The Great East Japan Earthquake and JICA's Cooperation in Disaster Management

Shinya EJIMA
Director General,
Global Environment Department
Japan International Cooperation Agency (JICA)

JICA's Approach in Disaster Management

Three concepts as the objectives of disaster management

1. Contributing to the improvement of "Human Security"
2. Contributing to sustainable development in developing countries
3. Contributing to the promotion of international cooperation in the field of DRR as an advanced nation of disaster management

Development Strategy Goal

1. Building disaster-resilient communities and societies **(Mitigation/Preparedness)**
2. Emergency response that reaches affected people quickly and effectively (Protection of life)**(Emergency response)**
3. Transition and implementation of accurate recovery and reconstruction**(Recovery/Reconstruction)**

JICA's Approach in Disaster Management

Disaster Management Cycle (DMC)

Hyogo Framework for Action

Overall Goal: Building the resilience of nations and communities to disasters

Three Strategic Goals:

- The integration of disaster risk reduction into sustainable development policies and planning
- Development and strengthening of institutions, mechanism and capacities to build resilience to hazards
- The systematic incorporation of risk reduction approaches into the implementation of emergency preparedness, response and recovery

Priorities for Action:

- **HFA1** Make Disaster Risk Reduction a Priority
- **HFA2** Know the Risks and Take Action
- **HFA3** Build Understanding and Awareness
- **HFA4** Reduce Risk
- **HFA5** Be Prepared and Ready to Act

HFA1		Ensure that disaster risk reduction in a national and local priority with a strong institutional basis for implementation
Earthquake	○	**Wide-area rescue and relief operation worked well** ・Extended associations of municipalities had been formulated based on the experience of the Great Hanshin-Awaji Earthquake 1995 for support from the non-damaged areas ・Prompt damage assessment and recovery of infrastructure by mobilizing resources of non-damaged areas *(Source: Sankei Shimbun dated 15 April)*
	×	**Awkwardness of receiving foreign assistance** ・Communication problem (e.g. language) ・Require additional care (e.g. language, culture, locality) ・Difference in laws and regulations *(Source: Sankei News dated 24 March)*

Extended association in the Kansai region including Kobe City

Based on the experiences of the Great Hanshin-Awaji Earthquake 1995, mutual aid agreements are being concluded across the country as a wide-area disaster relief system and medical system.

Tottori Hyogo Kyoto Shiga

Tokushima Osaka Wakayama

Seven prefectures join the extended association in the Kansai region for mutual relief and medical activities.

(Source: Kyoto Shinbun dated 14 September, 2010)

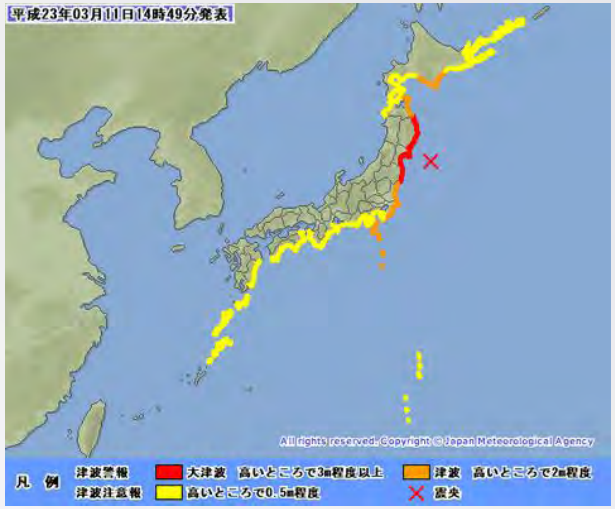
	Priority Action 1 **Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation.**
Key Activities	(1) Create and strengthen national institutional and legislative frameworks (2) Assess, develop and allocate resources (3) Promote community participation in disaster risk reduction
JICA's Activities in Priority Action	・National / local disaster policy ・Capacity development of staffs of disaster-related organizations ・Capacity development of community level
Example	The Study on Natural Disaster Management Plan, Indonesia

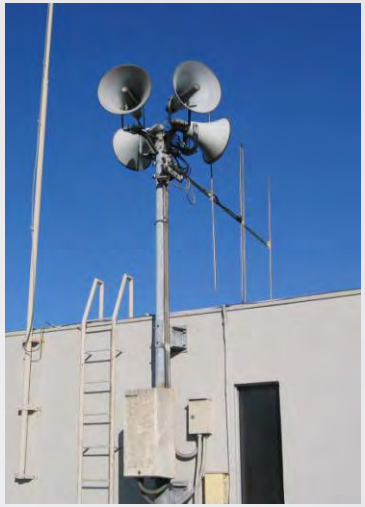
Japan Disaster Relief Team operating in front of City Hall of Padang. Disaster headquarters were established based on a formulated policy when an earthquake hit in 2009.

HFA2		Identify, assess and monitor disaster risk and enhance early warning
Earthquake	✕	**Reduced accuracy of earthquake early warning system** ・Accuracy of the earthquake early warning system was lowered after the Great East Japan Earthquake due to the following reasons: 1) Blackout, line disconnection and physical damage of equipments prohibit accurate calculation of epicenters and intensity. 2) Plural earthquake happened at once. *(Source: Japan Meteorology Agency Website)*
Tsunami	○	**Tsunami early warning system technically worked** ・ Tsunami Warning / Caution were issued 3 min. after the earthquake. ・ Estimated arrival time and tsunami height were also disseminated. *(Source: Seeds Asia Report)*
	✕	**Insufficient information from the tsunami early warning system** ・ In some areas, estimated or announced tsunami height was lower than actual height. ・ Some people over-trusted prediction of hazard map or incorrect information and delayed to escape. ・ Dissemination of warning was insufficient because of facility damage. *(Source: Mainichi Shinbun dated 14 April)*

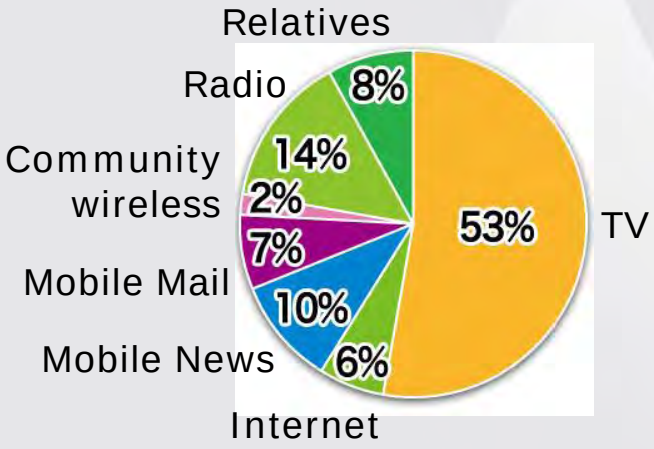
Tsunami Early Warning System

Tsunami early warning system seems to have produced mixed results. Alarm was issued promptly, but whether the people got information and react was another issue.

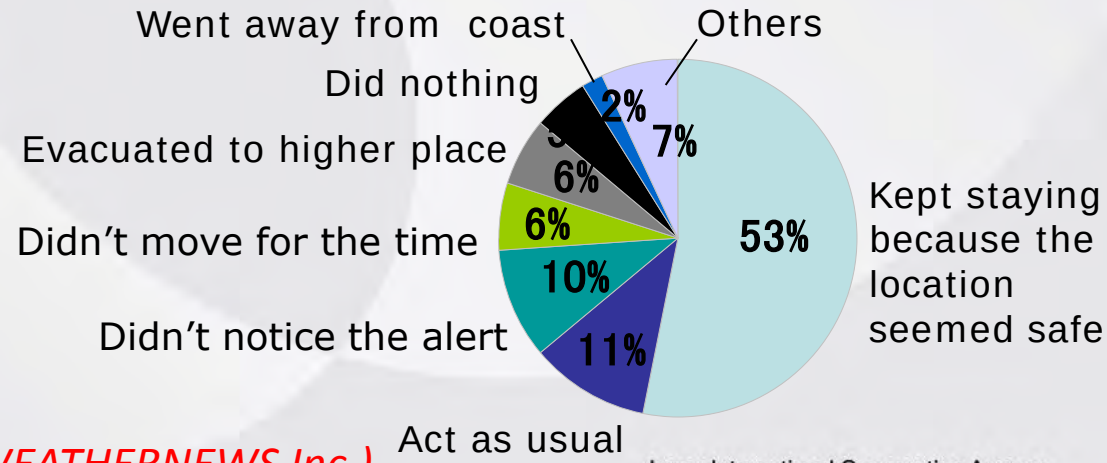




By which Media did you get the Tsunami Alert?



What did you do after the Tsunami Alert?



(Source: WEATHERNEWS Inc.)

	Priority Action 2 **Identify, assess and monitor disaster risks, and enhance early warning systems.**
Key Activities	(1) Assess national and local risks (2) Develop early warning systems (3) Support the development of capabilities (4) Assess and monitor apparent regional-level risks
JICA's Activities in Priority Action	・Evaluation of disaster risk ・Preparation of hazard map ・Formulation of early warning system ・Technology upgrading of observing and networking
Example	Project for Flood Forecasting and Warning System in High Atlas Area, Morocco

Warning station installed

HFA3		Use knowledge, innovation, and education to build a culture of safety and resilience at all levels.
Earthquake	×	**Dysfunctional community wireless system** ・Dysfunction takes away communication system from community. **Reconsidering the methodology of seismic prediction** ・Segmentation of epicentral areas *(Source: Asahi Shimbun 12/April)*
Tsunami	○	**Evacuation drill / Disaster education worked** ・Implementation of evacuation drills based on following principles: 1) Nonbiased response beyond assumption, 2) Make the utmost effort to survive, 3) Evacuation as a matter of priority ・1,927 elementary school students and 999 junior high school students survived (rate of survival: 99.8%) in Kamaishi City *(Source: Sankei Shinbun 13/April)*
	×	**Evacuation drill / Disaster education failed** ・People evacuated to a designated evacuation center, but they were swept away (54 bodies were found). ・The evacuation center was selected based on the past records of tsunami, but turned out to be inappropriate. *(Source: Yomiuri Shimbun 24/March)*

Successful Evacuation by Students in Kamaishi City

The students started evacuation promptly and voluntarily, following their experiences of evacuation drills.

The students decided to evacuate further to higher ground based on their own observation of situation.

(Source: Research Center for Disaster Prevention in the Extended Tokyo Metropolitan Area, Gunma University)

Priority Action 3
Use knowledge, innovation and education to build a culture of safety and resilience at all levels.

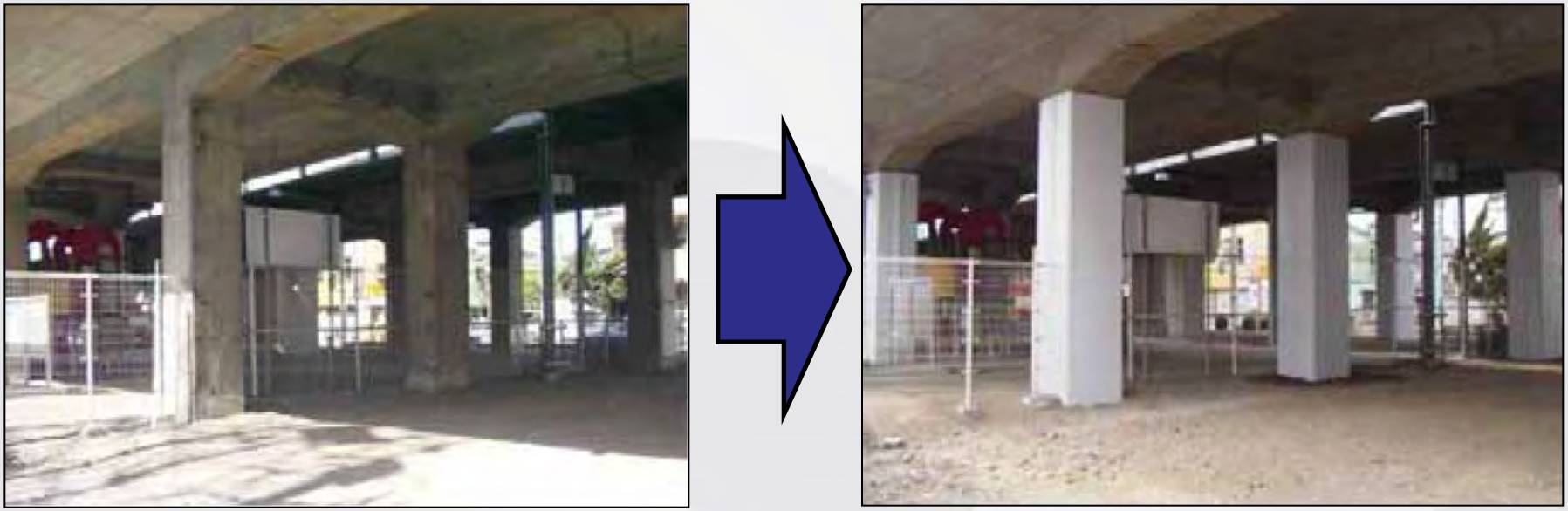
Key Activities	(1) Manage and exchange information (2) Strengthen networks (3) Promote and strengthen activities of DRR in communities and schools (4) Promote research (5) Enhance public awareness
JICA Activities in Priority Action	・Implementation of disaster education ・Community-based disaster prevention activity
Example	The Project on Capacity Development in Disaster Management, Thailand

Students experiencing DIG (Disaster Imagination Game)

HFA4		Reduce the underlying risk factors
Earthquake	○	**Revision of a seismic design standard（Infrastructure)** ・The standard was revised based on the experience from the Great Hanshin-Awaji Earthquake 1995. ・Viaduct reinforced after the Great Hanshin-Awaji Earthquake 1995 suffered no damage. *(Source: Prof. Takahashi (Kyoto Uni.) reported in Japan Society of Civil Engineering)* **Revision of a seismic design standard（Houses)** ・Many houses outside inundation areas of tsunamis didn't collapse. *(Source: Seeds Asia Report)*

Antiseismic Reinforcement of Tohoku Shinkansen (bullet train)

Viaduct (elevated tracks) and bridges were reinforced twice after the Great Hanshin-Awaji Earthquake 1995 and the Sanriku Minami Earthquake 2003.



No significant damage to main structures such as tunnels, bridges and viaduct → Early resumption of the train service

(Source: JR East)

HFA4	Reduce the underlying risk factors
Tsunami	**Structural measures reduced damages (e.g. Coastal levee, breakwater etc)** ・Structures constructed along coast based on historical record ・Some structures collapsed, but worked effectively to reduce the damage: 1) suppressed the height of tsunamis down to 40% at the coast 2) delayed the arrival time of tsunamis 6 minutes at the residential areas *(Source: Simulation by Port and Airport Research Institute)* **Town planning prevent damages** ・After repeated historical earthquakes and tsunamis, various countermeasures by town planning has been carried out. - Development of building lots : higher than 25m in Sendai - High mounted highway (Sendai Eastern Highway) to block tsunamis - Collective relocation to higher ground *(Nikkan Kensetsu Kogyo Shimbun 18/ Mar)*
	Seismic design standards needs to be reconsidered ・These standards don't consider tsunami aspects. **Limitation of structural measures** ・Community people didn't recognize limitations of structural measures.

Buildings saved evacuated people

Kamaishi municipal apartment house

Tsunami escape buildings, designated by municipalities as emergency and temporary shelter, withstood the shock of the tsunami and saved people.

Yuriage elementary school, Miyagi

Japan International Cooperation Agency

(Source: Nikkei Construction, Kyodo News)

Priority Action 4
Reduce the underlying risk factors.

Key Activities	(1)Environmental and natural resource management (2)Social and economic development practices (3)Land-use planning and other technical measures
JICA Activities in Priority Action	・Formulation of Integrated flood management plan ・Municipal effluent ・Construction of dams and dyke ・Preparation of disaster prevention facility
Example	Project for construction of multi-purpose cyclone shelters, Bangladesh

Constructed cyclone shelter

HFA5		Strengthen disaster preparedness for effective response at all levels
Earthquake	○	**Prompt recovery of important basic infrastructure** - Shinkansen (bullet train) : Completely recovered by 29/April *(Source: Asahi Shimbun 18/April)* - Highway : Completed recovery for emergency vehicles by 12/Mar. 813 kilometers (93%) of roads rehabilitated *(Source: NEXCO West Japan website)* - Aviation : Sendai Airport partially resumed 1 month after the disaster. *(Source: Sendai Airport website)*
	×	**Construction of temporary houses** ・Delay of construction 1) Lack of construction material 2) Insufficient utility and land *(Source: Asahi Shimbun 16/Apr.)*

Recovery of Tohoku Shinkansen

A network of 97 earthquake detectors functioned 15 seconds before the quake hit the tracks on 11 March, 2011. Automatic brakes stopped the 27 bullet trains in operation without any trouble.

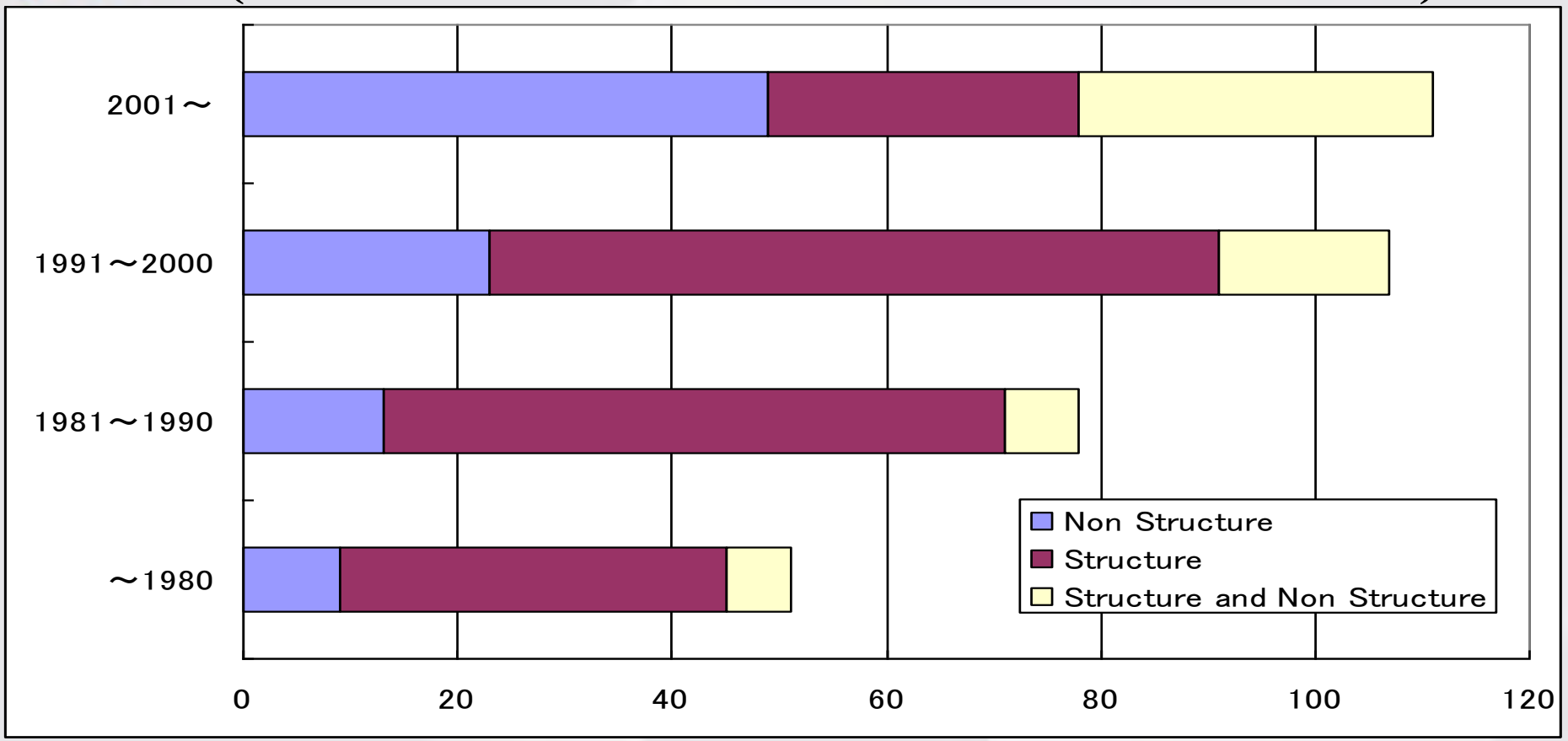
1,200 points were reported having small damages along 500 km tracks, but no serious damage to main structures. 8,500 engineers were deployed for rehabilitation.

(Source: International Herald Tribune Japan Edit. 29 Apr, Dr. Takahashi, Kyoto Univ., SankeiBiz)

	Priority Action 5 **Strengthen disaster preparedness for an effective response at all levels.**
Key Activities	(1) Development of emergency response plan (2) Having budget for emergency support of preparation and recovery (3) Formulation of regional approach (4) Continuous dialogue among relevant organizations.
JICA Activities in Priority Action	・Implementation of evacuation drill ・Formulation of Emergency Response Plan
Example	Dispatch of Japan Disaster Relief Team to Marmara Eq. , Turkey

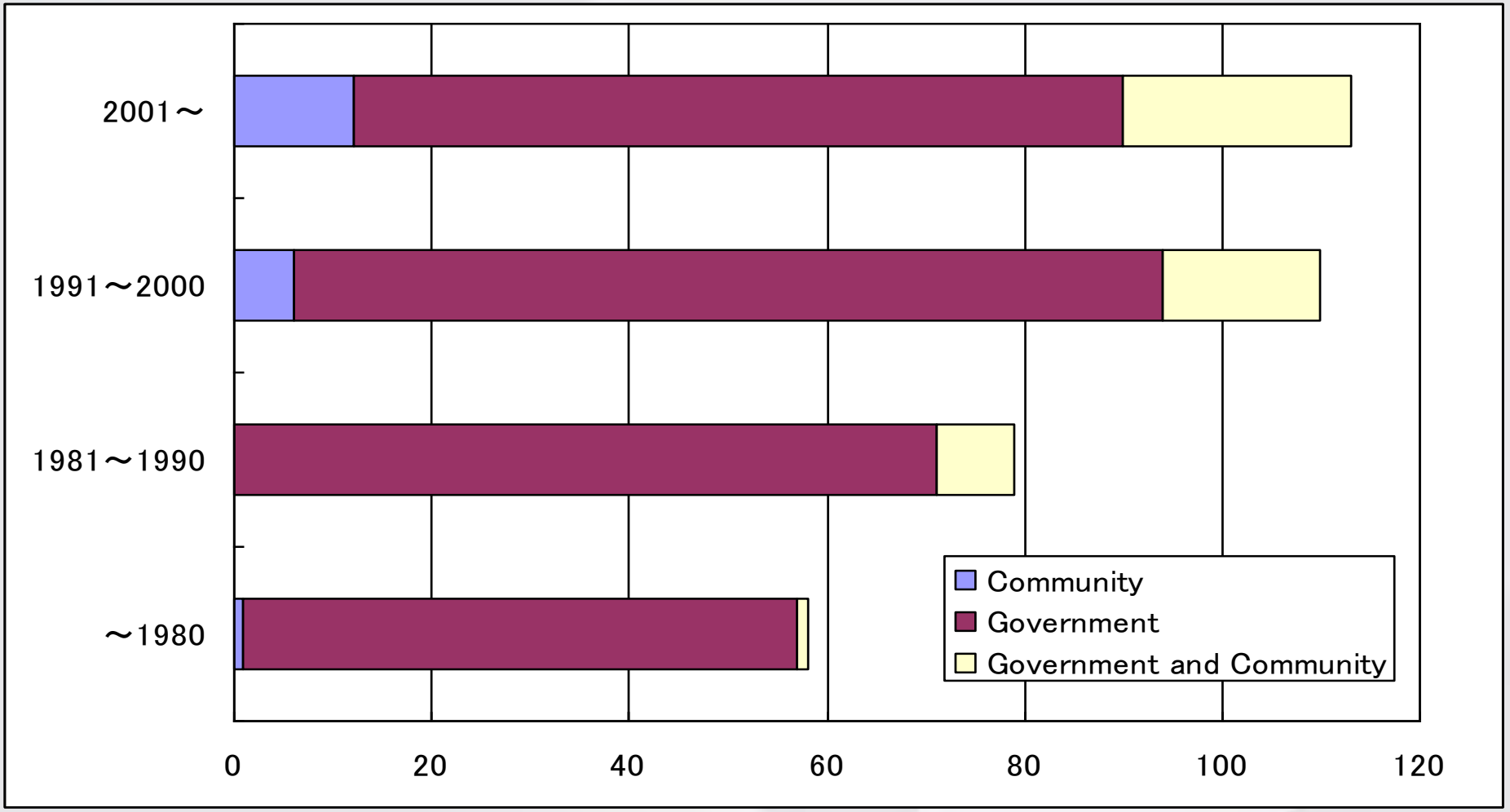
JDR team rescuing in affected area

Trend in JICA's Activity
(From structural to non-structural measures)

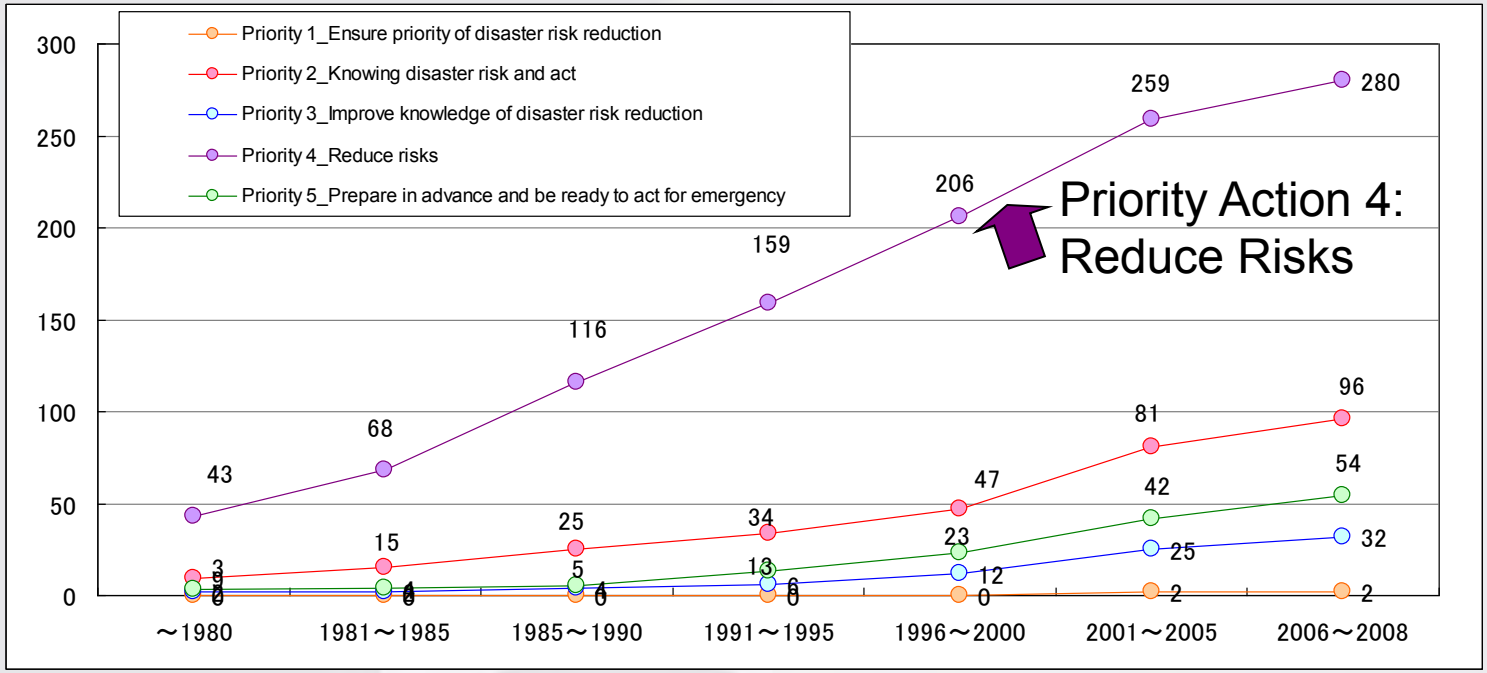


Majority of JICA Projects up to 90's : Structural measures
from 2000 : Non structural measures
Projects by combination of structural and non-structural measures are increasing.

Trend in JICA's Counterparts (From central government to community)



JICA's target is gradually shifting to community from 90's.



Type of Cooperation	Priority Actions						Total Number of Projects 1997-2008
	1	2	3	4	5	Total	
Development Study	3	35	14	60	21	133	70
Technical Cooperation	1	14	9	16	10	50	34
Grant Aid	0	14	4	11	3	32	30
Yen Loan	0	0	1	20	3	24	24
Total	4	63	28	107	37	239	158

-The projects related to priority action 4 are increasing rapidly compared to others.
- It entails the use of structural and non-structural measures.

Implication to future JICA's projects

1. Improvement of Non-structural measures

Non-structural measures, such as hazard map and early warning system, are increasingly important, to compliment structural measures.

Lessons from the Great East Japan Earthquake

(1) Information dissemination system was insufficient.

(2) Risk assumption based on hazard map was not always correct.

- Non-structural measures need to be improved based on the experiences and lessons learned.
- Capacity development is necessary to enable imagination of worst scenario, flexible response and repetitive awareness raising.

Implication to future JICA's projects

2. Outreach to the people

Japan was regarded as one of the most prepared countries against natural disasters by various systems.

Lessons from the Great East Japan Earthquake

(1) Magnitude of natural hazard may exceed expectation and design standards. Protecting lives should be prioritized.

(2) Downside risks for the elderly people and other vulnerable people

(3) Challenging reconstruction in depopulated and aging areas

- Disaster management measures need to reach to the people to save their lives.
- More attention should be paid to the vulnerable people and livelihood throughout the disaster management cycle ("Human Security").

Implication to future JICA's projects

3. Promoting knowledge sharing

Low frequency of tsunamis and mega-earthquakes even in disaster-prone countries like Japan

Lessons from the Great East Japan Earthquake

(1) Difficulty to inherit memories of past disasters over generations

(2) Perception bias by the people to rare event

- Lessons from low frequency disasters should be shared by the entire world to prepare for the coming event.
- JICA is ready to work as a catalyst to send lessons learned and exchange knowledge worldwide.

Thank you very much
for
your attention