Flood Management in Japan

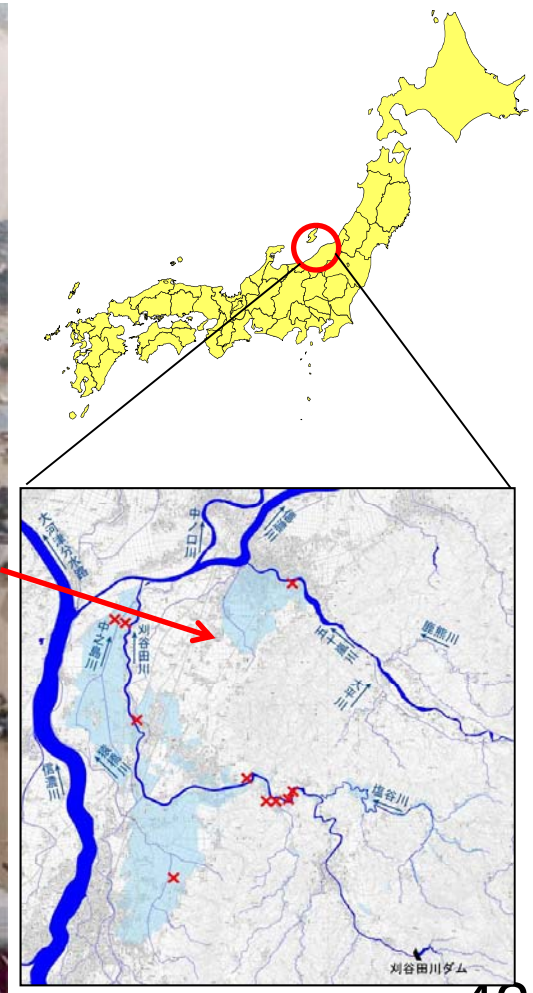
1. Comprehensive Flood Control Measures
2. Provision of River information
3. Responses to the Niigata Torrential Rain Disaster
4. About ICHARM
5. Responses to 2011 Thailand Floods
6. Outline of the Tsunami-Resilient City

2004 Niigata Torrential Rain Disaster

July 2004 torrential rain caused inundation in large areas, resulting in extensive damages (Fatalities were 15 and approx. 21,000 buildings were damaged in Niigata prefecture※).

※: Niigata Disaster Management Office (March 23, 2005)

Inundation caused by Ikarashi River levee failure
(Sanjo City, Niigata Prefecture)



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Damages caused by 2004 Niigata Torrential Rain Disaster

Inundation caused by Ikarashi River levee failure (Sanjo City, Niigata).

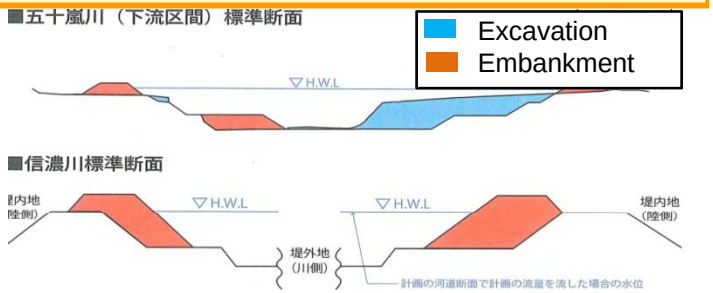
Inundation due to Kariyata River levee failure (Mitsuke City, Niigata)

Inundation due to Kariyata River levee failure (Nakanoshima Town, Niigata)

River Improvements in consideration of 2004 Disaster

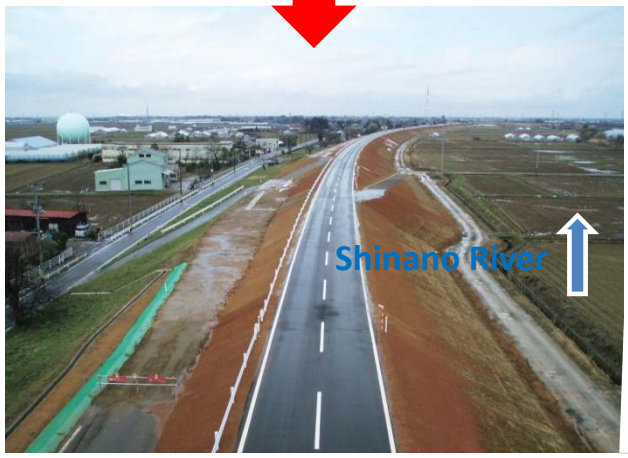
River improvements were implemented in consideration of July 2004 flood.

Shinano River（L=34.2km）（2004 – 2009）
Ikarashi River（L=3.9km）（2004 – 2010）
Kariyata River (L=24.5km）（2004 – 2010）



Downstream of Shinano River

（September 2008）



Levee Improvement
（March 2009）

Ikarashi River Tokiwa Bridge

（August 2005）

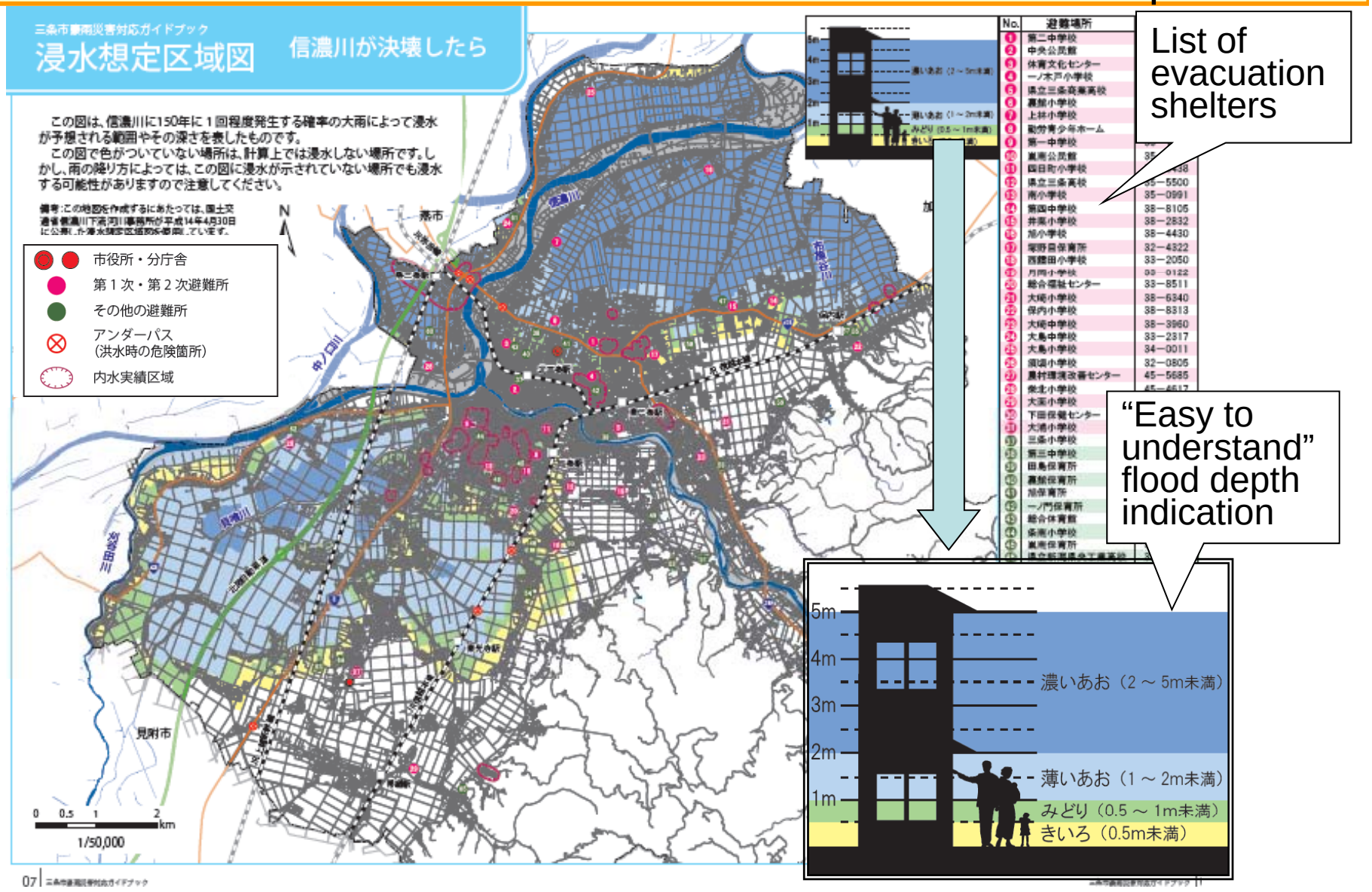
Widening & Excavation
（December 2010）

Kariyata River Nakanoshima Bridge

（June 2009）

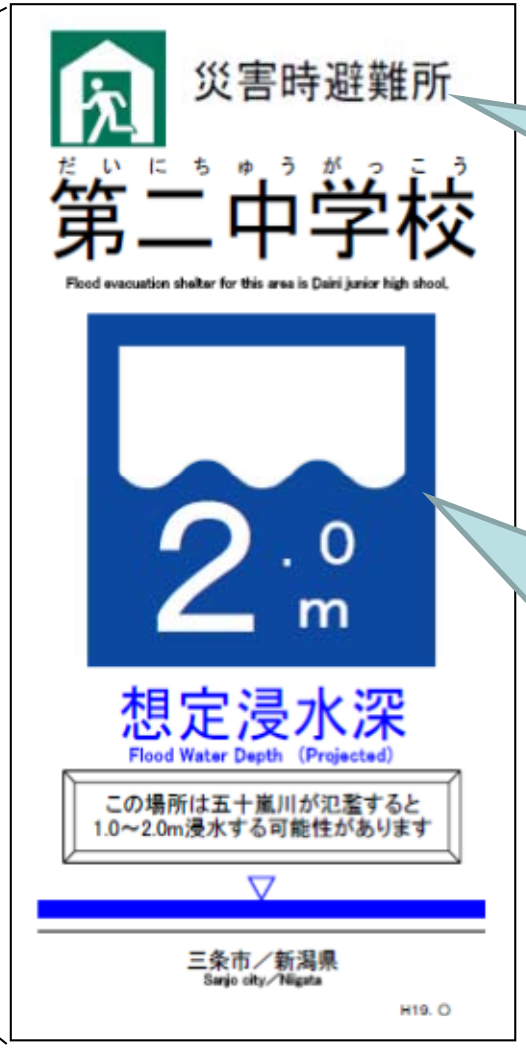
River Channel & Levee Improvement（December 2010）

Raising Public Awareness by Disseminating “Easy to Understand” Disaster Prevention Information such as Hazard Maps



Hazard Map - Sanjo City Torrential Rain Disaster Handbook -

On-Site Display of Past Inundation Levels (Marugoto-Machigoto Hazard Map)



Closest evacuation shelter

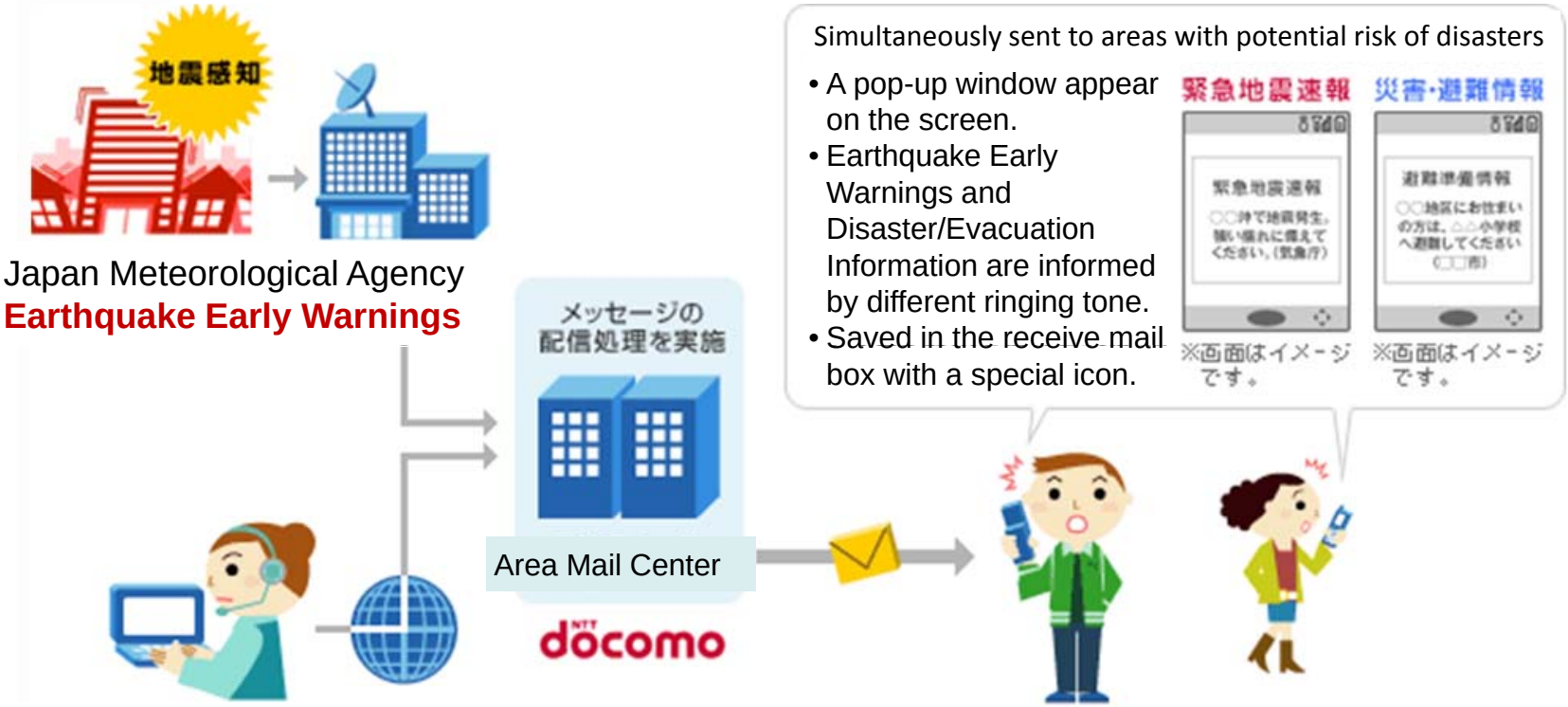
Maximum inundation depth expected at the location

Provision of Evacuation Information using Mobile Phone "Area Mail"

Early Warning "Area Mail"

Provides disaster information such as Earthquake Early Warnings issued by the Japan Meteorological Agency and disaster and evacuation information issued by national and regional public institutions to subscribers in afflicted areas.

- Each base station simultaneously transmit mail to all users in the coverage area.
- Information can be received without the impact of line congestion as it uses cell broadcast service (CBS).



NTTdocomo HP

Distribution of “Emergency Announcement FM Radio”

Emergency Announcement FM Radio

It can be automatically switched on/off by central control (community broadcast or public administration) and can make announcements with high volume.
It is equipped with rechargeable batteries, and receive broadcasts even during power-outage.

Disaster Prevention Training in consideration of 2004 Disaster

【Comprehensive Disaster Prevention Training】

Sanjo City is conducting a comprehensive disaster prevention training every year in June, lead by the fire department. All community firefighters in Sanjo City participate and visit homes of those people with special needs.

【Community Disaster Prevention Drills】

Local communities within Sanjo City conduct their own evacuation drills with the firefighters.

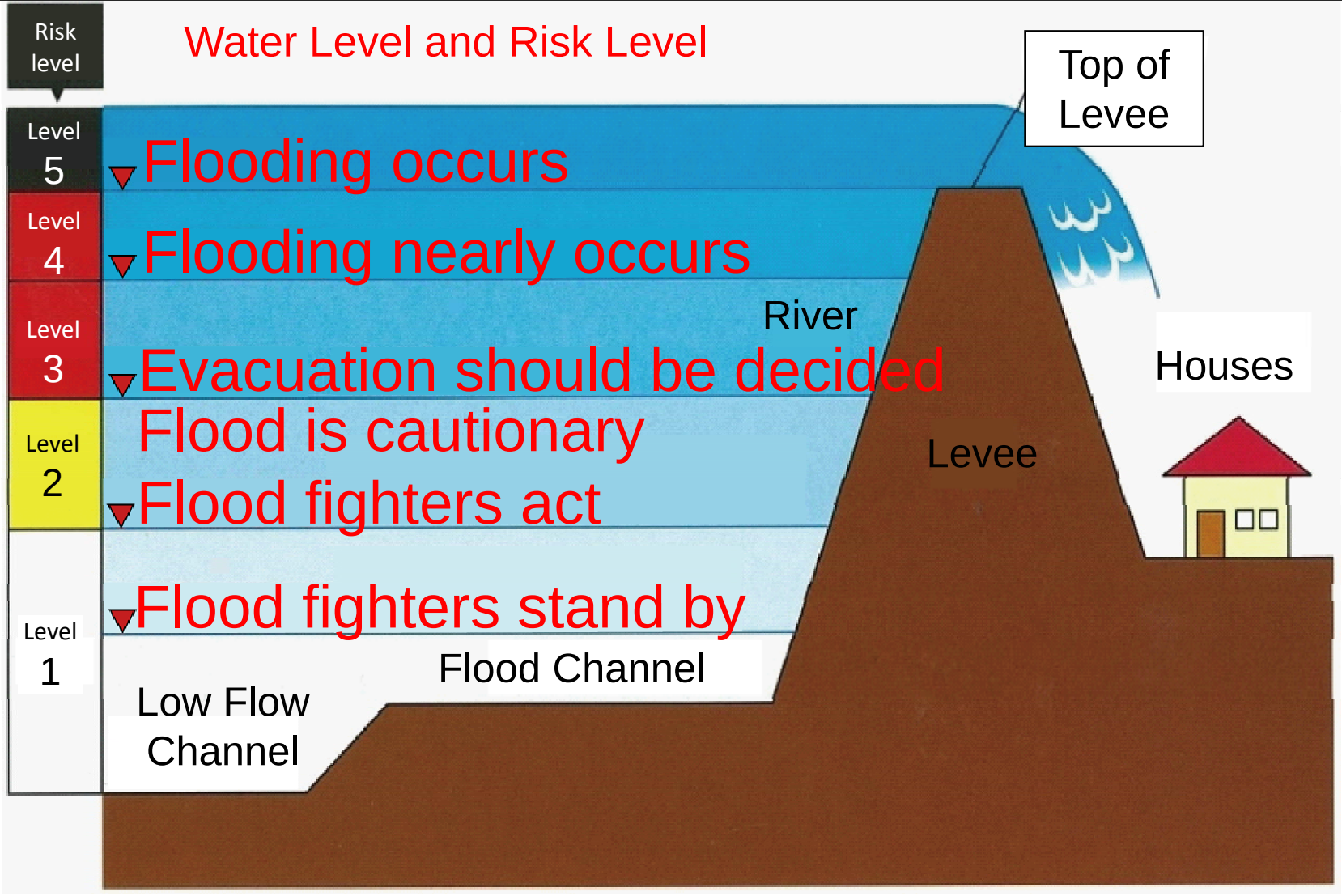
【Voluntary Disaster Prevention Organizations】

40 to 50 voluntary disaster prevention organizations were established after the 2004 flood disaster.

Photos：May 2010 Shinaogawa-Karyu Water Disaster Drills

Establishment of Standards for Evacuation Orders

In order to promote smooth evacuation actions reference to water levels for evacuation orders have been established and categorization of water levels based on risk levels have been implemented.



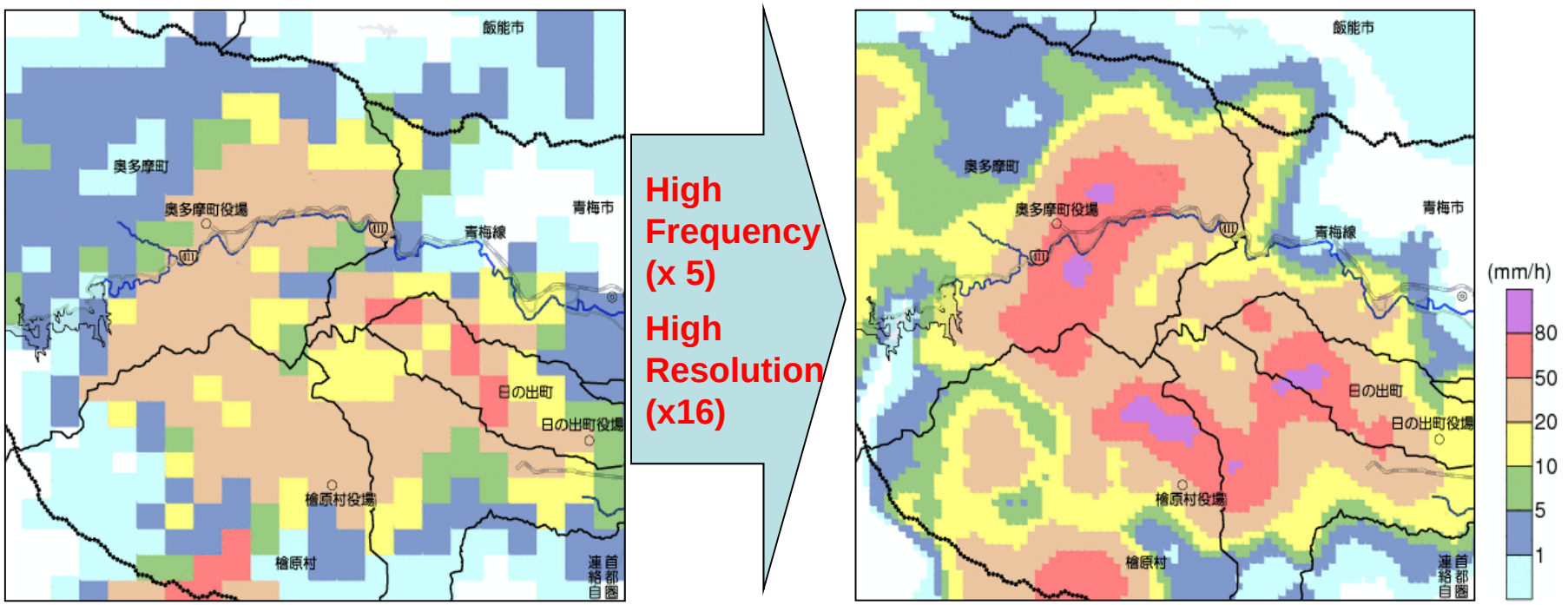
Installation of X Band MP Radar

○X Band MP Radar is being installed in urban areas to enforce real-time observation of localized torrential rainfall, so called “guerilla rainfall”, and to mitigate damages.

○Compared to the conventional radar (C Band Radar) observation with higher frequency (x5) and higher resolution (x16) is possible. Time required for dissemination is reduced from 5-10 minutes to 1-2 minutes.

【Conventional Radar (C Band Radar)】

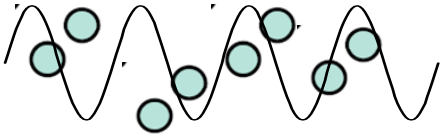
【X Band MP Radar】



Precipitation Information by X Band MP Radar

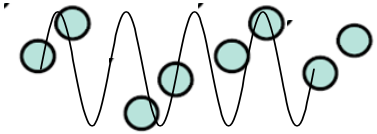
○X Band Radar enables higher resolution observation (250m grid)due to shorter wave length.

【C Band Radar (longer wave length) 】



⇨ Enable observation of long distance

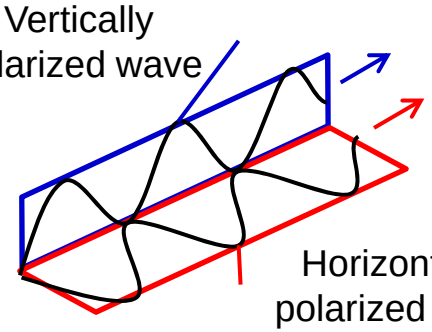
【X Band Radar (shorter wave length) 】



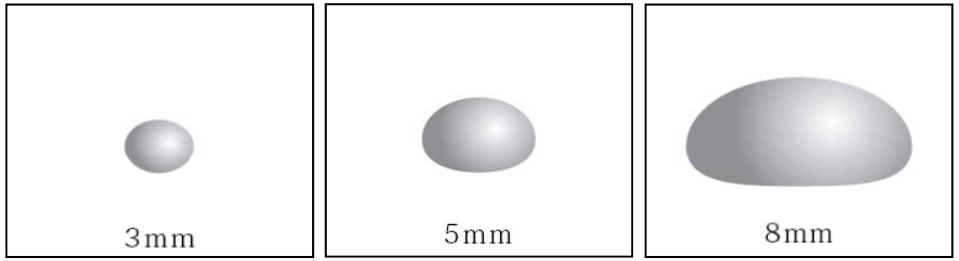
⇨ Detailed observation is possible but with smaller observation range

○ MP (Multi-Parameter) Radar captures the configuration of rain drops and accurately estimate precipitation amount, and does not require correction using ground gauges. ⇒ Information can be disseminated with almost no lag time.

【Multi Parameter Radar】



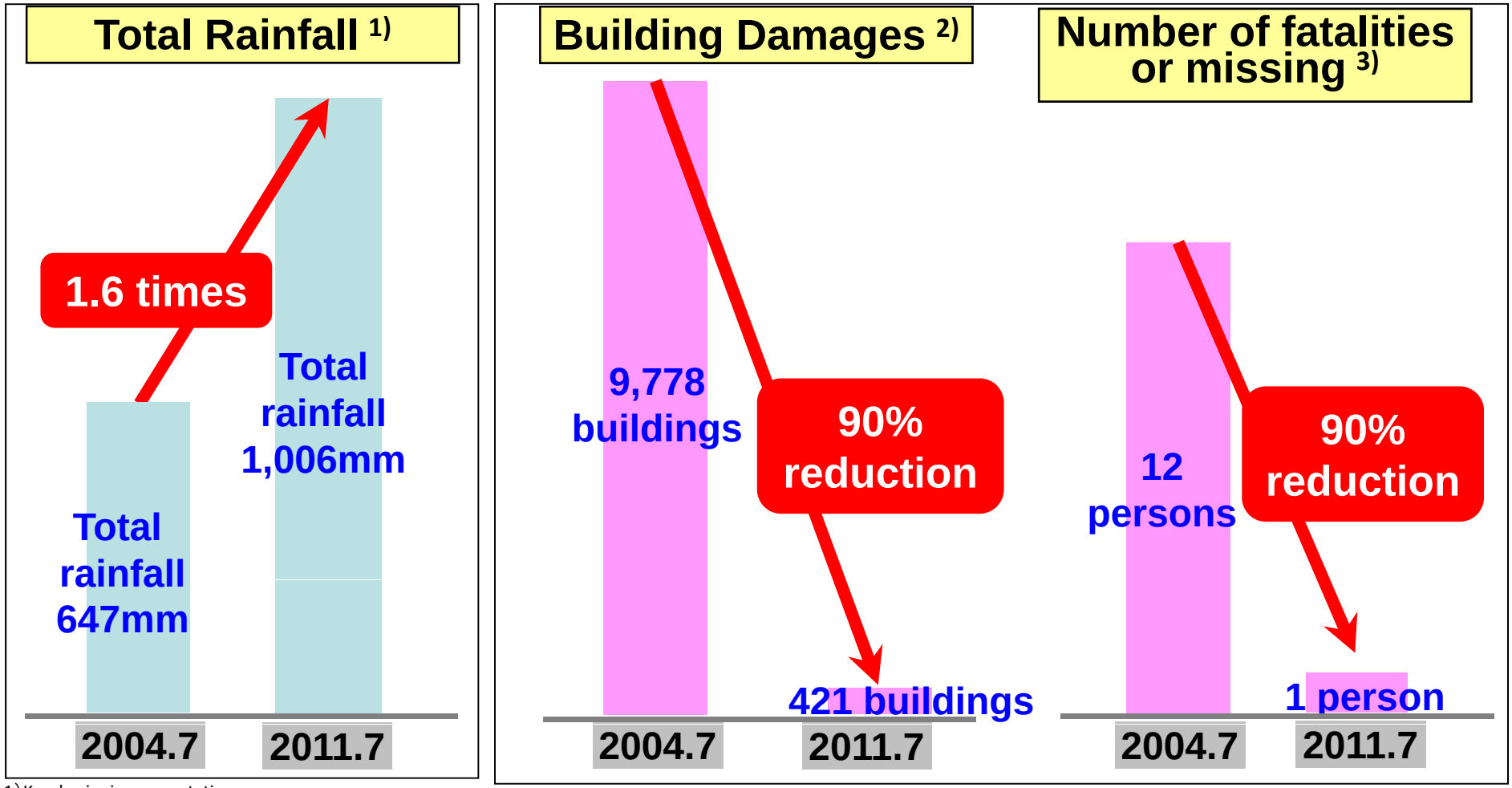
【Changing configuration of rain drops】



By transmitting two types of waves (vertical and horizontal) the configuration of rain drops can be captured.

Improvement of flood prevention facilities and enhancement of warning/evacuation procedures lead to reduction of damages

- In July 2011 the Shinano River Basin in Niigata experienced a torrential rainfall of approx. 1,000mm (cumulative rainfall), the largest rainfall in the recorded history.
- Total rainfall was 1.6 times more than that of July 2004 but both damages to buildings and human casualties were reduced dramatically.



1) Kasabori rain gauge station
2) 2004.7: 7.13 Rainfall and Flood Damage Report in Niigata (March 2006 Niigata Prefecture)
2011.7: Produced by Niigata Prefecture based on "First Niigata and Fukushima Rain Disaster Management Research Committee (Jul. 2011)"
3) Shinano River Downstream, Ikarashi River, Kariyata River Disaster Rehabilitation Emergency Project Pamphlet (Shinano Karyu River Office, Niigata Prefecture)