the trench in southern Sanriku-Oki
M8.0

Source) The Headquarters for Earthquake Research Promotion



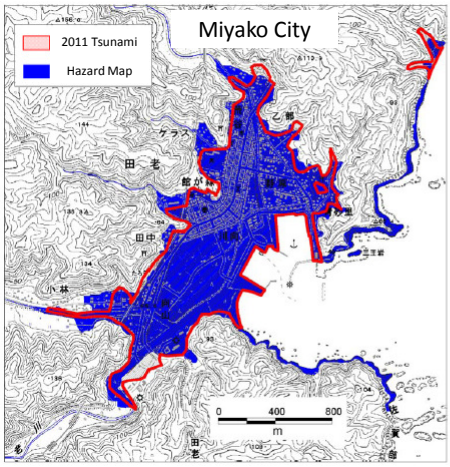
Source) ERI, the University of Tokyo

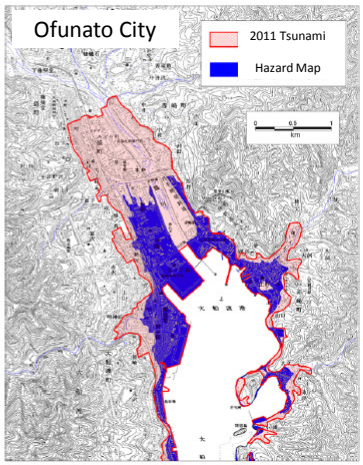
Tsunami heights observed



Source: Central Disaster Management Council

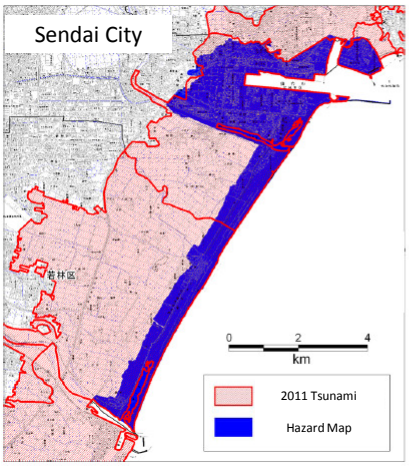
Inundation area and hazard map

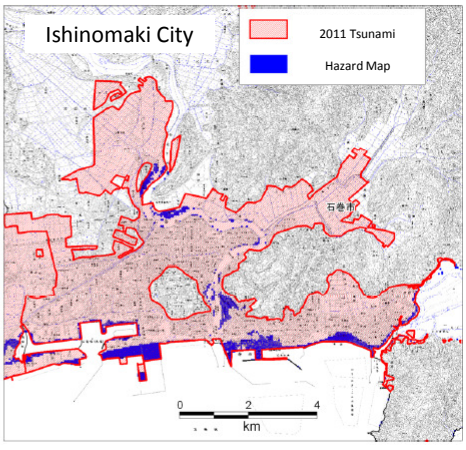




Source: Central Disaster Management Council

Inundation area and hazard map



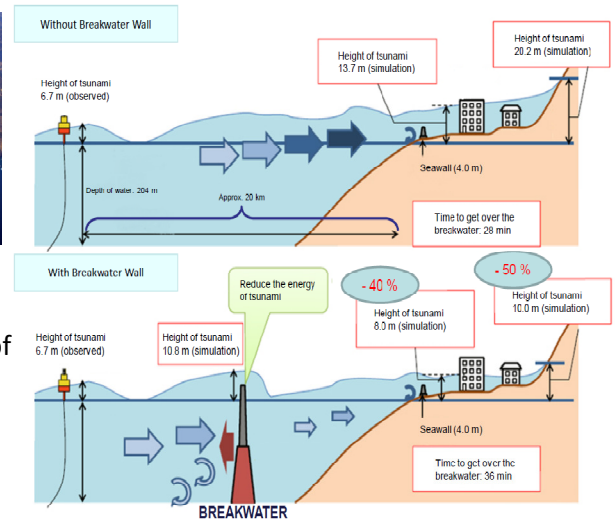


（出典）・東北地方太平洋沖地震浸水範囲・国土地理院資料より作図

Source: Central Disaster Management Council

Structural measures
seawall, dyke, breakwater

Breakwater



It has been reported that breakwater at the mouth of Kamaishi Bay delayed the arrival of and reduced the forces of tsunami waves greatly.

Structural measures
Minami-Sanriku Town, Miyagi Prefecture

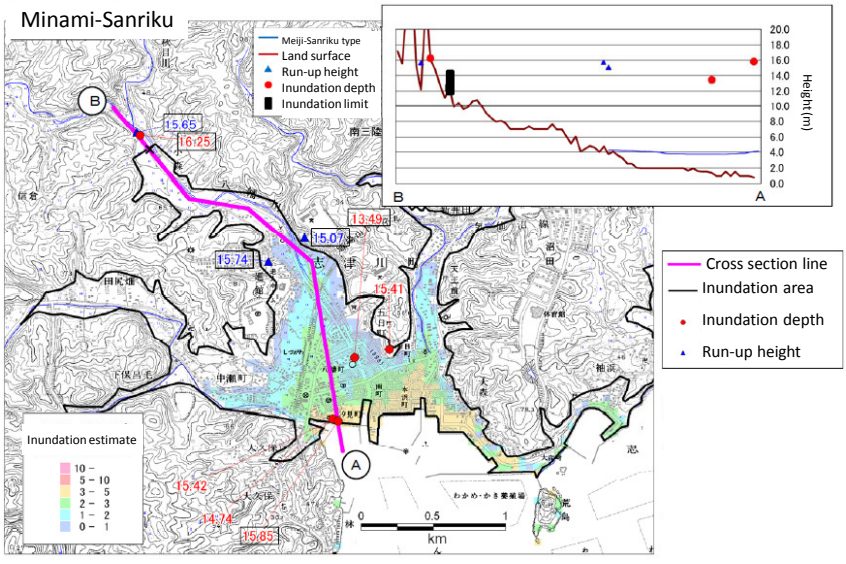
Tsunami reached the fourth floor of the buildings below. The building on the right is situated right beside the sea, but all the residents in this building escaped safely: some went to somewhere higher ground and other to the rooftop. This building was designated as tsunami shelter.

Minami-Sanriku Town Disaster management Center

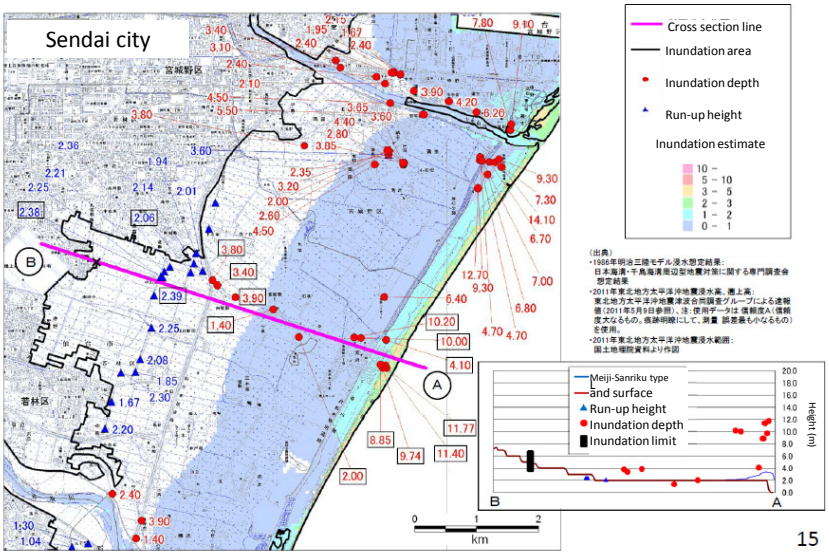
Source) Minami-Sanriku Town

http://mainichi.jp/select/weathernews/20110311/news/20110523k0000m040123000c.html

Inundation height and run-up height in Minami-Sanriku Town



Source: Central Disaster Management Council

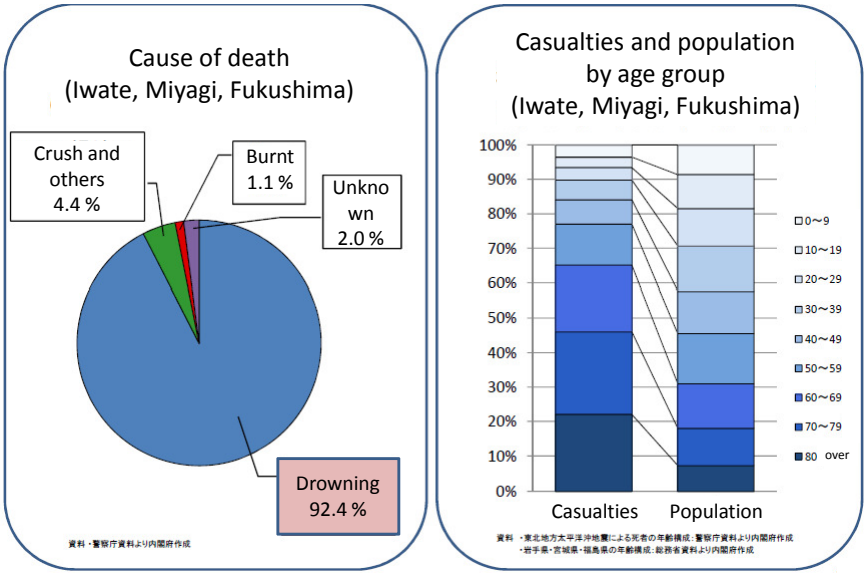


Source: Central Disaster Management Council

Almost all primary and junior-high school students, approximately 3,000 students of 14 schools, in Kamaishi city escaped from tsunami safely thanks to pre-disaster education and exercises.

http://sankei.jp.msn.com/life/news/110413/edc11041314070001-n1.htm

Human casualties



Source: Central Disaster Management Council

International Expert Group Meeting

Objectives

1) to provide valuable advice, based on experiences gained from large-scale disasters in the world, to Japanese experts working for recovery and reconstruction in Japan, and;
2) to gain precious lessons from painful disaster experiences in Japan and to make them useful for disaster risk reduction in other countries.

Organized by:

ADRC, IRP, UNHABITAT, UNESCAP, UNISDR, World Bank, Cabinet Office and Ministry of Land, Infrastructure, Transport and Tourism (Government of Japan), Hyogo Prefecture

Participants:

ILO, UNOCHA, UNEP, JICA, FEMA (USA), PMD (Pakistan), Indonesia (Former BRR Deputy), Earthquake Administration (China), etc.

Programme:

29-30 May: Visit to Tsunami-hit areas
31 May: Expert Group Discussion in Tokyo





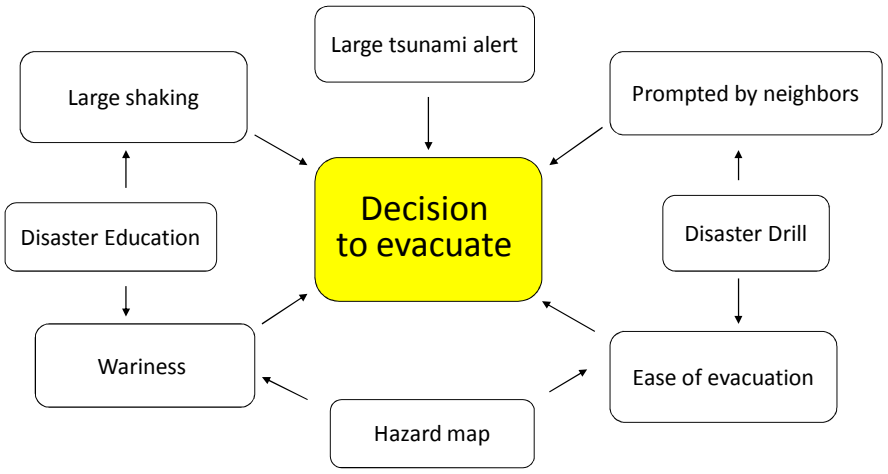






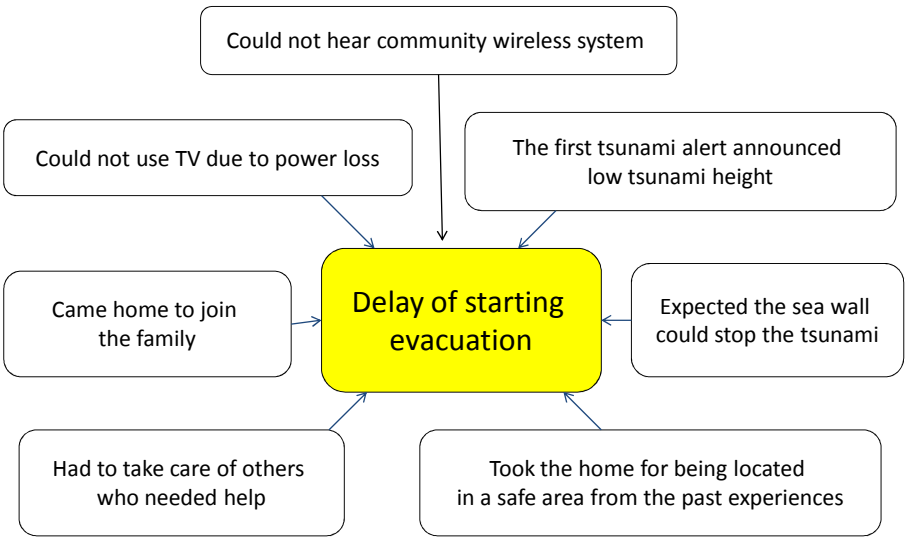
w Does FEMA Assist Communities to Recover from Disasters?
United States, each state has responsibility for disaster
onse and recovery. In a major disaster, the federal
rnment provides assistance at the request of the
rnor of the state.
ane Katrina affected many states, primarily Louisiana,
nippi and Alabama. Each state works with the local
rments and federal government on recovery issues.
FEMA


Factors of evacuation decision making



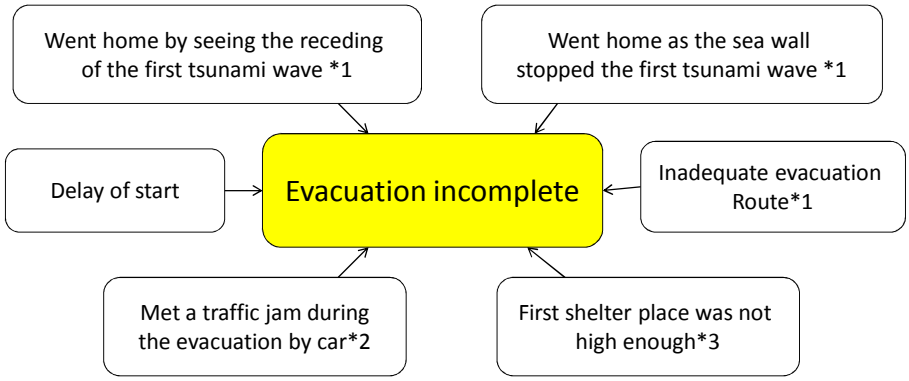
Courtesy) Yozo GOTO, ERI, the University of Tokyo

Factors to delay the start of evacuation



Courtesy) Yozo GOTO, ERI, the University of Tokyo

Factors of evacuation incomplete



*1 From the witnesses in Yamada-machi
*2 63.4% of evacuees took cars for evacuation and 36.6% were trapped by traffic jams.
(Prof. Seki of Toyo Univ. http://www.47news.jp/news/2011/05/post_20110523172902.html)
*3 56% of the first shelter places were washed by the tsunami.
(Higashi Nippon Broadcasting Co.,Ltd. http://www.surece.co.jp/src/press/backnumber/20110428.html)

Courtesy) Yozo GOTO, ERI, the University of Tokyo

ADRC in cooperation with its partners will continue to work on the Great East Japan Earthquake and Tsunami, and will report to you in the near future.

Thank you for your attention