

International Recovery Forum 2013

The Great East Japan Earthquake and
Safe Urban Development
Relocation to Higher Ground: Case of
Ofunato City

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Topics

- Ofunato City
 - March 11
 - Tsunamis Will Come Again
 - Reconstruction Plans
 - Relocation to Higher Ground
 - Setting of Disaster Risk Zones
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Ofunato City Overview

□ Location, geography and features

- Warm region on southern coast of Iwate Prefecture
- Population: 40,000; Area: 323 km²
- Ofunato Bay acts as good natural harbor.
- Fisheries with world's 3rd largest fishing grounds just offshore
- Port of call for international container ships and cruise ships

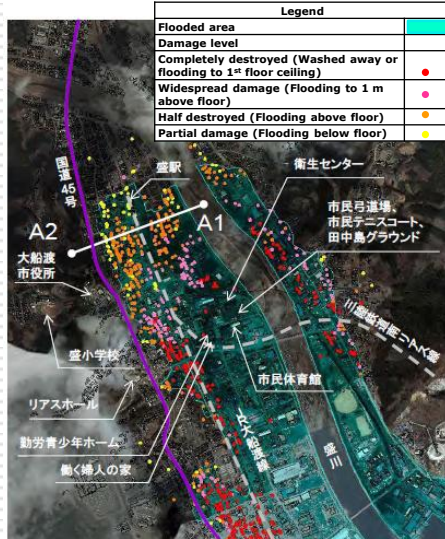


March 11 Areas Flooded by Tsunami



March 11 Damage in Sakari

Central city district contiguous with Ofunato City.

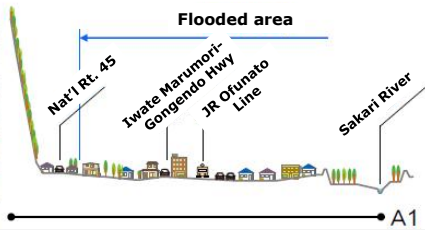


Legend	
Flooded area	
Damage level	
Completely destroyed (Washed away or flooding to 1st floor ceiling)	
Widespread damage (Flooding to 1 m above floor)	
Half destroyed (Flooding above floor)	
Partial damage (Flooding below floor)	

- Flooding as far as Sakari Station with widespread damage (1 m above floor). Many half-destroyed (flooding above floor) structures.
- City Hall and Sakari Elementary School were on high ground and undamaged.

- Red:** Completely destroyed (Washed away or flooding to 1st floor ceiling)
Pink: Widespread damage (Flooding to 1m above floor)
Orange: Half destroyed (Flooding above floor)
Yellow: Partial damage (Flooding below floor)

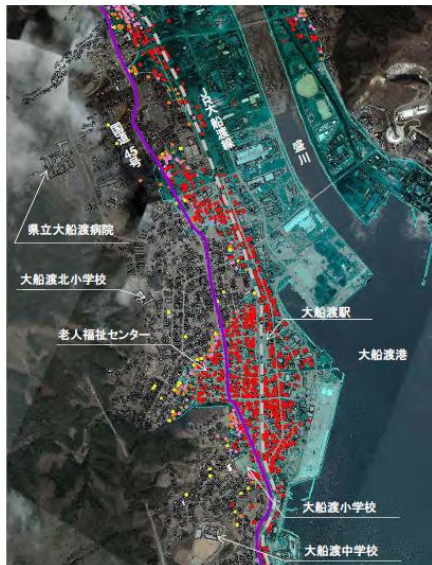
Cross-section (Conceptual view)



March 11 Damage in Ofunato-cho

Ofunato District

Commercial district and industrial belt around Ofunato Port at the end of Ofunato Bay



- Ofunato Station building and tracks flooded. Commercial district east of the station flooded.
- Many homes around the station and along the JR Ofunato Line completely destroyed.
- Industrial belt along the eastern bank of the Sakari River incapacitated by flooding.
- Sections of National Rt. 45 underwater.
- Ofunato Prefectural Hospital located on high ground and undamaged.

Legend	
Flooded area	
Damage level	
Completely destroyed (Washed away or flooding to 1st floor ceiling)	
Widespread damage (Flooding to 1 m above floor)	
Half destroyed (Flooding above floor)	
Partial damage (Flooding below floor)	

March 11 Damage in Yoshihama

Yoshihama District Rural village built on high ground at the mouth of the Yoshihama River at the top of the U-shaped Yoshihama Bay



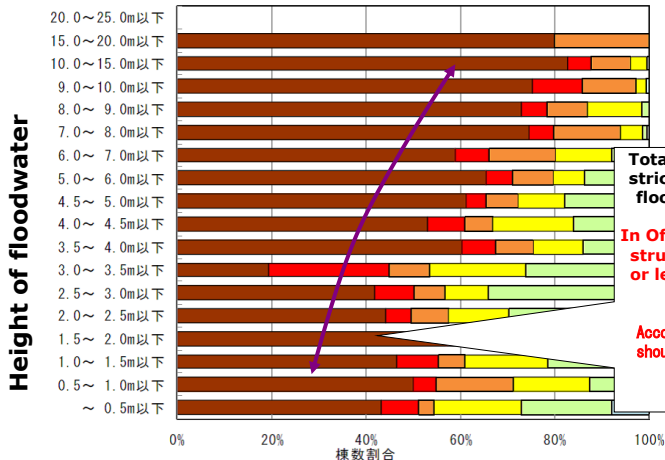
- Farmland between Yoshihama Harbor and village flooded. Serious damage to farmland.
- Rural village relocated to high ground in Meiji and Showa eras. No direct impact from tsunami.

Legend	
Flooded area	
Damage level	
Completely destroyed (Washed away or flooding to 1 st floor ceiling)	
Widespread damage (Flooding to 1 m above floor)	
Half destroyed (Flooding above floor)	
Partial damage (Flooding below floor)	

March 11 Floodwater Height and Structural Damage

Relationship between floodwater height and structural damage

[Percentage of damaged structures] Relationship between floodwater height and structural damage (Ofunato City)



Total loss percentage across stricken areas decreased for floodwaters of 2 m or less.

In Ofunato City, about 50% of structures exposed to 0.5 m or less of floodwater were a total loss.

Accordingly, wooden structures should be restricted in future flood zones.

March 11 Damage from Tsunami

As of August 31, 2012

- ❑ Loss of life: 340 dead, 81 missing (Total: 421, 1.1% of population)
 - ❑ Shelters: 69 locations, 5,169 evacuees (Immediately after tsunami)

 - ❑ Damaged structures: 5,520
 Total loss 2,787; Seriously damaged 428
 Partially destroyed 717; Partially damaged 1,588
 - ❑ Impacted households: About 2,500 (About 17% of all households)
 - ❑ Impacted businesses: About 1,400 (Of about 2,600 total)
-

Tsunamis Will Come Again

Necessary to relocate to higher ground

Year	Name	Years since prior tsunami
869	Great Jogan Tsunami	
1611	Keicho Sanriku Tsunami	
1677	Enpo Sanriku Tsunami	66 years
1763	Horeki Sanriku Tsunami	86 years
1856	Ansei Sanriku Tsunami	93 years
1896	Meiji Sanriku Tsunami	40 years
1933	Showa Sanriku Tsunami	37 years
2011	Great East Japan Tsunami	78 years
Excluding small and Transpacific tsunamis		Average 67 years

Reconstruction Plans

No one dies and homes are not washed away in the event of a tsunami

Rebuild a better city from the damage.

□Reconstruction projects

Civic life (72 projects)

Industry and economy (101 projects)

City infrastructure (41 projects)

Disaster prevention (40 projects)

□Policy on land usage

Greatest tsunami protection in history : Hard and soft

Second greatest tsunami protection in history : Hard

Identify future flood zones by simulation and reflect findings in policy on land usage.

Restrict home construction in future flood zones → Neighborhood relocation

Reconstruction Plans Planned projects under subtopics: About 250

事業名	事業概要	事業主体	事業期間				
			H23	H24	H25	H26~	
方針① 被災者の早期の住宅再建を支援するほか、地域コミュニティの維持・形成に配慮した、安全な生活環境を確保します。							
施策ア 被災者の事情に十分配慮しながら、個人住宅再建のための支援を行います。							
1 △	応急仮設住宅維持管理等支援事業	応急仮設住宅の補修や駐車場などの維持管理 ・市内37団地、1,801戸対象	市	→			
2 ○	住宅応急修理事業	自宅の応急修理費用の一部負担により、自宅での生活を促進、支援(災害救助事業、県委託事業) ・半壊以上の被害を受けた方 ・1戸あたり92万円(上限)を負担(所得などの制限あり) ・申請戸数:463戸	市	→			
3 △	住宅耐震改修補強事業	木造住宅の耐震補強工事実施者に補助金を交付し、災害に強いまちづくりを推進 昭和96年以前に建築された一戸建木造住宅が対象 ・工事費の1/2、上限:60万円	市	→			
施策イ 住宅の自主再建が困難な方のために、公営住宅を整備します。							
5 ◎	災害公営住宅整備事業 ▼P28	住宅を失った被災者を対象に公営住宅を整備 ・土地購入、用地造成、取付道路工事なども実施 ・県営住宅630戸(H23~H28) ・市営住宅270戸(H23~H25)	県・市	→			
施策ウ 住宅の高台移転や宅地のかさ上げなどにより、津波などの災害にあわない安全な居住環境を整えます。							
7 ◎	防災集団移転促進事業 ▼P29	居住に不当でないと思われる区域内にある住居の集団移転の促進 ・住民の意向を踏まえて移転促進区域を設定するほか、住宅団地の整備、移転者に対する助成などを行う ・住宅団地の規模は10戸以上(移転しようとする住居の数が20戸を超える場合は、その半数以上の戸数) ・国が検討している移転跡地の公費買い上げ制度に注視しながら制度導入を目指す ・土地利用にあたっては、所有者の意向を確認しながら遊休農地の活用を図る ・移転後の跡地については、再び住宅が建設されて危険が生じることのないよう、条例により建築基準法第39条の規定による災害危険区域として指定する	市	→			

Relocation to Higher Ground

Neighborhood relocation + Disaster-strong public housing + Central city redevelopment



Setting Disaster Risk Zones

□ Purpose

- Protect lives and property, and lessen damage across the entire area in the event of a similar tsunami to that in the Great East Japan Earthquake.

□ Necessity

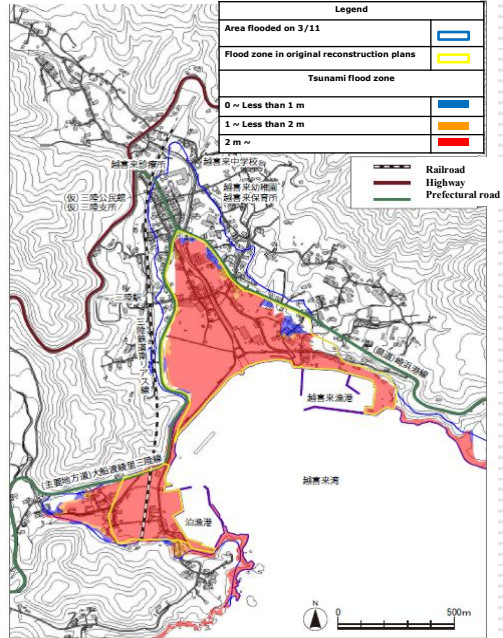
- Tsunamis of comparatively high frequency (Once every several decades ~ hundred years or so)
 - Ensuring safety via levees, etc.
- Historical largest tsunamis (Low frequency of occurrence)
 - Flooding from overtopping of levees, etc. (Set via simulation.)
- Construction of homes, etc., must be restricted in identified disaster risk zones.

Setting of Disaster Tsunami flood zone

Set tsunami flood zones (blue area) via simulation.
 0 ~ Less than 1 m: Light blue
 1 ~ Less than 2 m: Brown
 2 m ~: Red

Area flooded in Great East Japan Tsunami: Blue line

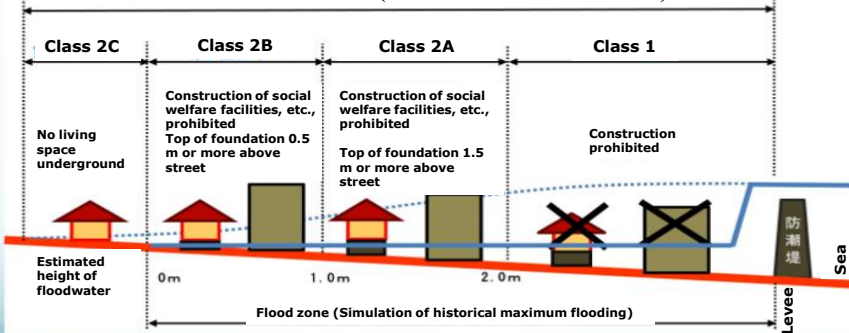
Tsunami flood zone (By floodwater height) Okirai District



Setting of Disaster Risk Zones Building restriction 1

Conceptual view of disaster risk zones

Disaster risk zones (Areas flooded on 3/11/2011)



Setting of Disaster Risk Zones

Building restriction 2

Setting of disaster risk zones

Area	Estimated height of floodwater	Applicable structures	
		Structures for living	Social welfare facilities, schools, hospitals
Class 1	About 2.0 m or more	Construction prohibited	Construction prohibited
Class 2A	About 1.0 m to less than 2.0 m	Top of foundation must be 1.5 m or more above street and there must be no living space underground. If top of foundation is less than 1.5 m above street, structures must be sturdy and living space located on 2 nd and higher floors.	Construction prohibited
Class 2B	Less than 1.0 m	Top of foundation must be 0.5 m or more above street and there must be no living space underground. If top of foundation is less than 0.5 m above street, structures must be sturdy and living space located on 2 nd and higher floors.	Construction prohibited
Class 2C		There must be no living space underground	There must be no living space underground

Setting of Disaster Risk Zones

Using laws to prevent disasters

- ❑ Preserve lessons of the Great East Japan Earthquake in laws.
- ❑ Designate flooded areas from the earthquake as disaster risk zones.
 - Within flood zone (Simulation of historical maximum flooding): Divided and regulated into 3 zones
 - Flood zone of areas flooded on 3/11/2011: Relaxed regulations
- ❑ Applicable structures
 - Structures for living
(Purely residential structures, multi-use housing, apartment houses, row houses, boarding houses, lodgings, dormitories)
 - Social welfare facilities, schools, hospitals
(Facilities regulated under Article 21 of Act on Regional Development for Tsunami Disaster)

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Thank you for your attention.
We are committed to rebuilding from
disaster.
Follow our progress in the stricken areas.
