

Symposium in conjunction with The Third World Conference on Disaster Risk Reduction

第3回 国連防災世界会議 シンポジウム

Towards Mitigating Loss Caused By Mega-Disasters 激甚化する巨大災害にどう立ち向かうか

**March 15, 2015
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**2015年3月15日
国土交通省 技監
徳山 日出男**

Japan is beautiful and rich in nature, but natural conditions are severe.

美しく、自然豊かな日本の国土。一方で国土条件が厳しい



The rich nature of Japan 自然豊かな日本

Severe natural conditions 厳しい国土条件



Vulnerable to disasters

脆弱な国土

App. 20% of earthquakes above magnitude 6.0 occur in Japan that is just 0.25% of the whole land in the Earth.

世界の0.25%の面積にM6以上の地震約2割

◇**No. of dead or missing people in major earthquakes**

主な地震による死者・行方不明者数

・**Great Kanto Earthquake** : app. 105,000

関東大震災(1923)

・**Great East Japan Earthquake** : 21,707*

東日本大地震 (2011)

※Based on statistics by the Fire and Disaster Management Agency (September 1, 2014)

消防庁集計 (平成26年9月1日)



Area affected by the Great Kanto Earthquake
(Yokohama city, Kanagawa Pref.)

関東大震災(神奈川県横浜市)

Even a single flood causes devastating damages.

一度の水害で甚大な被害をもたらす

◇**No. of dead or missing people in major storms and floods**

主な風水害による死者・行方不明者数

・**Great storm and flood in 1856** : over 100,000

安政3年(1856)の大風災

・**Ise Bay Typhoon (Typhoon Vera)** : 5,098

伊勢湾台風 (1959)



Area affected by Ise Bay Typhoon
(Yatomi city, Aichi Pref.)

伊勢湾台風(愛知県弥富市)

Japan experienced heavy mortality caused by natural disasters.

Therefore, Japan has continuously prepare for disasters.

自然災害による大量死を経験。昔から、災害への備えを行ってきた

Preparations for recurrent natural disasters

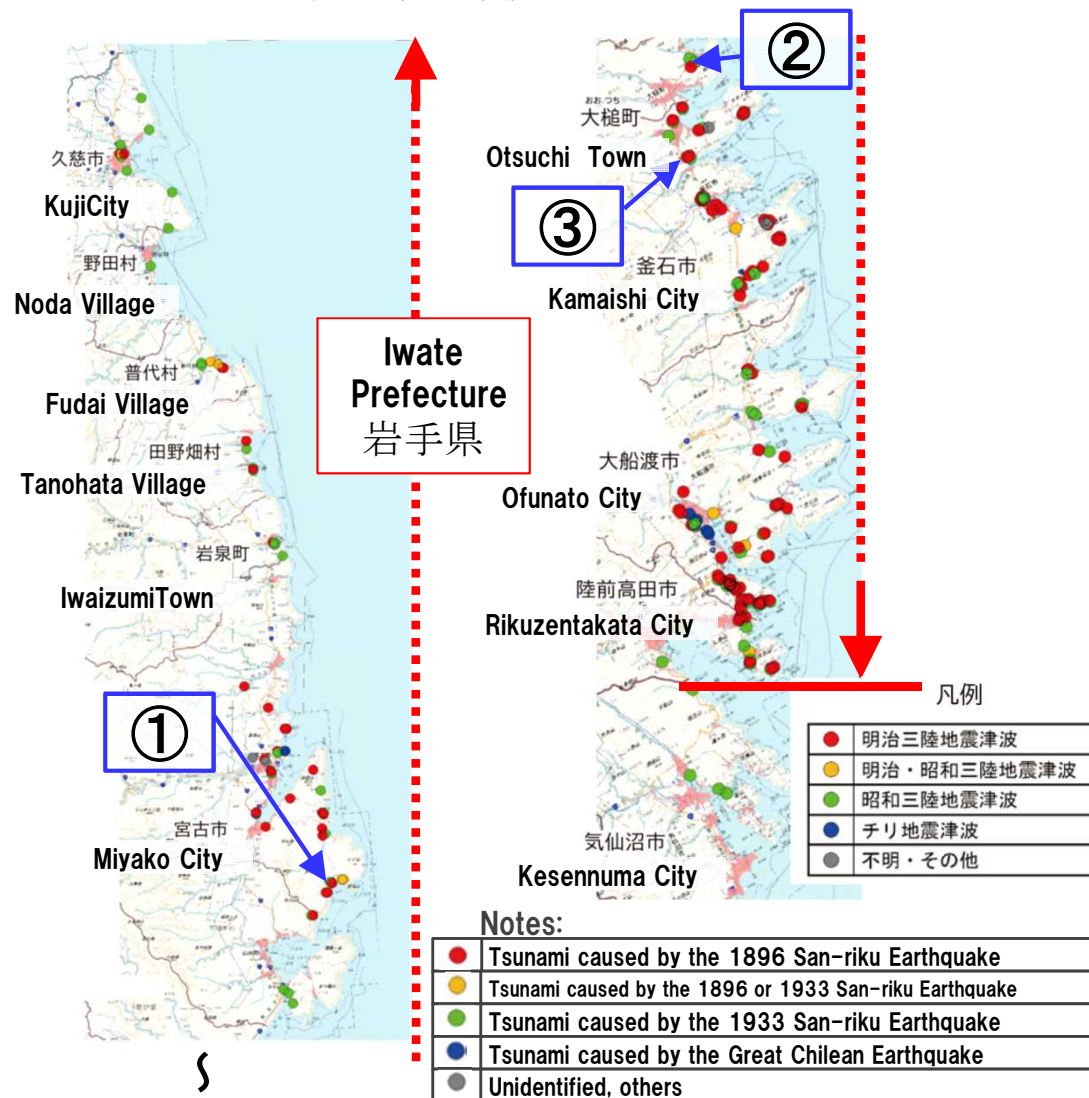
繰り返り起こる災害への備え

Numerous “tsunami stone monuments” have been erected to warn future generations of the risks of natural disasters and the necessity of evacuation actions.

数多くの「津波石」により、土地の災害リスクや避難文化を伝承

【tsunami stone monuments in Iwate Pref.】

岩手県の津波石



①Omoe Aneyoshi in Miyako city, Iwate Pref.
宮古市重茂姉吉地区



②Kiri-Kiri in Otsuchi town, Iwate Pref.
大槌町吉里吉里地区



③Ryoishi in Kamaishi city, Iwate Pref. 釜石市両石地区

Preparations in two stages (1)

二段階の備え(1)

Following the Great Hanshin-Awaji Earthquake, earthquake-resistance standards were revised to ensure that structures withstand “once-in-a-century” earthquakes and are not critically broken in “once-in-a-millennium” earthquakes.

阪神・淡路大震災を契機に、「100年に一度の災害」には健全性を損なわず、
「1000年に一度の巨大災害」には、致命的な損傷を防ぐように耐震基準を改定

◇the Great Hanshin-Awaji Earthquake

阪神高速の倒壊

January 1995



◇the Great East Japan Earthquake

東日本大震災の状況

March 2011

**Reinforced bridges
were not damaged.**

耐震補強により損傷なし



Azuma elevated bridge of National
Highway Route 13, Fukushima-Nishi
Road

**Anti-falling device
落橋防止装置**



Preparations in two stages (2)

二段階の備え(2)

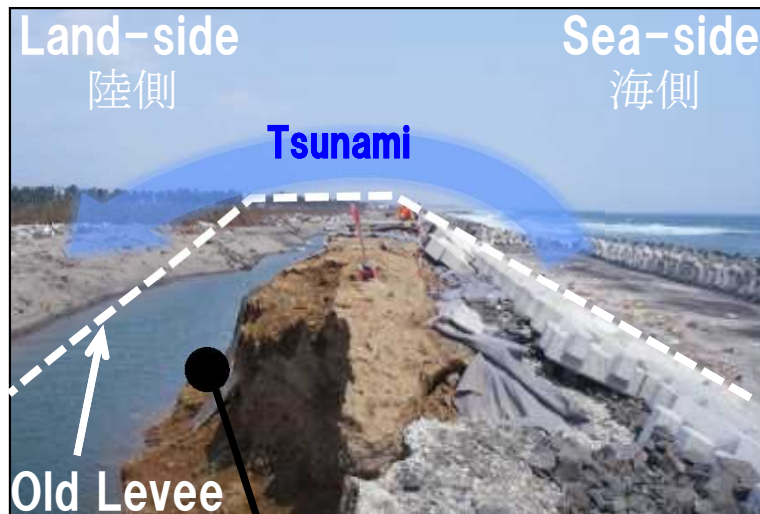
Following the Great East Japan Earthquake, new principle was introduced to protect human lives and assets by structural measures including coastal levees against “once-in-a-century” tsunamis and to reduce losses by securing as much time to evacuate as possible with “Resilient structure” in “once-in-a-millennium” tsunamis.

東日本大震災を契機に、「100年に一度」の津波には、施設整備により人命、資産等を確実に守り、
「1000年に一度」の津波には、粘り強い構造により、避難する時間を少しでも長くするという考え方を導入

◇the Great East Japan Earthquake

東日本大震災の状況

March 2011



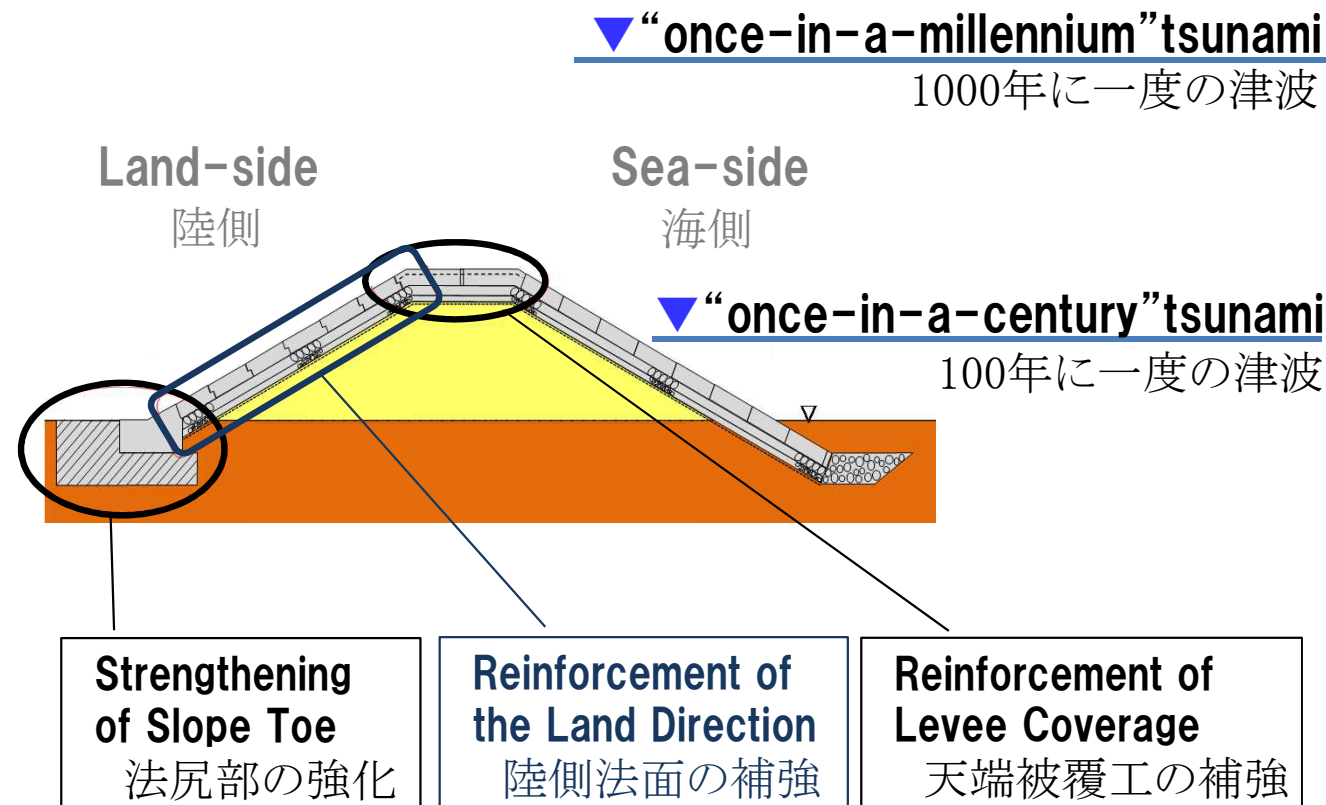
Old Levee
元の堤防

Land-side slope was destroyed
worse than seaside slope.

陸側の法面が崩落

◇Resilient coastal levee

粘り強い構造



▼“once-in-a-millennium” tsunami

1000年に一度の津波

Land-side
陸側

Sea-side
海側

▼“once-in-a-century” tsunami

100年に一度の津波

Strengthening
of Slope Toe

法尻部の強化

Reinforcement of
the Land Direction

陸側法面の補強

Reinforcement of
Levee Coverage

天端被覆工の補強

Preparations in two stages (3)

二段階の備え(3)

Protection by structural measures against “once-in-a-century” disasters

Protection by both structural and non-structural measures against “once-in-a-millennium” disasters

「100年に一度の災害」には、ハード対策で防御

「1000年に一度の巨大災害」には、ソフト対策も加えて防御

◇Measures for “once-in-a-millennium” disasters

⇒ putting focus on various “non-structural” measures

◇「1000年に一度の巨大災害」への対応

⇒ソフト対策に重点を置いて対応

・Improving forecast for torrential rains and typhoons

集中豪雨や台風の予測強化

・Developing hazard maps

ハザードマップの整備

・Enhancing education disaster

防災教育の充実

・Conducting evacuation drills in schools

学校での避難訓練

(Only 5.6% of the casualties caused by the Great East Japan Earthquake in the Tohoku region were children.)

(東日本大震災では、東北の犠牲者のうち、未成年者は5.6%)

・Having agreements with construction companies to clear roads prior to the occurrence of disasters

道路啓開のための建設業界との協定締結

【Experience from the Great East Japan Earthquake】

東日本大震災の経験

(Road Clearing 道路啓開)



“Operation Comb” くしの歯作戦

Sharing of knowledge and experience in preparation for disasters

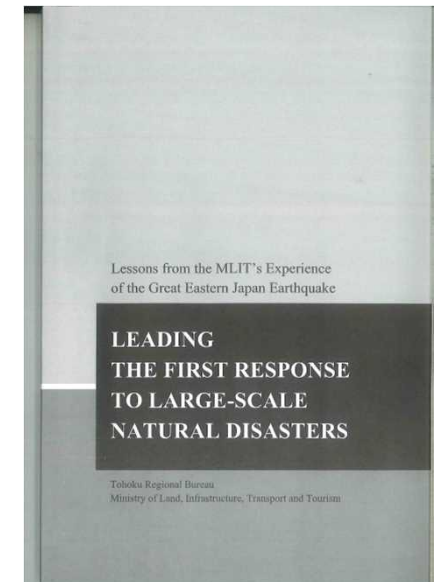
災害に備える知識・経験の共有

◇Effective measures and lessons learned from the Great East Japan Earthquake were compiled in the “Leading the First Response to Large-scale Natural Disasters”.

東日本大震災で有効だった対策・教訓を
「災害初動指揮心得」に収録

**“We made all possible preparations.
What we prepared was still not enough.”**

『 備えていたことしか、役には立たなかった。
備えていただけでは、十分ではなかった。 』



【Website for (free) downloading of Amazon eBook】 Amazon電子書籍(無料): 配信URL

<http://www.amazon.co.jp/dp/B00S8UXG9G> (日本語版: Japanese)

<http://www.amazon.co.jp/dp/B00S8UXFU6> (英語版: English)

『Two-stage disaster preparations: “Disaster Prevention” and “Disaster Mitigation”』

『防災・減災という二段階の備え』

- ◇ **We do contribute to the international societies through sharing Japanese knowledge and experiences on Mega-disasters.**

日本の巨大災害に対する知識と経験を世界に共有することで国際貢献していく