

## Session 2: Panel Discussion

# “Sustainable Reconstruction from Super Earthquake Disasters”

## 巨大震災からの復興を考える

### Issus on reconstruction and disaster mitigation

(Viewpoints: Community, Gender, Building technology, Urban development, International activities etc.)

地域社会、ジェンダー、建築技術、まちづくり、国際活動などの視点から

## Super Earthquake Disasters in the World

### 最近50年間の世界的な巨大地震災害

Earthquake Disasters with over 15,000 casualties (1960-2011) 犠牲者15,000人以上の地震

	Country: Earthquake	Year	Mg	Casualty (A) = Dead +missing	Collapse (B)	Casualty ratio A/B x 100
1	China: Hebei (Tangshan Earthquake)	1976	7.8	242800		A/B x 100
2	Indian Ocean Tsunami	2004	9.0	226408	470000	48.1
3	Haiti Earthquake	2010	7.0	222576	(300000)	(74.5)
4	China: Sichuan (Wenchuan Earthquake)	2008	8.1	87576	5461900	1.6
5	Pakistan Kashmir Earthquake	2005	7.6	73328	272000	26.9
6	Peru: Chimbote, Huaras	1970	7.8	66794	(>15000)	
7	Iran: Manjil Earthquake, Rudbar	1990	7.7	35000		
8	Iran: Kerman, Bam Earthquake	2003	6.7	31830	55000	57.8
9	Armenia: Spitak Earthquake	1988	6.8	25000		
10	Guatemala Earthquake	1976	7.5	22870		
11	India: Bhuj Earthquake (Gujarat)	2001	8.0	20023	(339000)	(5.9)
12	Japan: Great East Japan Earthquake	2011	9.0	19295	127185	15.2
13	Iran: Tabas Earthquake	1978	7.4	18220		
14	Turkey: Kocaeli Earthquake	1999	7.8	17118	(60000)	(28.5)
15	China: Yunnan Earthquake	1970	7.8	15621		
ref.	Japan: Great Hanshin-Awaji Earthquake	1995	7.3	6434	111123	5.7

Events in gray box represent the earthquake disasters occurred in 2001-2011. Part of collapse data. ( ): not confirmed data

# Why many Super Disasters happens?

なぜ多くの巨大災害が発生しているのか

## 1. Constant occurrence of natural hazards

自然現象は常に生じている。

## 2. Increasing risks by expansion of rapid urbanization, city, industry and population

急速な都市化、産業や人口の拡大がリスクを増加させ、

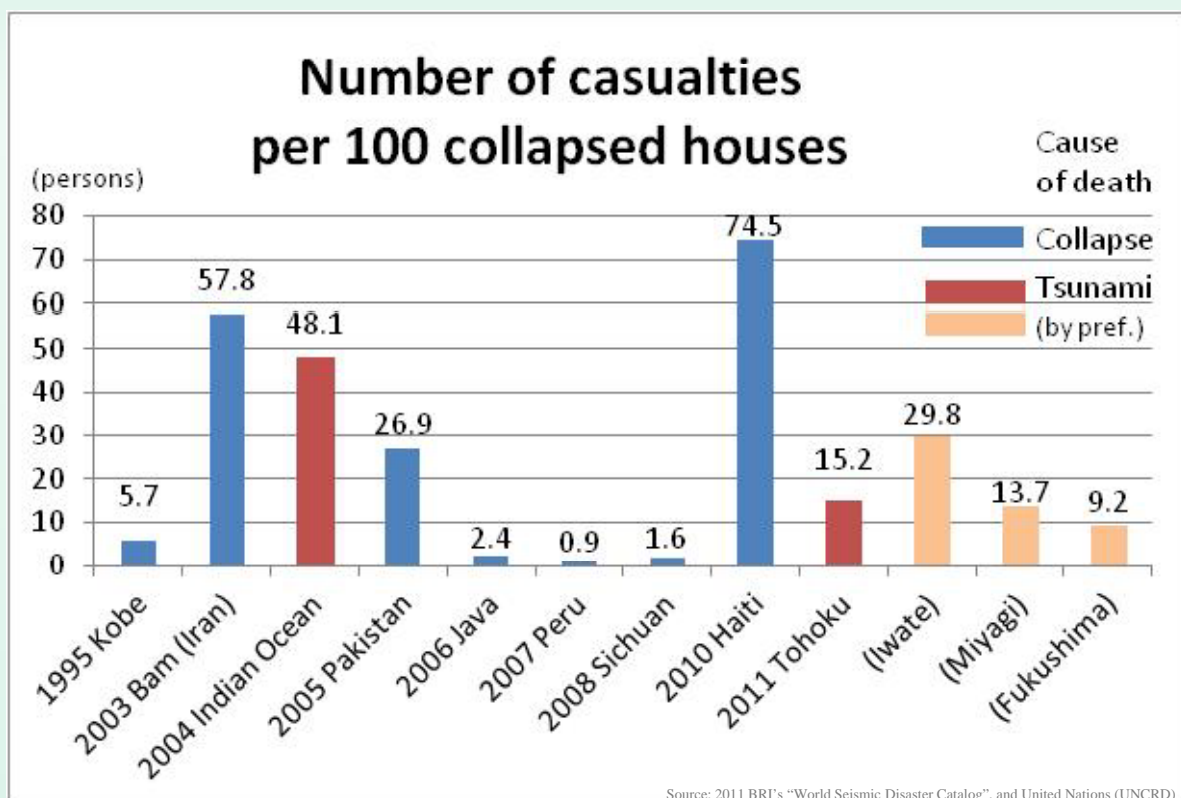
## 3. Trends of heavier damages to the poor (some earthquake cases to middle income)

貧困層が被害を受けやすい(地震では中間層の場合もある)。

## 4. Environment degradation, climate change

環境の悪化や気候変動。

## International Comparison of “number of casualties per 100 collapsed houses” of recent world huge disasters 「全壊100戸当たりの死者行方不明者数」による災害国際比較





Bam, Iran



Aceh, Indonesia

**Heavy Damages**



Barakot, Pakistan



Aceh, Indonesia

(UNCRD)



Java, Indonesia

**Smaller Human Damage Ratio**



Sichuan, China



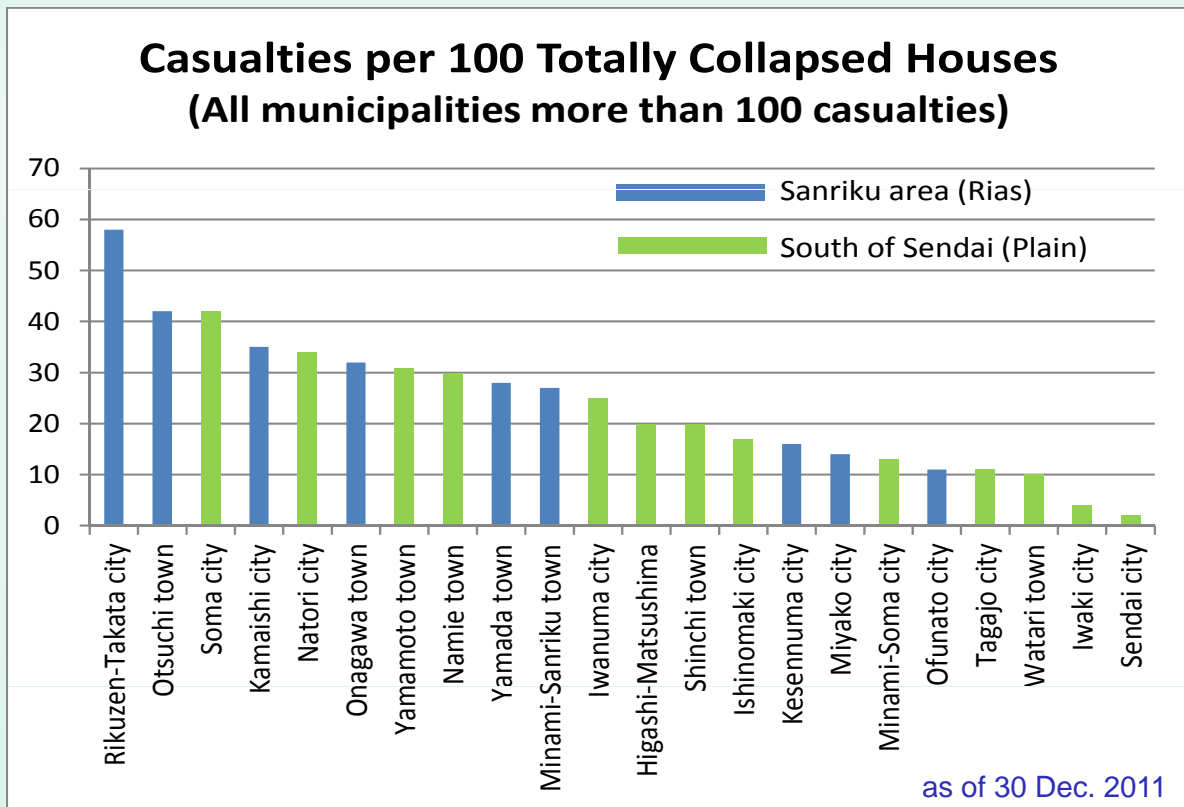
Pisco, Peru



Sichuan, China

(UNCRD)

Municipal Comparison of “number of casualties per 100 collapsed houses” of the **Great East Japan Earthquake**  
 東日本大震災の市別「全壊100戸当たりの死者行方不明者数」



Otsuchi

**Heavily damaged areas**  
 in Onagawa, Minami-Sanriku & Otsuchi Town  
 by the Great East Japan Earthquake, photo by BRI

東日本大震災の激甚被災地  
 女川町、南三陸、大槌町の例



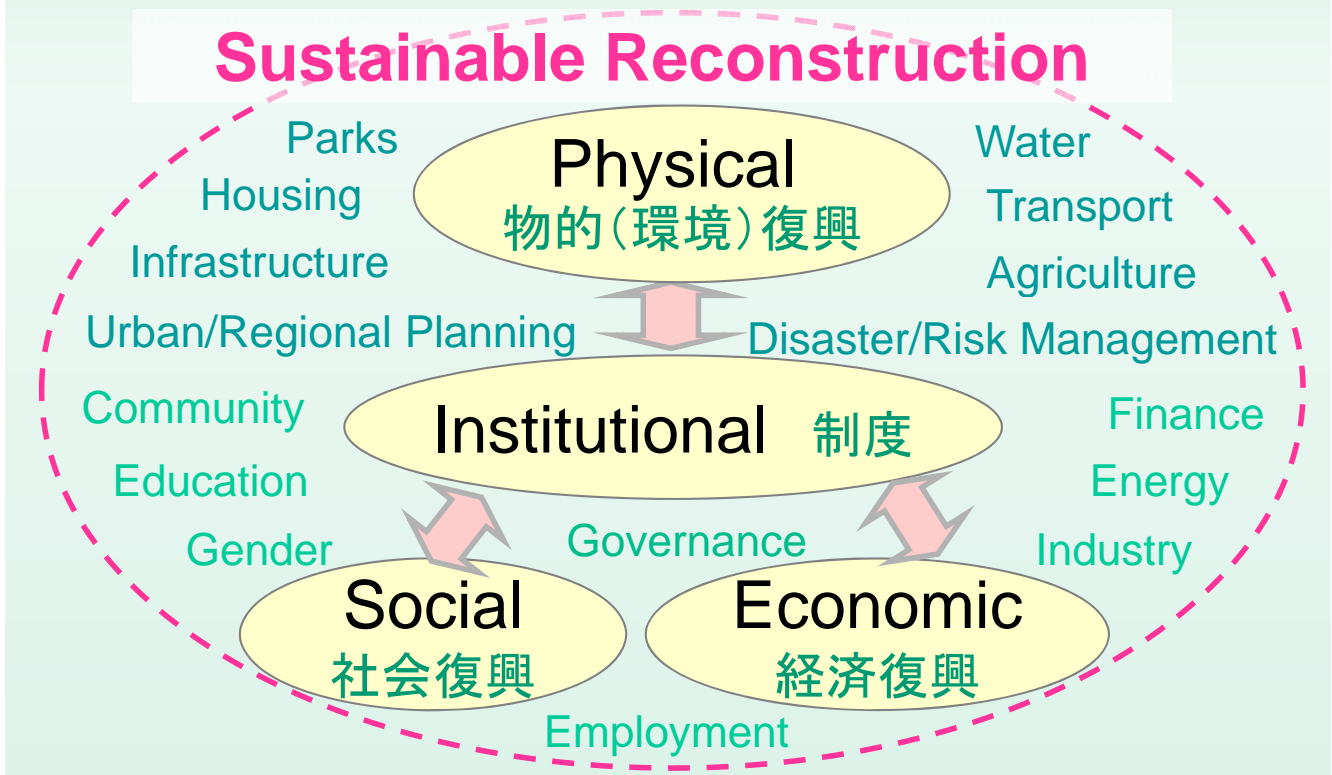
Minami-Sanriku



Onagawa

# What is a Sustainable Reconstruction?

サステナブルな復興とはどのようなものか。



## Time Frame for Sustainable Reconstruction

サステナブルな復興の時間軸

0 -1 Year Institutional 制度(整備)

3 -5 Years Physical Reconstruction 物的復興

5 -10 Years Economic 経済復興

10 - Years Social 社会復興



## 1) What should we prepare before disaster for a better reconstruction?

1) 復興のため地震が来る前から備えるべきことは何か。

## 2) How can we transfer the lessons to other areas, other countries, and next generations?

2) 復興の教訓を他の地域や国際社会、さらに次の世代にどのように伝えるべきか。