Tsunami Damage and Recovery of the Sanriku Coastal Area

November 15, 2013

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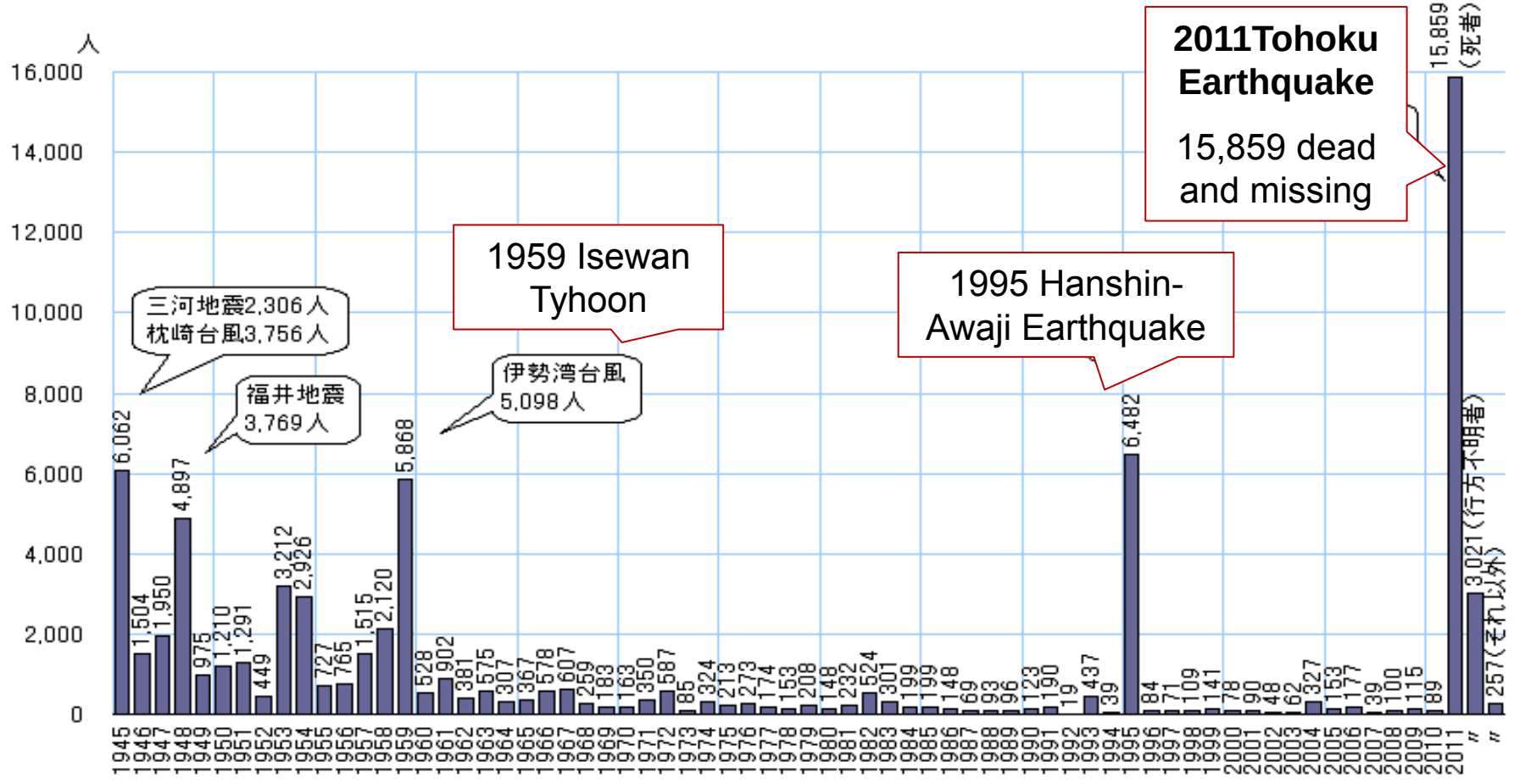
Iwate University

1. TSUNAMI DAMAGE

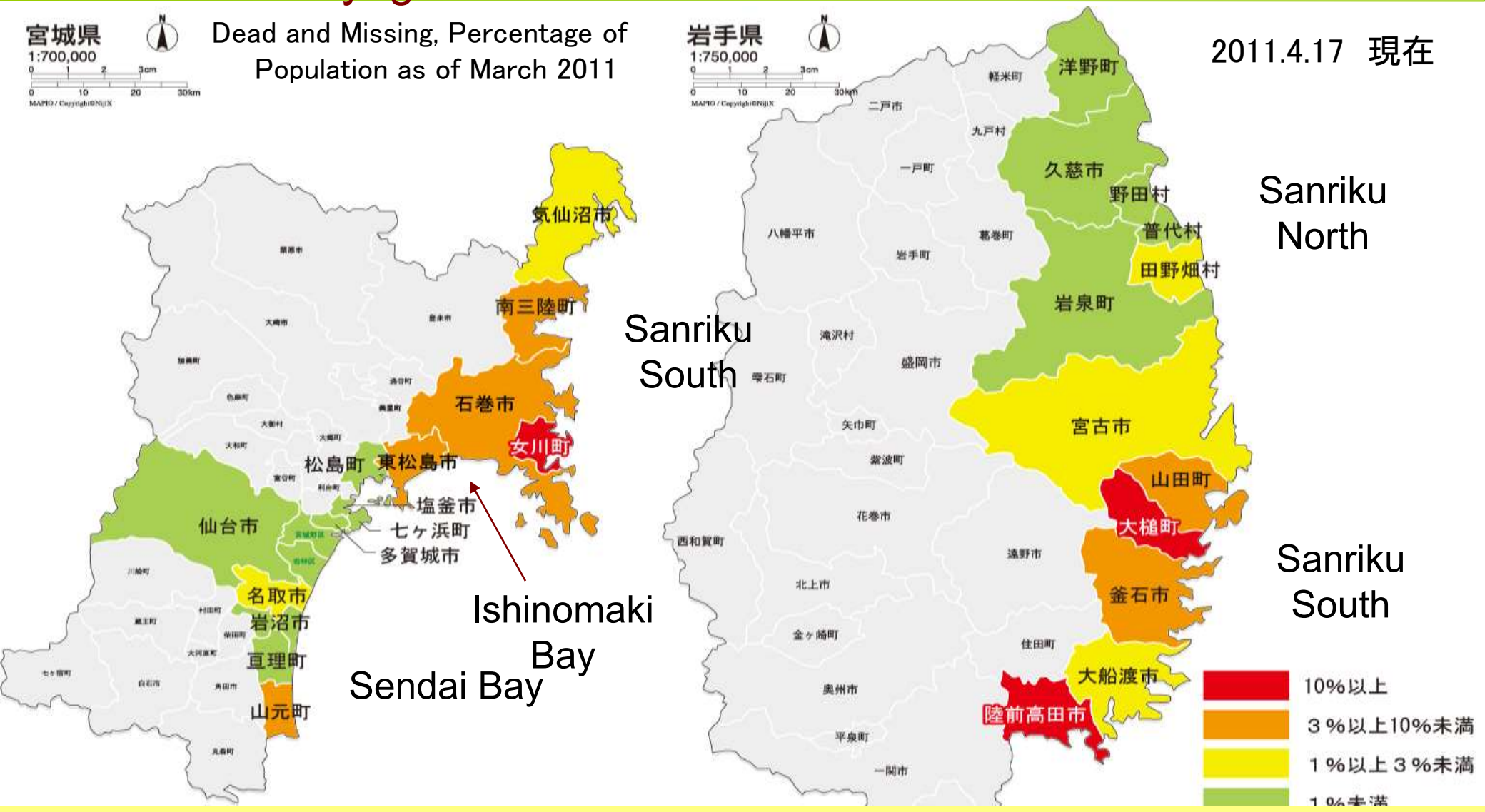
2011 Tohoku Earthquake and Tsunami: the Largest Natural Disaster in Post-War Japan



Number of Dead and Missing, by Post-War Natural Disaster

（資料）平成24年版防災白書
（資料）社会実情データ図録（http://www2.ttcn.ne.jp/honkawa/）

Rate of Dead and Missing, by City, Town and Village
（Iwate and Miyagi Prefectures）

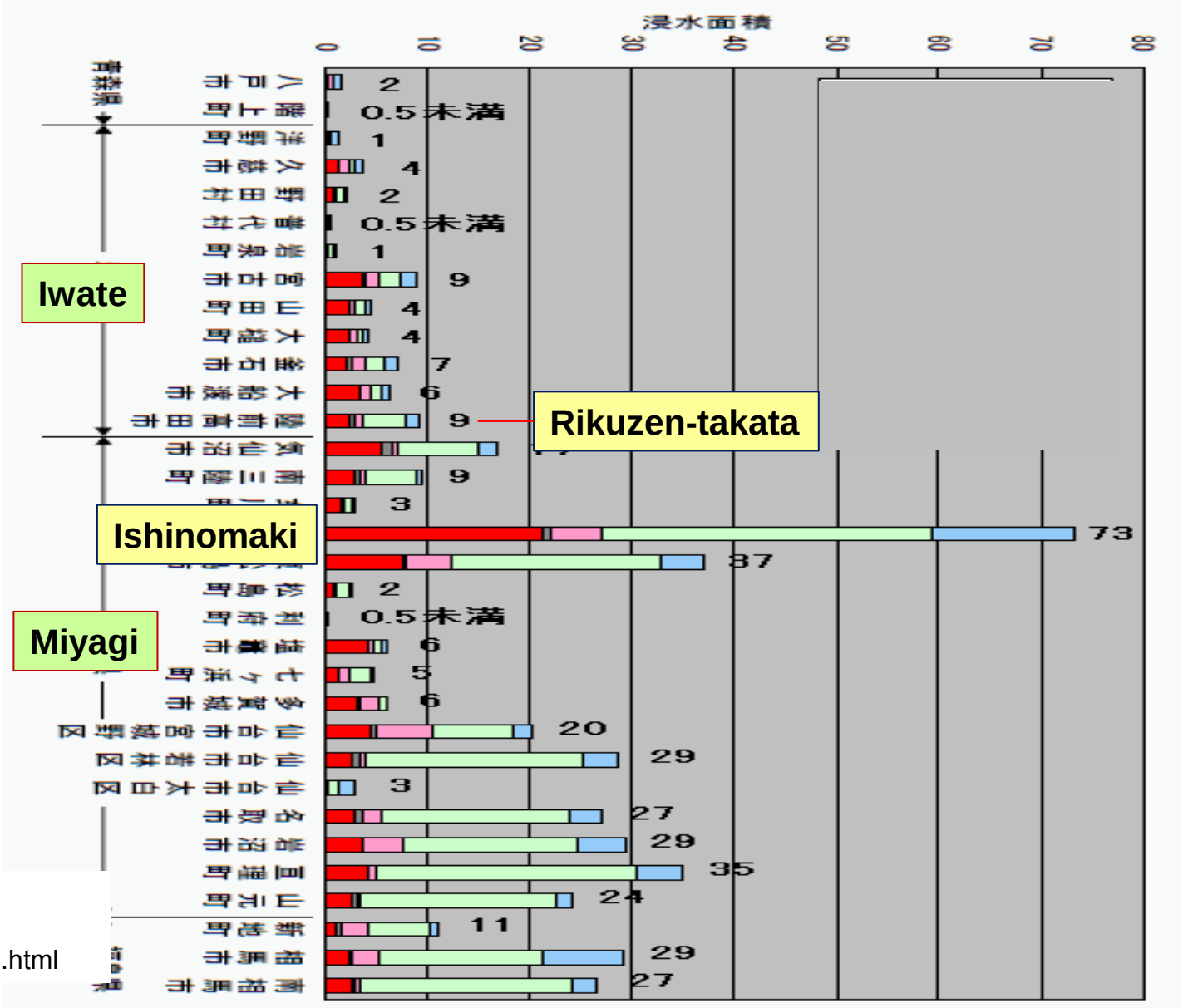


Damage in Southern Sanriku, Especially Serious

Area Flooded by Tsunami (by City, Town and Village)

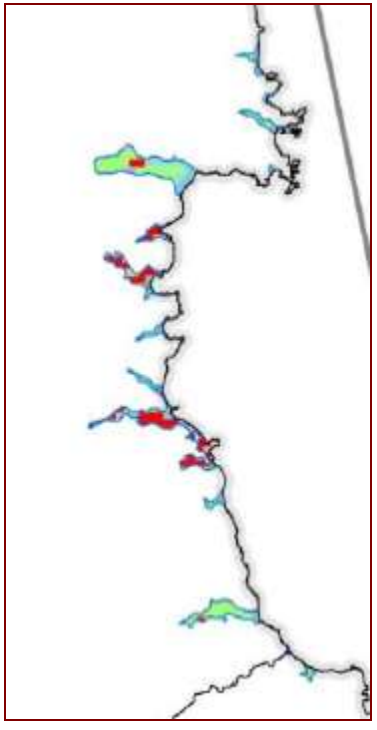
In Iwate, Flooded area was smaller, but the rate of buildings(red) flooded was higher.

In Miyagi, Flooded area was larger, and most of the flooded area was agricultural land(green),.

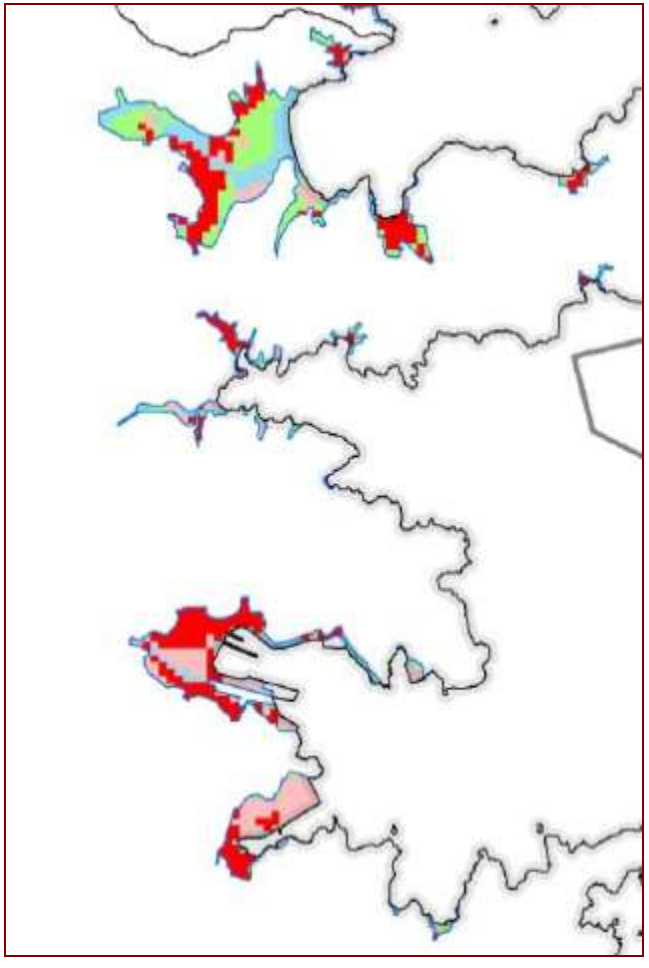


（出所）社会実情データ図録
（原資料）国土地理院
http://www2.ttcn.ne.jp/honkawa/4363d.html

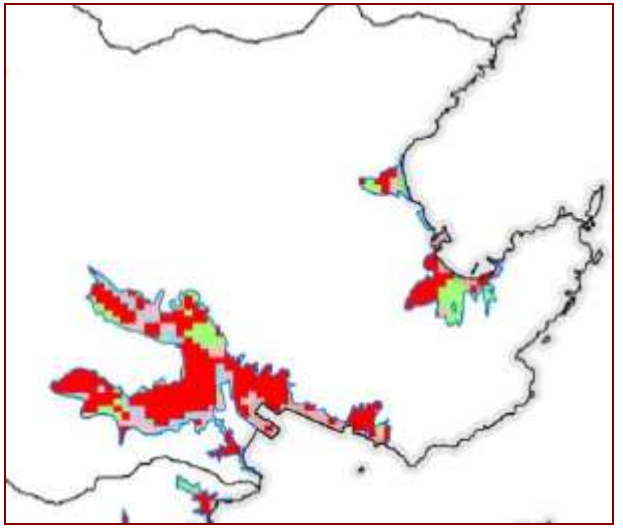
Maps of North and Central Sanriku Flooded Area



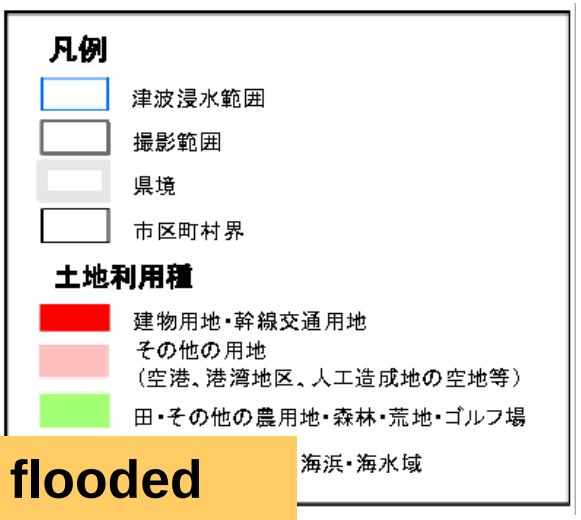
Tanohata-mura, Iwate Prefecture



Kamaishi, Iwate Prefecture



Otsuchi, Iwate Prefecture



0 1 5 km

国土地理院：津波浸水範囲の土地利用
http://www.gsi.go.jp/common/000060279.png

Many buildings were flooded

Shimakoshi of Tanohata-mura in Northern Sanriku

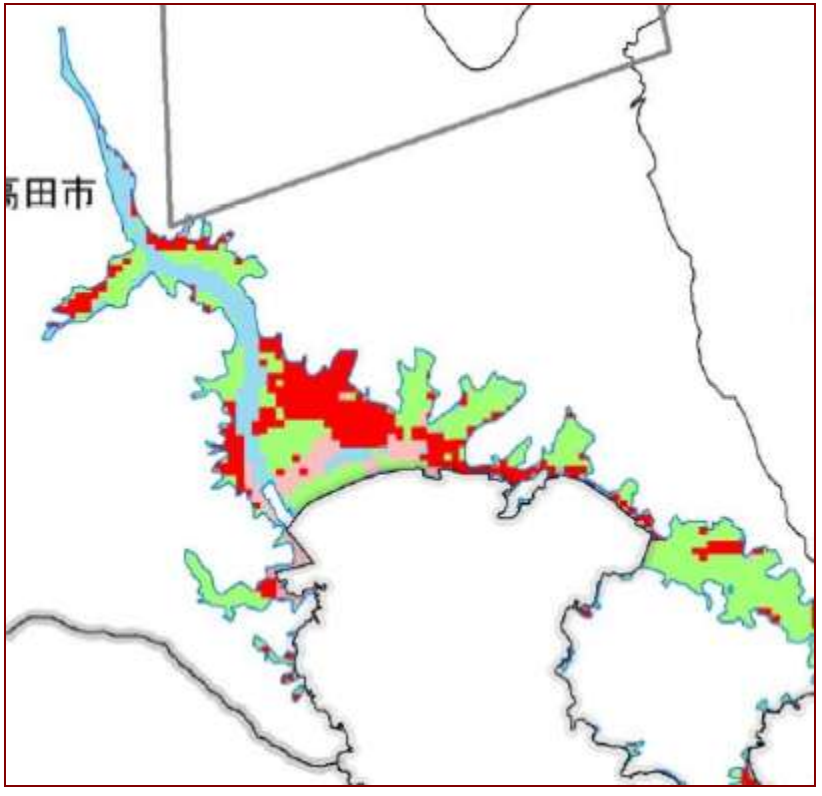
Sanriku Tetsudou Kouka Bridge

April 2, 2011. (Photo by Hirota)

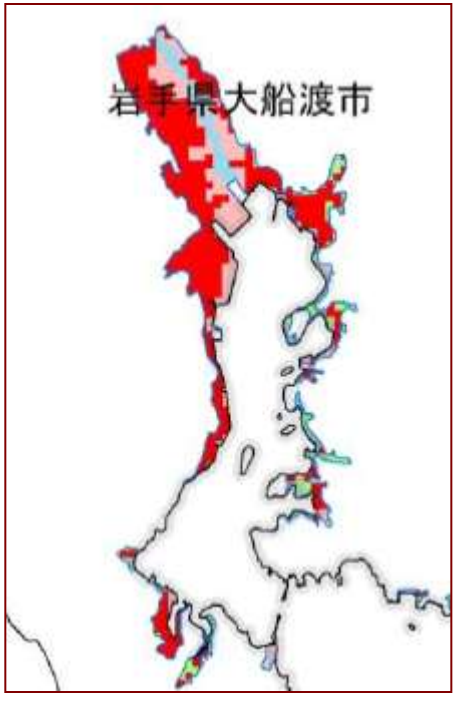
Flooded areas of Southern Sanriku Area

Much of Flooded area was land with buildings.

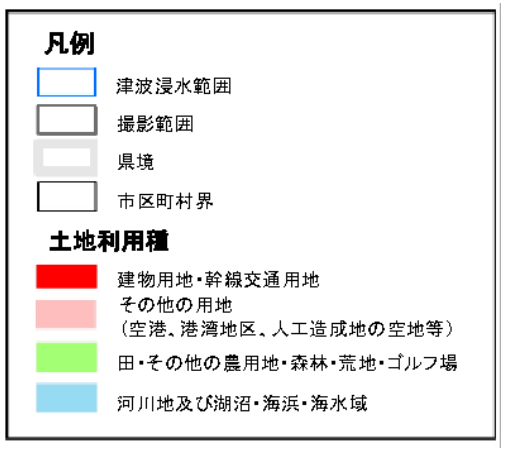
In Rikuzentakata, many paddy fields were also flooded.

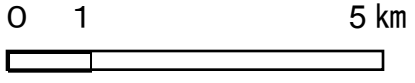


Rikuzen-takata city



Ofunato city





国土地理院：津波浸水範囲の土地利用
http://www.gsi.go.jp/common/000060279.png

Rikuzentakata, Iwate

Dead and Missing:1,771 person
Rate Dead and Missing: 10.4%

The city area was completely destroyed.

Almost 30% of city employees were killed, and city hall was destroyed. The government also stopped functioning.

国土地理院：平成23年(2011年)東北地方太平洋沖地震による被災地の空中写真
http://cyberjapandata.gsi.go.jp/h23taiheiyo-ok/photo/kokudo45s/thumb/C16/CTO-2010-6X-C16_0010.jpg

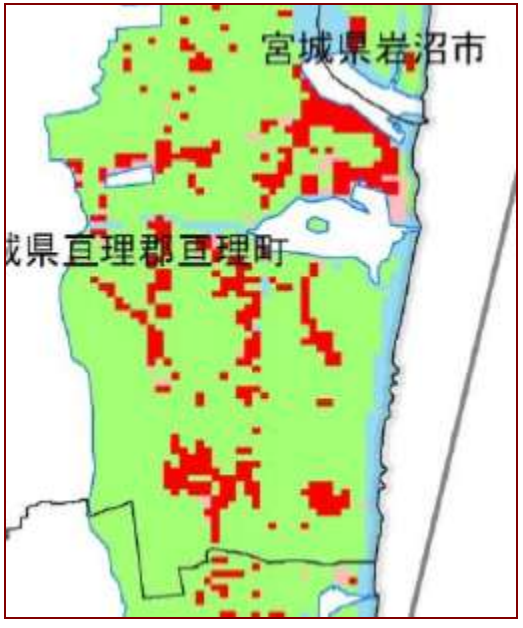
In front of JR Rikuzentakata Station

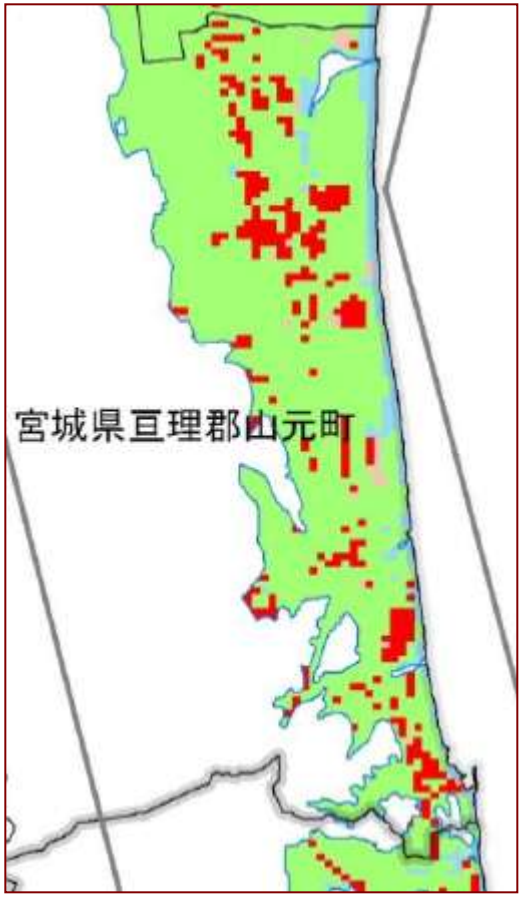
March 28, 2011. (Photo by Hirota)

March 28, 2011. Rikuzentakata City Hall (Hirota)

March 28, 2011 (Hirota)

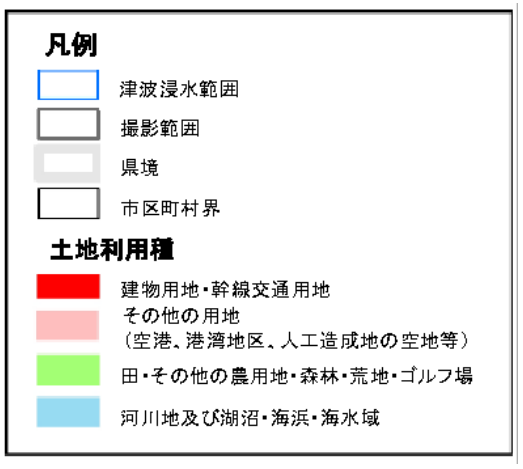
Flooded Maps in Sendai Bay Areas,

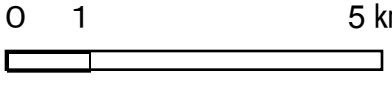




A large area of paddy fields (green) was flooded.

Agricultural settlements (red) suffered devastating damage.





国土地理院：津波浸水範囲の土地利用
http://www.gsi.go.jp/common/000060279.png

Shinhama Village of Yamamoto town, Miyagi Prefecture

Communities and paddy fields on the coast were damaged, and a large area was flooded.

Inland public facilities were safe, but city hall sustained earthquake damage.

Rate dead and missing	4.6%
Disaster victims	15.4%

国土地理院：平成23年(2011年)東北地方太平洋沖地震による被災地の空中写真
http://jmc.gsi.sakura.ad.jp/h23taiheiyo-ok/photo/kokudo45s/thumb/C24/CTO-2010-6X-C24_0019.jpg

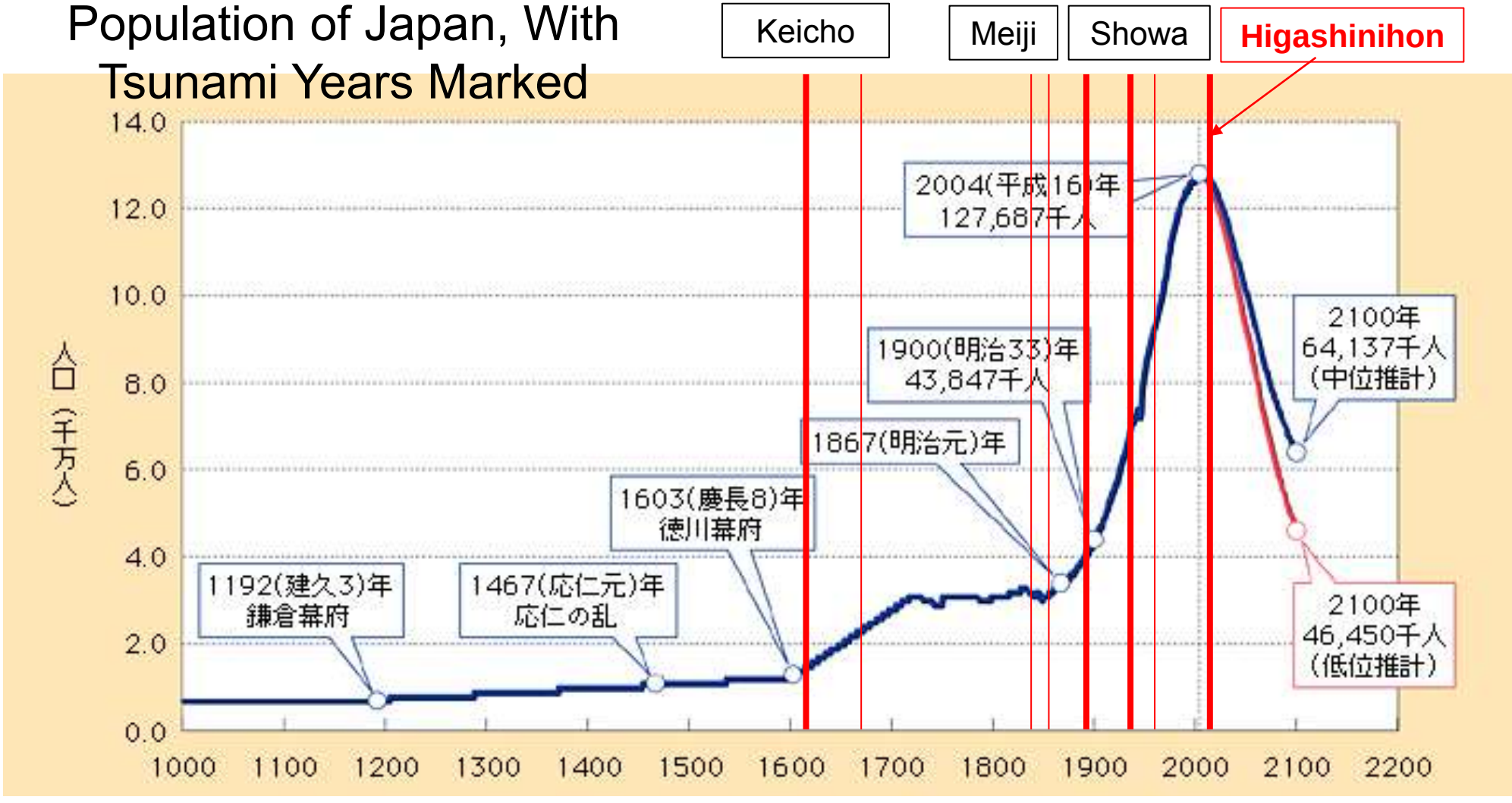
Shinhama Village in Yamamoto Town : May 25, 2011

Paddy Field and Drainage Pump, Shinhama Village

2. TSUNAMI COMES BACK

Every 60 to 80 Years: A Great Tsunami Comes!

Population of Japan, With Tsunami Years Marked

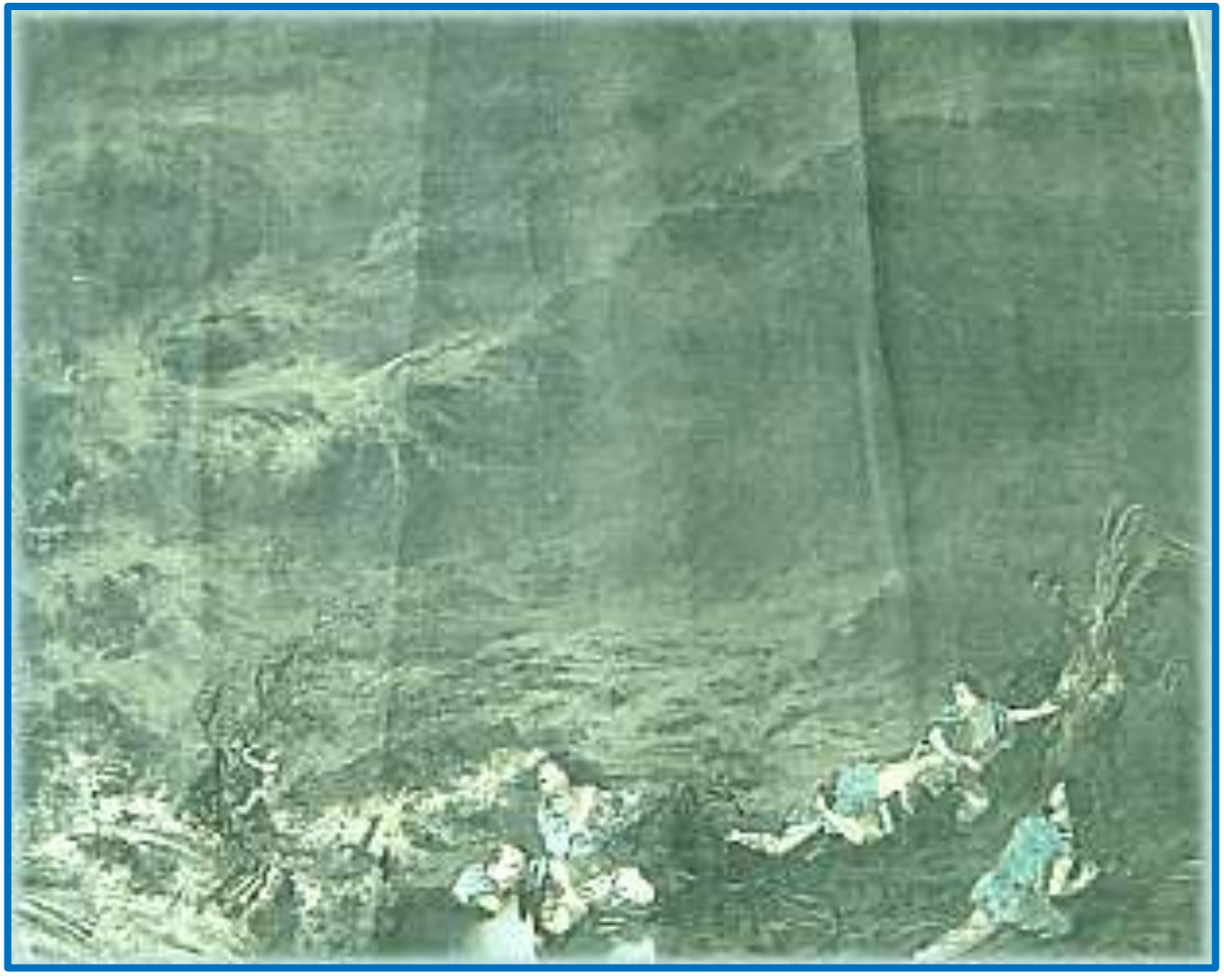


平成17年度　少子化社会白書

Meiji Sanriku Tsunami（1896）

Dead and Missing (person)

Iwate	18,158
Miyagi	1,452
All Japan	21,920



Kamaishi city

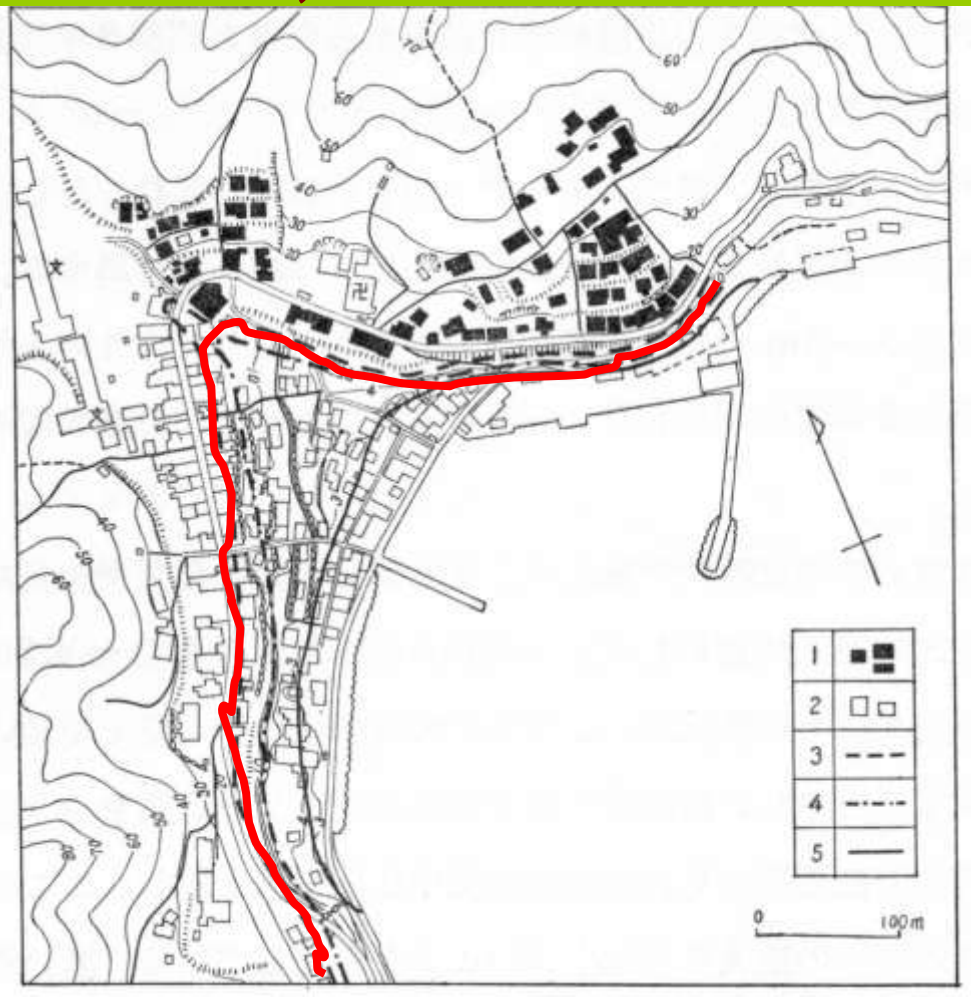
Showa Sanriku Tsunami（1933）

Dead and Missing (person)

Iwate	2,713
Miyagi	308
All Japan	3,064

釜石市HP：http://www.city.kamaishi.iwate.jp/kyoudo/kamaishi/tsunami_shouwa.html

Movement to Higher Ground: Kojirahama Village, Toni-cho, Kamaishi（After Showa Tsunami）



Higher Ground Plans, Kojirahama Area, Toni-cho (1933)

建設省国土地理院（1961）：チリ地震津波調査報告書

Kojirahama Area, Toni-chi (2002)

数値地図（平成14年2万5千分の1地形図図式）

Kojirahama Area, Toni-cho, Kamaishi

April 27, 2005, before Tsunami

March 14, 2011, after Tsunami

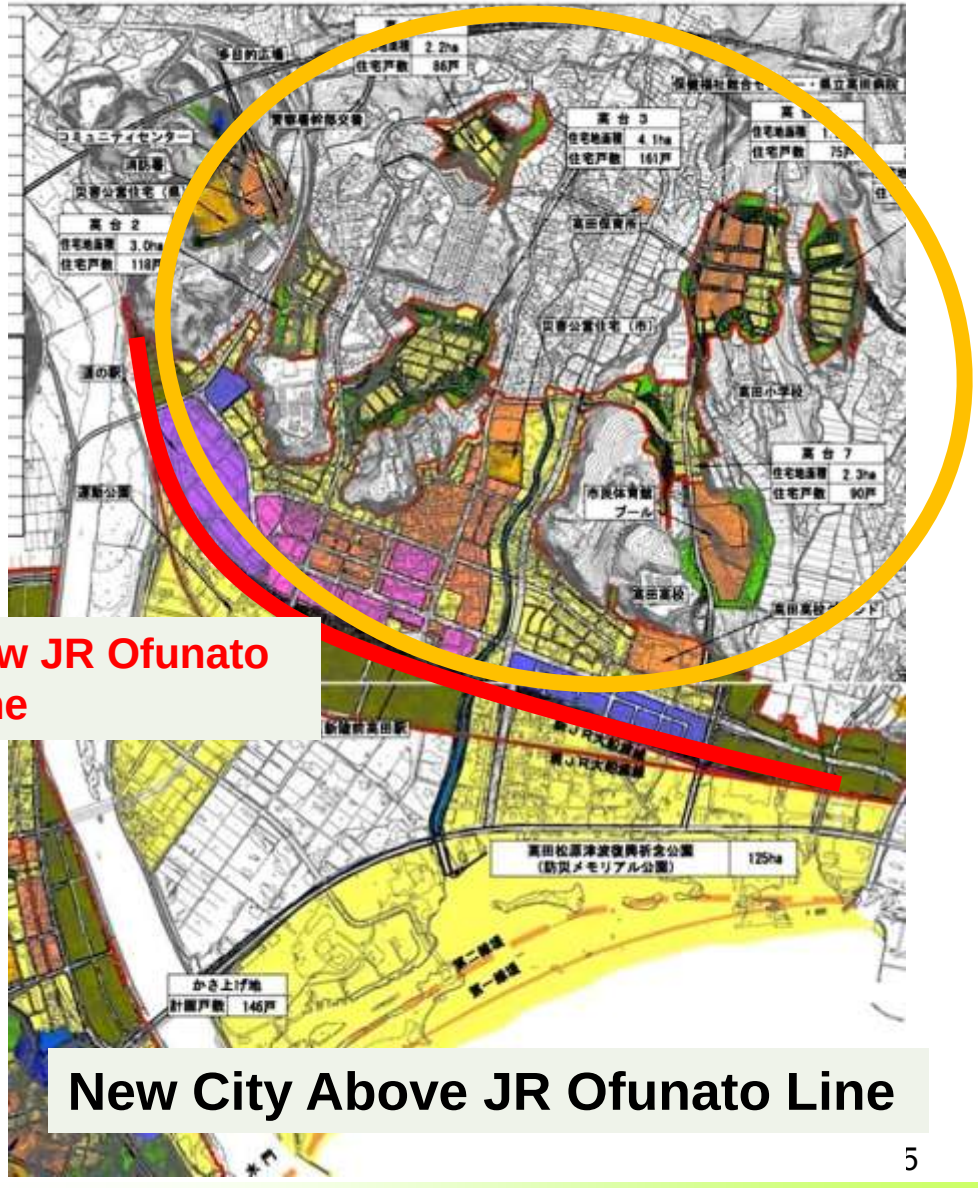
3. RECOVERY PLAN

Rikuzentakata Recovery Plan

Before Thunami **Just After Thunami**

Rikuzentakata Recovery Plan

New JR Ofunato Line

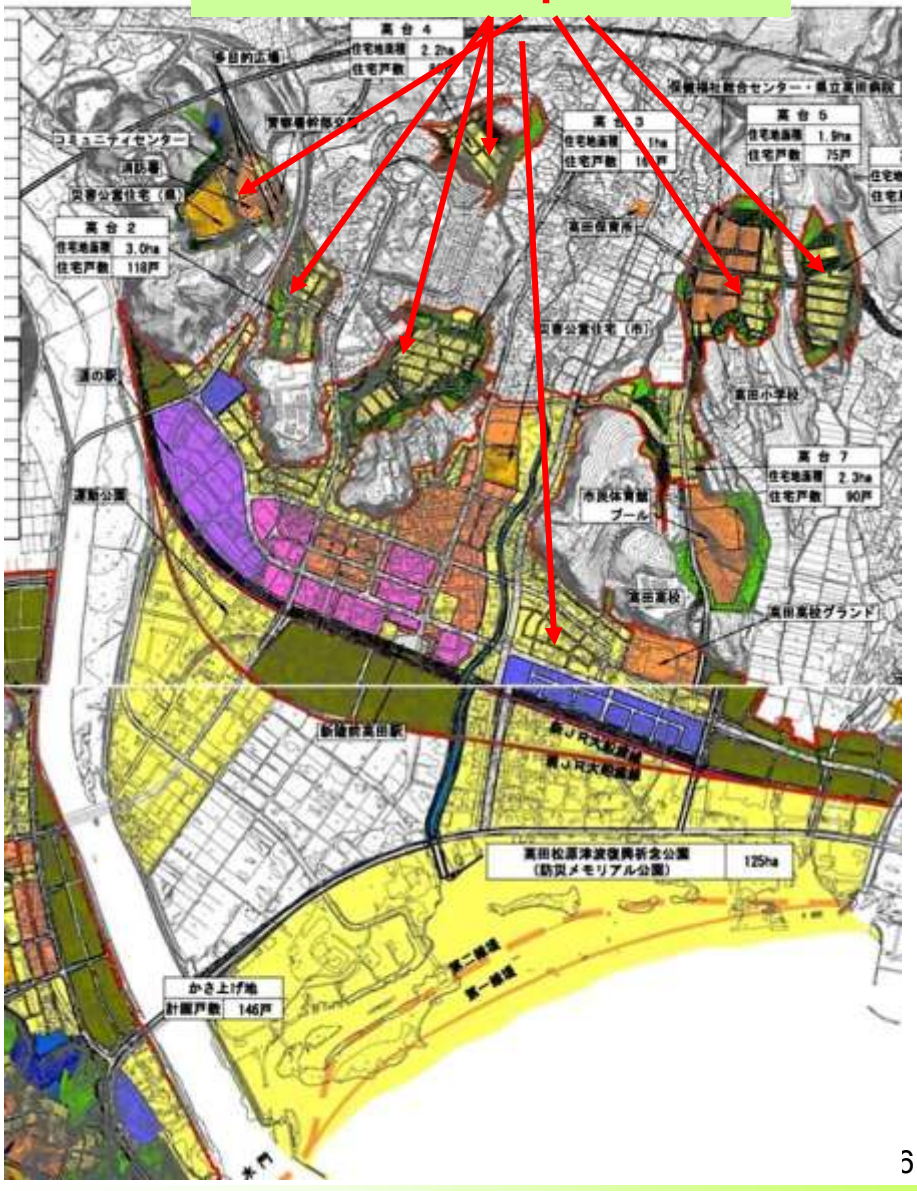


New JR Ofunato Line

New City Above JR Ofunato Line

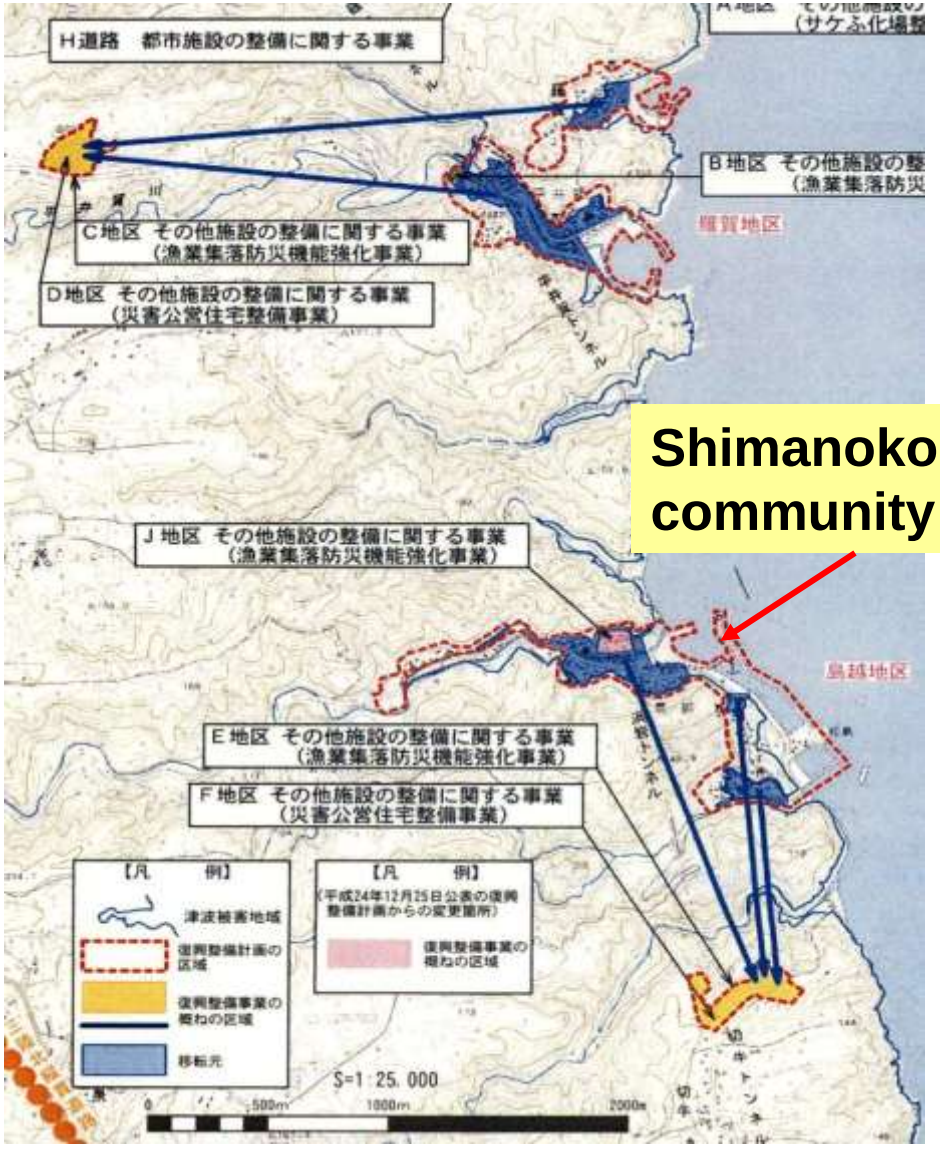
Rikuzentakata Recovery Plan

- Original residence areas will be dispersed into different area on higher ground.
- Exsting communities will be broken up and new communities will have to be formed.



Tanohata-mura village recovery plan

- Part of the communities will move as a group to higher ground.
- The original communities will be separated into over two places on higher ground and nearer the ocean.



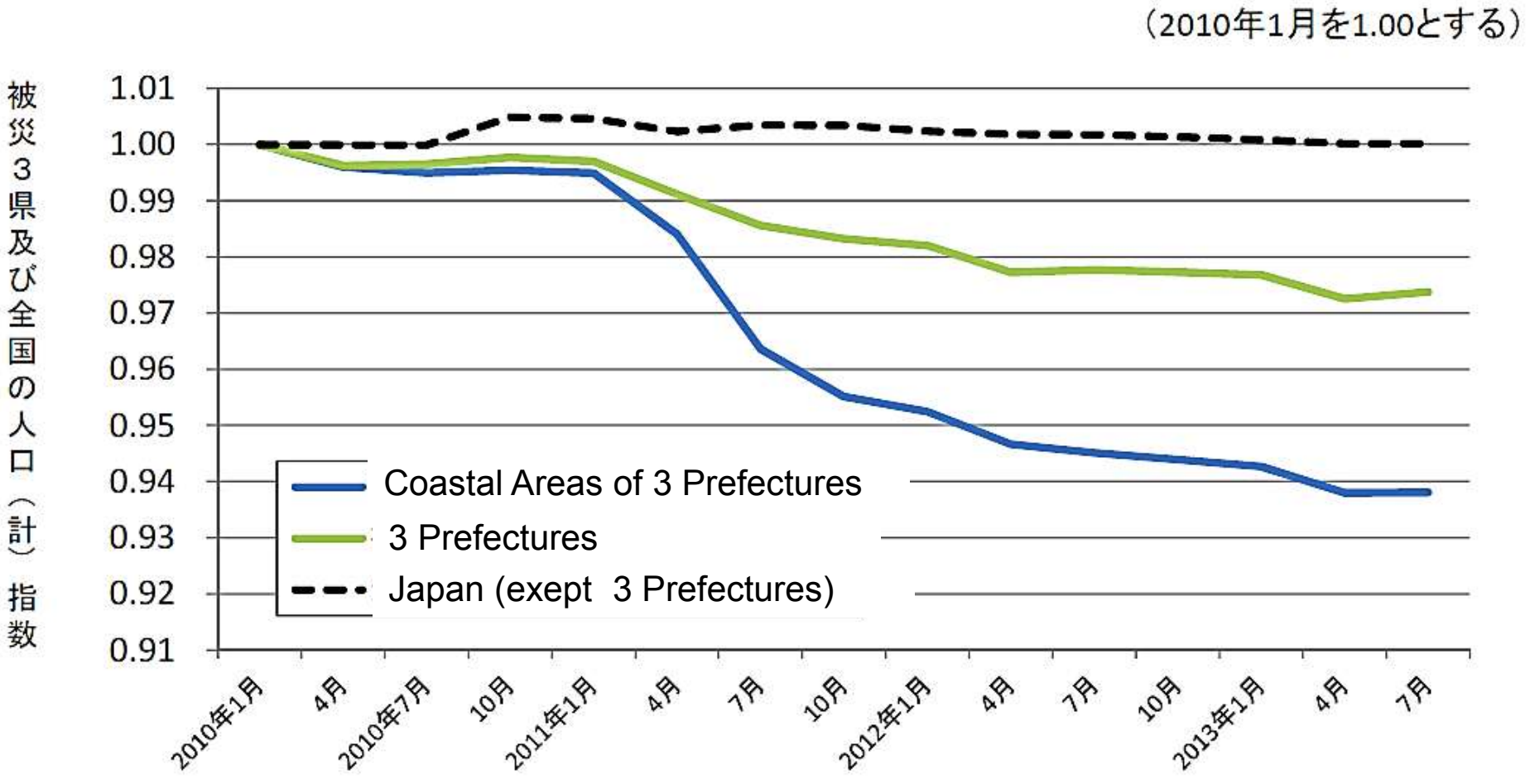
Shimanokoshi community

田野畑村復興整備計画（第3回変更，平成25年3月26日公表）

4. CHALLENGES FOR RECOVERY

Challenges for Recovery （1）Population Loss

・Three Prefectures Hit by the Disaster Suffering from Drastic Population Loss



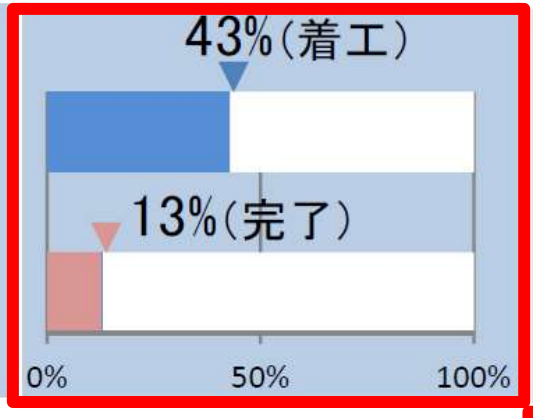
Challenges for Recovery （2) Public Infrastructure

Seawalls and Fishing Harbors are poor recoveried.

完了 着工

Seawalls

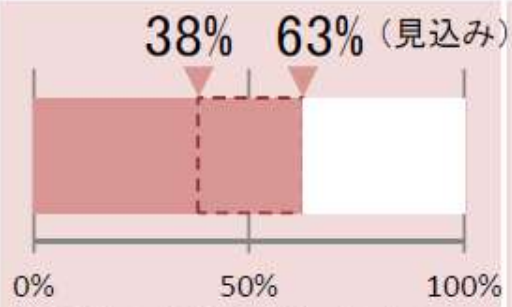
本復旧工事に着工した地区海岸の割合
※H25.6末時点



完了

Agricultural lands

※H25.6末時点

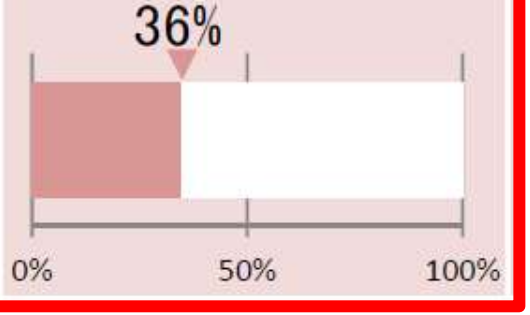


※見込みとは、平成25年度に作付け可能となる割合

完了

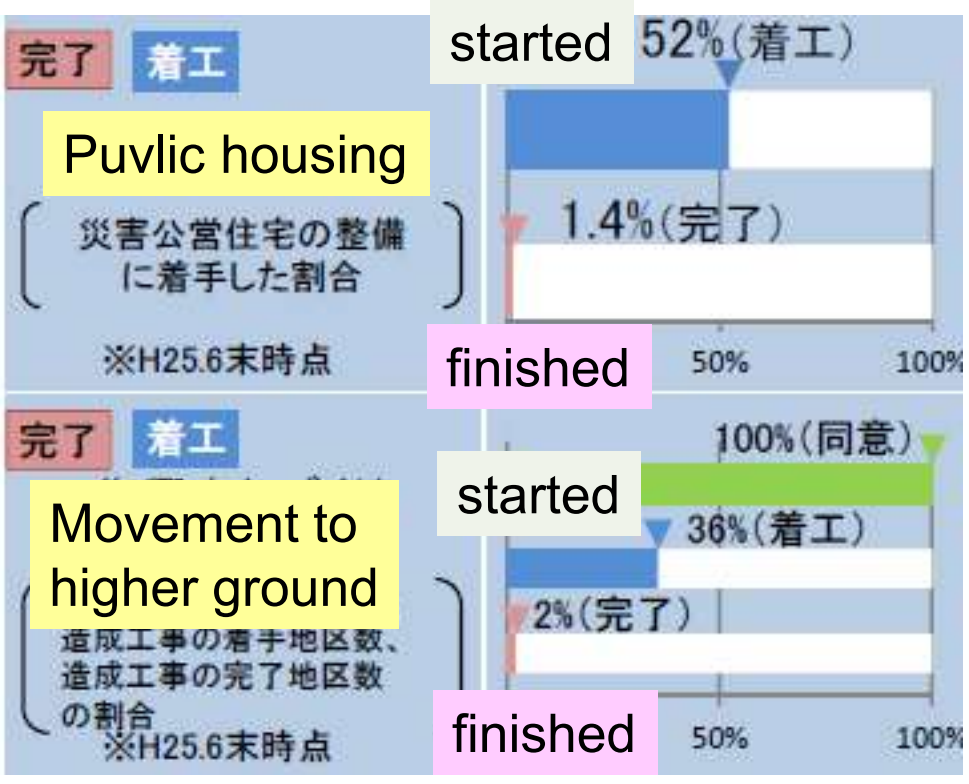
Fishing Horbors

※H25.3末時点



Challenges for Recovery (3) Housing recovery

- Projects for public housing, movement to higher ground and land readjustment have just begun.
- It will take time to complete these projects.



Challenges for Recovery (4) Community recovery

- Above mentioned

Challenges for Recovery (5) Nature Restoration

- *Only a few plans focus on nature restoration.*

☐Restoration of Otomoura（Rikuzentakata）

– In 1968, tidelands were made into paddy fields.

– The paddy fields were destroyed in 2011 tsunami.

– It was decided to restore tidelands.

– Before 1968, tideland was paradise for clamming, etc.

東海新報社:
http://www.tohkaishimpo.com/scripts/index_main.cgi?mode=kiji_zoom&cd=nws8465

Restoration of Tidelands（Otomo, Rikuzentakata）

国土地理院「平成23年(2011年)東北地方太平洋沖地震正射画像」
http://saigai.gsi.go.jp/h23taiheiyo-zort/block/kamaishi.jpg

IN CLOSING

Sanriku Fukko (Reconstruction) National Park

Established in May 2013 to contribute to the recovery of Sanriku area, the park is 220 km long. In the north, there are magnificent cliffs that have been praised as “Alps of the Sea.” In the south, complicated terrain forms an elegant ria coast.

環境省HP：http://www.env.go.jp/park/sanriku/index.html

Children and Students of Otsuchi town at Otsuchi ARIGATO Rock Festival, July 28, 2013

Thank you for Attention!