Great East Japan Earthquake

(GLIDE: EQ-2011-000028-JPN)

Update on damage and recovery (2nd report)

April 6, 2011

Asian Disaster Reduction Center（ADRC)

International Recovery Platform (IRP)

Update

- ✓ It has been nearly four weeks since the “Great Eastern Japan Earthquake” (official name of the March 11 earthquake and tsunami) devastated numerous small towns and communities along the Pacific coast of northeastern Japan. Record, as of April 4, shows 12,344 people dead and 15,237 people missing. These figures may still change in the next few days.

- ✓ About 163 thousand displaced people, staying at the evacuation centers, are still under harsh living conditions. Some of them are temporarily moving to less disaster-affected areas. Recovery and rebuilding in disaster-affected areas has been progressing. In Rikuzen-Takata city of Iwate Prefecture, 36 temporary housing units were completed on March 31 since it first started on March 19. Currently, about 4,000 temporary housing units are being constructed, which is much lesser than required number. The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has been cooperating with disaster affected prefectures and housing companies to further provide the necessary temporary housing units to the displaced people.

- ✓ Massive amounts of debris are still blocking the roads in affected areas, hampering the delivery of assistance to some evacuation centers. Removal or cleanup of debris remains an imminent issue.

- ✓ Government at different at levels has started preparing appropriate measures for full-scale recovery and rebuilding, including the first supplementary budget proposal and bills to be submitted to the Diet (Parliament) shortly.

Profile of the Great Eastern Japan Earthquake

Date and Time:
11 March 2011 at 14:46 JST (5:46 GMT)

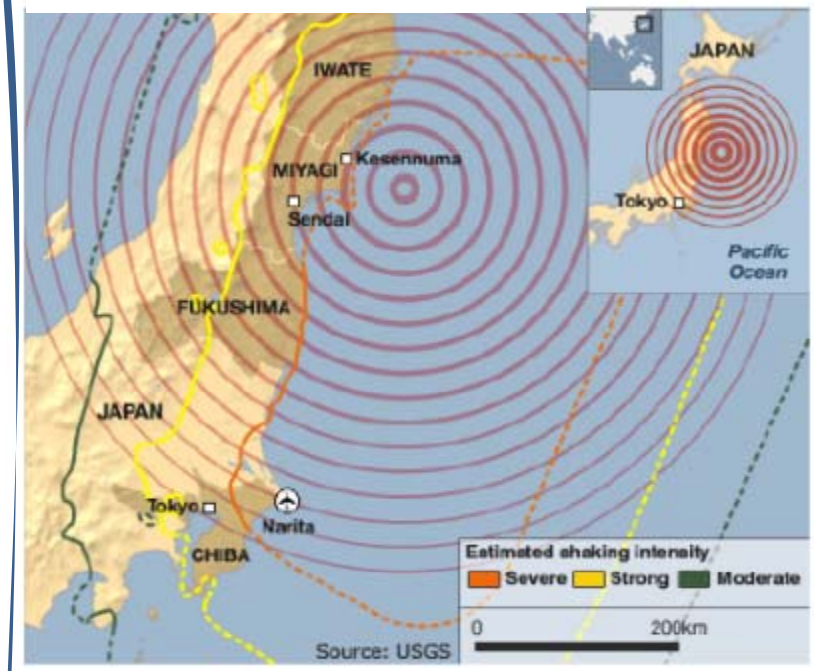
Type of earthquake:
Plate-boundary thrust-faulting earthquake on or near the Japan Trench subduction zone

Hypocenter:
130km off the Pacific coast of Tohoku region (38°N, 142°E), 24km depth

Magnitude:
9.0 (interim value, the largest in Japan and the 4th largest in the world)
c.f. 1960 Chile Earthquake M9.5
1964 Alaska Earthquake M9.2
2004 Sumatra Earthquake M9.2

Damage:
The destruction of social infrastructure, housing and corporate facilities is estimated to cost between 16 and 25 trillion yen (Cabinet Office)

Areas affected by the quake



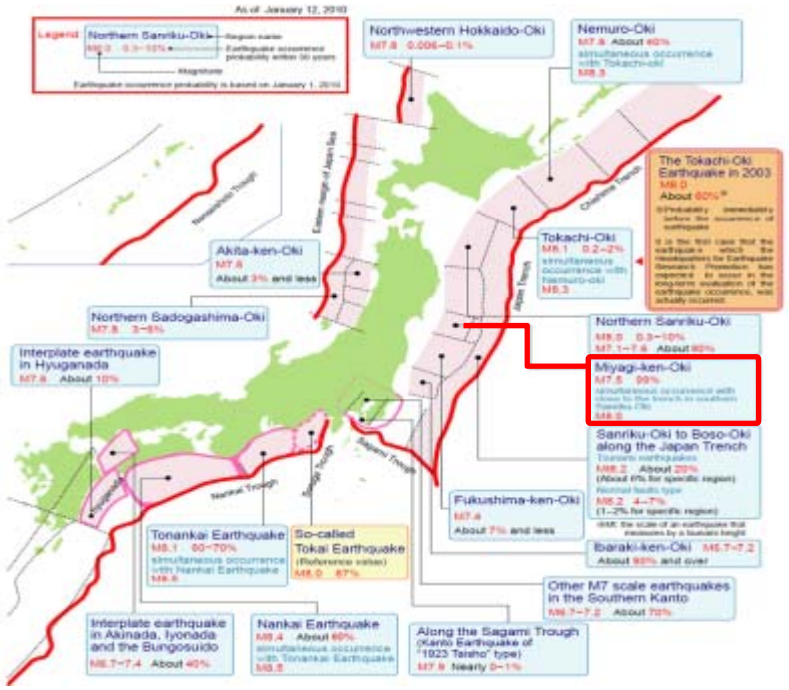
Source: OCHA Situation Report No.1

Profile of the Great Eastern Japan Earthquake

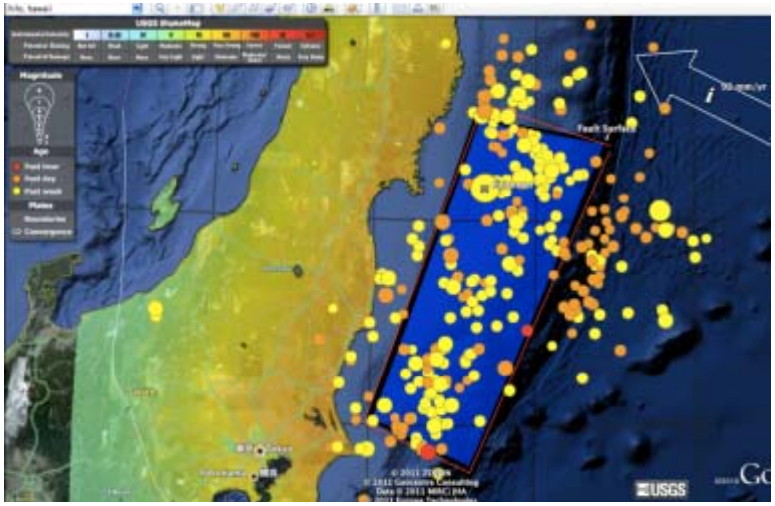
- ✓ The areas hit by the Great Eastern Japan Earthquake are known to be vulnerable to tsunami, as they were recurrently hit by tsunami. Large offshore earthquakes occurred in the same subduction zone in 1611, 1896, and 1933. Each of earthquake caused devastating tsunami on the coast.

- ✓ Large inter-plate earthquakes had been predicted to occur in this region with 99% probability within thirty years and the magnitudes ranging from M7.5 to M8.0.

- ✓ The March 11 earthquake was much bigger than predicted, recoding M9.0 and the rupture zone stretched 500 km length and 200 km width. It is the 4th strongest ever recorded in history around the world. Some experts say that the occurrence of this kind of earthquake and tsunami is by one thousand return period.



Source: The Headquarters of Earthquake Research Promotion



Source: USGS

Casualties

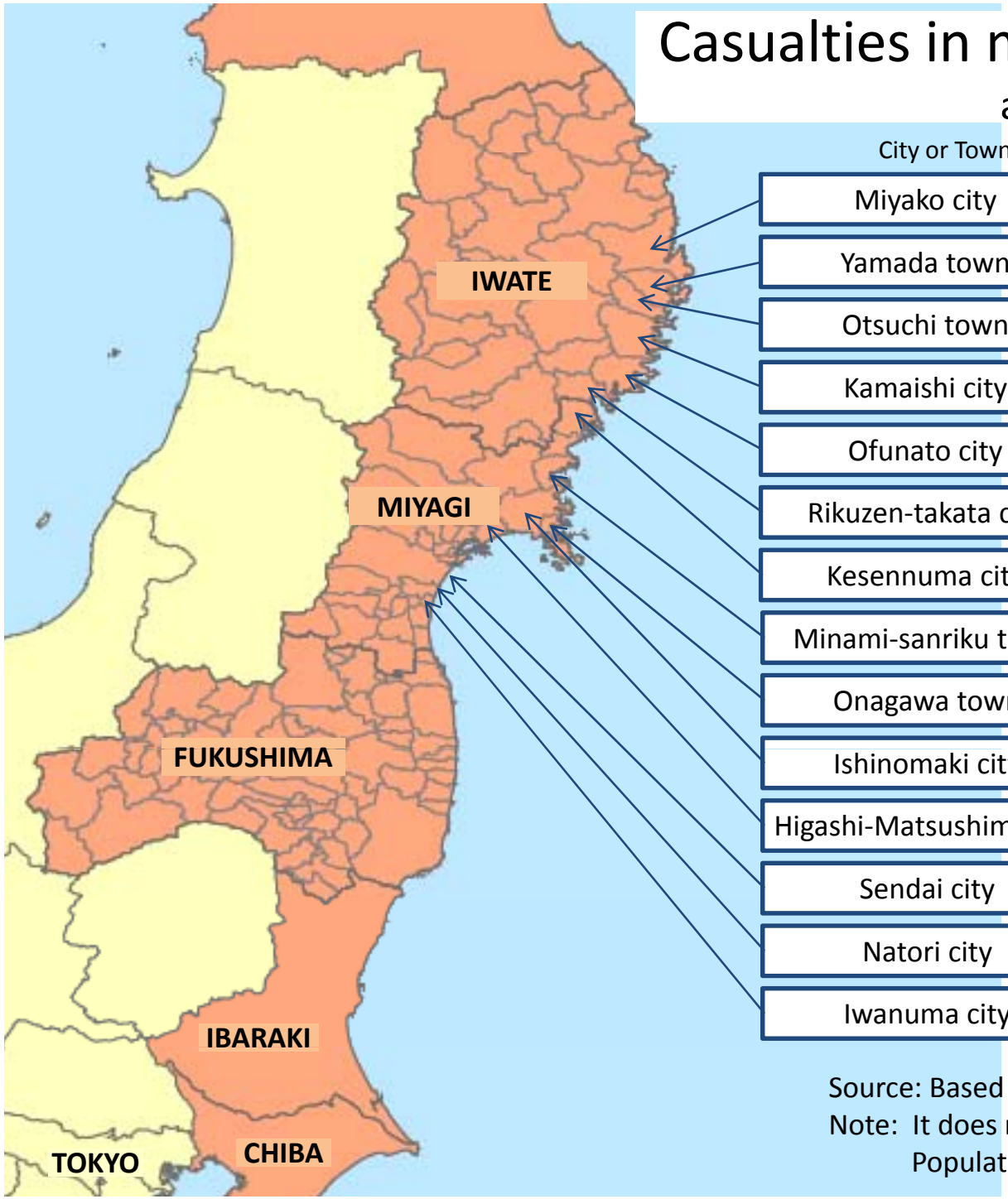
by Prefecture (as of April 5)

The number of casualties continues to rise. The Government has confirmed 12,344 people have died. It has already exceeded that of the 1995 Great Hanshin Awaji (Kobe) Earthquake. The number of people who are missing covers only those who have been reported to the police by their families or acquaintances. However, it is likely that there are still thousands of people missing in most severely affected areas, such as Minami-Sanriku town (see next slide), that are not yet counted. The number of evacuees once topped 300 thousand, but it has been decreasing as the situation stabilized and services and utilities and services gradually restored.

As of 17:00 April 5 2011

Prefecture	Killed	Missing	Evacuees
Iwate	3,615	4,444	49,020
Miyagi	7,530	6,312	63,901
Fukushima	1,139	4,477	26,495
Others	60	4	24,191
Total	12,344	15,237	163,607

Source: The Emergency Disaster Response Headquarters

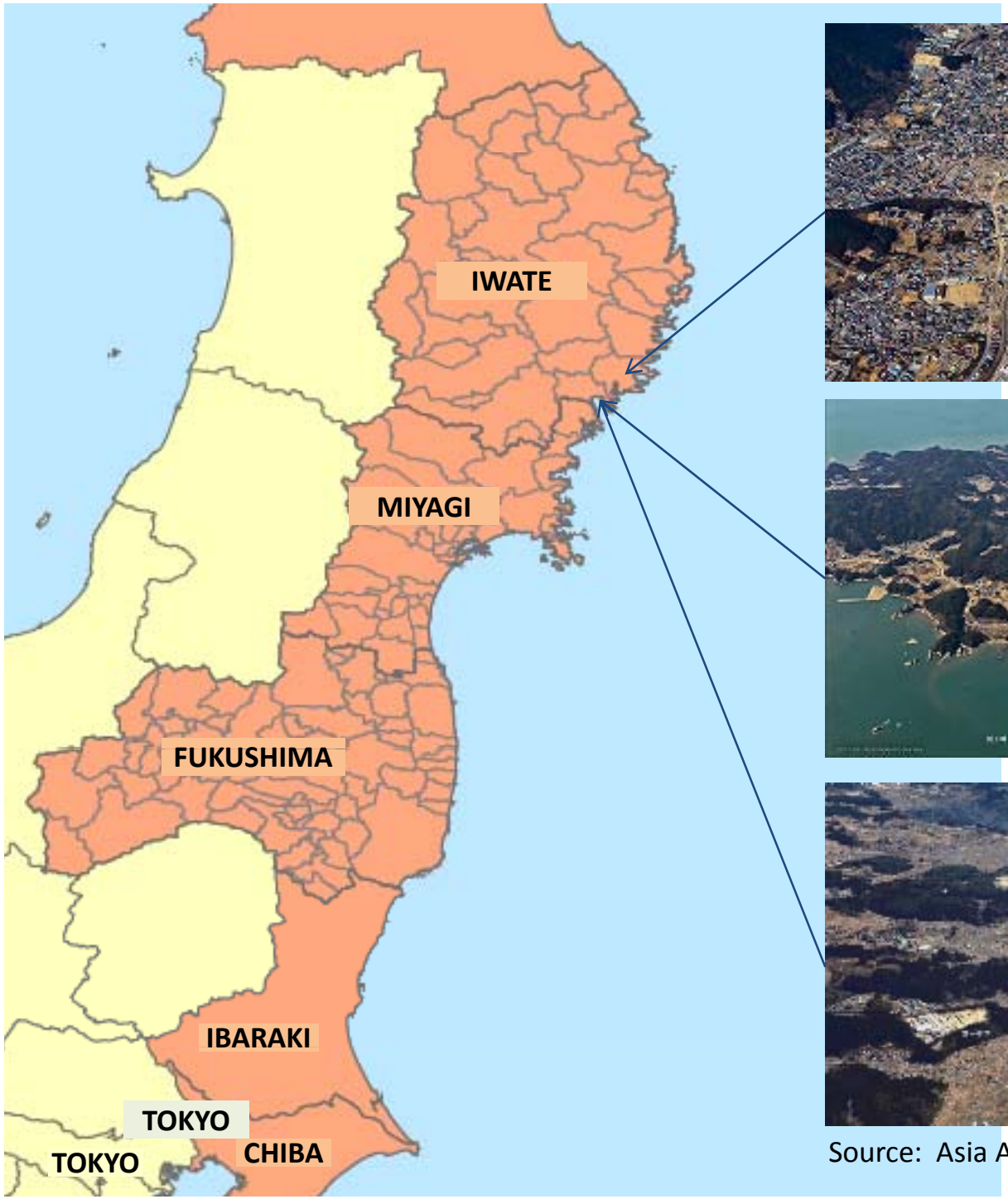


Casualties in major cities and towns

as of April 1

City or Town	Dead	Missing	Evacuee	Population
Miyako city	363	1301	5,301	65,682
Yamada town	456	n.a.	4,347	21,180
Otsuchi town	531	1,066	4,533	17,468
Kamaishi city	655	640	6,203	44,632
Ofunato city	274	237	6,290	43,847
Rikuzen-takata city	1,032	1,278	13,474	26,018
Kesennuma city	600	1,471	12,656	79,675
Minami-sanriku town	360	n.a.	9,390	19,105
Onagawa town	318	851	2,530	11,073
Ishinomaki city	2,341	2,698	20,074	171,107
Higashi-Matsushima city	775	n.a.	7,184	43,785
Sendai city	400	n.a.	4,197	1,001,804
Natori city	744	1,000	1,781	68,343
Iwanuma city	149	141	695	43,602

Source: Based on Mainichi Newspaper
Note: It does not cover all cities and towns.
Population as of April 1, 2010



Ofunato
March 14

Rikuzen-
takata
March 14

Rikuzen-
takata
March 12

Source: Asia Air Survey Co., Ltd.

Kesennuma
March 12

Minami-
Sanriku
March 14

Onagawa
March 13

Source: Asia Air Survey Co., Ltd.

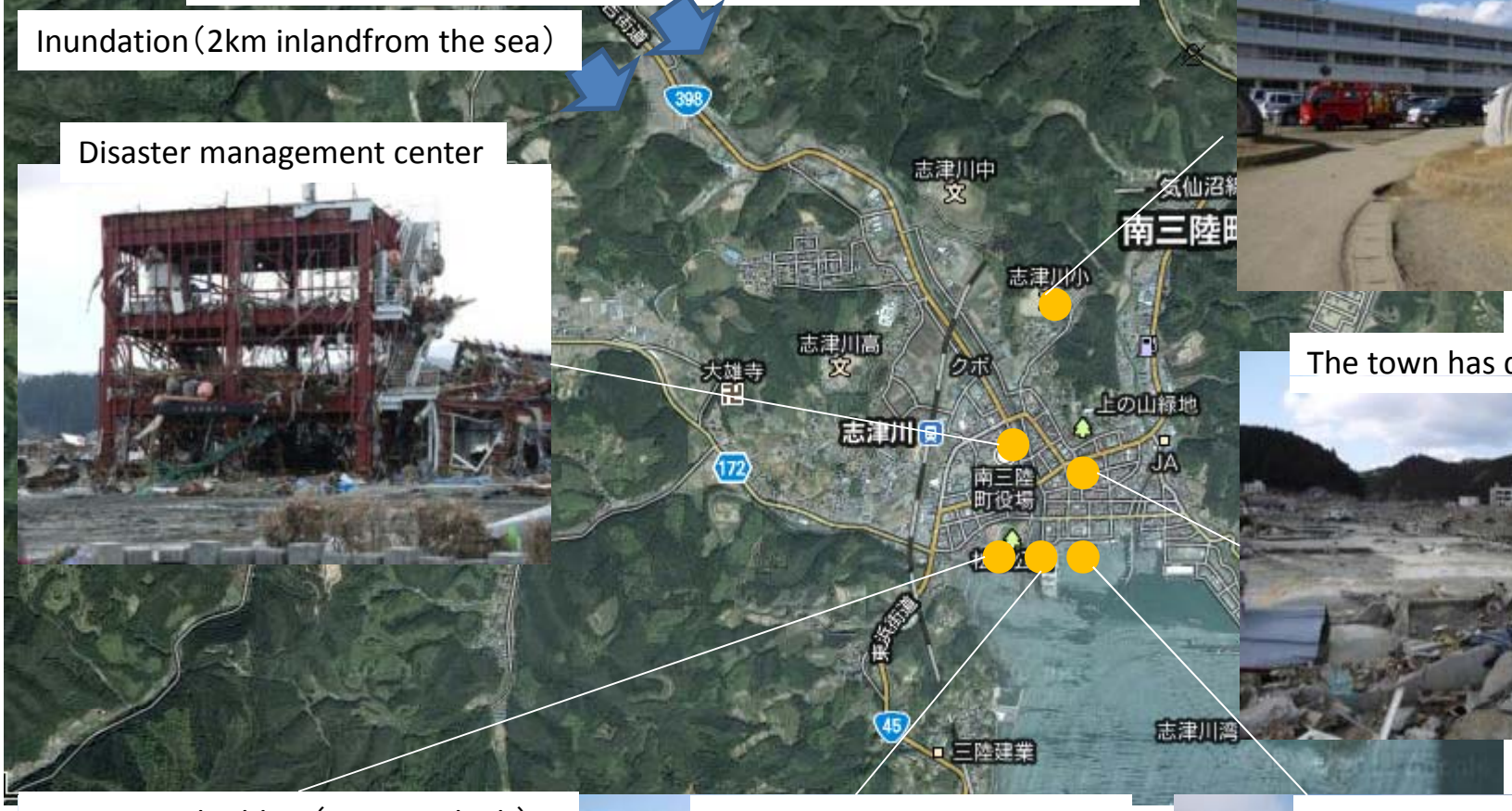
Minami-Sanriku town

Inundation（2km inlandfrom the sea）

Disaster management center

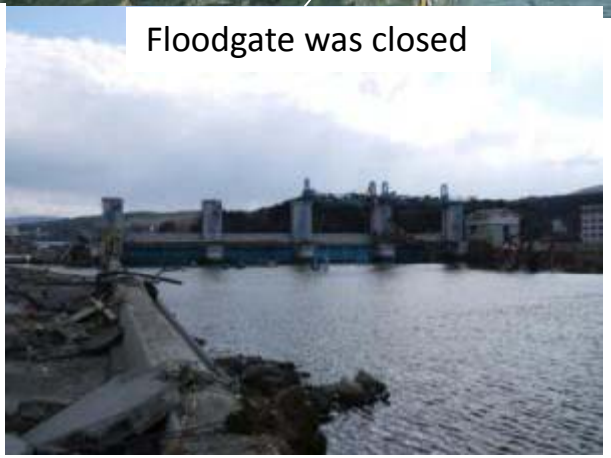
Shizugawa elementary school
on a hill used as an evacuation center

The town has disappeared



Evacuation building（4 stories high）

Floodgate was closed

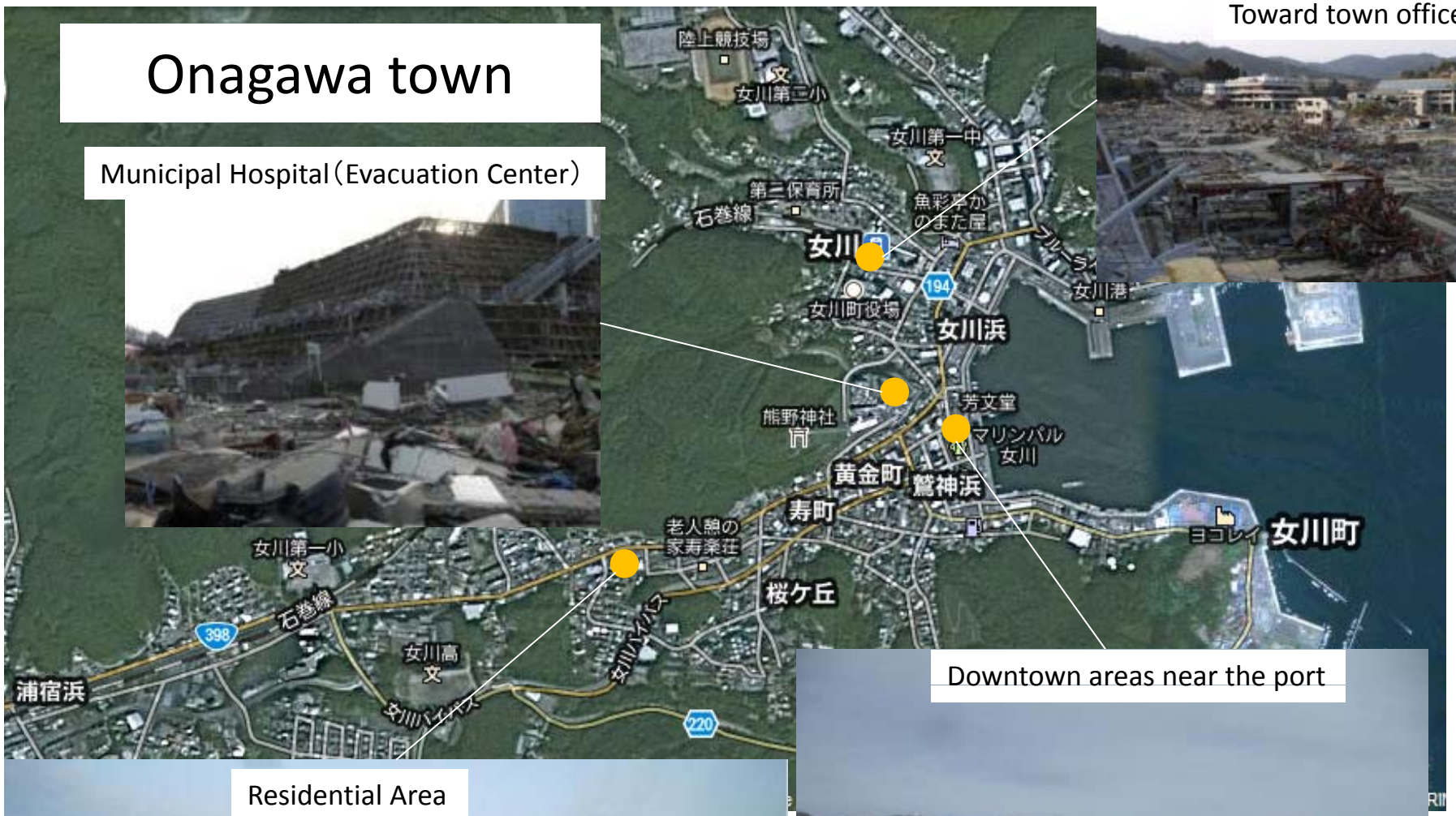


Destroyed Seawalls

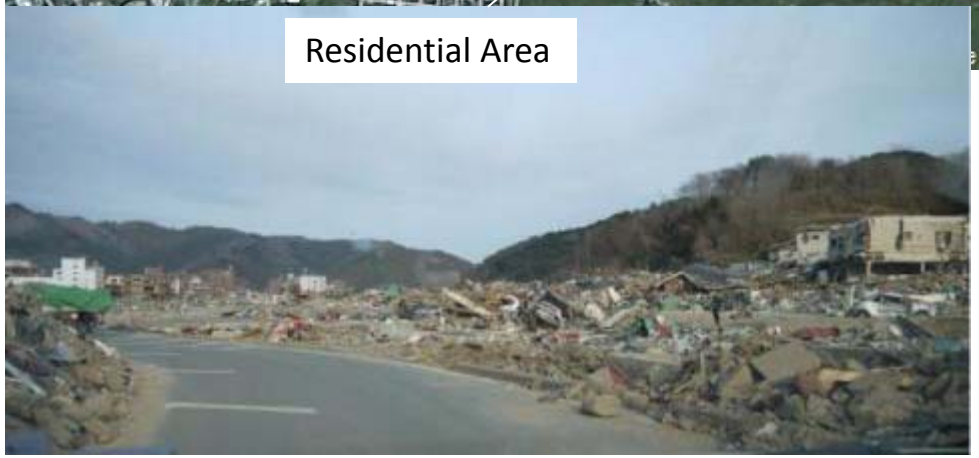
Onagawa town

Municipal Hospital（Evacuation Center）

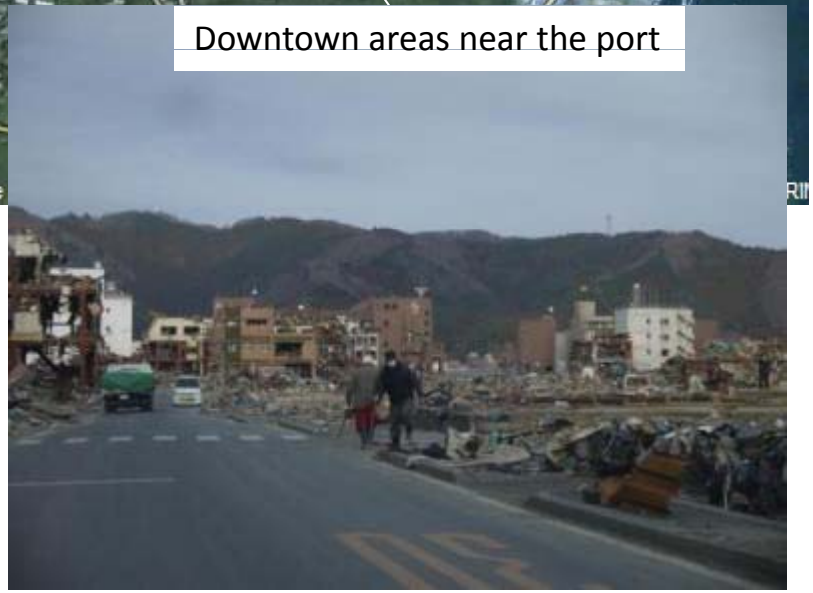
Toward town office



Residential Area



Downtown areas near the port



Ishinomaki
March 12

Sendai
March 13

Natori
March 13

Source: Asia Air Survey Co., Ltd.

Ishinomaki City

Factories destroyed by fire

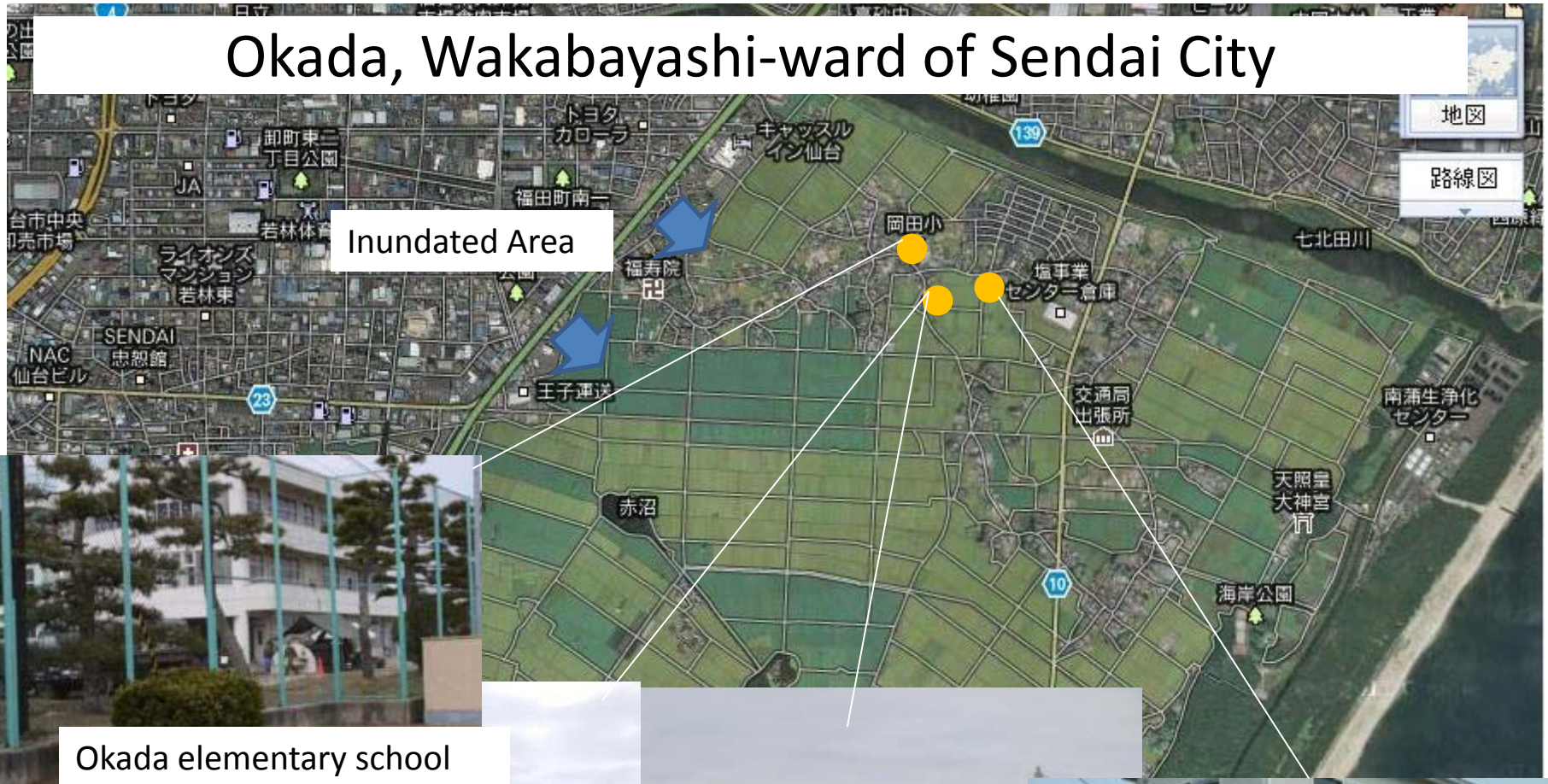
Ishinomaki municipal hospital

Houses on a hill

Houses destroyed by fire

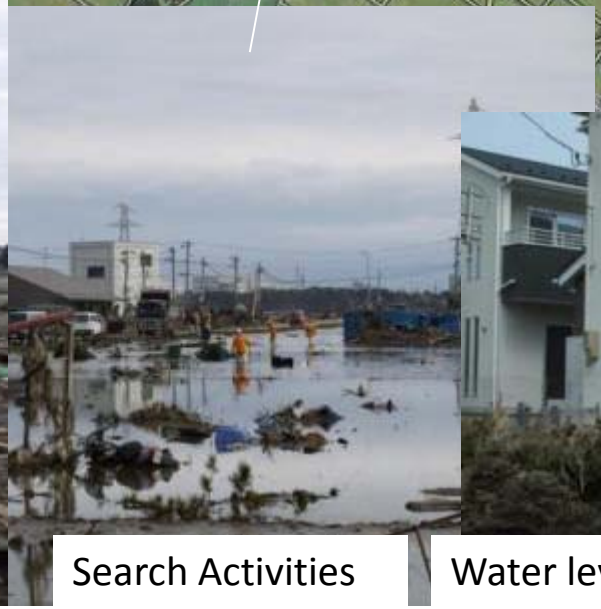
Houses destroyed by tsunami

Okada, Wakabayashi-ward of Sendai City



Okada elementary school
Evacuation center

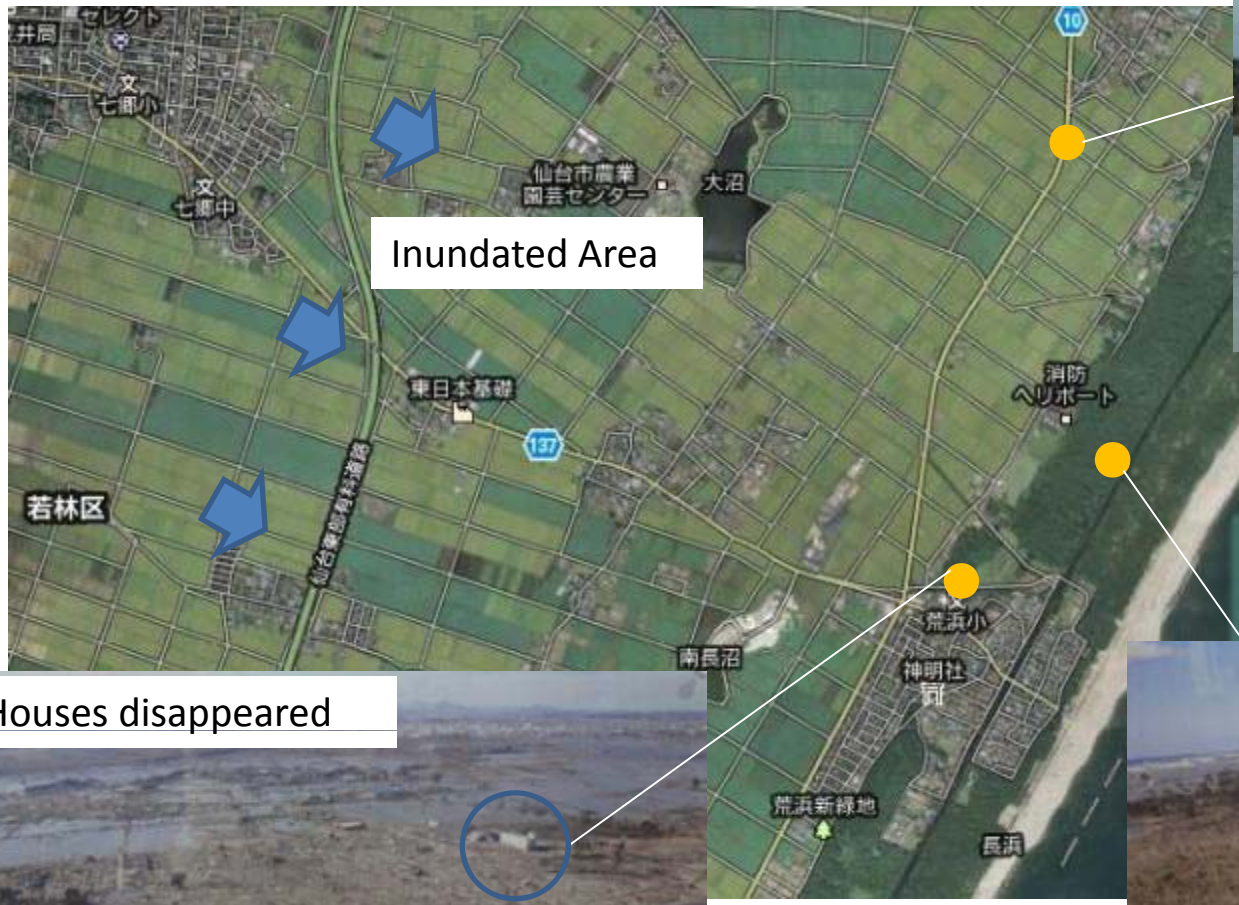
Still inundated



Search Activities

Water level could be 1.5m high

Wakabayashi-ward of Sendai City




Search Activities


Houses disappeared

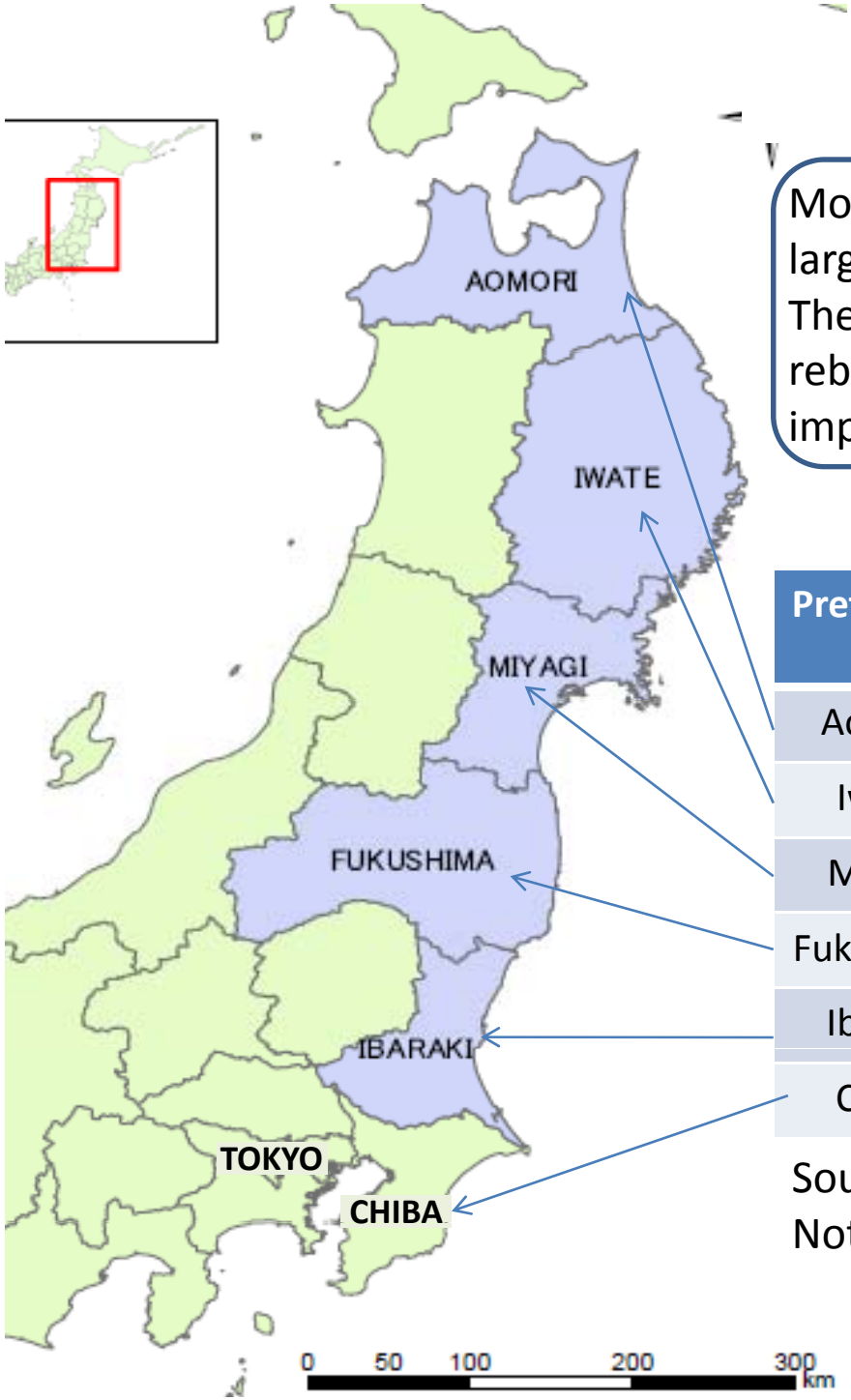
Arahama elementary school
（4-story building）

(Source: Sendai city government)


Windbreak forest swept away

(Source: Sendai city government)

Damage to economic base



Most prefectures, severely hit by the tsunami, depend largely on agriculture and marine product industries. These key industries were badly damaged, and rebuilding these industrial bases is of supreme importance for local economy and job security.

Prefecture	Fishing boats	Fishing ports	Fields (10,000 ㎡)
Aomori	546/6,990	17/92	79/19,680
Iwate	n.a/10,522	n.a./111	1,838/15,649
Miyagi	n.a./9.717	n.a./142	15,002/35,777
Fukushima	896/1,068	n.a./10	5,923/29,461
Ibaraki	249/1,215	15/24	531/21,679
Chiba	335/5,640	10/69	227/4,0826

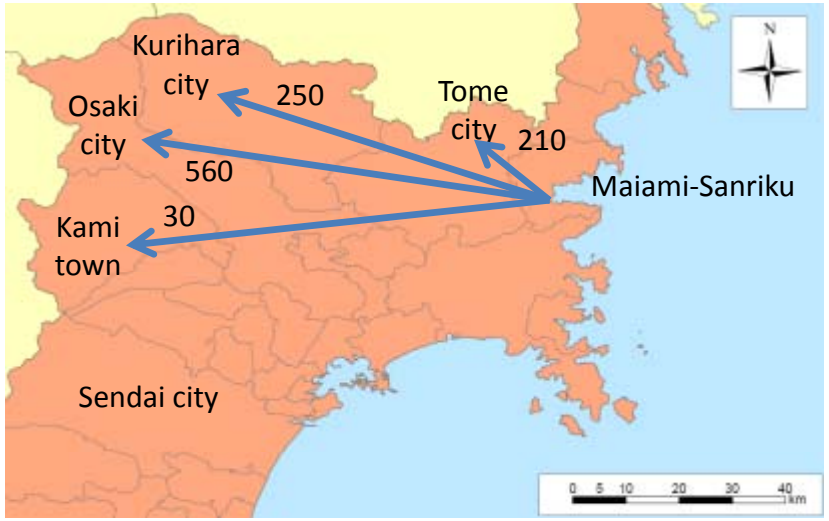
Source: Yomiuri Newspaper

Note: Estimate of damage/total does not cover all disaster-affected prefectures.

Evacuation Center

More than 160 thousand displaced people are staying at evacuation centers such as community centers, schools, and sports stadiums (photo below left). This figure does not cover those who are staying at their homes, in cars, or elsewhere under harsh conditions. Since provision of temporary shelters will take many months and hygienic conditions at the evacuation centers continue to deteriorate, local authorities such as Minami-Sanriku town have started to temporarily relocate some evacuees to other places with better conditions such as hotels and public apartments in less disaster affected areas.

Evacuation center at Shizukawa primary school in Minami-Sanriku town



Source: based on NIKKEI Newspaper

Shelter

On March 14, MLIT requested the Japan Federation of Housing Organizations to construct 30,000 temporary housing units in two months. The construction started in Rikuzen-takata, Iwate Prefecture on March 19 followed by other cities and towns. As of April 5, about 4,216 temporary housing units were being constructed in 43 sites. Considering high demand, the prefectures have increased the number of required temporary housing units. In this regard, MLIT has requested housing companies to construct another 30,000 units in addition to the 30,000 units requested in March.

Typical design of temporary housing. Size is about 30 ㎡ comprising rooms, a kitchenette, a toilet, and a bath. Average cost for one unit is 2 million JPY. Usage is originally planned for two years, but may be extended for one more year.

Source: Yomiuri Online, Japan Prefabricated Construction Suppliers & Manufactures

Debris

The tsunami caused huge amount of debris from collapsed structures, washed away cars, boats, and other materials that have been scattered everywhere in tsunami-hit areas. Debris are still blocking the roads and streets. It has been reported that in Miyagi Prefecture alone, the estimated amount of debris is between 15 and 18 million tons - equivalent to 23 years of waste in usual situation. Moreover, there is a growing concern that debris might cause harmful effects to people's health and environment as the temperature starts rising and rainy season is coming in June.

Cleanup and disposal of debris is complicated because it has to consider many different things such as cars, boats, toxic waste, and items of personal value.

Ishinomaki city

Higashi-Matsushima city

Minami-Sanriku town

Other initiatives of government

✓The government is now preparing some bills, which propose various policy measures and necessary mechanism for full-fledged recovery and reconstruction, to be submitted to the Diet (Parliament). The proposal includes establishing new institutions to be responsible for recovery and reconstruction.

✓Likewise, the government is also preparing a supplementary budget proposal for deliberation to the Diet (Parliament), which is reported to be more than 3 trillion JPY.

✓It is also reported that the government is examining a plan to relocate residents of tsunami-hit areas to higher ground and build new communities, and buying up areas totally devastated by tsunami - as these are not appropriate to rebuild communities.

✓To help local economy pickup, the government is considering a plan that gives preference to local businesses from disaster-hit areas in handing out restoration contracts in the first phase of government emergency employment assistance program, as this helps people affected by the March 11 earthquake and tsunami.

What worked and what did not work

Pacific Sea coast areas of Iwate Prefecture and the northern part of Miyagi Prefecture (Sanriku Coast) are known to be vulnerable tsunami as they had been devastated by recurrent tsunami caused by 1896 Meiji-Sanriku earthquake, 1933 Showa-Sanriku earthquake, and 1960 Chile earthquake.
Various measures, both structural and non-structural, had been taken in those areas to protect people and communities from tsunami . The most notable was the construction of 10m high and 2.5 km long dykes in Taro area of Miyako city, often called as “the Great Wall”, and the world biggest breakwater (8 meter high above sea which is 63 meter deep) in Kamaishi city. The structural measures must have reduced the impact of tsunami, but were found to be insufficient to protect people’s lives this time.

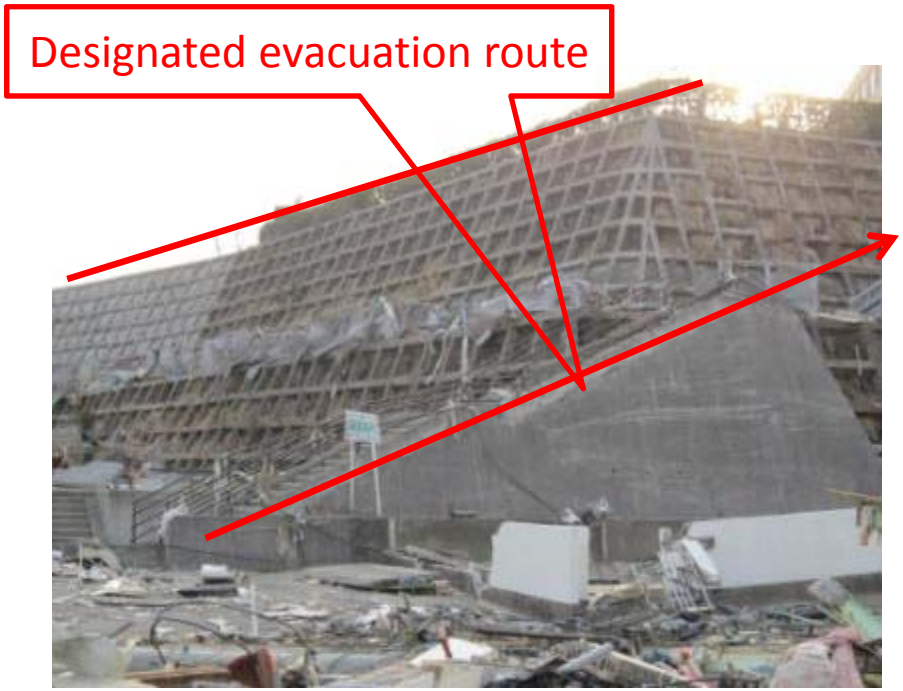
Major earthquake and tsunami that affected Sanriku Coast

earthquake	date	Magnitude	epicenter	People died or missing	Maximum height of tsunami
Meiji-Sanriku	June 15 1896	M 8.2	Off Iwate	21,959 (Only people died)	38.2 (Ofunato city)
Showa-Sanriku	March 3 1933	M 8.1	Off Iwate	3,064	29.3 (Ofunato city)
Chile	May 22 1960	M 9.5	Off Chile in South America	142	5.6 (Miyako city)

Source: Yomiuri Newspaper

Implications to tsunami preparedness

This three-story building (left below) was the disaster management center of the Minami-sanriku town which was also designed to function as a tsunami evacuation building. At the time of tsunami, about thirty municipal officials evacuated to the rooftop but only ten of them survived. A young female official who kept delivering evacuation message to the villagers until the last moment has not been found yet.
A hill just behind the Onagawa port (right below) was designated as a evacuation area. On top of this hill, traces of water were found inside the hospital building indicating that tsunami had reached the top which is nearly 16 meters high.



Implications to tsunami preparedness

At Shizugawa hospital (left below) located near the coast (some 200 meters), there were traces indicating that tsunami had reached the 5th floor, and people at the rooftop deck managed to save their lives. This apartment building (right below), situated near the seashore, was designated as tsunami evacuation building and evacuation signs are indicated. In this apartment, there were traces that tsunami reached the 4th floor. It was generally believed that three-story RC buildings could be designated as evacuation buildings, but these have been found to be insufficient. Media (Yomiuri Newspaper) reported that tsunami waves reached almost one-tenth (123 out of 959) of the designated evacuation sites/centers in both Iwate and Miyagi Prefectures.

Implications to tsunami preparedness

Non-structural measures complement structural measures. Media has reported that measures such as the pre-disaster education and lessons learned from the past disasters helped people escape from tsunami as indicated in the following cases: The pre-disaster education, which had been conducted before the tsunami, guided the pupils at primary and junior high schools in Ishinomaki-city (one of the cities completely washed away) to successfully escape from tsunami. Mizuhama area in Ishinomaki city, total of 380 residents and about 130 households, was completely destructed by tsunami. However, only one person died and eight people reported missing. It has been revealed that people's awareness of what to do at the event of an earthquake and regular conduct of exercises/drills had helped them.

Source: Kamaichi city

ADRC and IRP will continue to work on this disaster and keep updating the information. For inquires and comments, please contact:

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