Seminar series of SAPI

(Strategic Analysis of Policy Implementation under Colombia Japan Cooperation)

Target audience group: D = Decision maker, P = Practitioner of DRM, T = Technician of particular areas

1. Seminar on Disaster Risk Management in Japan: Target = D, P
   - introduction of geological background, history of DRM, system, rolls and responsibilities of entities
   - discussion about advantages and disadvantages of the both systems in Japan and Colombia
2. Seminar on Disaster Risk Reduction in Japan: Target = D, P
   - Investment in measures to reduce various types of disaster risks (Prevention and Mitigation)
   - Preparedness and emergency response
   - Rehabilitation and reconstruction
3. Seminar on Societal Resilience to Disaster: Target = D, P
   - Risk awareness raising
   - Civic participation on DRR
   - Private sector participation, BCM
   - Area BCM
4. Workshop on SFDRR: Target = D, P
   - Outline and difference from HFA
   - Target and Indicators
   - Implementation and challenges
5. Seminar on River Law of Japan: Target = D, P, T
   - Outlines of the law
   - Essential features
   - Relevant law on urban flood prevention
6. Seminar on climate change adaptation in Japan: Target = D, P, T
   - Basic concept of CCA
   - Technical guides
   - Case study of assisting developing countries, Indonesia
7. Workshop on flood risk assessment: Target = P, T
   - Introduction of Integrated Flood Management
   - Open source and open data
   - Process of flood risk assessment
   - Tutorial of the process
     - Scoping
     - DEM
     - Scenario flood hydrograph
     - Flood hazard simulation
     - Risk assessment
8. Seminar on construction regulation: Target = P, T
   - Building code
   - Restriction in disaster zones
9. Seminar on sediment disaster prevention law: Target = D, P
10. Seminar on active volcanic zones law: Target = D, P
11. Seminar on Space Technology for DRM: Target = P, T
12. Workshop on Open Data for Resilience Initiative: Target = P, T
13. ..and more

Disaster Risk Reduction by phases of….

Prevention, Mitigation, Preparedness, Response, Recovery and Reconstruction

1. Investment in Disaster Risk Reduction (Prevention and Mitigation)
2. Preparedness and Emergency Response
3. Recovery and Reconstruction

1. Investment in Disaster Risk Reduction (Prevention and Mitigation)

Measures for prevention and mitigation are taken by each disaster type.

Countermeasures against:

a. Earthquake and Tsunami
b. Storm and Flood
c. Sediment related disasters
d. Volcanic disasters
e. Snow disasters
f. Others

Disaster Group (EM-DAT) : http://www.emdat.be/new-classification

Group	Subgroup	Main Type
Natural	Geophysical	Earthquake, Mass Movement, Volcanic activity
	Meteorological	Extreme Temperature, Fog, Storm
	Hydrological	Flood, Landslide, Wave action
	Climatological	Drought, Extreme Temperature, Glacial Lake Outburst, Wildfire
	Biological	Epidemic, Insect infestation, Animal Accident
	Extraterrestrial	Impact, Space weather
Technological	Industrial accident	Chemical spill, Collapse, Explosion, Fire, Gas leak, Poisoning, Radiation, Other
	Transport accident	Air, Road, Rail, Water
	Miscellaneous	
Natech disaster: Natural Hazard Triggering Technological Disasters		

Earthquake Disasters in Japan

Japan is located at a point on the earth's surface where four of more than 10 tectonic plates covering the globe are crushed against each other, making it an archipelago susceptible to earthquake disasters.

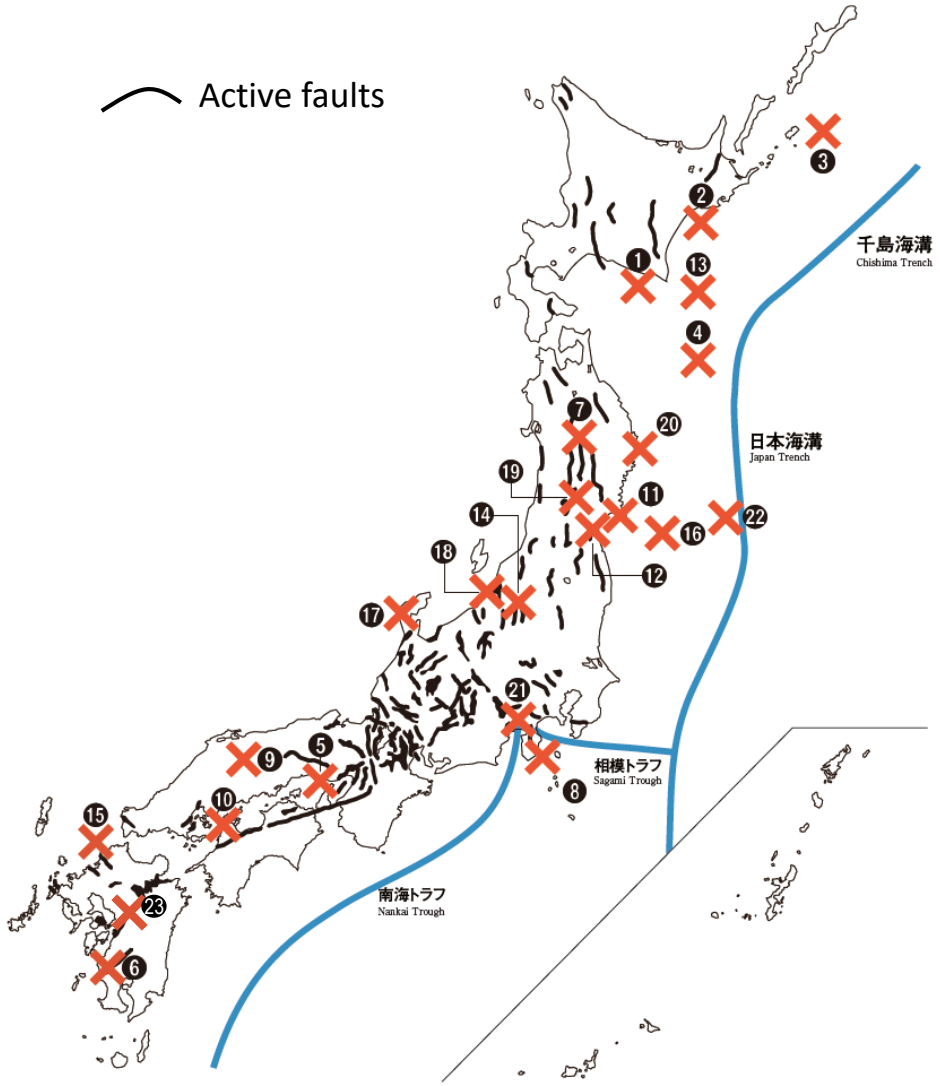
Nearly 20% of the world's earthquakes（of magnitude 6 or greater）have occurred in or around Japan.

Japan has suffered great damages from the massive inter-plate earthquakes produced by plate subduction (such as the Great East Japan Earthquake in 2011) and the inland crustal earthquakes caused by plate movements (such as the Great Hanshin-Awaji Earthquake in 1995 and the Kyusyu Earthquake in 2016).

Major Earthquakes recorded in Japan last 35 years

Earthquake (Main Shock) with seismic intensity of 6 or greater (after 1975)

1 1982.3.21 Urakawa-oki Earthquake
2 1993.1.15 Kushiro-oki Earthquake
3 1994.10.4 Hokkaido-Toho-oki Earthquake
4 1994.12.28 Sanriku-Haruka-oki Earthquake
5 1995.1.17 Hyogo-ken-Nanbu Earthquake (Great Hanshin-Awajji Earthquake)
6 1997.5.13 Satsuma region in Kagoshima Prefecture
7 1998.9.3 Northern region in Iwate Prefecture
8 2000.7.1 Niijima and Kozushima Earthquake
9 2000.10.6 Tottori-seibu Earthquake
10 2001.3.24 Geiyo Earthquake
11 2003.5.26 Miyagi-ken-oki Earthquake
12 2003.7.26 Northern Miyagi Earthquake
13 2003.9.26 Tokachi-oki Earthquake
14 2004.10.23 Niigata-ken-Chuetsu Earthquake
15 2005.3.20 Fukuoka-ken-Seihou-oki Earthquake
16 2005.8.16 Miyagi-ken-oki Earthquake
17 2007.3.25 Noto-hanto Earthquake
18 2007.7.16 Niigata-Chuetsu-oki Earthquake
19 2008.6.14 Iwate-Miyagi Inland Earthquake
20 2008.7.24 Northern coastal area of Iwate Prefecture
21 2009.8.11 Suruga Bay
22 2011.3.11 Great East Japan Earthquake
23 2016.4.16 Kyusyu Kumamoto Earthquake



Earthquake Observation System

In order to constantly monitor seismic activity, the Japan Meteorological Agency (JMA) and other relevant organizations install and maintain seismometers that are used for estimating the location of the epicenter and magnitude of an earthquake as well as for tsunami warnings, and seismic intensity meters that measure the intensity of ground motion, in numerous places nationwide.

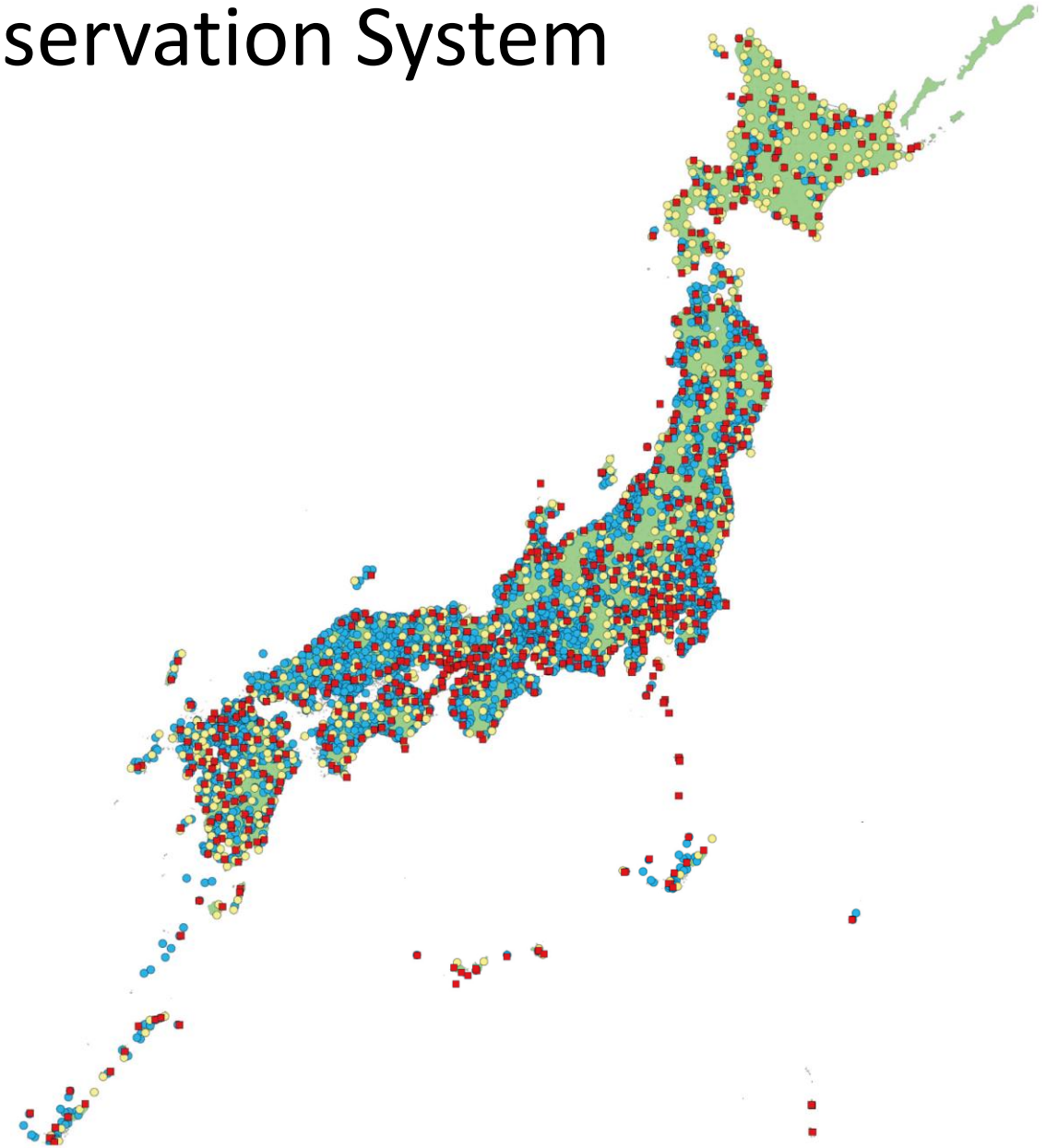
As soon as an earthquake occurs in or around Japan, the JMA analyzes P-wave at seismometers placed close to the hypocenter. If an earthquake of intensity 5 or greater (JMA standard seismic intensity) is estimated, **Earthquake Early Warning** (EEW) information is issued immediately. EEW information is widely used for quick life saving action, automatic breaking of trains and elevators, shut down of factory machines for example.

Within about two minutes, JMA issues a seismic intensity information report for earthquakes of intensity 3 or greater, and within about five minutes, it issues an earthquake information report indicating the epicenter and magnitude of the earthquake and the seismic intensity in the municipalities where strong shaking was observed.

Earthquake Observation System

Seismic Intensity Observation Points

- Japan Meteorological Agency (671 points)
- Local government (2,927 points)
- National Research Institute for Earth
- Science and Disaster Prevention (779 points)
- Total: 4,377 points (as of Jan 2015)



Assessed Risks of and Strategy against Large-scale Earthquakes

It has been pointed out with a great sense of urgency that Japan can be struck by large-scale earthquakes in the near future, in areas such as Nankai Trough, the Japan and Chishima Trenches, and directly below Tokyo and the Chubu and Kinki regions.

With regard to the Nankai Trough Earthquake, earthquakes around the ocean trench such as Japan Trench and Chishima Trench, and Tokyo Inland Earthquake, the government designated the areas where disaster reduction measures are to be taken in accordance with relevant laws and regulations. Also, the government is developing a plan concerning how to accelerate disaster reduction measures by administrative entities and private businesses.

The Central Disaster Management Council has developed the “Policy Framework for Large-scale Earthquake Disaster Prevention and Reduction,” a master plan of the countermeasures for the large scale earthquake, that includes a range of activities from preventive measures to post-disaster response and recovery; the “Earthquake Disaster Reduction Strategy,” to determine an overarching goal of damage mitigation and strategic targets based on the damage estimation; and the “Guidelines for Emergency Response Activities,” as specific actions to be taken by related organizations.

It is possible that an earthquake other than these large scale ones can hit any place in Japan as with the cases in the past 35 years. A guideline for the countermeasures against earthquakes by local municipalities has been compiled covering every step of the disaster response levels (preparation, initial response, response, and recovery).

Assessed Risks of and Strategy against Large-scale Earthquakes

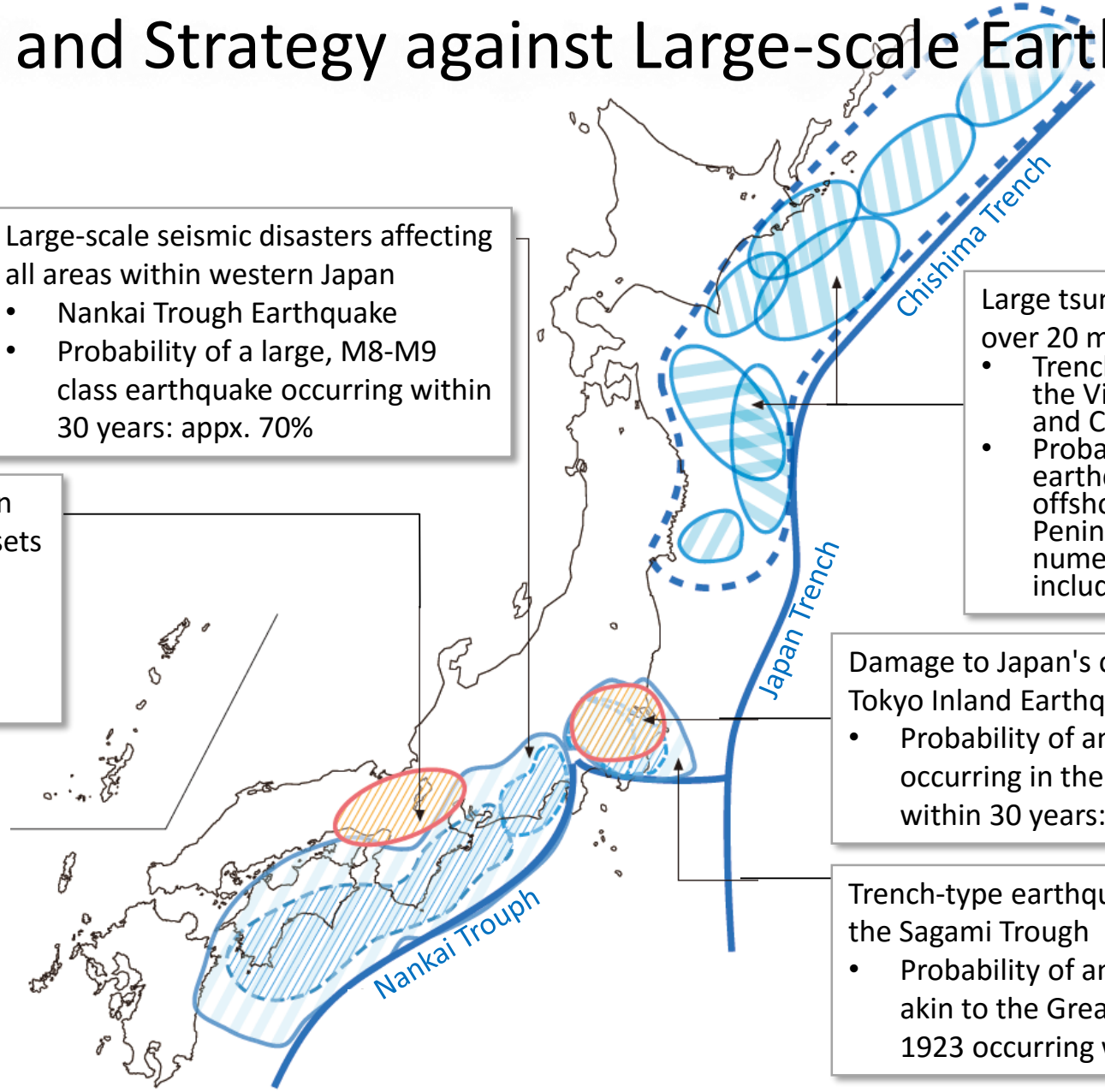
Anticipated Large-scale Eart

Trench-type Earthquake

Epicentral Earthquake

Large-scale seismic disasters affecting all areas within western Japan
- Nankai Trough Earthquake
- Probability of a large, M8-M9 class earthquake occurring within 30 years: appx. 70%

Damage to aged, primarily wooden urban areas and major cultural assets is of concernNankai Trough Earthquake
- Chubu and Kinki Region Inland Earthquakes



Large tsunamis with waves of over 20 meters in height
- Trench-type earthquakes in the Vicinity of the Japan and Chishima Trenches
- Probability of an earthquake occurring offshore of the Nemuro Peninsula within 30 years: numerous figures exist; including appx. 50%

Damage to Japan's crucial functions; Tokyo Inland Earthquakes
- Probability of an M7 class earthquake occurring in the southern Kanto area within 30 years: appx. 70%

Trench-type earthquakes occurring along the Sagami Trough
- Probability of an M8 class earthquake akin to the Great Kanto Earthquake of 1923 occurring within 30 years: 0-2%

Tsunami Disasters and Countermeasures

Surrounded by sea on all sides with long and complex coastlines, Japan is highly vulnerable to earthquake-generated tsunamis. In reality, there has been severe damage caused by various tsunamis in the past.

When a tsunami is expected to cause coastal damage, Japan Meteorological Agency issues a big tsunami warning, tsunami warning or advisory within 2-3 minutes after the earthquake and then follows up with announcements about the estimated height and arrival time of the tsunami. The information is transmitted immediately to disaster management organizations and media outlets, and further forwarded to residents and maritime vessels.

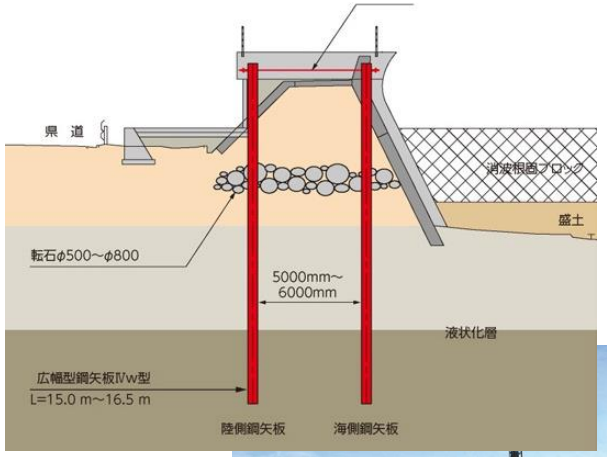
To prevent or reduce tsunami disasters, coastal/tidal embankments and tide prevention gates have been developed.

Tsunami History

Note: : Includes deaths and people missing not directly due to Tsunami

Disaster Name	Date	No. of dead or missing persons
Meiji Sanriku Earthquake Tsunami	Jun 15, 1896	22,000
Showa Sanriku Earthquake	Mar 3, 1933	3,064
Tsunami	Dec 7, 1944	1,223
Tonankai Earthquake	Dec 21, 1946	1,443
Nankai Earthquake	May 23,1960	142
Chile Earthquake Tsunami	May 16, 1968	52
Tokachi-oki Earthquake	May 26, 1983	104
Nihonkai-Chbu Earthquake	July 12, 1983	230
Hokkaido-Nansei-oki Earthquake	Mar 11, 2011	21,839
The Great East Japan Earthquake	Apr 16,2016	50
Kumamoto Earthquake		

Tsunami Disasters and Countermeasures



Coastal/tidal Embankments

Implementing agency:

- National Government at designated coastal area
- Local Government at normal coast
- Port Authority at Port area

Tide prevention gate

Tsunami Disasters and Countermeasures

Tsunami Evacuation Tower (Ise City, Mie)

Despite these efforts, more than 21,000 people lost their lives by the Great East Japan Earthquake and subsequent Tsunami in March 2011. Based on this experience, the Act on Promotion of Tsunami Countermeasures which includes enhancement of the tsunami observation systems, education and training about tsunami and construction of necessary facilities, and the Act on Development of Areas Resilient to Tsunami Disasters prescribing formulation of comprehensive plans and restriction of development in areas estimated to be inundated by tsunami have been enacted.

Further, necessary revisions were made to the Disaster Countermeasures Basic Act to enable local entities to designate emergency shelter areas. Based on these laws, more comprehensive tsunami countermeasures are being taken.

Multi level target setting

Two-stage Comprehensive Tsunami Countermeasures (Prevention and Mitigation)

Definition of Target Level	Frequency of occurrence	Protection objectives to be achieved	Comprehensive tsunami countermeasures	
			Prevention facility, land use regulation	Evacuation
Target Level 1 A maximum Tsunami which is assumed to arise within the period of the life time of Prevention facility	1 / from a few decades to hundreds of years	• Human life protection • Asset protection • Business continuity • Continuation of port functions necessary immediately after disaster	Planned and designed to prevent the flooding of the protected inland	Planned for the worst case scenario
Target Level 2 A maximum possible scale of Tsunami anticipated to occurred at each site	1 / from hundreds of years to a thousand years	• Human life protection • Economic loss mitigation • Prevention of large secondary disaster • Early rehabilitation	Planned and designed to forgive the inundation of the protected inland, but not to expand the damage by bank breach; Planned flooding areas, land-use planning in accordance with the inundation depth; Consideration of a multi-defense if necessary	Planned for the worst case scenario

Source: Ministry of Land, Infrastructure and Transport

Earthquake-resistant construction of Houses and Buildings

More than 80% of the casualties in the Great Hanshin-Awaji Earthquake were caused by building collapse. Similarly, damage estimates assume that building collapse will be the cause of a large number of deaths in future large-scale earthquakes such as Nankai Trough Earthquake and Tokyo Inland Earthquake. It is estimated that, as of 2008 some **20% of existing residences are insufficiently earthquake-resistant**, as they were built before 1981 when stricter earthquake-resistant building codes were introduced. In addition, as of 2013, about **30% of schools and 40% of hospitals lack adequate earthquake-resistant** construction.

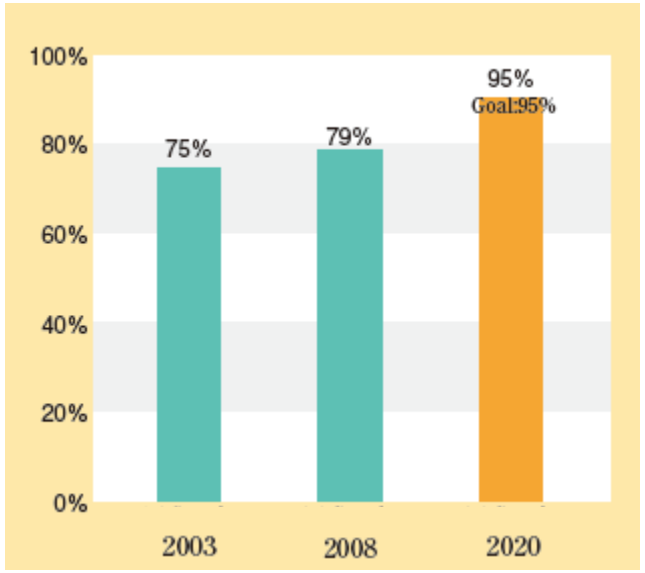
In view of this situation, the Central Disaster Management Council drafted the “Urgent Countermeasures Guidelines for Promoting the Earthquake Resistant Construction of Houses and Buildings” in 2005, which stipulates the earthquake-resistant construction throughout the country should be urgently and strongly enforced in close cooperation with related ministries as a national priority.

In November 2013, the Act on Promotion of the Earthquake-proof Retrofit of Buildings was revised, making obligatory to conduct a **seismic qualification test** and make reports on large-scale buildings, including hospitals and shops, which are available to the general public, as well as schools and nursing homes, which are used by those who need special attention in the event of evacuation.

Earthquake-resistant construction of Houses and Buildings

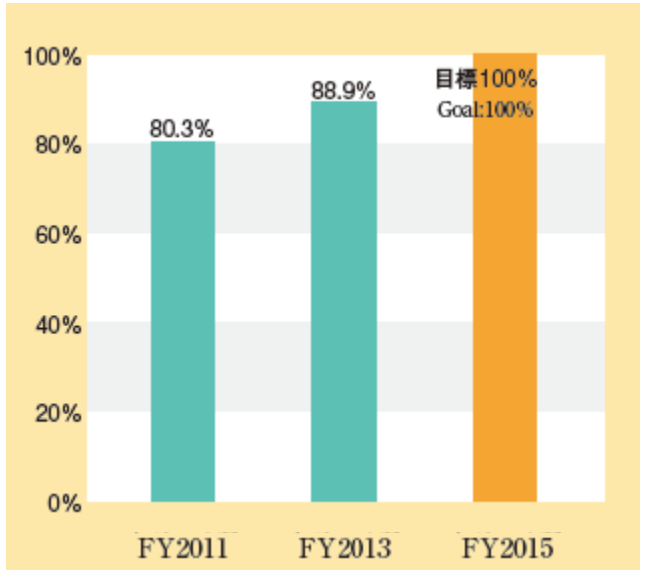
Progress for promoting earthquake-resistant buildings and their progress

Houses



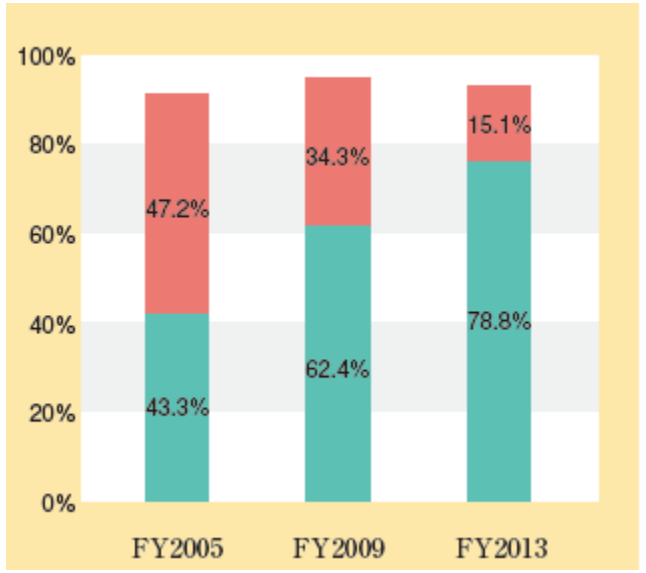
Source: Cabinet Office, created based on the documents of Ministry of Land, Infrastructure, Transport and Tourism

Public Schools Elementary and Junior-high



Source: Created by the Cabinet Office based on the "Study of Earthquake-proof retrofit“ by the Ministry of Education, Culture, Sports, Science and Technology; as of April 1, respective years

Disaster Base Hospitals, Emergency Medical Care Centers



Source: Created by the Cabinet Office based on the "Survey of Hospitals regarding Earthquake-proof Retrofit as of 2013"

Countermeasures against Nankai Trough Earthquake

In the area along the Nankai Trough, trench type mega earthquakes have occurred on a 100 to 150 year cycle, causing great damage to the area. The study of large-scale earthquake countermeasures in this area has been conducted. Based on the lessons learned from the Great East Japan Earthquake of March 2011, the Central Disaster Management Council decided to assume the “maximum possible earthquake and tsunami” to occur, taking all possibilities into account.

With this assumption, the possible maximum seismic movements and tsunami height were simulated. Based on this study, in May 2013, the final report on the damage estimation and the direction of countermeasures was adopted.

According to the simulation, maximum death toll could be as many as 323,000, of which death by tsunami would amount to 230,000. Maximum possible economic loss could be approximately 170 trillion yen for assets and 45 trillion yen for degradation of production and services. It is estimated, however, that these damages could be reduced substantially by taking countermeasures in advance.

Countermeasures against Nankai Trough Earthquake

In March 2014, on the basis of Act on Special Measures for Promotion of Nankai Trough Earthquake Disaster Management, areas were designated to make progress in the measures against the Earthquake (29 Prefectures including Tokyo, Osaka and Kyoto, and 707 municipalities as of April 2014), and further, areas encompassing 14 Prefectures including Tokyo and 139 municipalities were designated to reinforce the evacuation plan against tsunami triggered by the Earthquake. To promote measures for these areas, the Basic Plan was formulated.

Taking into consideration that this earthquake will affect quite a wide area with strong tremor and huge tsunami as characterized as typical to this particular earthquake, this Plan stipulates that the national government, public administrative entities, local public entities, private businesses and residents will all take part in coordinated manner, to act on comprehensive response activities, deploying all structural and nonstructural measures.

Based on this policy, the Plan set clear goals to be achieved within 10 years: more than 80% in the number of deaths and more than 50% in the economic value of damage to houses and buildings. It also defines concrete measures and target dates to accomplish the goals, such as promoting earthquake-proof or fireproof buildings, developing tsunami hazard maps, and improving the capacity for disaster management for local communities.

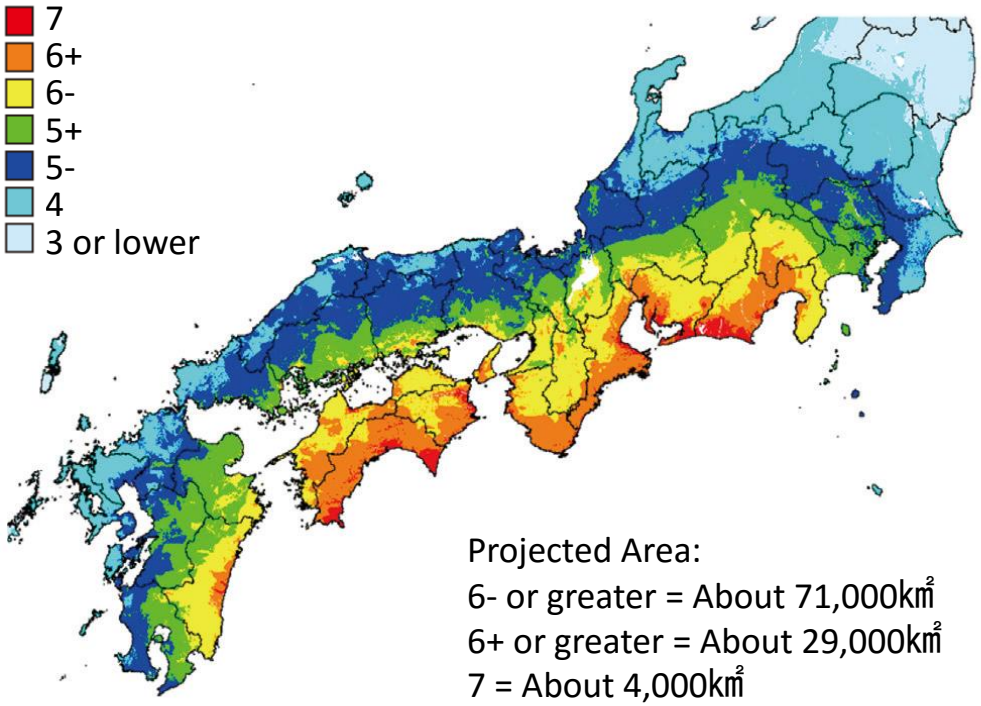
Countermeasures against Nankai Trough Earthquake

Basic Policies, measures and activities for the Nankai Trough Earthquake Disaster Management

Damage reduction goals (in the next 10 years)		1. More than 80% reduction of number of estimated death toll from about 323,000 persons 2. More than 80% reduction of number of estimated total collapse of buildings from about 2.5 million units
Measures and Activities	Earthquake damage prevention and mitigation:	Earthquake-resistant building; Making buildings fire-resistant; Prevention of land slides, soil liquidation; Earthquake-resistant life-lines, infrastructure;
	Tsunami damage mitigation:	Building tsunami-resilient community structure; Securing safe evacuation;
	Comprehensive Disaster Management Actions:	Enhancement of disaster risks education, evacuation drills; Cooperation with volunteers; Improvement of disaster risk reduction capability; Measures for long-period earthquake motion;
	Preparedness for response to the disaster:	Establishing disaster response systems; Rescue and emergency response; Medical plans Firefighting activities; Securing emergency transportation; Procurement of food, water and life support necessities; Securing fuel supply; Measures to the evacuees; Measures to stranded workers (commuters); Measures for life-line and infrastructure recovery; Hygiene and public health, epidemic prevention measures; Plans for the victim bodies Measures for disposition of disaster debris; Collection of disaster information; Provision of disaster information Securing and stabilizing social order; Effective use of various space; Establishing wide-area cooperation and support system;
	Prevention of confusion in the areas directly hit by a disaster and other areas:	Securing main traffic network; Securing business continuity of the private sector; Securing services continuity of the national and local public entities;
	Measures for various mode of disaster occurrence:	Natech disaster preparedness;
	Measures for various local challenges:	Securing safety of skyscrapers, underground shopping malls, department stores, and terminal stations; Securing safety of the sea level area; Securing safety of nuclear plants, etc.; Securing safety of petrochemical plant complex; Response to local communities highly likely to be isolated; Prevention and reduction of damage in the local business and logistics in the water-front area; Measures for cultural heritages;

Countermeasures against Nankai Trough Earthquake

Distribution of Maximum Seismic Intensity (JMA) in the event of maximum possible earthquake

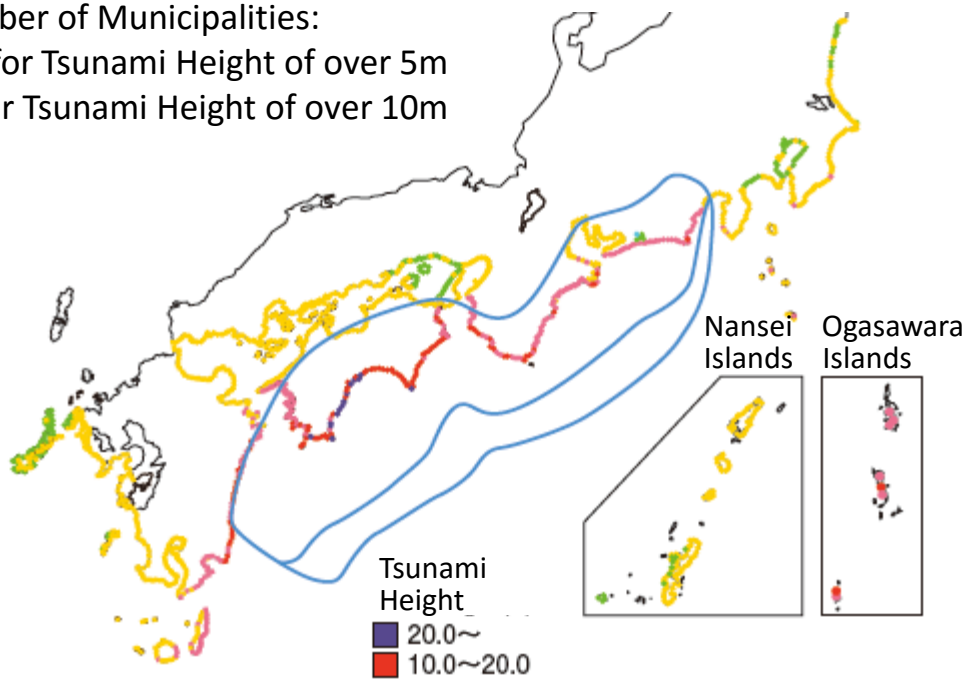


Projected Area:
6- or greater = About 71,000㎢
6+ or greater = About 29,000㎢
7 = About 4,000㎢

Distribution of Tsunami Wave Height in the event of maximum possible earthquake

Projected Tsunami Height (in case of High Tide)

Number of Municipalities:
124 for Tsunami Height of over 5m
21 for Tsunami Height of over 10m



Countermeasures against Tokyo Inland Earthquake

It is estimated that in the capital area (Tokyo), massive trench type earthquakes with a magnitude of 8 or greater, like the Great Kanto Earthquake (1923), will occur at intervals of 200-400 years. Additionally, it is presumed that several Tokyo Inland Earthquakes of M7 scale will occur before a M8 scale earthquake, and the imminent possibility of such an event has been pointed out.

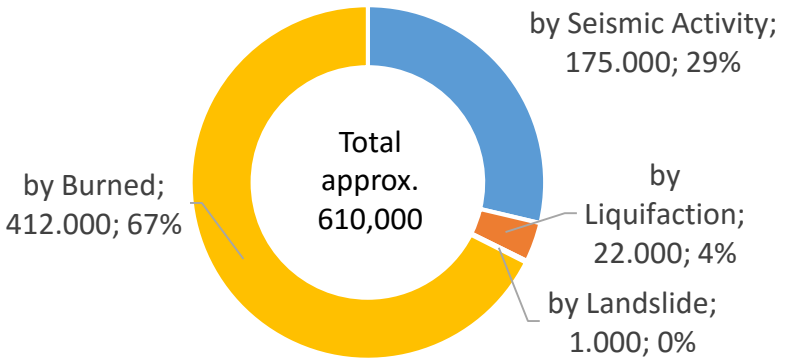
In the study meeting for the Tokyo Inland Earthquakes, an estimation was made about the earthquake intensity and the height of the tsunami waves from the earthquake directly underneath the Tokyo Metropolitan Area (M7 class) and those along the Sagami Trough (M8 class). Based on the results, a final report was completed in December 2013 as to the estimation of the damage and possible measures.

According to the final report, the earthquake with an epicenter in the southern part of Tokyo (assumed scale of M7.3), which is one of the 19 types of possible M8-class earthquakes, would cause extensive damage including a death toll of as many as 23,000 people, number of people in need of rescue of 72,000, total collapse of 610,000 buildings and a maximum possible economic loss of 47 trillion yen for assets and 48 trillion yen for degradation of production and services.

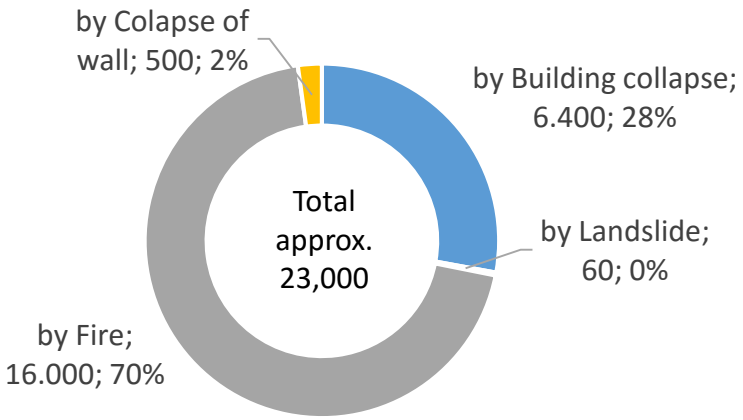
Countermeasures against Tokyo Inland Earthquake

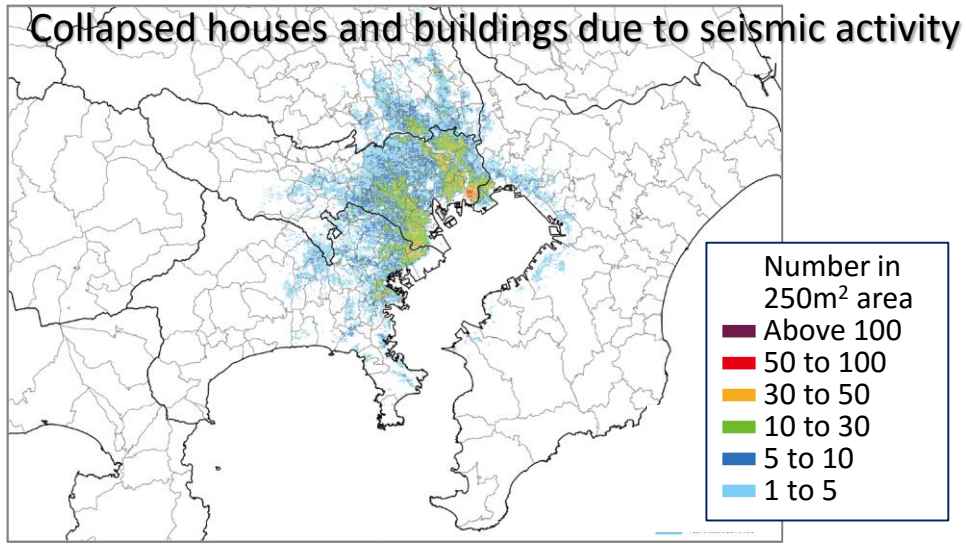
Damage Estimation from the Tokyo Inland Earthquake
Assumed conditions: Winter, evening; wind speed of 8 m/s.

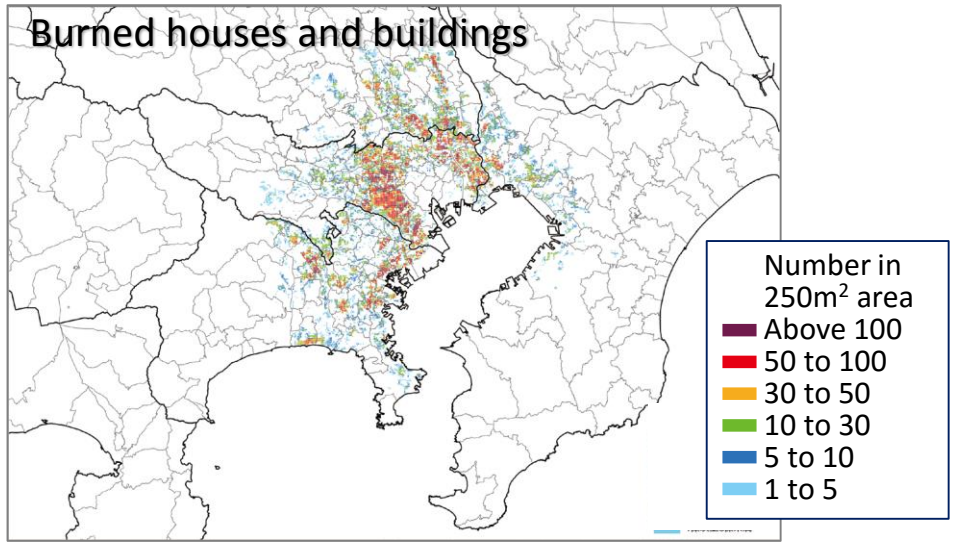
No. of houses and buildings collapsed or burned



No. of Death







Countermeasures against Tokyo Inland Earthquake

In November 2013 the Act on Special Measures for the Tokyo Inland Earthquake was enacted, and, in March 2014, areas were designated as in need of urgent measures to be taken (Tokyo and 9 prefectures, and 309 municipalities as of March 2015). At the same time, the Basic Plan for urgent implementation of measures and the **Business Continuity Plan** by Central Government were formulated.

The Basic Plan stipulates that the continuity of core functions of the metropolis be maintained and the damage would be significantly reduced by preparedness for the disaster and by emergency response plans. Thus, it is critically necessary that such measures be planned ahead and strategically implemented. As the basic policy, the Plan includes:

・Construction of the systems for continuation of the services of core institutions and the infrastructure supporting such systems

・Construction of earthquake and fire resistant structures as the basis for all countermeasures taken, and measures against anticipated serious road traffic paralysis and measures for enormous number of evacuees and workers having difficulties getting home

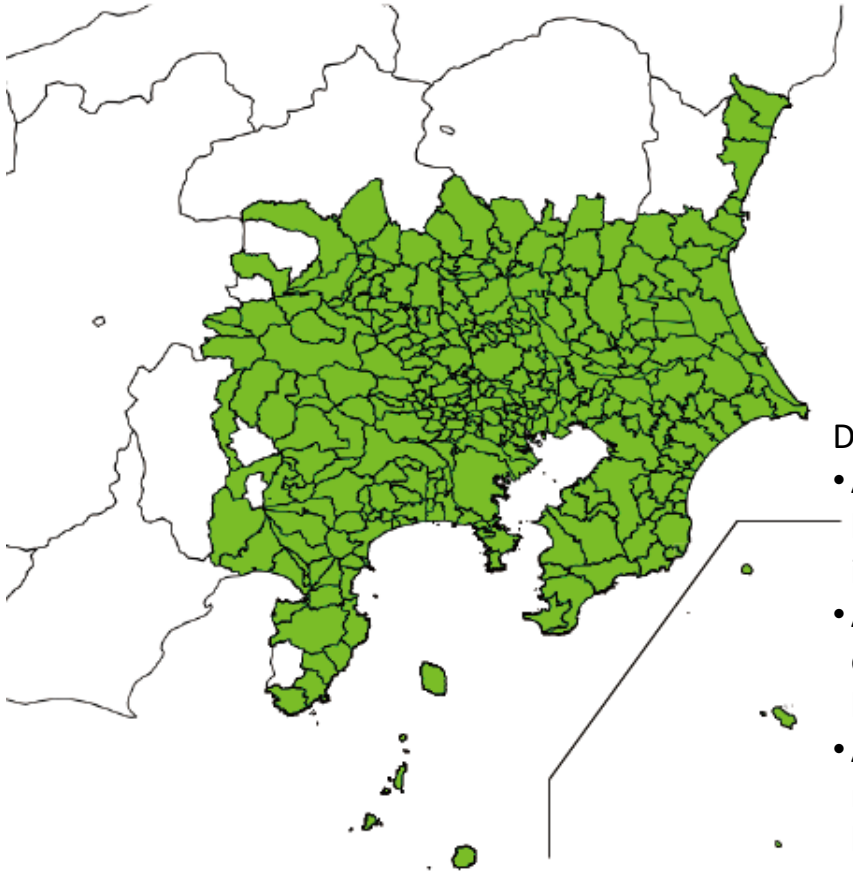
・Promotion of whole-society cooperation on a “self-help”, “mutual help” and “public help” basis

・Measures toward the 2020 Tokyo Olympic and Paralympic Games

Furthermore, in compliance with a decision made at the Cabinet in March 2015, the Plan sets numerical targets for disaster reduction with a time limit, and includes concrete targets for measures to achieve those numerical targets.

Countermeasures against Tokyo Inland Earthquake

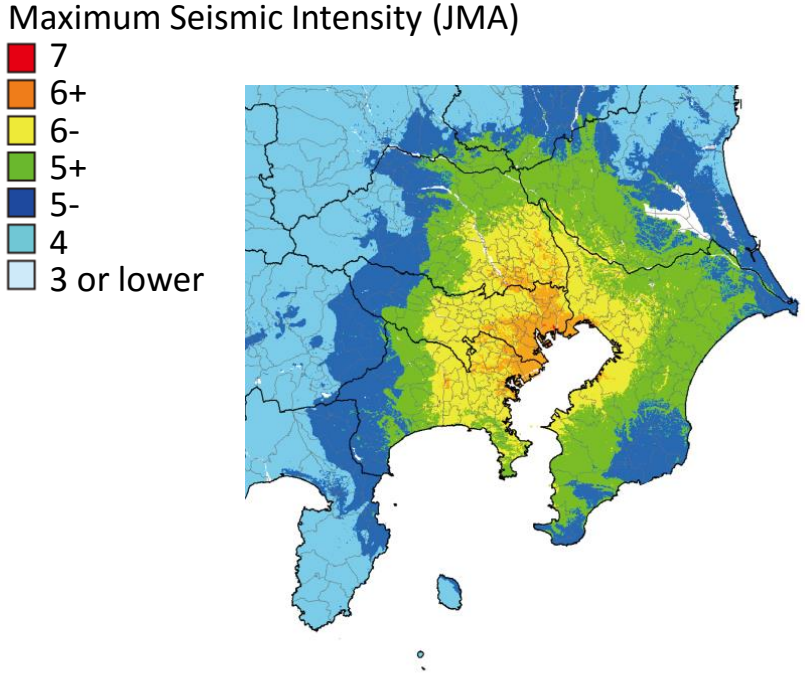
Designated Areas for Urgent Implementation of Measures against Tokyo Inland Earthquake



Designation Criteria:

- Areas assigned a 6- or higher on the Seismic intensity scale.
- Areas with Tsunami heights of at least 3 meters and have low coastal levees.
- Areas crucial for disaster management, or have need based on past experience.

Forecasted Seismic Intensities of Southern Tokyo Inland Earthquake



Countermeasures against Tokyo Inland Earthquake

The Business Continuity Plan of Central Government

"The Business Continuity Plan of Central Government (Measures against Tokyo Inland Earthquake)" stipulates the executive systems and work environment essential to continue the governmental services smoothly in the event of the Tokyo Inland Earthquake occurring and in case the political, administrative and economic core functions may be seriously affected by the Earthquake.

Regarding the executive system, the Plan stipulates that, upon Tokyo Inland Earthquake occurring, government staff including those in charge of the administrative management gather at the central government buildings and stay there for **a week to continue the emergency priority operations in rotation**, so that such emergency priority operations will be smoothly carried out. With regard to the work environment, it stipulates that the government buildings be constructed to be earthquake resistant with work environment to continue the emergency priority services and administrative work in case of emergency.

Based on this Plan, central government ministries and agencies shall revise the business continuity plans of each ministry and agency, identify **services that need to be continued** under their responsibility in case of emergency as the emergency priority operations, and they work out a system and environment necessary to carry those out.

It is planned that those business continuity plans developed by respective ministries and agencies be **reviewed and evaluated by experts**, and that these plans as well as the Plan itself be revised based on the result of such evaluation.

In the same manner, the systems for business continuity of local governments in the event of a large-scale disaster are being developed and the Government is to give support to them by way of formulating guidelines.

Countermeasures against Tokyo Inland Earthquake

The Business Continuity Plan of Central Government

Goal : Establish an organizational structure that enables to carry out **emergency priority operations*** in rotation for a week without external aid.

Emergency priority operations* will be scrutinized on the basis of the number of personnel estimated to be able to gather in a severe scenario

Requirements of the Executing System

1. Business Continuity Management System across the entire nation
- The Cabinet Office and the Cabinet Secretariat should establish a network or cooperation
- Each ministry and agency should build collaboration with local governments, related organizations and the private sector

2. Securing emergency personnel
- All the offices should survey the number of personnel that can gather at government facilities in Kasumigaseki
- All the offices should secure emergency personnel, considering substitute workers

3. Emergency delegation of authority
4. Designation of an acting representative person

Requirements of the Working Environment

1. Renovating and enhancing safety of government buildings to be earthquake resistant
2. Secured electricity by
- Emergency power generators
- Approximately one week's worth of fuel stock

3. Acquiring backups for communication and information systems
4. Stockpiling goods and resources
- A week's worth of food, drinking water, and portable toilets for gathered staff
- Three-day worth of them for other staff

5. Securing alternative facilities for use in case the main buildings become useless

Review of the education, training, evaluation and the Plan

Countermeasures against Trench-type Earthquakes in the Vicinity of the Japan and Chishima Trenches

There have been many large-scale earthquakes of M7 or M8 scale occurring in the vicinity of the Japan Trench, extending in the oceanic areas from off of Eastern Chiba to Sanriku, and in the vicinity of the Chishima Trench, extending from the areas of Sanriku, Tokachi and Etorofu Island. There are many types of earthquakes in this area, such as the Meiji-Sanriku Earthquake Tsunami in 1889, which caused enormous damage from a giant tsunami, and the Miyagi-ken-oki Earthquake, which occurs at intervals of approximately 40 years.

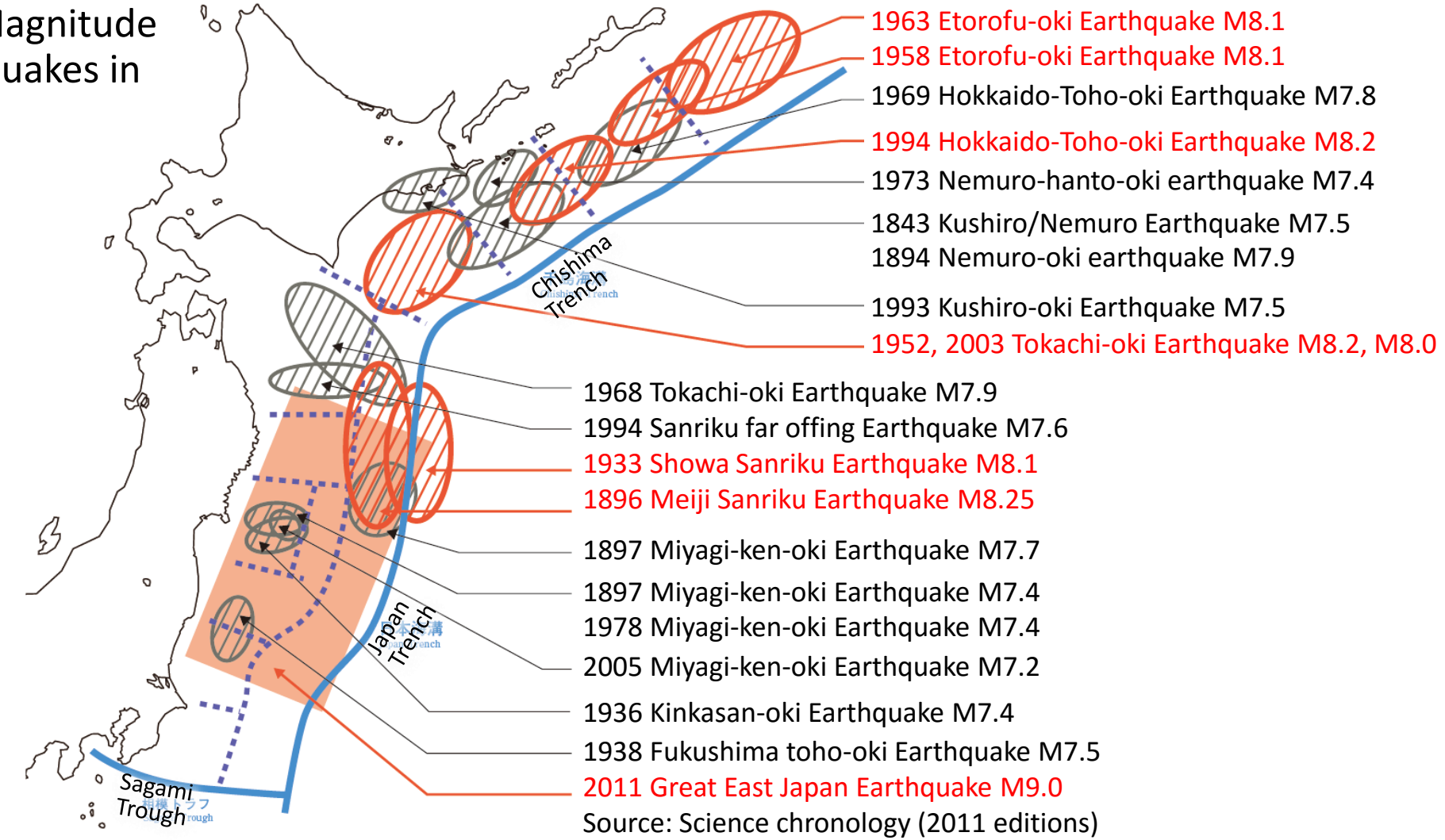
The Central Disaster Management Council chose eight of these earthquakes as subject matter for strengthening disaster countermeasures and examined the strength of tremors and distribution of tsunami wave height, and announced the estimated damage in 2006.

Based on the Special Countermeasures Act Concerning Earthquakes in the Vicinity of the Japan and Chishima Trenches, countermeasures promotion areas for these earthquakes were established (Hokkaido and 4 prefectures and 117 municipalities included as of April 2014), and the "Countermeasures Basic Plan for Trench-type Earthquakes in the Vicinity of the Japan and Chishima Trenches" was formulated. The relevant organizations have their own plans based on the basic plan.

Today, upon occurrence of Great East Japan Earthquake in March 2011, review is underway with respect to earthquakes and tsunami anticipated in the area as well.

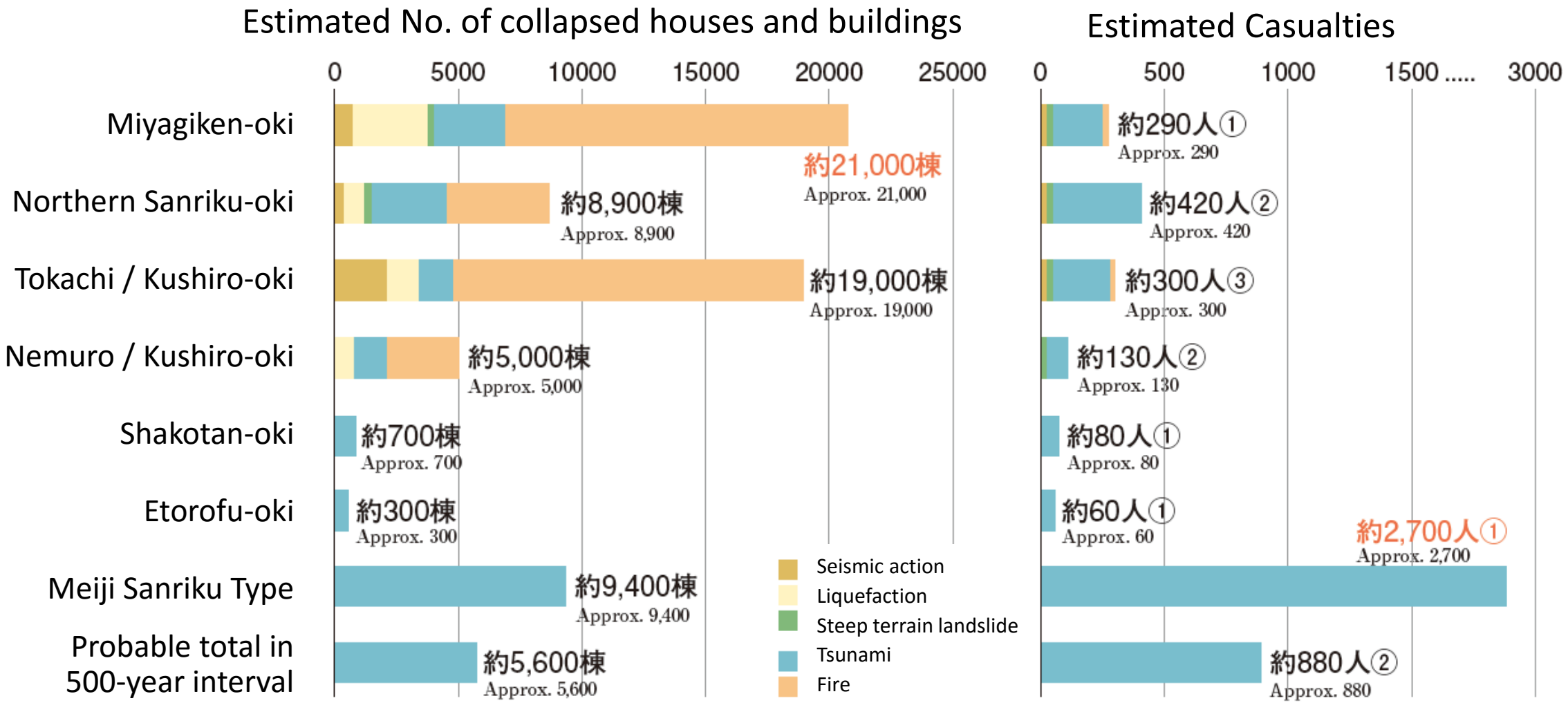
Countermeasures against Trench-type Earthquakes in the Vicinity of the Japan and Chishima Trenches

Distribution of the Magnitude of Large scale earthquakes in 1800 and afterwards



Source: Science chronology (2011 editions)

Countermeasures against Trench-type Earthquakes in the Vicinity of the Japan and Chishima Trenches



Countermeasures against Chubu and Kinki Regions Inland Earthquakes

Earthquakes in the inland areas of the western Japan including Chubu and Kinki regions have been observed to occur before and/or after the large-scale earthquake occurring along the Nankai Trough and it is pointed out that they are in the active phase.

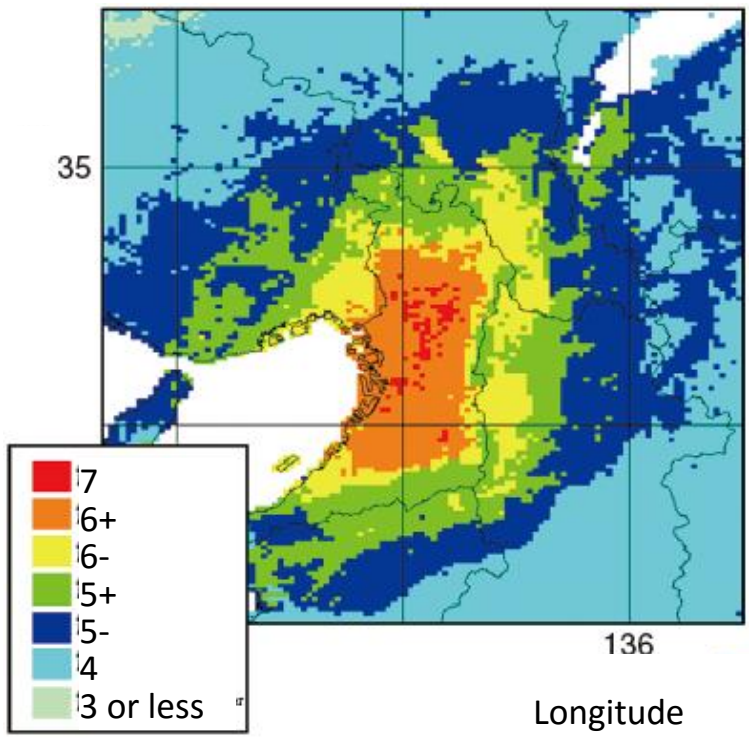
The Central Disaster Management Council has studied possible tremor strength on various types of earthquakes assumed: namely, 5 types in the Chubu region and 8 types in the Kinki region. The Council announced the estimated human and physical damages in 2007, and it also published its estimation of the damages on transportation systems, economy and the lifelines in 2008.

The countermeasures against the Earthquakes include promotion of disaster management measures in the city areas with high concentration of wooden houses, damage reduction plan for the cultural heritages in the Kyoto and Nara areas, and security plan for the petrochemical plant complex concentrated in the Osaka and Ise bays.

Assumptions on the earthquake and tsunami in these areas are currently being re-examined, based on the experience of the Great East Japan Earthquake in March 2011.

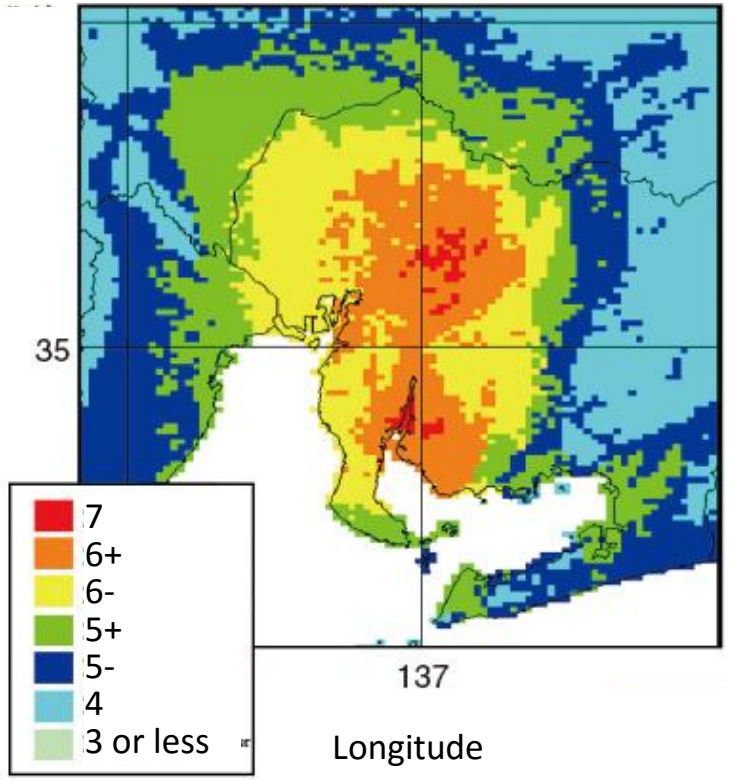
Countermeasures against Chubu and Kinki Regions Inland Earthquakes

Chubu regions inland earthquakes damage estimates



970,000 Buildings completely destroyed or burned down(in winter at 12:00 noon, wind speed 15m/s)
42,000 casualties (in winter at 5:00am, wid speed 15m/s)
220,000 injured (of which seriously 47,000)
Direct damage: Approx. ¥61 trillion
Indirect damage: Approx. ¥13 trillion
Total damage: Approx. \74 trillion

Kinki regions inland earthquake damage estimates



300,000 Buildings completely destroyed or burned down(in winter at 12:00 noon, wind speed 15m/s)
11,000 casualties (in winter at 5:00am, wid speed 15m/s)
69,000 injured (of which seriously 14,000)
Direct damage: Approx. ¥24 trillion
Indirect damage: Approx. ¥8 trillion
Total damage: Approx. \33 trillion

Storm and Flood disasters

Japan is prone to a variety of water and wind-related disasters including flooding, landslides, tidal waves and storm hazards, owing to meteorological conditions such as typhoons and active weather-front systems and geographical conditions such as precipitous terrains and steep rivers, as well as settlement conditions in which many of the cities are built on river plains. One-half of the population is concentrated in possible inundation areas, which account for about 10% of the national land.

Although there has been a large reduction in the area inundated by floods owing to soil conservation and flood control projects over many years, the amount of general assets damaged in flooded areas has increased in recent years. Additionally, as a long-term trend, there is an increasing tendency of downpours throughout the country, due probably to climate change, including an increase in rainfalls of over 80 mm per hour or more.

The Government has a strategy to adapt our development against the climate change.

In order to reduce damage which would be caused by severe weather disasters, prevention and mitigation measures such as improving rivers, dams and sewage systems, and non-structural measures such as risk mapping and land use regulation are conducted based on river improvement plans of all the registered river basins. As introduced later, the plans include preparedness and response activities as well in consideration of the best combination of all the Disaster Risk Management Cycle.

Integrated Flood Management

The basic concept of Storm and Flood risk management of Japan is based on the Integrated Flood Management (IFM) which is internationally acknowledged principle of flood management that consists of 1) risk management system, 2) river basin as a planning unit, 3) inter-disciplinary approach, and 4) stakeholders participation.

IFM is also a structure of Integrated Water Resource Management (IWRM). IWRM is a process which promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. (Global Water Partnership, ADB, etc.)

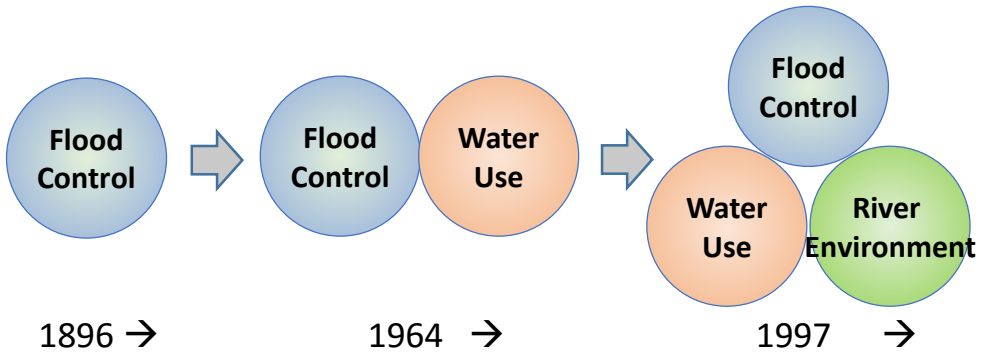
IFM is a process promoting an integrated – rather than fragmented – approach to flood management. It integrates land and water resources development in a river basin, within the context of IWRM, and aims at maximizing the net benefits from the use of floodplains and minimizing loss of life from flooding. (Integrated Flood Management Concept Paper, WMO 2004）

IFM requires:
- Clear and Objective Policies Supported with Legislation and Regulations
- The Need for a Basin Approach
- Institutional Structure through Appropriate Linkage
- Community-Based Institutions
- Multidisciplinary approach
- Adaptive management
- Information Management and Exchange
- Appropriate Economic Instruments

River law

Measures of flood disaster prevention and mitigation in line with the concept of IFM are designated by the 'River Law' of Japan, which stipulates three fundamental functions such as Flood Control, Water Use, and River Environment Management.

The Law first enacted in 1896 when construction of the modern state had begun, with an aim to develop country wide resilience to flood disasters. In accordance with growing industry, major amendment of the Law was made in 1964, introducing provisions relating to water use and be able to manage consistently river water system as the IWRM defines. The latest major amendment was enacted in 1997, adding the purpose of improvement and conservation of the river environment, where it was introduced river basin development plan that reflects the opinion of local community.



The main provisions relating to disaster prevention are:

- The provisions of the rivers and river management facility
- Specification of primary rivers and secondary rivers
- River area (territory), river administrator, the provisions of the river works
- Structural standards, operation rules of river management facilities, etc.
- River maintenance basic policy, the development of river improvement plan
- Emergency management in the flood or the like
- Restrictions such as excavation of land
- Water conservancy adjustment, the operation of the dam, water conservancy use at the time of drought
- Provisions for surface water extraction

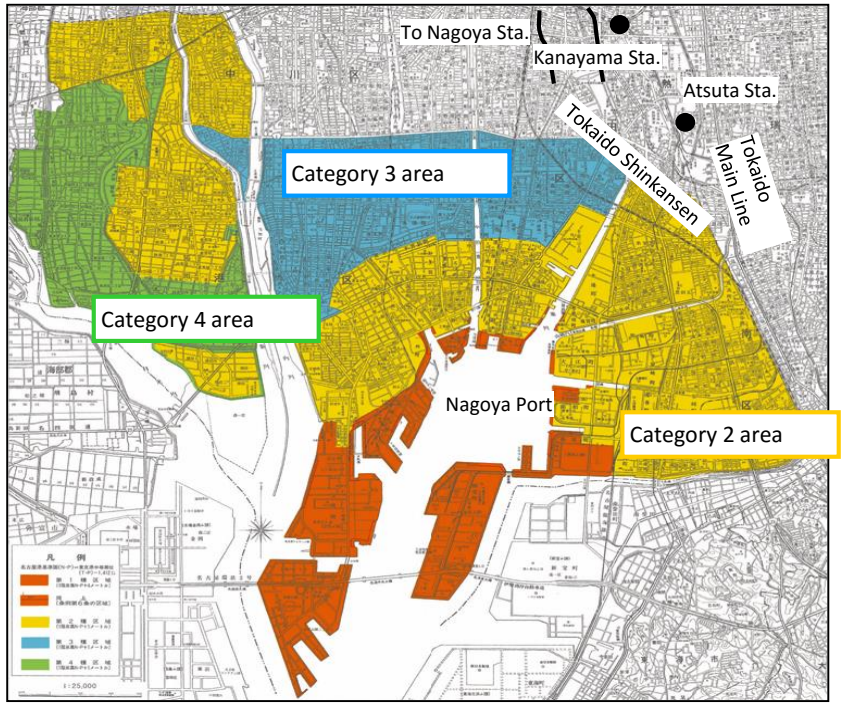
Comprehensive measures of flood control

	By Strategies of Flood Control	In-stream	Watershed	Information
Prevention and Mitigation	<u>Preserving the Natural Resources of Flood Plains</u>			
	Floodplain zoning and land use regulation		O	
	<u>Reducing Flooding</u>			
	Dams and reservoirs	O		
	Dikes, levees and polders	O		
	High flow diversions, cut-off works	O	O	
	Catchment management		O	
	Channel improvements	O		
	<u>Reducing Susceptibility to Damage</u>			
	Floodplain regulation, storm water retention		O	
	Surface water infiltration		O	
	Design and location of facilities		O	
	Housing and building codes		O	
	Flood proofing buildings and facilities		O	
Preparedness and Response	Flood forecasting and warning			O
	<u>Mitigating the Impacts of Flooding</u>			
	Information and education			O
	Disaster preparedness	O	O	O
	Food figiting, evacuation and rescue	O	O	O
Rehabilitation and Reconstruction	Post-flood recovery and reconstruction	O	O	
	Flood insurance			O

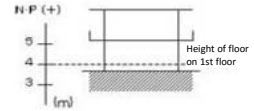
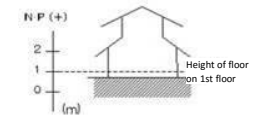
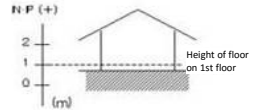
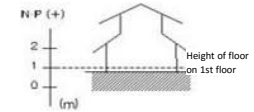
Tools for Flood Prevention and Mitigation

- Article 39 of the Building Standards Act, “Disaster Hazard Areas” -

Example of Building Restriction by Disaster Hazard Zoning, coastal disaster-prevention areas in Nagoya



* Where schools, hospitals, meeting grounds, public offices, welfare facilities for children, and other public architectures located in areas of Categories 2 – 4 are concerned, one or more residential spaces will be placed on the architecture with the floor height of the first floor of N・P(+) 2 m or higher, and with the height of N・P (+) 3.5 m or higher.

	Description of area	Height of floor on 1st floor	Restrictions on structure	Graphics
Category 1 area	Areas on the sea side from tide barriers. Chiefly coastal reclaimed industrial area.	N/P (+) 4 m or higher	Any wooden structures will be prohibited. In the areas which are within 50 m from the coastal line or river bank and specified by the mayor, construction of any structural buildings with residential rooms, hospitals, welfare facilities for children, etc. will be prohibited. (Structural buildings other than wooden ones, where the floor height of residential spaces, etc. is N/P (+) 5.5m or higher may be constructed.)	
Category 2 area	Areas already urbanized before Isewan Typhoon, and those urbanized after the typhoon are included. The land as a whole is being used for similar purposes.	N/P (+) 1 m or higher	Any residential spaces will be placed on the second or higher floor. The restriction may be relaxed if any of the following three conditions is satisfied: 1: The floor height of one or more residential spaces on the 1st floor will be N/P (+) 3.5m or higher. 2: A structural building with 2 or more stories will be built on the same premises. 3: An evacuation room and facilities will be installed, if the total floor area is 100 m^2 or less.	
Category 3 area	Areas already urbanized at the time of Isewan Typhoon, and located inland. Thus they do not require strict regulations	N/P (+) 1 m or higher	—	
Category 4 area	Urbanization-restricted areas	N/P (+) 1 m or higher	Any residential spaces will be placed on the second or higher floor. The restriction may be relaxed if any of the following two conditions is satisfied: 1: The floor height of one or more residential spaces on the 1st floor will be N/P (+) 3.5 m or higher. 2: A structural building with 2 or more stories will be built on the same premises.	

Methods for Flood Prevention and Mitigation

An example of flood diversion in Tone River basin (400years ago)

Up to 15th Century, Tone River crossed the Kanto Plain from north to south and flew into Tokyo Bay

From 1594 to 1654, Tone River was connected to Pacific Ocean by eastward channel

- After the flood in 1910, flood control measures in upper and middle reaches has changed from “flood control allowing inundation” to “sequential levees confinement”
- After this change, the maximum design discharge in the Tone River Channel has increased, which became the main challenge of flood control in Tone River Basin

Methods for Flood Prevention and Mitigation

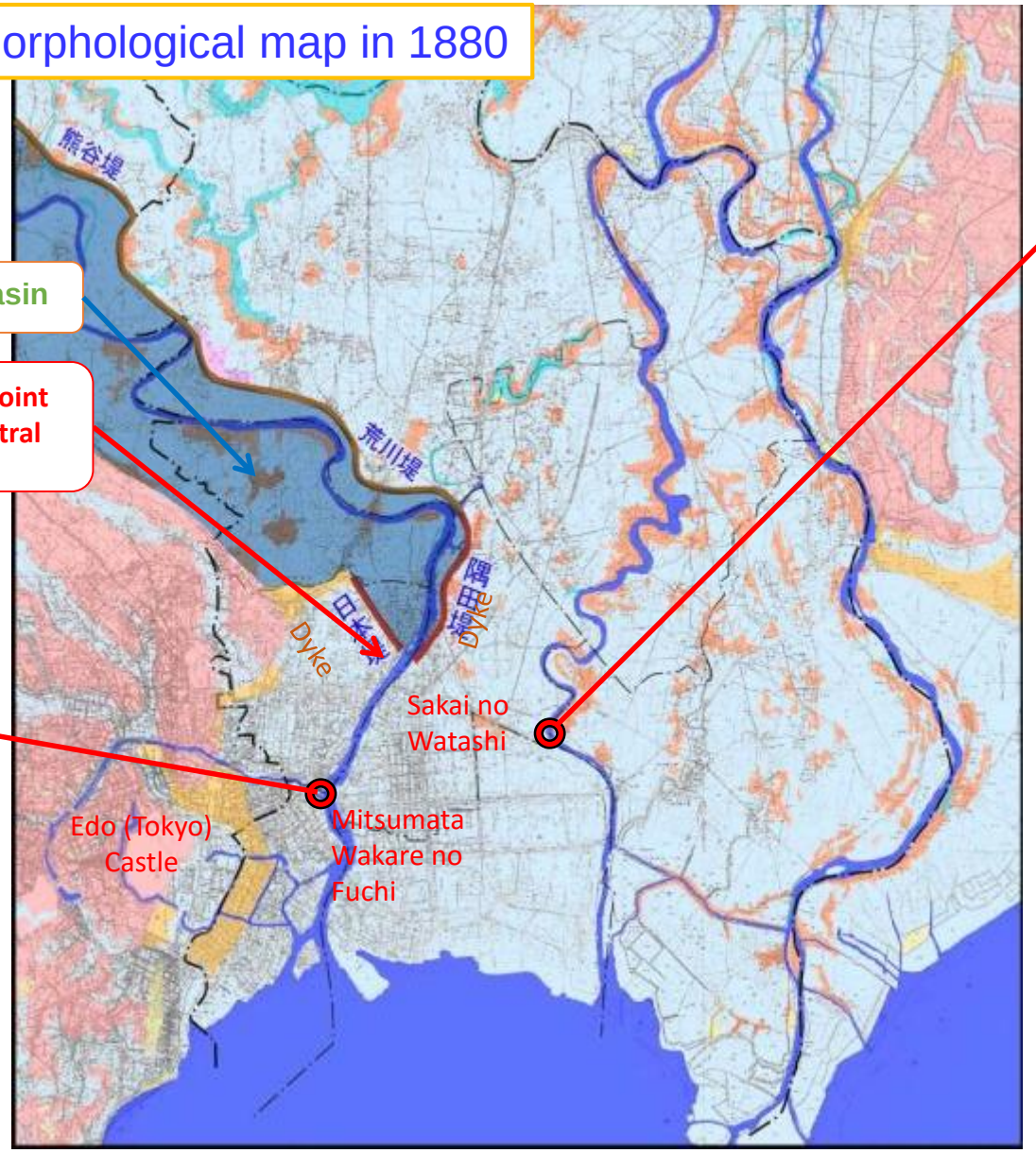
Flood Control History of Ara River basin (130years ago)

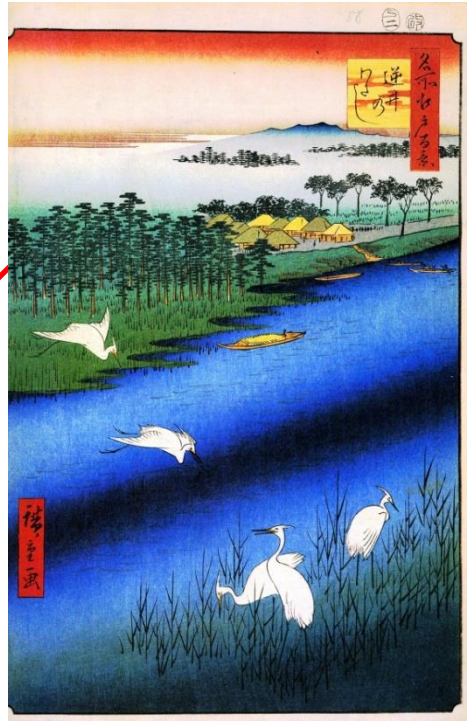
Up to the beginning of 19th century, upstream area of Tokyo functioned as retarding basin to protect central Tokyo area

Geomorphological map in 1880

Retarding basin

Constriction point to protect central Tokyo





Mountain, hillock
Plateau
Natural levee
Mound along river track
Alluvial fan
Raised bed river
Sand dune
Retarding basin

Methods for Flood Prevention and Mitigation

Urbanization of Tokyo metropolitan area has progressed with the improvement of the safety level by the excavation of Ara River Floodway and many Flood Prevention works

1882

37yeas

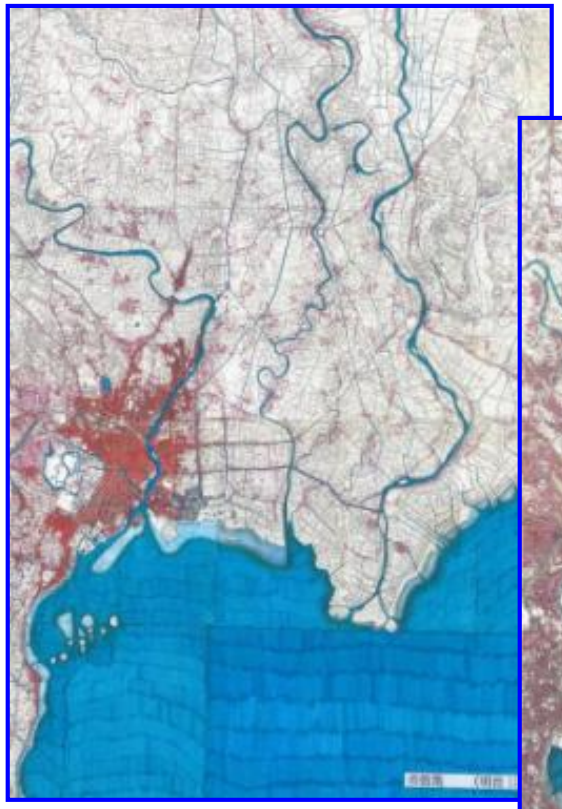
1919

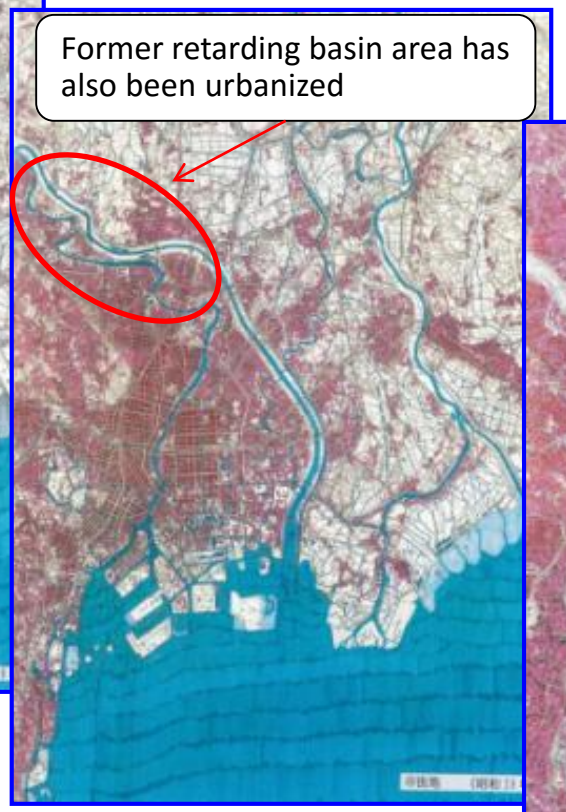
35years

1954

42years

1996





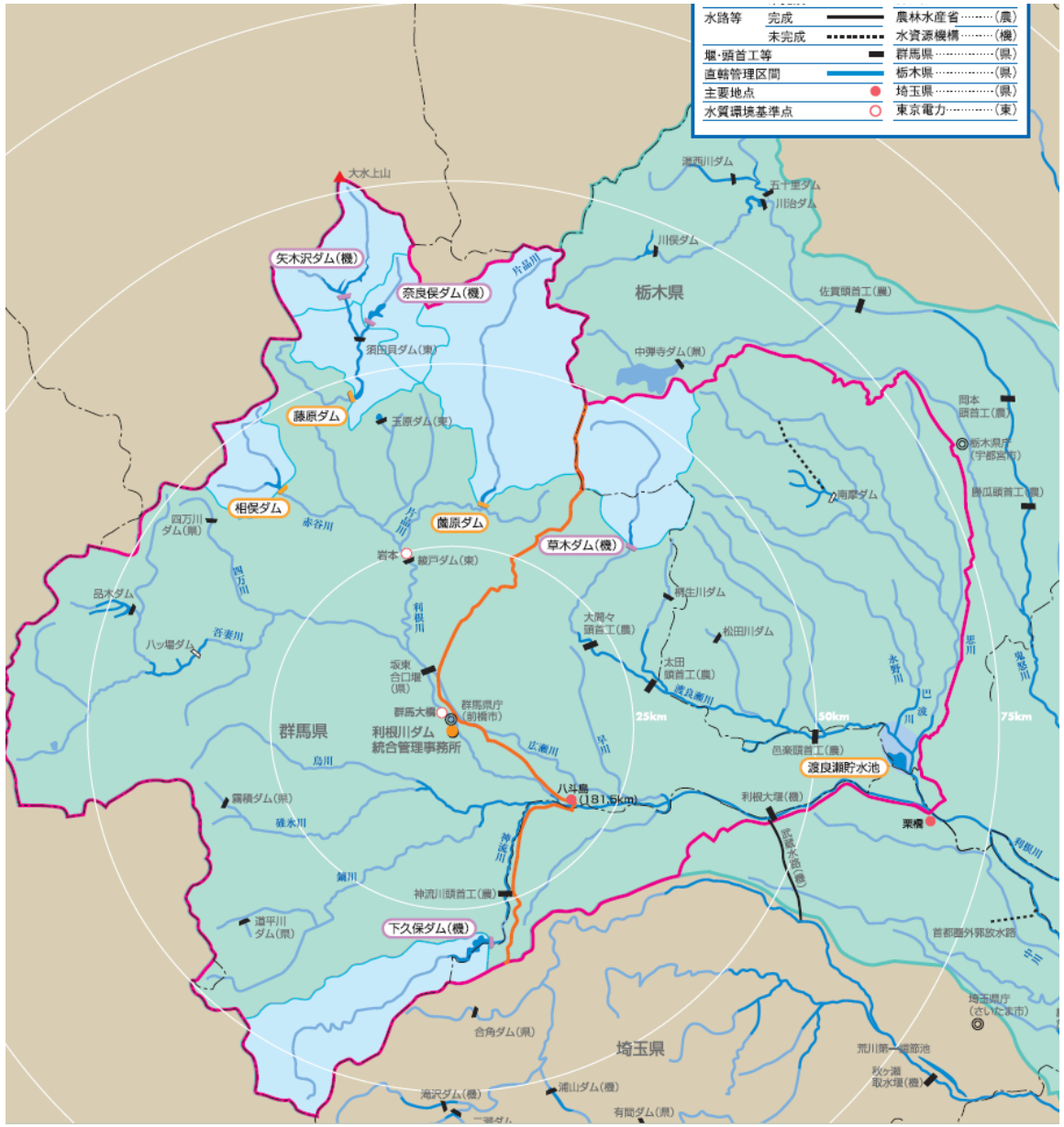
1911 1930

Excavation of Ara River Floodway

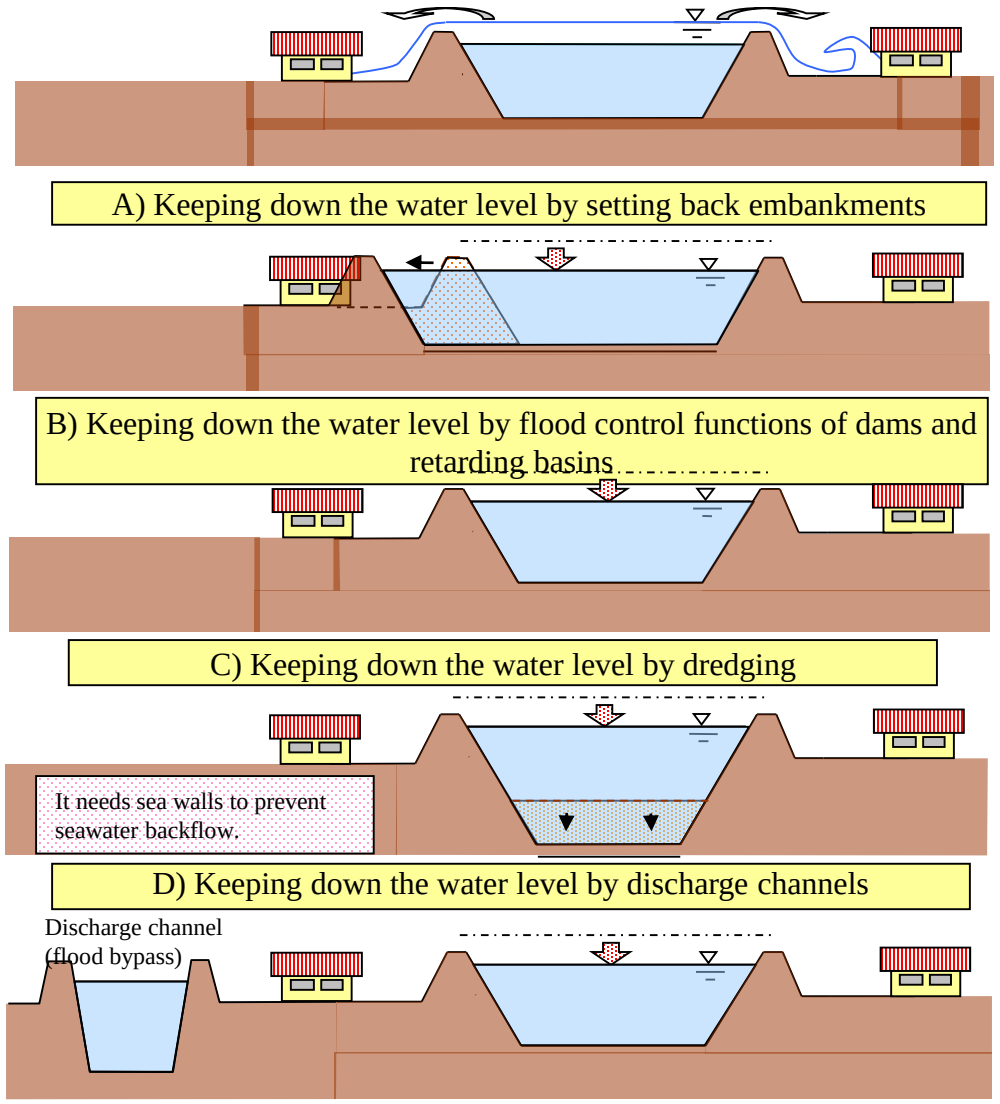
Methods for Flood Prevention and Mitigation

In Tone River basin, flood control is also contributed by 7 reservoirs (dams) and one retarding basins. A new dam is under construction.

Those dams and retarding basins can reduce excessive flood discharge and lower the flood water levels downstream.



Structural (Hard. Measures for Flood Mitigation



Flood control principles

Lowering the water level at floods to maintain safe flow of the river

A) Keeping down the water level by setting back embankments (increasing the river width) to increase the river capacity

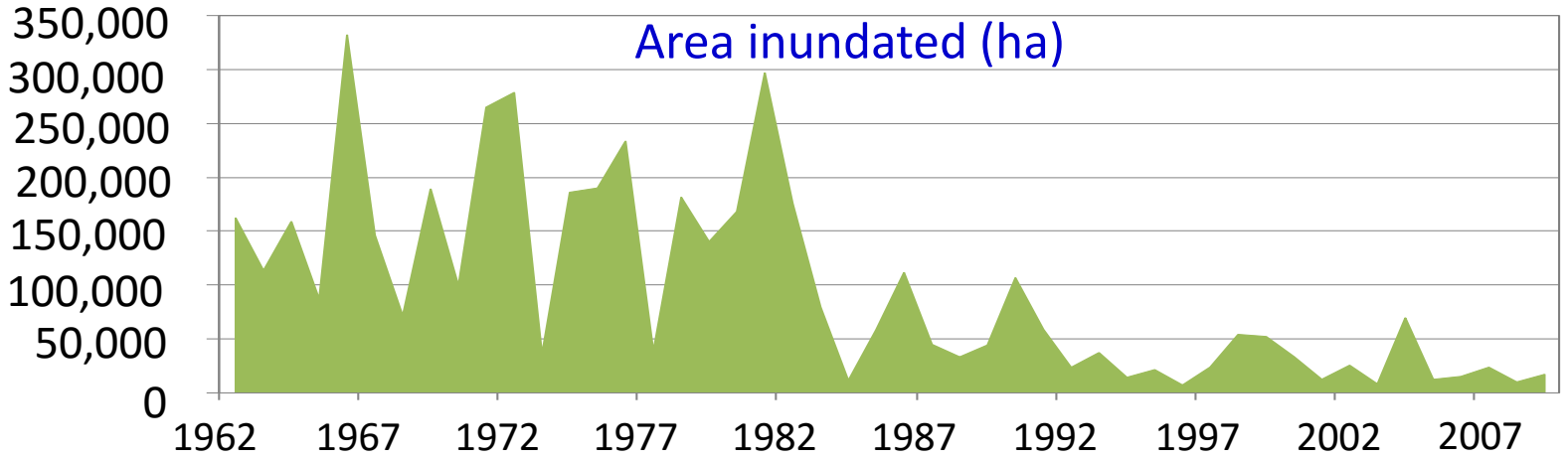
B) Keeping down the water level in the downstream by pooling the excess water than safety level at dams and retarding basins to decrease the flow volume

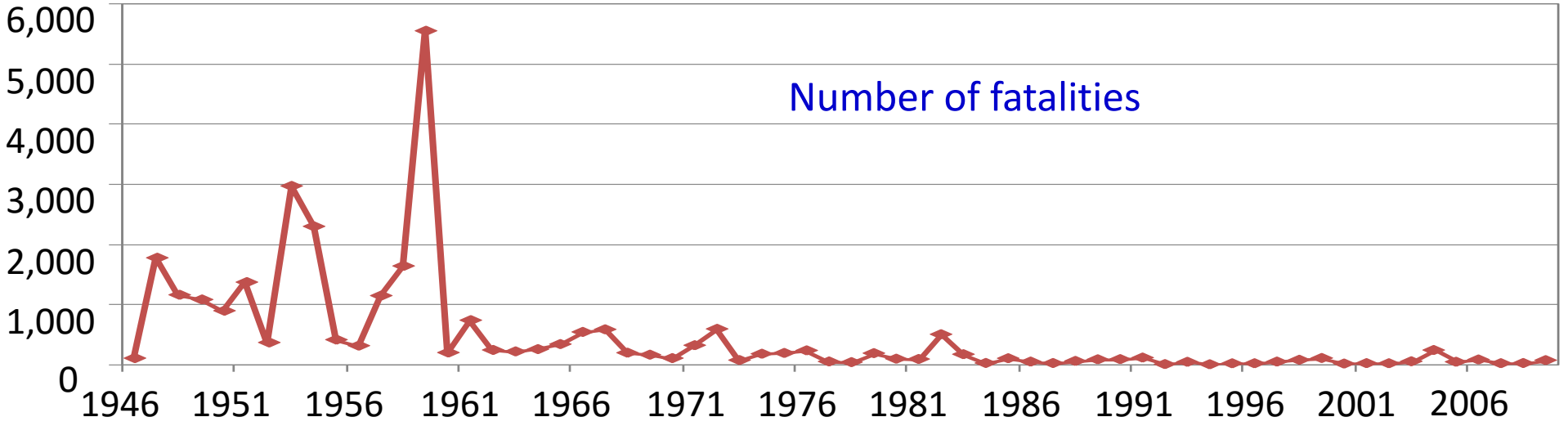
C) Keeping down the water level by dredging (digging down the river bed. to increase the river capacity (It may needs estuary barrages.)

D) Keeping down the water level in the downstream by diversion channels to bypass overflowing water

Reduction of flood damages in Japan

Source: Water Disaster Statistics, Ministry of Land, Infrastructure Transport and Tourism

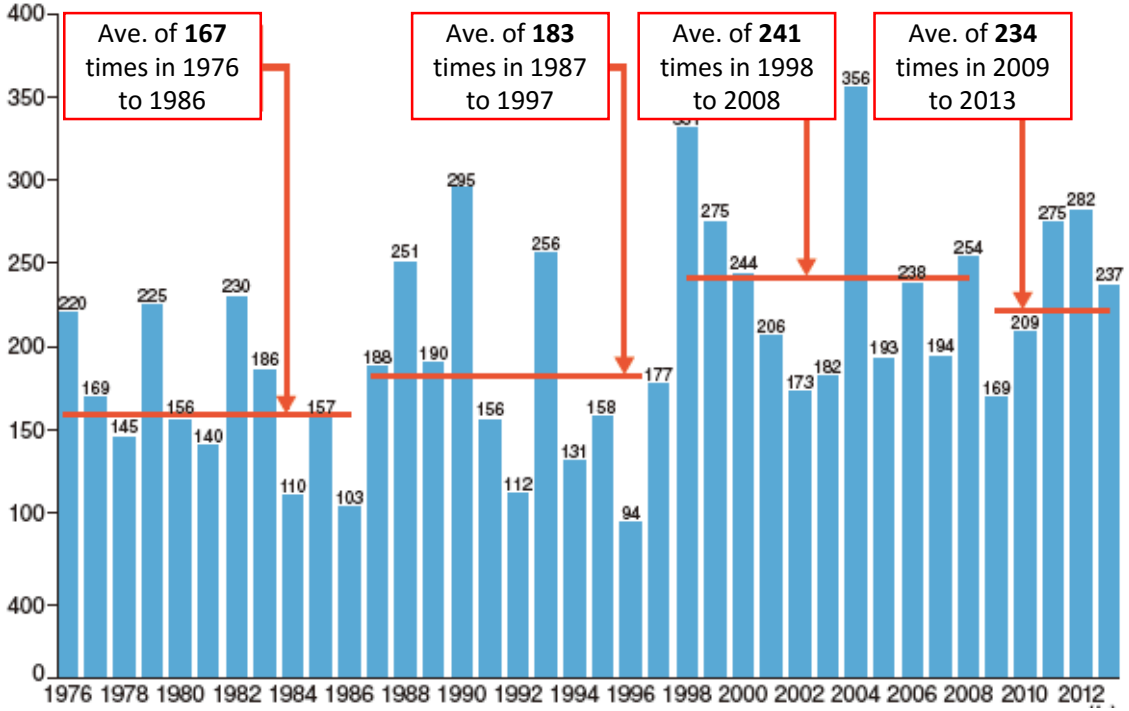




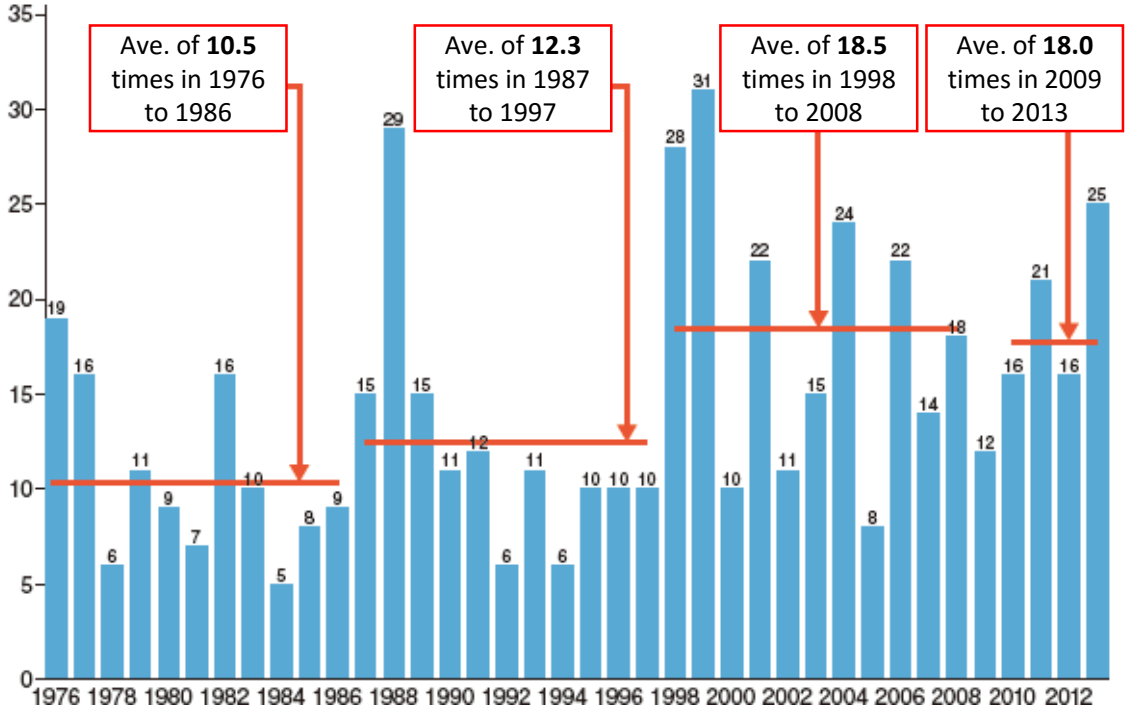
Number of fatalities and inundation area have dramatically been reduced in Japan due to continuous investment in and efforts for flood prevention and mitigation.

Adaptation to Climate Change

Number of occurrences per year of torrential rainfall of 50mm or more in one hour (per 1,000 measurement points)



Number of occurrences per year of torrential rainfall of 80mm or more in one hour (per 1,000 measurement points)



Annual number of occurrences of hourly rainfall exceeded over respective thresholds, accumulated from AMeDAS data for 1,300 observation points nationwide

Adaptation to Climate Change

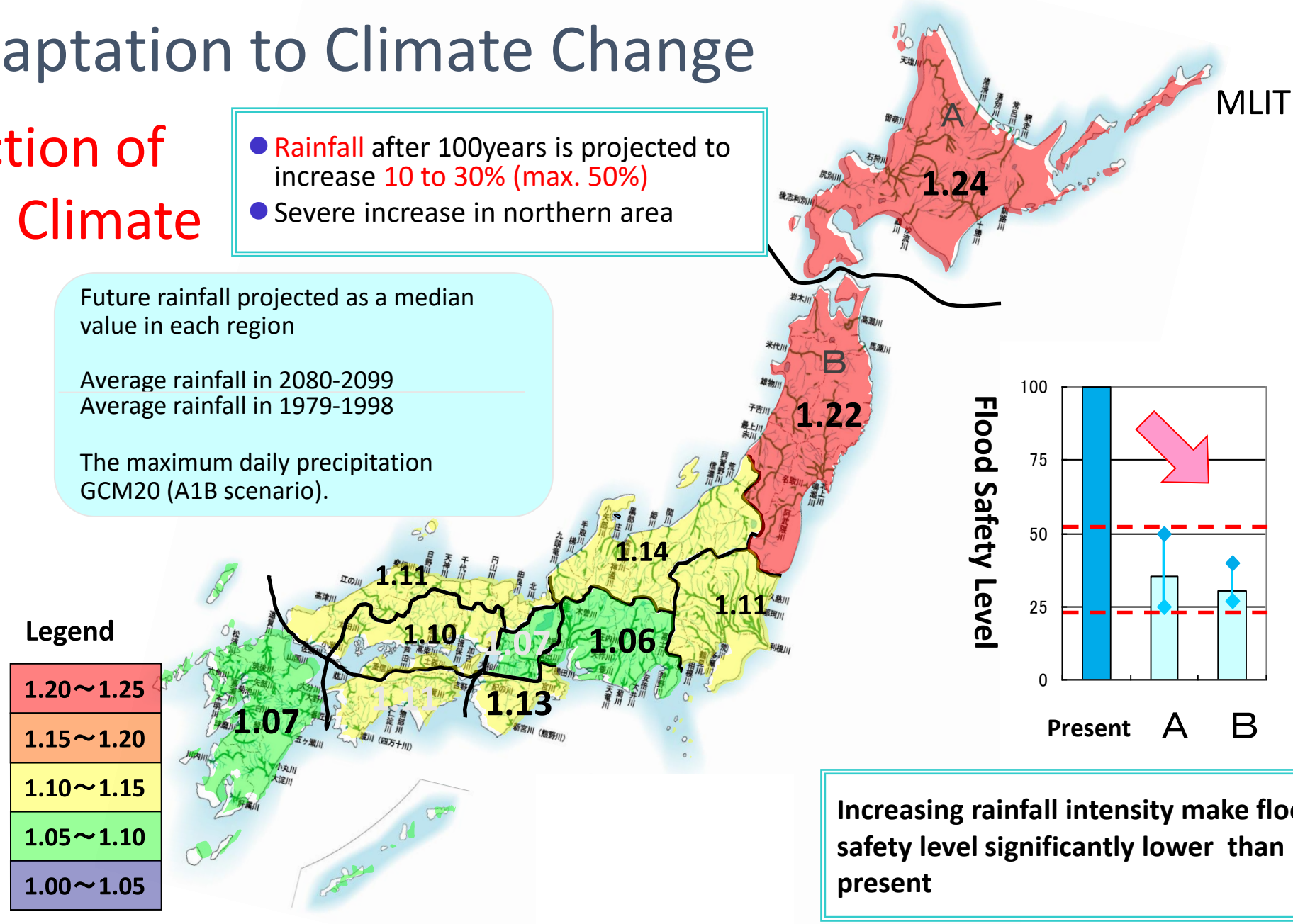
Projection of future Climate

- Rainfall after 100years is projected to increase 10 to 30% (max. 50%)
- Severe increase in northern area

Future rainfall projected as a median value in each region

Average rainfall in 2080-2099
Average rainfall in 1979-1998

The maximum daily precipitation GCM20 (A1B scenario).



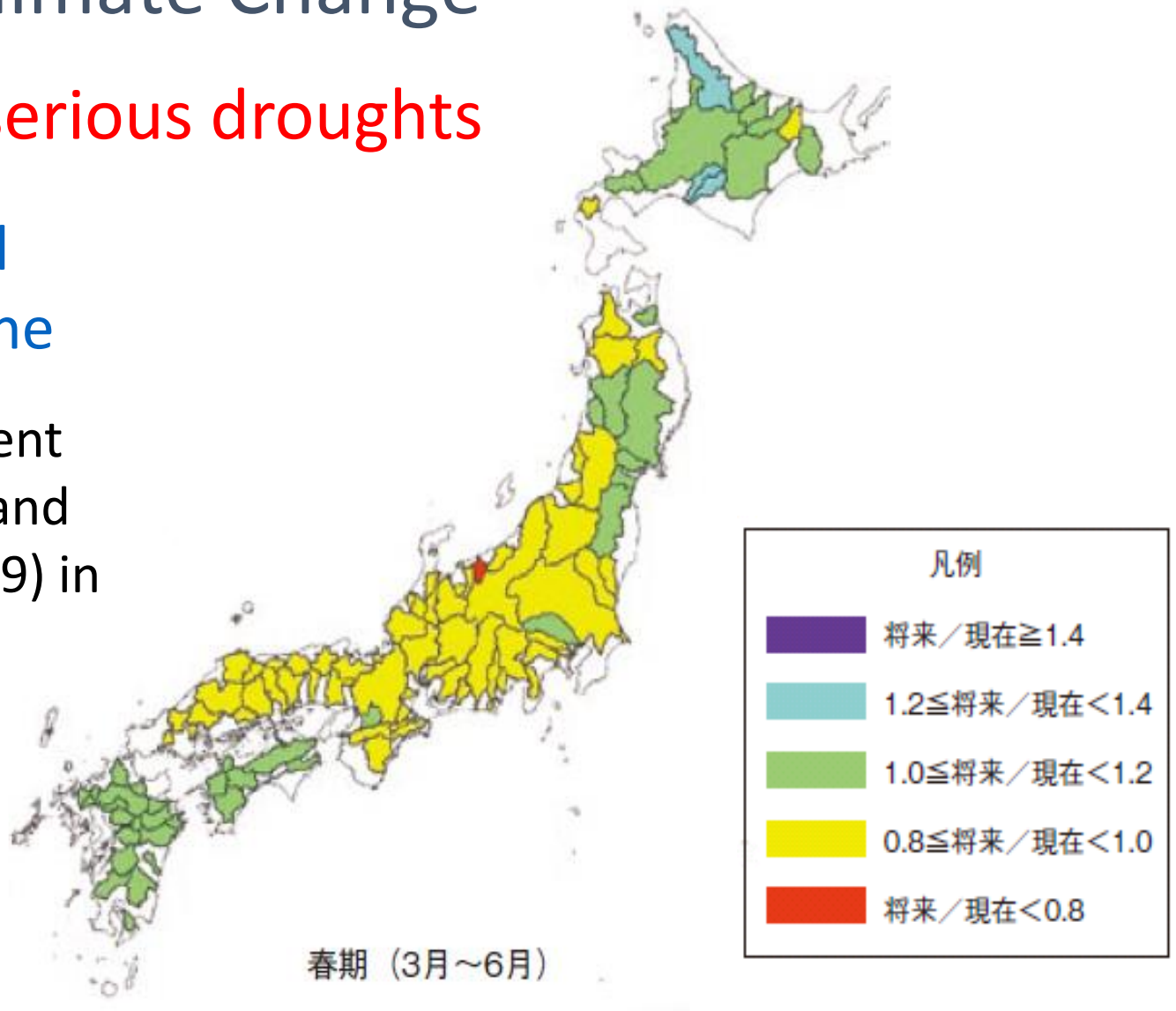
Increasing rainfall intensity make flood safety level significantly lower than present

Adaptation to Climate Change

More frequent and serious droughts

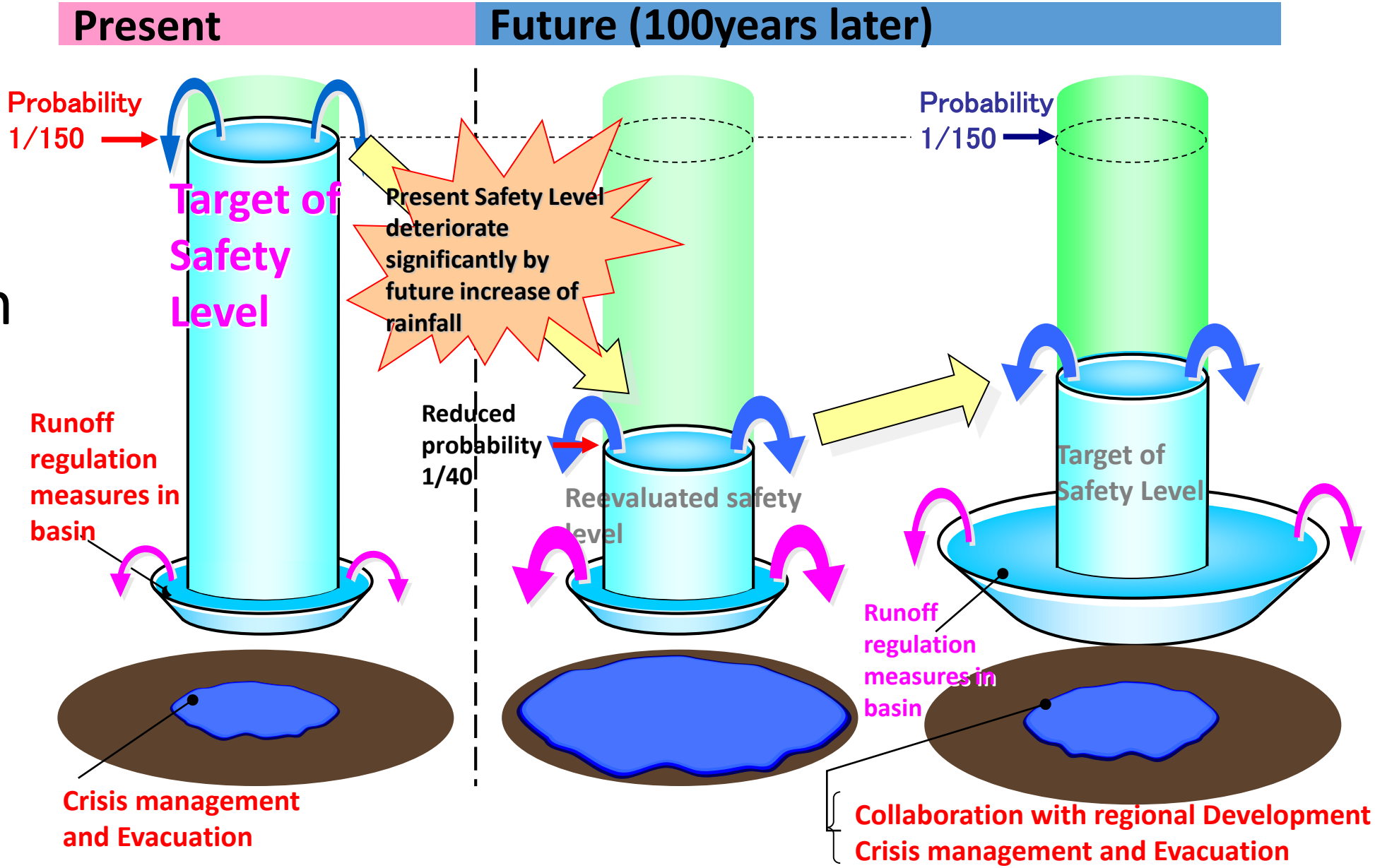
After 100 years, rainfall decrease in March - June

Comparison between present conditions (1979 to 1998) and future rainfall (2080 to 2099) in Class A rivers



Source: Water Resources in Japan 2007, Land and Water Bureau, Ministry of Land, Infrastructure and Transport

Adaptation to Climate Change



Sediment related disasters

Hazard types that are defined in the Basic Act include; Strong wind, Heavy rainfall, Heavy snow, Flood, High tide, Earthquake, Tsunami, Volcanic eruption and other natural phenomenon. Causes of sediment related disasters are not clearly mentioned however, the Sediment-related Disaster Prevention Law, which is the main law for managing those risks, defines three categories of it, consisting of Slope failure, Debris flow and Land slide. Based on this Law, “Basic Guideline for Sediment-related Disaster Prevention Measures” was established by MLIT.

Prevention and mitigation of sediment related disasters is therefore planned and implemented in accordance to the Basic Guideline and relating laws such as Sabo Law, Landslide prevention Law, Slope failure prevention Law.

Slope failure

Debris flow

Land slide

Structural measures against sediment related disasters

Prevention and Mitigation measures against sediment related disasters is a combination of structural and non-structural options. It requires consideration of assessed disaster risks, living environment, societal safety, community opinion and cost effectiveness of probable options.

Structural measures are planned and implemented by branch offices of MLIT as well as local governments in consideration of priority and financial availability.

Sabo works

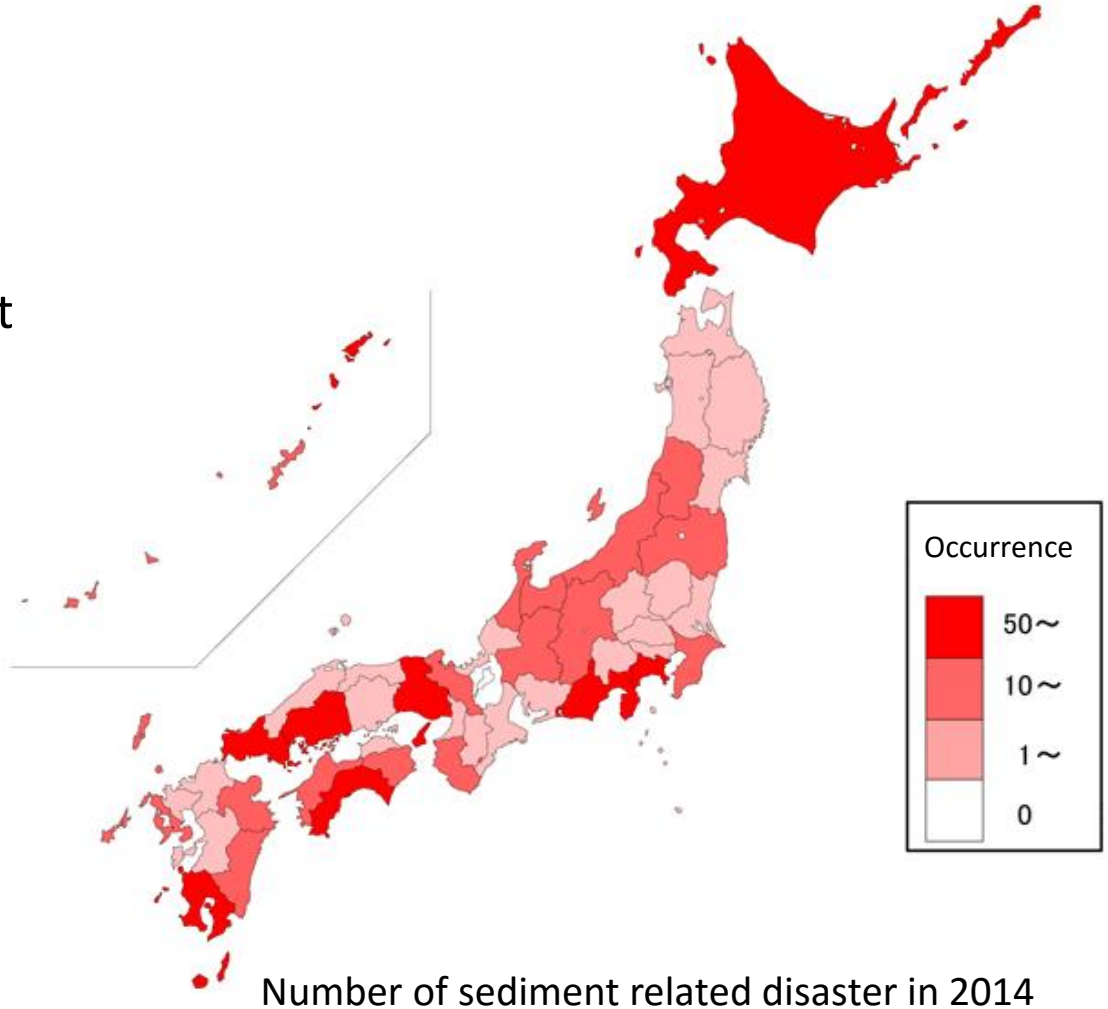
Slope protection

Landslide prevention

At risk of sediment related disasters

Despite the risk reduction efforts by national and local governments, number of sediment related disaster occurrence counts over 1,000 /year.

According to assessment in 2015, there are about 530,000 locations where is at risk of sediment related disasters.



Number of sediment related disaster in 2014

Sprawling population and assets to risk areas

While the structural protections are applied in only prioritized locations due to time and cost consuming conditions, development pressure of various assets is sprawling out to the risky areas such as hill side slope, erodible river side and landslide prone terrestrial.

To effectively reduce those existing and newly arising risks of disasters, actions of risk assessment, hazard zoning, land use regulation, relocation of people and assets are the essentially important options for prevention and mitigation.
The Sediment-related Disaster Prevention Law also provides governments and community with fundamental rules and regulation to manage those risks.

Risk management by the Law

Outline of Sediment Related Disaster Prevention Law

Basic Guideline for Sediment-related Disaster Prevention Measures, MLIT
- Basic investigation protocol of possible disaster areas
- Consideration of structural options for prevention of sediment-related disaster
- Designation of special restriction area due to sediment-related disaster, etc.
- Guideline in relocation of buildings, etc. within special restricted area

Carrying out basic investigations [by each Prefecture]
- Investigations in order to designate restricted areas and special restricted areas due to sediment-related disaster, etc.

Governor's Designation of **Restricted Area** as
<Area threatened with sediment-related disaster>
- Preparation for warning and evacuation systems etc.
- Informing residents about measures of warning and evacuation

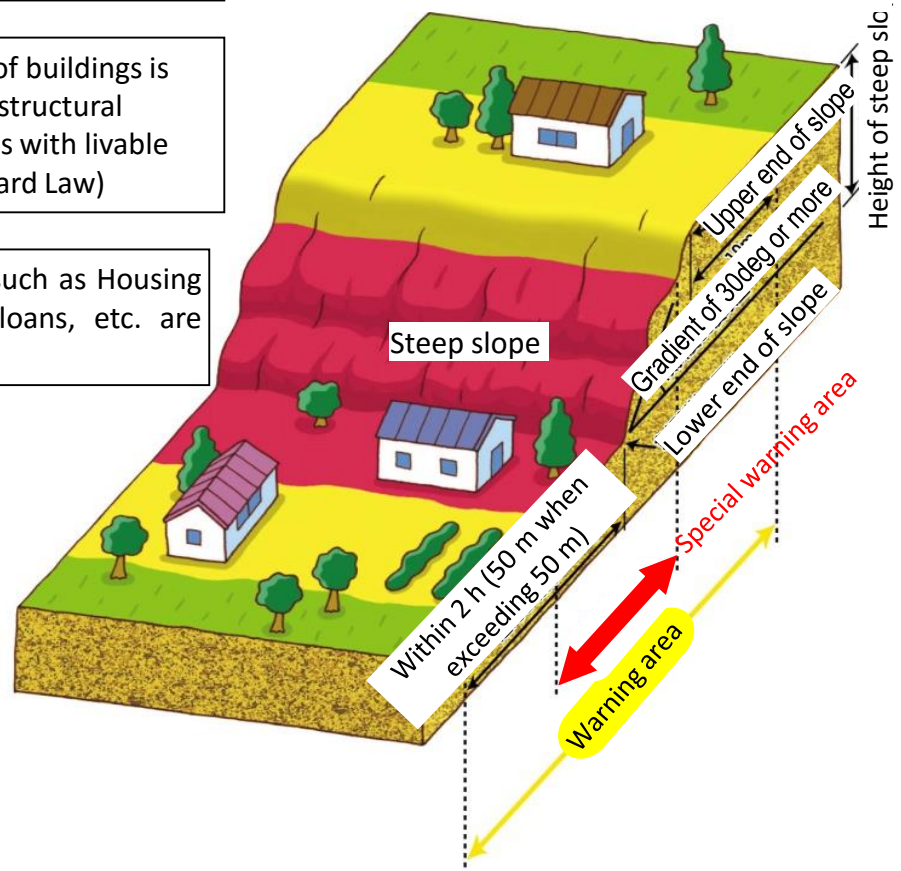
Governor's Designation of **Special Restricted Area** as
<Area with damaged buildings threatened with possibility for resident to incur tremendous harm>
- Permission to Specific development action
  Subject: development actions such as lotting-out of residential areas, social welfare facilities, etc.
- Structural regulation of buildings (building certification required for areas outside city planning area)
- Recommendation on relocation, etc. for buildings likely to incur tremendous damage in sediment-related disaster
- Financing and securing of funds for those relocating according to recommendation

Warning and evacuation systems must be reflected on the regional plan for DRM of municipality (Disaster Countermeasures Basic Act)

Structural regulation of buildings is applied based on the structural standards for buildings with livable safely (Building Standard Law)

Relocation supports such as Housing Loan, Corporation loans, etc. are provided by Gov.

Designation of sediment-related disaster warning area (Steep slope with a height of 5 m or more under the area)



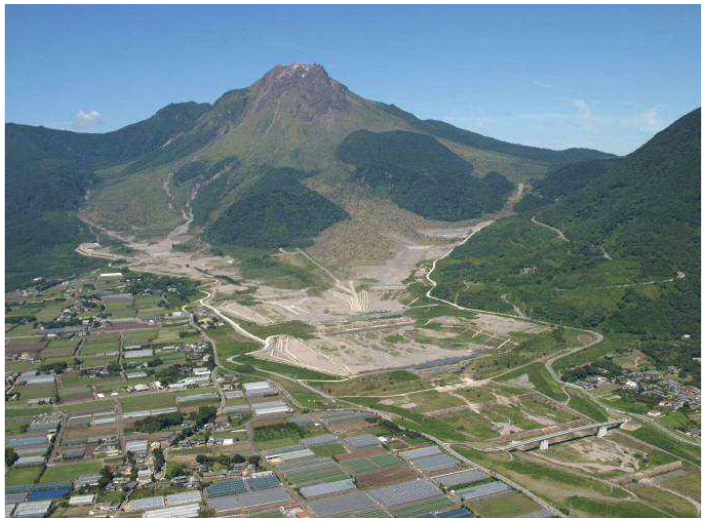
Volcanic Disasters

Major Volcanic Disasters in Japan

Year	Name of Volcano	Number of Death	Description
1707	Mt. Fuji	Large number of deaths by starvation	Thick accumulation of volcanic ejecta, heavy volume of ash falling even on Edo
1741	Oshima Oshima	2,000 or more	Tsunami due to mountain collapse
1779	Sakurajima	150 or more	Cinders, lava flows, etc.
1783	Asamayama	1,151	Proclastic flow, volcanic mudslides, flooding
1785	Aogashima	130–140 persons (40% of island population)	Island remained uninhabited for over 50 years
1792	Unzendake	Approx. 15,000	Mountain collapse and tsunami
1822	Mt. Usu	82	Pyroclastic flow
1856	Hokkaido Komagatake	20 or more	Falling pumice, pyroclastic flow (pumice flow)
1888	Bandaisan	477	Debris avalanche due to mountain collapse
1900	Adatarayama	72	Destruction of a sulfur mining facility
1902	Izu-Torishima	125	All residents of the island dead
1914	Sakurajima	58	Cinders, lava flows, earthquakes
1926	Tokachidake	144	Volcanic mudslides
1952	Beyonesu Rock column	31	Eruptions on the seabed
1991	Unzendake	43	Pyroclastic flow
2014	Ontakesann	57	Cinders, etc.

Locating on the Pacific Rim Volcanic Belt or “Ring of Fire,” Japan is highly volcanic archipelago, home to 110 active volcanoes which account for 10% of the Earth’s total. In the past, eruptions and other volcanic activities have caused heavy damages. In three recent examples, the eruptions of Mt. Usu and Miyakejima in 2000 and Mt. Kirishima (Shinmoedake) in 2011 caused thousands of residents to flee their homes.

Volcanic Disasters



The phenomena associated with volcanic eruptions are extremely varied, and once a volcano begins to erupt, there is often little time to evacuate. Naturally, authorities place the greatest emphasis on protecting against the most life-threatening situations, such as volcanic cinders, pyroclastic flows, snowmelt and volcanic mudflows.

The important approaches to protect residents' lives against volcanic disasters are broadcasting of appropriate information based on the accurate reading of the precursors to volcanic eruptions, and wide-area networks to ensure rapid and orderly evacuation in the event of an eruption.

Eruption Alarms and Eruption Caution Level

Type of Alarms	Targeted areas	Eruption Caution Level	Keyword
Eruption Alert	Residential areas and the areas closer to a crater	Level 5	Evacuation
		Level 4	Preparation for evacuation
Alarm for the vicinity of a crater	Wide areas near a crater including areas close to residential areas	Level 3	Limited access
	Areas around a crater and their vicinity	Level 2	Limited access to the areas around a crater
Eruption Forecast	Inside a crater	Level 1	

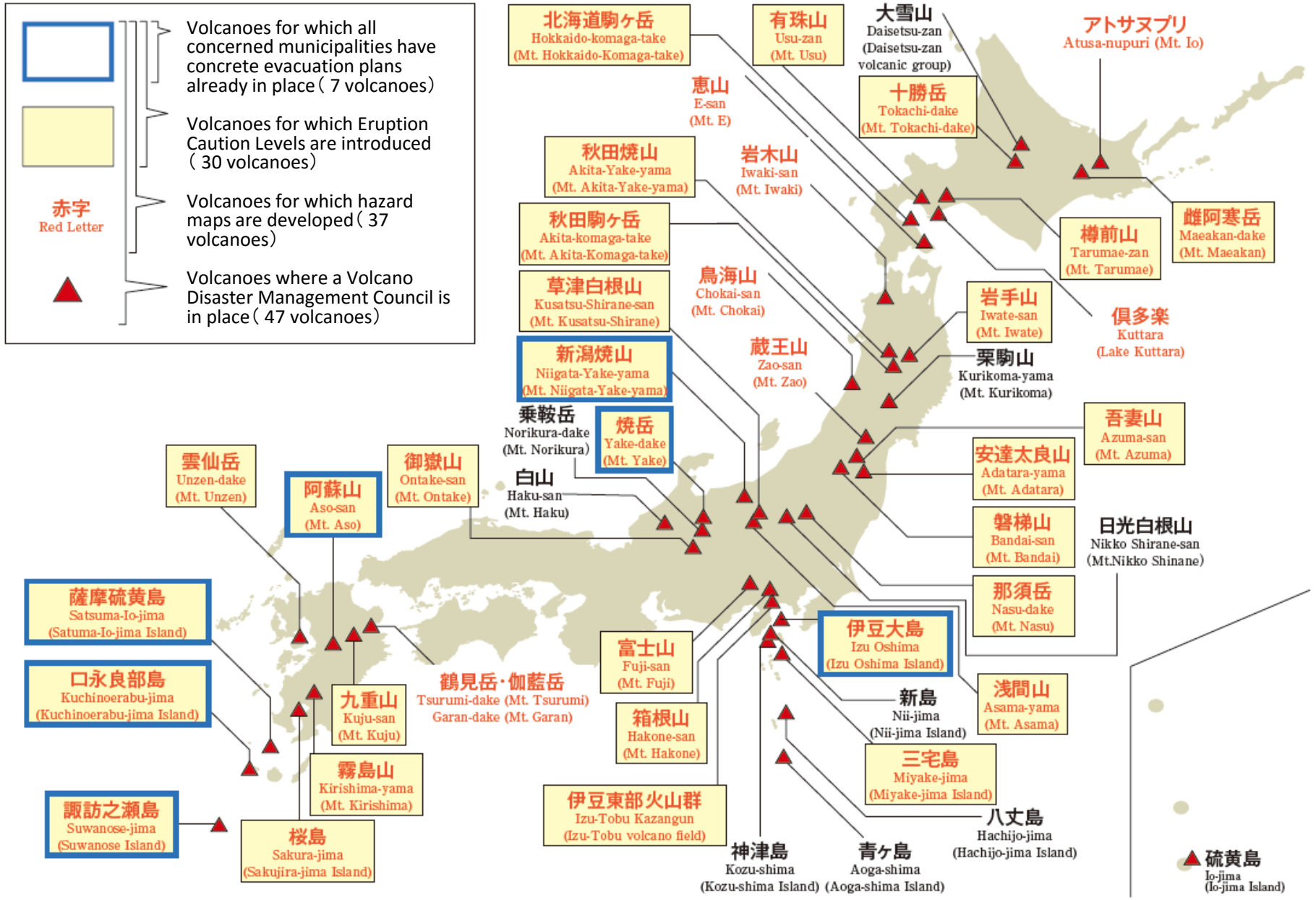
Volcanic Disasters

Preparing hazard maps for 47 continuously monitored volcanoes（The data for March 2015）

JMA deploys a network of seismometers, telephoto cameras and angle meters ranged around 47 volcanoes throughout Japan (selected by the Coordinating Committee for Prediction of Volcanic Eruptions, an organization of academics and related government agencies), and carries out monitoring and surveillance of the volcanoes continuously, 24 hours 7 days. If an eruption affecting the caldera periphery or populated areas is predicted, an eruption warning is issued. For a group of 30 of these volcanoes (as of March 2015), five volcano alert levels are assigned according to the status of volcano activity, each clearly connected to a specific set of disaster countermeasures: Evacuate; Prepare to Evacuate; Entry Restricted, and so on.

Preparing hazard maps for 47 continuously monitored volcanoes

As of March 2015



Volcanic Disasters

Volcano Disaster Countermeasures

In volcanic areas where sediment movement and volcanic activity is significant, the MLIT or local government has implemented various disaster countermeasures such as Sabo dam with an emphasis on active volcanic areas, the development of sand retarding spaces, erosion control equipment such as offtake embankments and stream bed solidification.

Snow Disasters

Japan is a bow-shaped archipelago filled with steep mountain ranges. When cold winds blow in from Siberia in winter, the warm current flowing up the coast from the south brings heavy snowfalls to the Sea of Japan side of the country. Among the seasonal problems that result every year are falls by people removing snow from their roofs, avalanches, and obstruction of traffic and city functions due to snow accumulation.

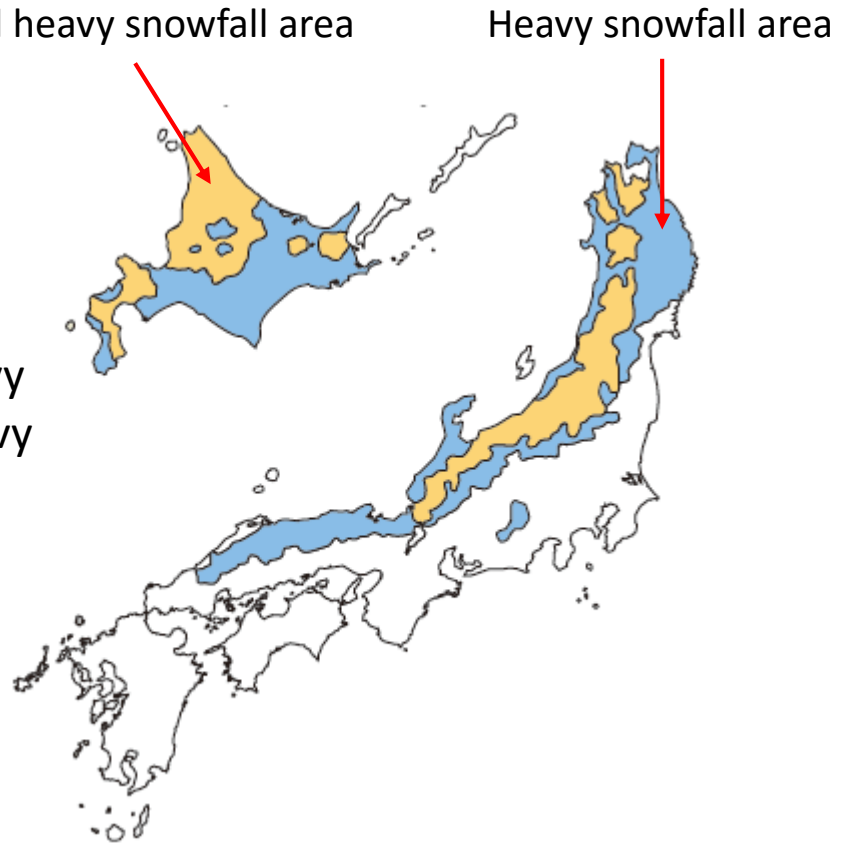
In the winter of 2006, the death toll by heavy snow reached 152. In the years between 2010 and 2012, death toll of snow related incidents amounted to more than 100 each winter. Most of such death is a result of accidents during the snow-plowing activities and mostly the victims were aged people. In the winter of 2012-2013, heavy snow storm took death tolls from among automobile drivers stuck in the snow from carbon-monoxide and freezing while walking in the snow.

Further, during the winter between November 2013 through March 2014, the Kanto and Koshinetsu Area experienced the record-breaking deepest snow falls, vastly damaging the area including many cars stranded on the street blocking the traffic, forcing railways operations to a halt and as many as 6,000 families being isolated and stranded.

Snow Disasters

Designated Areas of Heavy Snowfall and Special Heavy Snowfall

Source: MLIT



Snow Disaster Countermeasures

Measures are being taken to prevent accidents that result in injury, improve the avalanche warning system, and remove snow for securing road traffic networks at the time of heavy snowfall.

Against avalanches, comprehensive measures including avalanche prevention projects for protecting communities, risk communication efforts about dangerous locations among residents, and improvement of the warning and evacuation system are taken.

Furthermore, as heavy snowfall areas account for approximately half of the national land, based on the Act of Special Measures for Heavy Snowfall Areas, measures have been introduced to secure traffic and communications, protect agricultural and forestry industries, and improve living environmental facilities and national land conservation facilities.

Based on the trend of recent disasters, advices have been provided on how to avoid accidents while clearing snow as public-awareness campaigns through various related organizations and agencies, particularly municipal governments.

Also, as lessons learned from the Heavy Snowfalls started in the end of November 2013, review and revisions are being made on issues as to how the alert, warning and special warning and other weather advisory be provided and measures to clear stranded autos blocking the traffic, and the timing of closing the highway, which are critical for effective disaster management.

2. Preparedness and Emergency Response

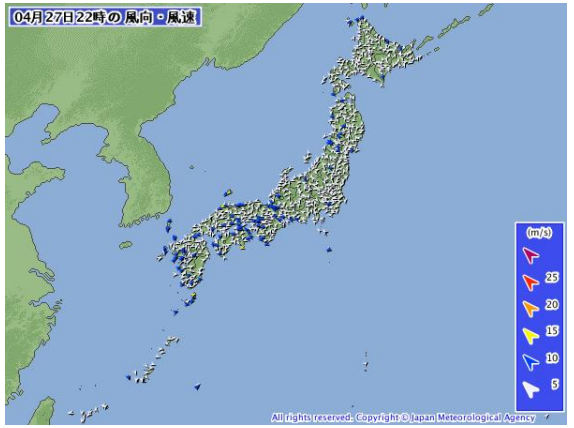
a. Observation System of Hydro-meteorology
b. Public information of flood risks by MLIT
c. Public information of disaster risks by PPP (Public Private Partnership)
d. Warning and Evacuation
e. Other Preparedness Actions for anticipated hazards
   - Reference Water Levels (RWL) for evacuation orders
   - Emergency Risk Discriminator for Houses and Buildings
   - Municipalities mutual support agreement
   - Symbolic Indicators of Hazards
   - Preparedness for Metropolitan Area Large Scale Water Hazard
f. Information and Communications Systems (supporting infrastructure)
g. Systems for Supporting Disaster-Affected People
h. Disaster Reduction Drill / Human Resources Development
i. Disaster Management Base Facilities

Observation System of Hydro-meteorology

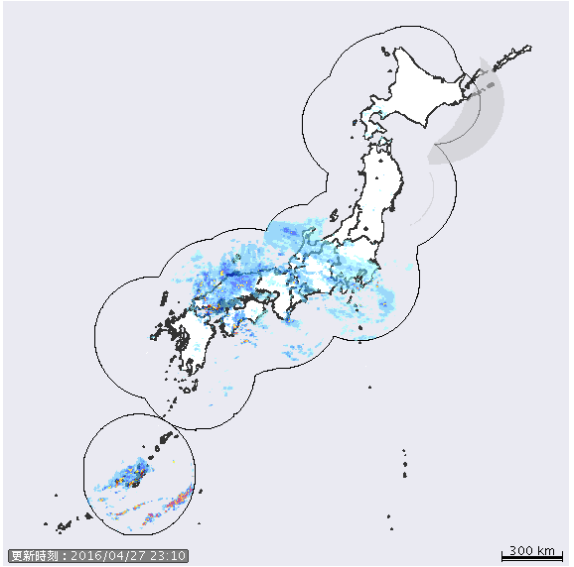
The Japan Meteorological Agency (JMA) observes meteorological phenomena that cause storm and flood disasters using the Automated Meteorological Data Acquisition System (AMeDAS), which automatically measures rainfall, air temperature and wind direction/speed, weather radar, and geostationary meteorological satellites. These are used to announce forecasts and warnings to prepare against disasters (weather warnings and advisories for individual municipalities began in May 2010).

In addition, the rainfall and the water levels in and around rivers are observed by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and prefectural governments utilizing visual observation methods, mechanical observation equipment including radar systems, and a wireless telemeter system that transmits automatically observed data from remote locations. Flood forecasts and water level information are provided utilizing the Internet and mobile phones.

AMeDAS



River Info. by MLIT



Public information of flood risks by MLIT

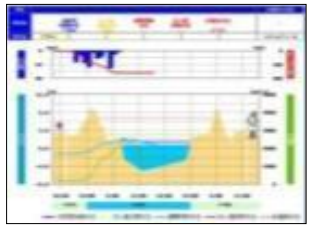
Real time, 24/7

Nationwide data are measured and sent by telemetry

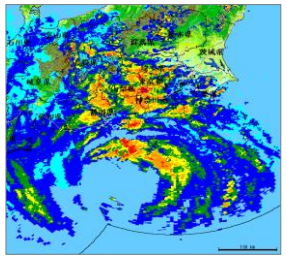
Data are collected, processed and edited into an easy-to-use form and transmitted

Collection
Data from 17,300 stations nationwide every 10 minutes.

Processing・Editing
Into easily understood tables, graphs, maps, diagrams etc.



Transmission
(Information by time/location provided as needed.



Sent to users

River manager

Municipalities

State depts.

Public information of flood risks by MLIT

観測所別水位グラフ

計画高水位	10.0
危険水位	—
特別警戒水位	—
警戒水位	—
指定水位	—

水系名	吉野川
河川名	吉野川
観測所名	高瀬橋
所在地	徳島県名西郡石井町藍畑字西覚円

年月日時分	水位(m)
2006/02/27 11:00	**
10:00	**
09:00	**
08:00	**
07:00	**
06:00	**
05:00	**
04:00	**
03:00	**
02:00	**
01:00	**
2006/02/26 24:00	**
23:00	**
22:00	**
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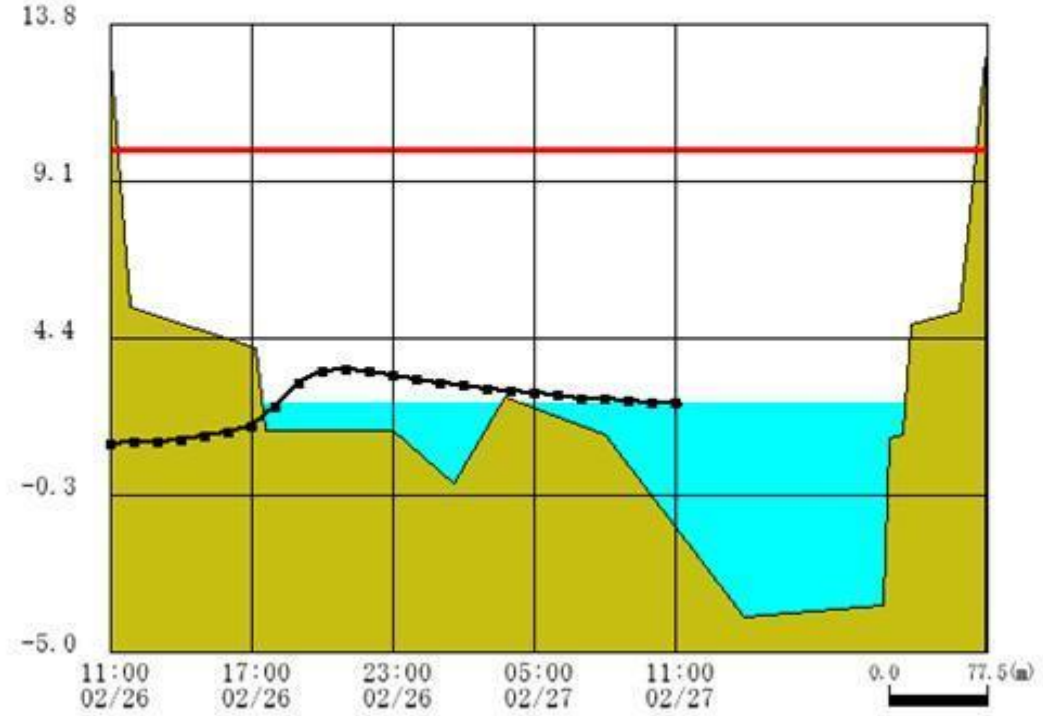
19:00	**
18:00	**
17:00	**
16:00	**



※この情報は速報値であり 検定済データではありません。

- Precipitation by hyetometer
- Precipitation by radar rain gages
- Water level etc.

Public information of disaster risks by PPP

It is established the integrated Public Information System (PIS) of Observing, Forecasting and Warning of disaster risks from relevant agencies to the public. Using the latest technologies of Information and Communications, it is still developing day by day.

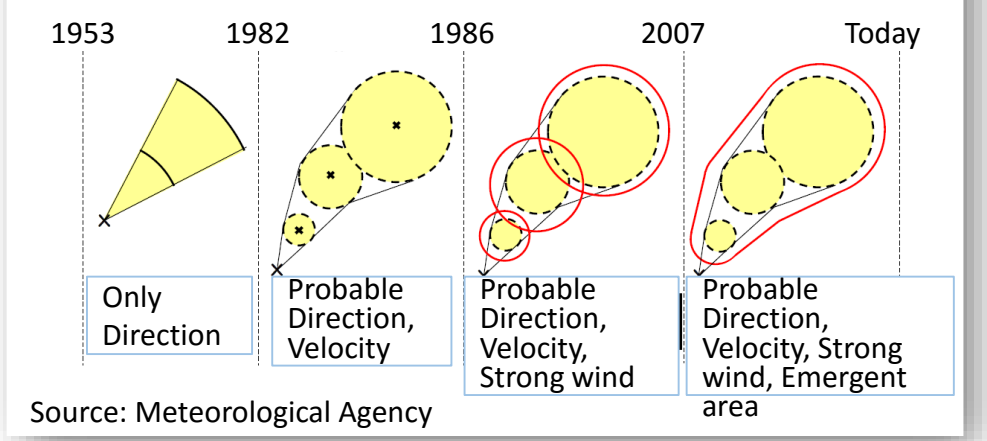
Integrated Disaster Risk Management Information System of Cabinet Office is consisting of:

- Function for early assessment of damage from earthquakes,
- Early damage assessment function using artificial satellites, and
- Information sharing and PIS.

One of the important aspect of PIS is the enhanced capacity of people's risk literacy, which has been supported by various national/local organizations:

- Typhoon and Flood Forecasting by MLIT and JMA
- Flood Fighting organizations
  (Flood Fighting Act, since 1949)

An example of improving Typhoon alert information by JMA, which can be understood implicitly by public



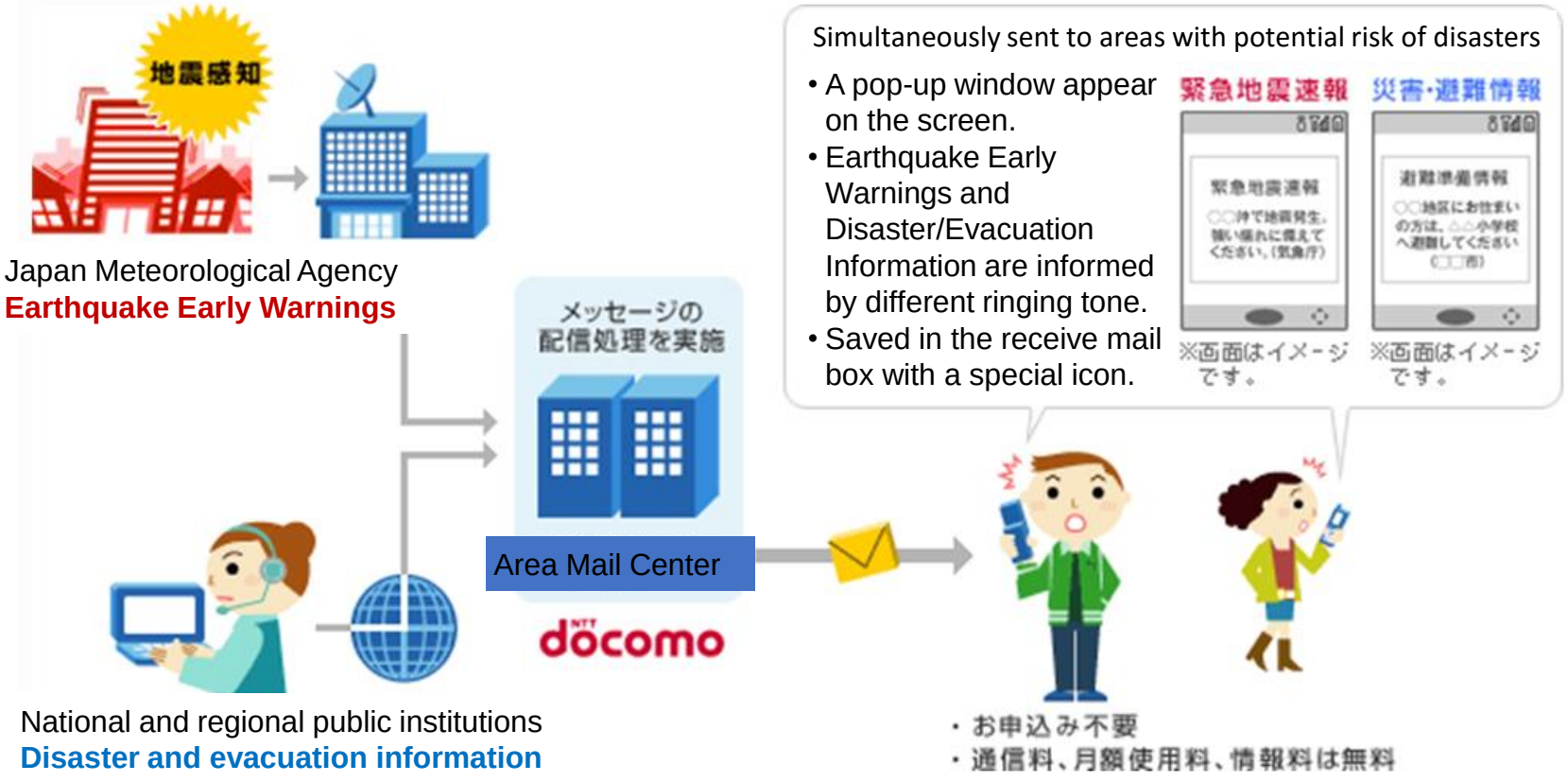
Source: Meteorological Agency

Public information of disaster risks by PPP

Early Warning through “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).

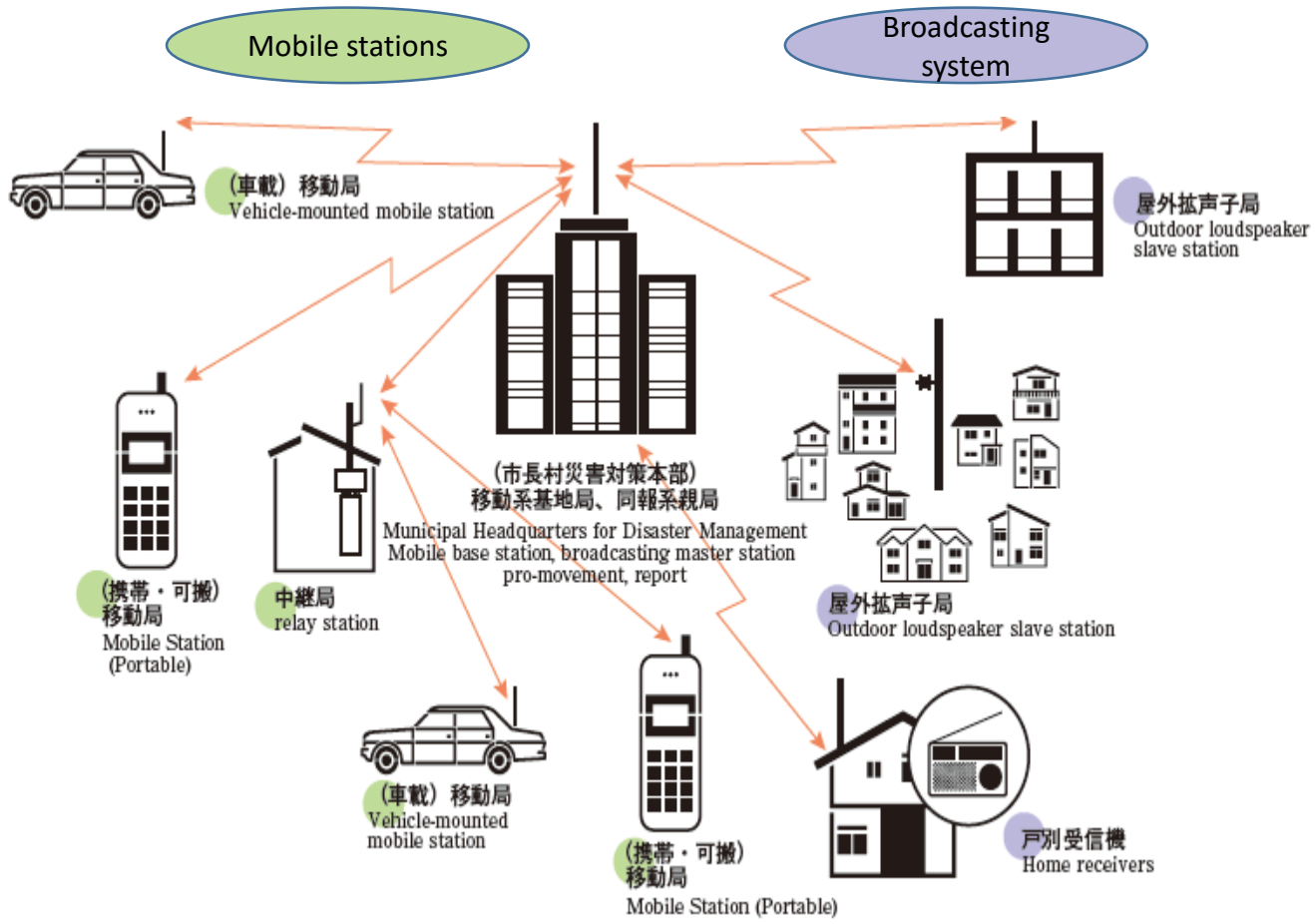


Source: NTT docomo

Warning and Evacuation

Observation systems that can accurately detect disaster risks in real time have been progressively improved for establishing early warning systems, supporting early evacuation and response activities, and thereby reducing disaster damage. Organizations involved in disaster reduction, especially the Japan Meteorological Agency(JMA), use 24-hour systems to carefully monitor various natural phenomena and weather conditions. In addition to observed information, the JMA issues a wide range of forecasts, warnings and advisories. Furthermore, in August 2013, it started to issue “Emergency Warnings” in case that a severe disaster far exceeding the past level of issuing warnings is anticipated.

Outline of Early Warning Systems



Warning and Evacuation

When a disaster occurs or is imminent, residents may start evacuating on their own volition, and the mayor of the municipality may also issue an **evacuation advisory or order**.

It is effective for municipalities to prepare a **manual** explaining the **criteria** regarding disaster situations that require the issuance of evacuation advisories or orders, including under what situation and to what area, thereby helping the mayor's quick decision.

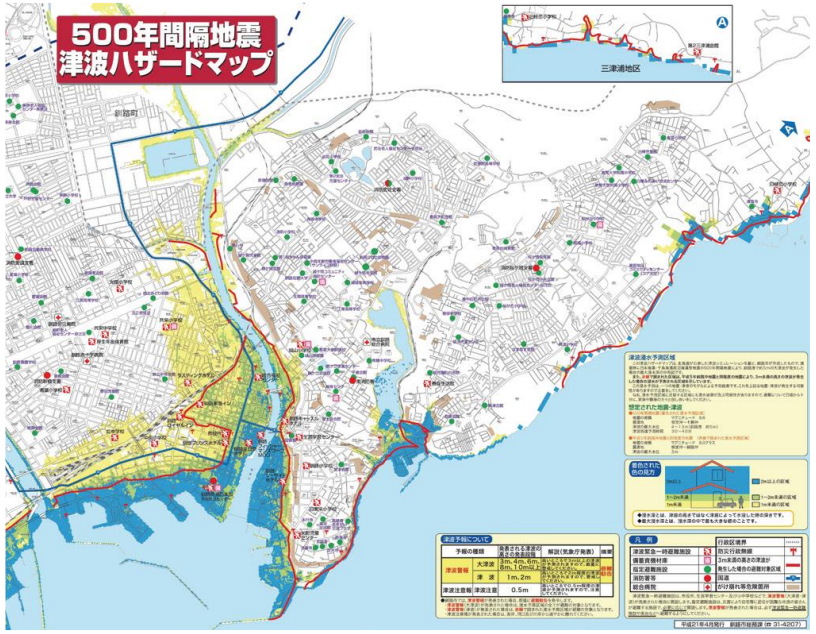
The Cabinet Office, with new disaster management information being released and lessons from past disasters, has revised the "**Guidelines** for Producing a Decision and Dissemination Manual for Evacuation Advisories and Orders" entirely in April 2013, and has requested that each local government review and revise its criteria for issuing advisories or orders for evacuation. Also, it has requested relevant prefectural and national entities to proactively give advice in the efforts of municipalities making such revision.

The new guidelines place an emphasis on making it **easy to understand the criteria** for issuing advisories or orders for evacuation, and **urges municipalities to issue** them early enough without fear of resulting in unnecessary action.

Efforts will be to support, in full cooperation with relevant entities, the municipalities to understand and recognize the purpose of this guideline and make progress in amending the criteria for issuing evacuation advisories or orders.

Warning and Evacuation

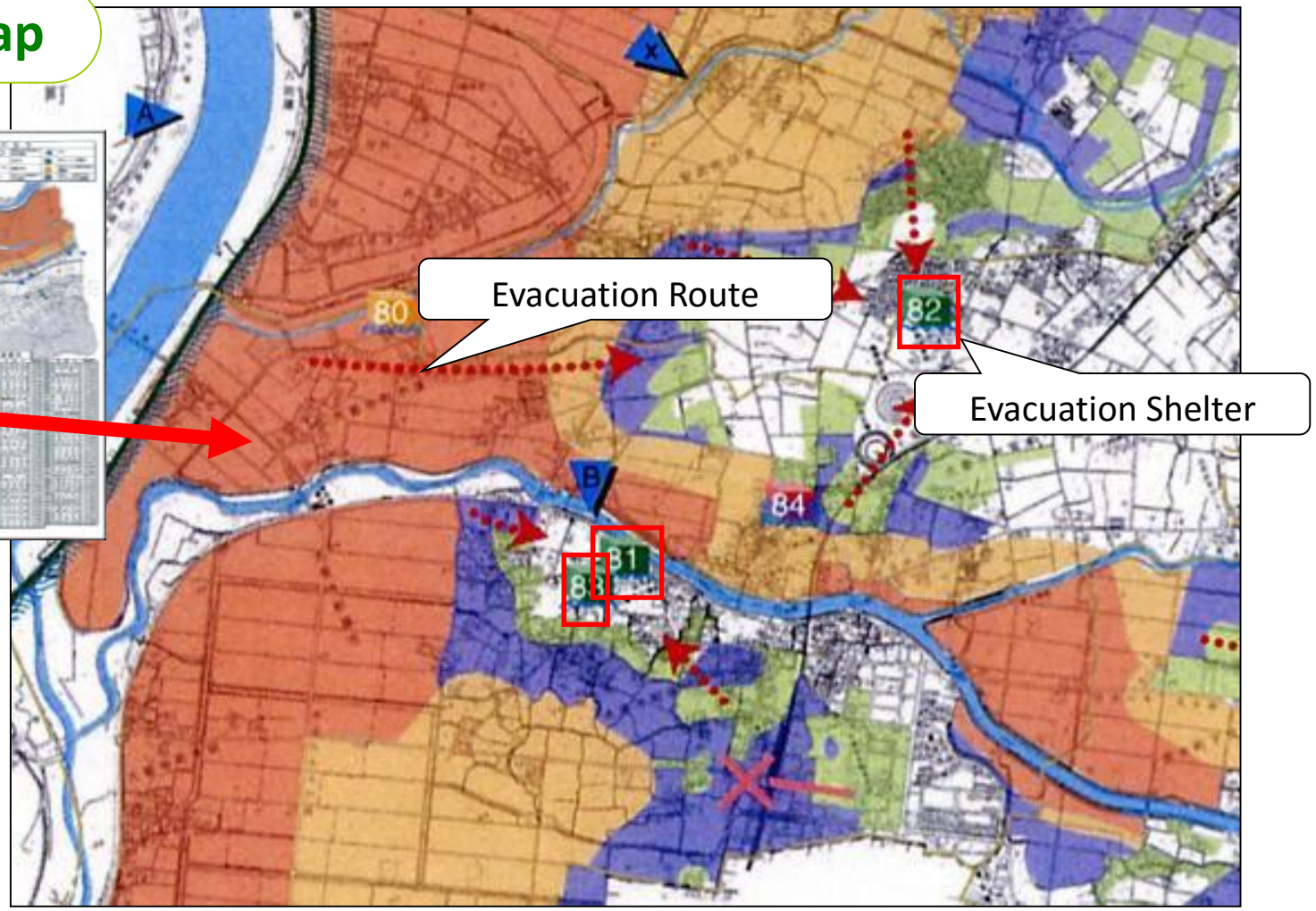
As non-structural countermeasures for effective preparedness and response, the warning and evacuation systems for the possible inundation areas and landslide prone areas have been developed in accordance with the Disaster Countermeasures Basic Act, Flood Control Act and the Sediment Disaster Prevention Act.
For Tsunami Hazard, 53.9% of the municipalities subject to Tsunami Warning have prepared the Tsunami Hazard Map as of 2010, although most of those are under revision due to the change of national strategy after 2011 Great East Japan Earthquake.
Based on the Flood Control Act, 417 rivers subject to flood warning and 1,555 rivers subject to water-level notifications are designated. Of these, inundation risk areas are currently designated and published for 1,931 rivers (as of March 2014). Moreover, municipalities that include such areas are encouraged to prepare and disseminate flood hazard maps. Currently 1,272 municipalities have published such maps (as of March 2014).



Tsunami Hazard Map
(Kushiro-shi, Hokkaido)

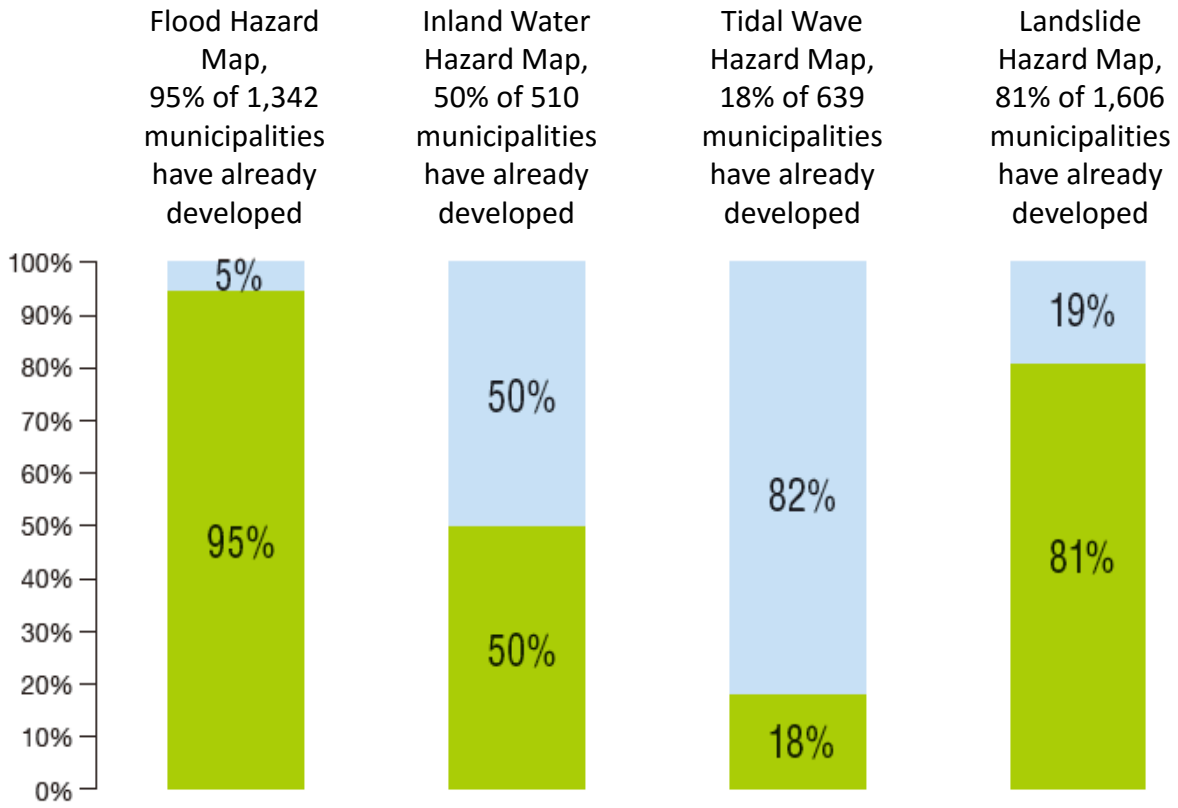
Warning and Evacuation

Example of Flood Hazard Map



Warning and Evacuation

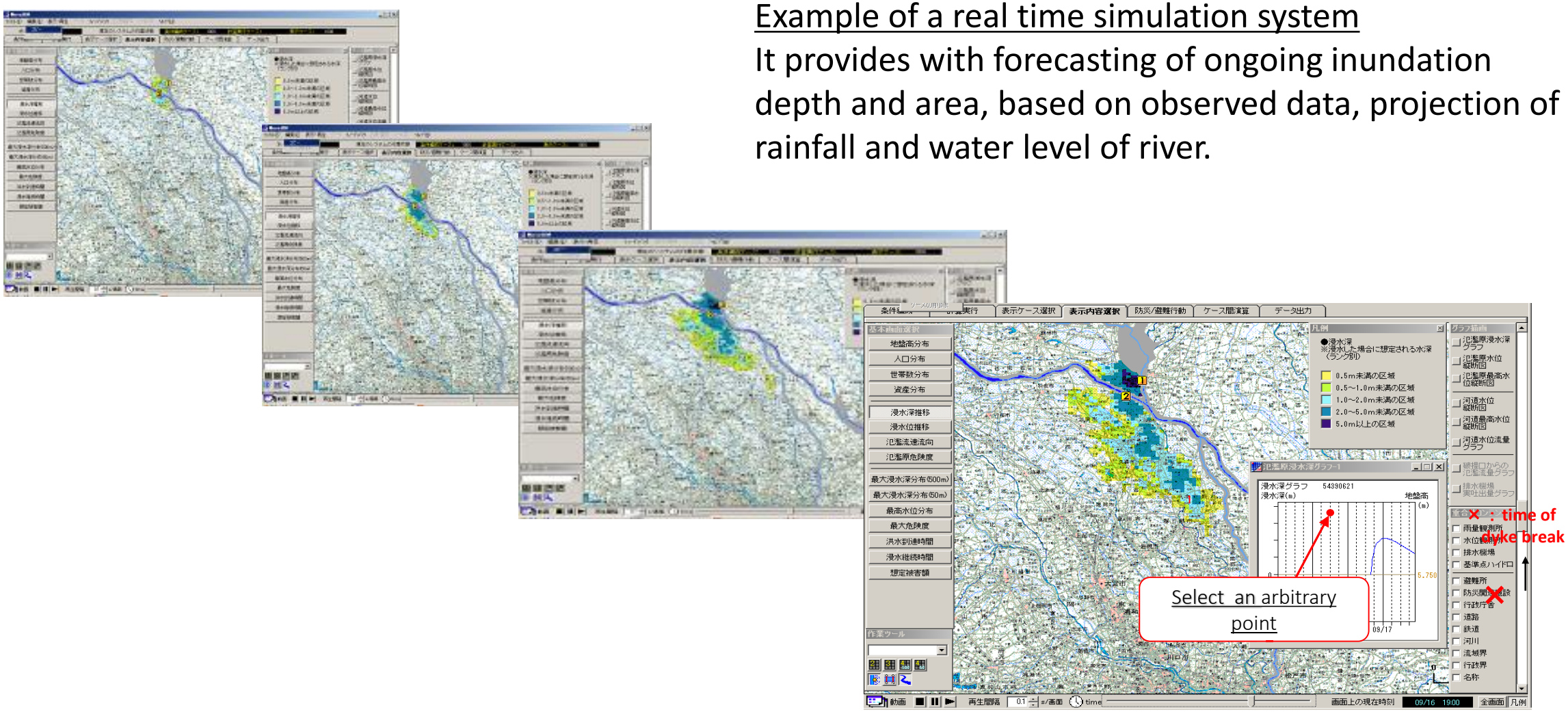
Preparation of Hazard Maps (as of the end of March 2013)



Landslides triggered by Typhoon 26, 2013, Izu-Oshima Island

Upon the sediment disaster occurred in the Hiroshima Prefecture in August 2014, the Sediment Disaster Prevention Act was revised to strengthen countermeasures including obligating the government to share the sediment disaster alert information with municipalities and general public so that it will contribute to smooth issuance of the evacuation order.

Warning and Evacuation



Example of a real time simulation system

It provides with forecasting of ongoing inundation depth and area, based on observed data, projection of rainfall and water level of river.

Warning and Evacuation

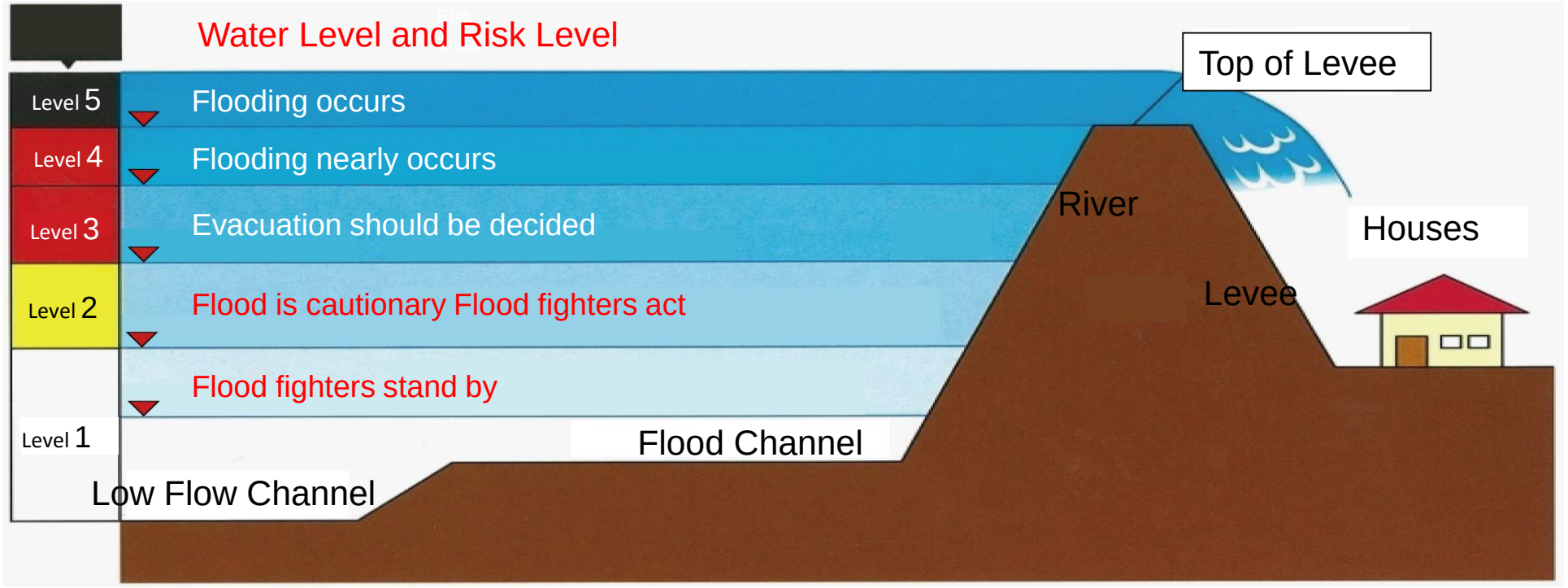
For Volcanic Disasters:
In accordance with the “Guideline for Disaster Management Systems Concerning Evacuation in the Event of Volcano Eruption” (March 2008) and the “Recommendations for Countermeasures against Large-scale Volcano Disasters” (May 2013), following actions are being taken (as of March 2015):
1) Volcano Disaster Management Councils, a wide-area coordinating framework consisting of various volcano related government agencies (prefectural and local government officials, meteorological observatory personnel, the Sabo (Soil Erosion Control) Department, and volcanologists) are established for 47 volcanoes.
2) Based on a variety of eruption scenarios, “Volcano Hazard Maps” indicating areas at risk of dangerous eruption phenomena are drafted for 37 volcanoes.
3) Drafting of specific and practical evacuation plans are in progress at relevant municipalities. These plans specify when to begin evacuation, areas likely to require evacuation, and evacuation routes and methods.
Further, in response to the disaster caused by the eruption of Mt. Ontake in September 2014, the Government announced “Measures to be taken urgently for Prevention of Disasters related to the Volcanic Eruption” and established a “Working Group for Promotion of Volcano Disaster Prevention” in order to further promote the countermeasures against volcanic disaster prevention in Japan.
In March 2015, a report was compiled under the title of “Future Countermeasures vis-a-vis Volcanic Activities Reflecting upon Eruption of the Mt. Ontake”.

Preparedness Actions for anticipated hazards

Reference Water Levels (RWL) for evacuation orders

In order to promote smooth evacuation actions, categorization of the RWLs were pre-determined based on risk levels and capacity of emergency operation in fields.

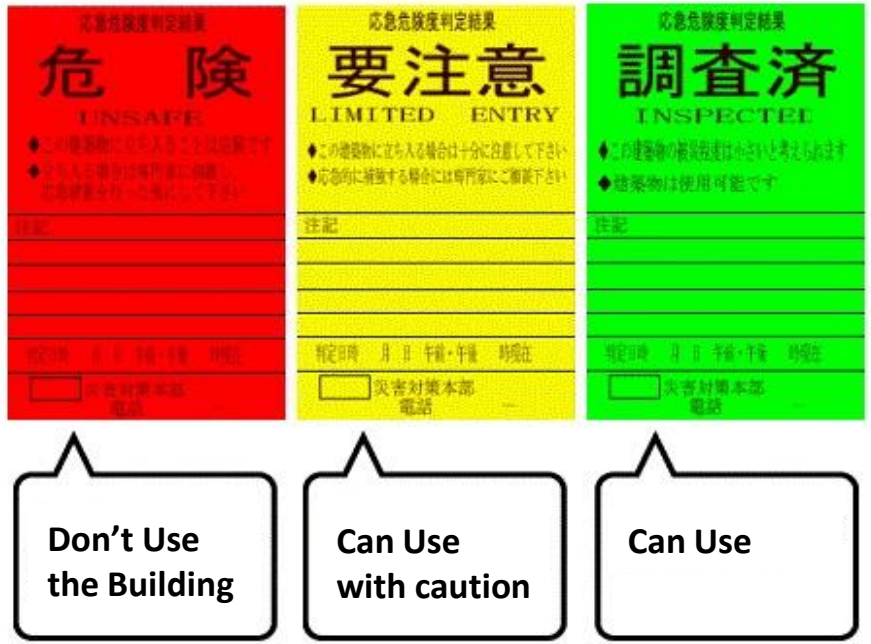
The RWLs in all the critical points of rivers have been designated and emergency operation protocols have been implemented.



Preparedness Actions for anticipated hazards

Emergency Risk Discriminator for Houses and Buildings

- Prefectural qualification (under national standard.
- 106,000 technicians national total in 2016



Preparedness Actions for anticipated hazards

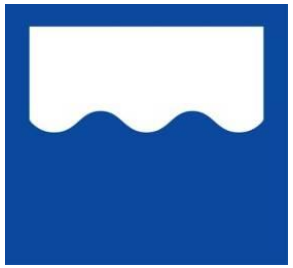
Municipalities mutual support agreement

- Not too far, not too close
- Similar level of organizational capacity
- Push-type support activation, dispatching personnel from initial liaison to specialist in particular work field
- Good communication regularly at normal situation

Preparedness Actions for anticipated hazards

Symbolic Indicators of Hazards

Assumed hazard, evacuation sites, etc. are indicated in town in order to allow residents to escape safely and smoothly when threats occurs.



[Flood]

This symbol indicates that the area concerned may be affected by floods.

[Evacuation site (building)]

This symbol shows a safe building that provides a shelter when a disaster occurs.

Examples of Hazard-related signs installed

Information on the assumed flood water depth, evacuation sites, etc. is indicated on electric poles and the walls of public facilities.

Preparedness Actions for anticipated hazards

Preparedness for Metropolitan Area Large Scale Water Hazard

In light of a rising trend in heavy downpours in recent years, a strong need exists to fortify measures for rapid, effective evacuation and relief, in anticipation of large-scale flood disasters. The Central Disaster Management Council published a series of disaster scenarios in 2008, detailing the anticipated damage in the event of a number of possible cases. These included heavy downpours causing destruction of the fortified weirs along the banks of the Tone River and Ara River in the Tokyo metropolitan area. At worst, such a catastrophe could leave up to 2,600 people dead and another 1.1 million people stranded. To minimize the damage in such an event, the Central Disaster Management Council has formulated the Basic Policies for Metropolitan Area Large Scale Water Hazard, and measures have been promoted so that prompt evacuation can be effected.

Damage assumption of the Tone Rive metropolitan area by a large scale flood:
Flood affected area = 530km^2
Population affected = 2,300,000
Flooded houses above floor = 680,000
Flooded houses below floor = 180,000

Metropolitan Area Outer Underground Discharge Channel
Photo courtesy: Edogawa river office, MLIT

Information and Communications Systems

Central Disaster Management Radio Network

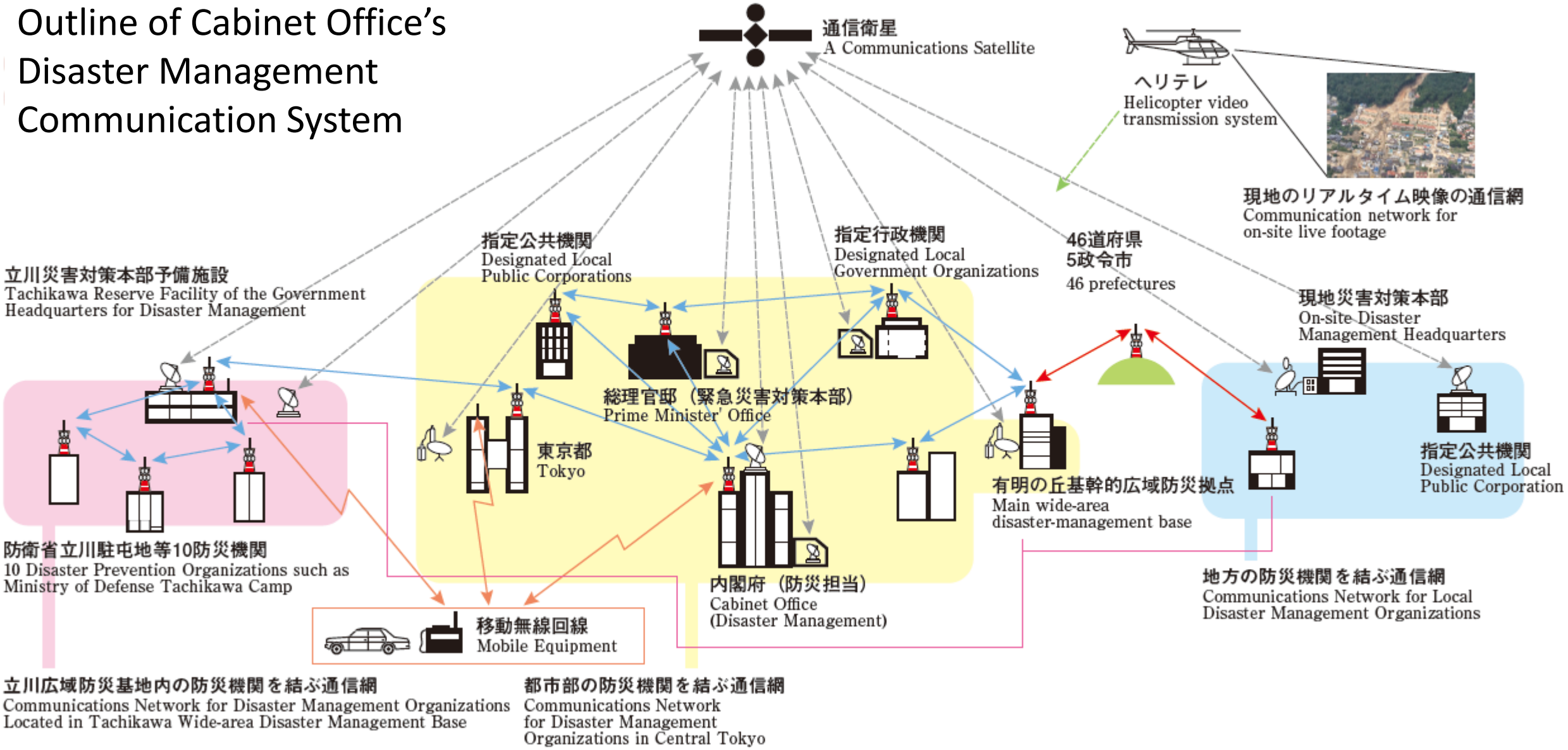
The development of a quick and accurate communications system is essential for the effective use of disaster management information. For this purpose an online system has been built, linking the Japan Meteorological Agency(JMA) with disaster management organizations of the national and local governments and media organizations.

Disaster management organizations have also been developing radio communications networks exclusively for disasters: the Cabinet Office's Disaster Management Radio Communication System, which connects national organizations; the Fire Disaster Management Radio Communication System, which connects firefighting organizations across the country; and prefectural and municipal disaster management radio communications systems, which connect local disaster management organizations and residents.

The Cabinet Office has established the CAO's Disaster Management Radio Communication System to link with designated government organizations, designated public corporations and prefectural governments, providing communications by telephone, fax, data transmission, video conferencing and video transmission of disaster situations from helicopters and other sources.

Simultaneous wireless communications systems using outdoor loudspeakers and indoor radio receivers are used to disseminate disaster information to residents. Tsunami and severe weather warnings are widely provided to citizens via TV and radio broadcasts.

Outline of Cabinet Office's Disaster Management Communication System



Information and Communications Systems

Integrated Disaster Management Information System

Based on the experiences of the Great Hanshin-Awaji Earthquake, the Cabinet Office has been developing an integrated disaster management information system that helps to grasp the situation of the disaster early on and promotes information sharing among relevant organizations, thereby enabling quick and appropriate decision-making for disaster management operations.

The main features of the Integrated Disaster Management Information System are as follows.

1 EES (Early Estimation System) for early assessment of damage from earthquakes

The Earthquake Disaster Information System (DIS) receives information on earthquake intensity as observed by the JMA and automatically activated by an earthquake intensity level of 4 or greater. It has a feature that estimates the distribution of seismic intensity and scale of damage (human suffering and building damage)）within 10 minutes.

2 Early damage assessment function using artificial satellites

When large-scale disasters occur, this feature uses images from artificial satellites capable of wide-area observation to provide early assessment of damage.

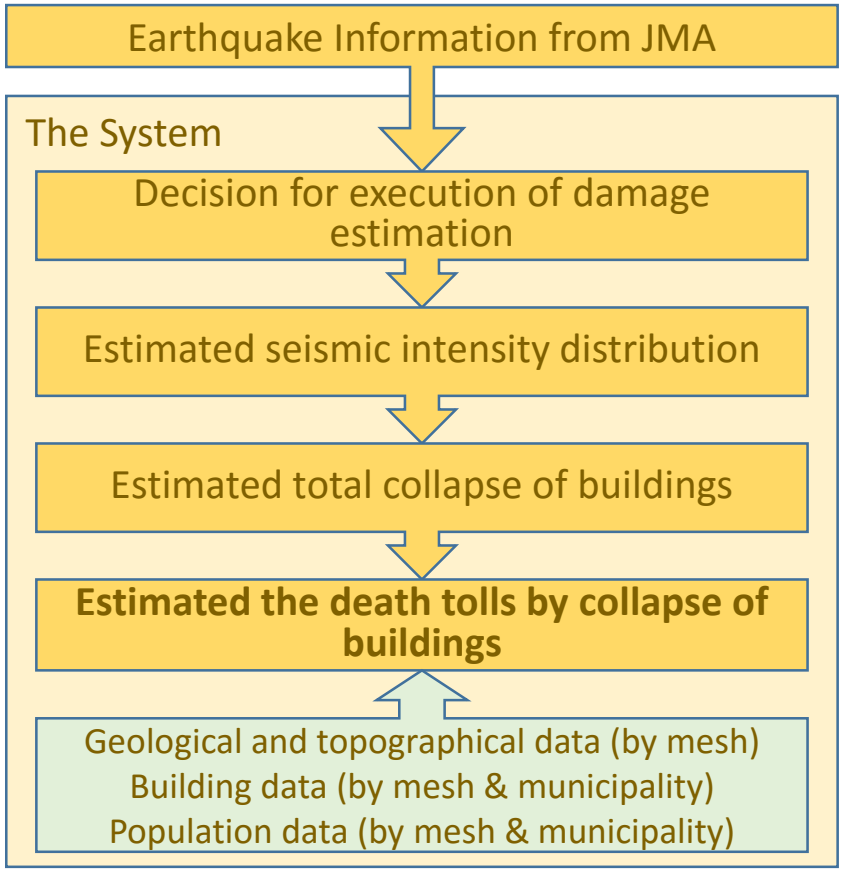
3 Information sharing function

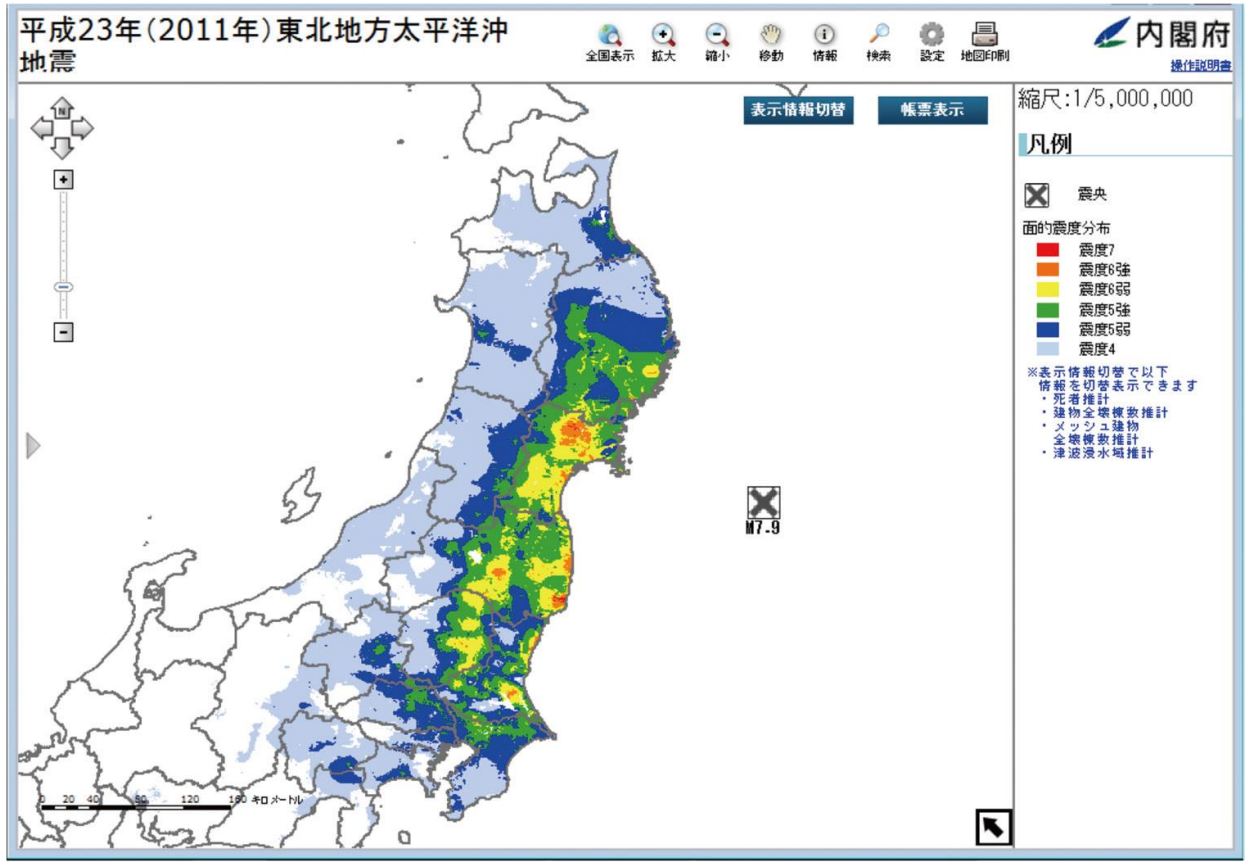
This feature plots disaster information provided by disaster-management agencies to a map using GIS, so it can be freely accessed by all.

Information and Communications Systems

Integrated Disaster Management Information System

Information Flow in the system





- Example of Early assessment of Damage from Earthquakes -

Systems for Supporting Disaster-Affected People

Measures for Residents in Need of Assistance in Evacuation

In 2006 the Cabinet Office released and disseminated to municipalities the Guidelines for Evacuation Support of People Requiring **Assistance during a Disaster**.

A survey resulted in high mortality rates for **age and disabled** groups in the Great East Japan Earthquake in 2011, while there was a sacrifice on a broad scale for those who provided support such as **firefighters and social workers**.

With these lessons, the Disaster Countermeasures Basic Act was amended in 2013 to stipulate that head of each municipality be assigned with the responsibilities of establishing a **list of residents who need assistance** in evacuation at the time of disaster, and upon revision of the Basic Act, the above-mentioned Guidelines were revised in its entirety into the guidelines which incorporated specific procedures for establishing a list of residents in need of assistance at the time of evacuation.

Systems for Supporting Disaster-Affected People

Securing good living environment at the evacuation centers

In the Great East Japan Earthquake, there were many problems arising during the disaster: affected people suffered health problems; aged people were forced to stay home because they could not adapt themselves to the evacuation shelters in some cases, relief supplies were not provided sufficiently to **home evacuees** in many cases; and there were reported problems for provision of information, relief supplies, and services for wide area evacuees who evacuated to other prefectures or municipalities.

In order to address these challenges, the Disaster Countermeasures Basic Act was revised in 2013, adding provisions to oblige administration to make efforts to improve living environment of the evacuees at the evacuation center, including food supplies, clothes, medicines, and other basic living needs and health and medical services. Also, with the said revision of the Act, guidelines were formulated and published for securing **good living environment** at the evacuation centers, directed mainly to municipalities.

Systems for Supporting Disaster-Affected People

Disaster Relief Act, Disbursement of Condolence Grant to Disaster Affected People

The Disaster Relief Act aims at protecting disaster affected people and maintaining social order by the national government in cooperation with **local public corporations**, the Japan Red-Cross and other organizations, and the general public, at the time of disaster, by providing emergency relief.

Specifically, upon occurrence of a disaster with specified magnitude or more, prefectural governors will make **emergency disbursements** to assist the affected, for which the national government will reimburse 50% to 90% of such disbursement.

The Law concerning Disbursement of Condolence Grant stipulates the disbursement of **condolence grants** to the bereaved families, **emergency cure grants** to the victims severely damaged mentally or physically and **emergency loan** to the head of families with severe damage.

Disaster Management Drill / Human Resources Development

Disaster Management Drills and Exercises

In order for various disaster management entities to check and confirm the emergency measures to be taken upon occurrence of a disaster, and to raise awareness and motivation among residents of disaster reduction, the Government annually sets out, at the Central Disaster Management Council, basic guidelines for the drills to be exercised nationally and by the local entities and sets out the “Disaster Preparedness Drill Plan” stipulating overview of drills and exercises implemented by the Government.

Based on this Plan, on every “Disaster Preparedness Day” on September 1, a wide, large-scale disaster response drills are implemented nationwide with various disaster management entities working together.

Further in 2014, with the experience of the Great East Japan Earthquake in 2011, and in anticipation of the Nankai Trough Earthquake occurring, the Government conducted large-scale tsunami drills in Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku, and Kyushu with extensive participation of the general public, on or around November 5, the day designated as the “Tsunami Preparedness Day”.

Disaster Management Drill / Human Resources Development

Human Resources Development

The Cabinet Office started a “program for developing disaster management specialists” for the purpose of developing and training people “who can respond to the emergency promptly and appropriately” and “who can form a network between the national and local entities.”

Specifically, it provides training programs to employees of local public organizations who are engaged in services at the Cabinet Office and take lectures from various organizations related to disaster management. It also conducts training programs organized at the Ariake-no-Oka Main Wide-area Disaster Management Base Facility, such as “Training on comprehensive management” tailored for core management personnel level, “Themed trainings” for specialists who are in charge of specific disaster field, and “Basic training on disaster management” for those who have recently appointed as disaster management personnel. In addition, it organizes trainings in various locations under a theme which is specific to characteristics of each location.

Disaster Management Base Facilities

In preparation for the Tokyo Inland Earthquake the Government maintains and manages disaster management bases as follows. The Disaster Management Back-up Facility in Tachikawa will serve as the Government's Extreme Disaster Management Headquarters when the Prime Minister's Official Residence are seriously damaged and become dysfunctional. It is equipped with the back-up functions of the Cabinet Office (set up in the Joint Government Building #8) including communications control and information processing dedicated to the disaster management.

The Main Wide-area Disaster Management Base Facility in the Tokyo Bay Waterfront area, located in the Ariake-no-Oka area, is a potential site for accommodating the Government's On-site Disaster Management Headquarters, to function as the headquarters for wide-area disaster management covering the entire Metropolitan area. Also, it functions as the base camp for the wide-area support forces and for supporting disaster medical aids. In normal times, the facilities are utilized for information exchange among disaster-related institutions and for various trainings.

The Main Wide-area Disaster Management Base Facility in the Tokyo Bay Waterfront area, located in the Higashi-Ohgijima area, coordinates the arrival of shipments of support materials from Japan and overseas in the event of a disaster, and functions as a relay base for the shipment by sea, river and land, and offers a temporary base camp for the mustering of wide-area support teams.

Disaster Management Base Facilities

Back-up for the Disaster Management Headquarters (Tachikawa Wide-Area DM Base, Tokyo)

Disaster Management Headquarters Backup Facility

- Setting up an emergency headquarters if the Prime Minister's Office is severely damaged
- Backup communication control function of the Central disaster Management Radio Communications System
- Heliport (for two helicopters)

Operation room, approx. 1,280m^2

Conference room, approx. 1,280m^2

The Facility is surrounded with: Japan Ground Self-Defense Force Tachikawa Camp; Metropolitan Police Department; Tokyo Fire Department; Japan Coastal Guard; Tokyo Metropolitan Tachikawa District Disaster Management Center; Tokyo Metropolitan Tachikawa District Disaster Management Center; and Housings for disaster management staffs

Disaster Management Base Facilities

In the event of a large-scale disaster, such as an earthquake centered below Tokyo, The Tokyo Rinkai Disaster Prevention Park acts as a central base of operations for disaster prevention in the Tokyo Metropolitan Area that houses emergency response facilities including local disaster management headquarters, as well as institutions that compile disaster-related information and coordinate emergency disaster measures. The park is also a disaster prevention facility that acts as a core base camp for regional assistance units and a base of support for disaster medical care that functions in an integrated manner with the Higashi Ohgishima region (Kawasaki City) distribution control center.

The City of Tokyo divides responsibilities with MLIT through the Urban Park Program taking into account activities during standard operating hours: (1) area for relevant organizations collaborate and perform exchanges of information, simulations, training, and other activities, (2) place to raise intelligence, knowledge, techniques, as well as values of self-help and mutual assistance, (3) Tokyo waterfront sub center.

Disaster Management Base Facilities

Headquarter of the Greater Metropolitan Area Disaster Management

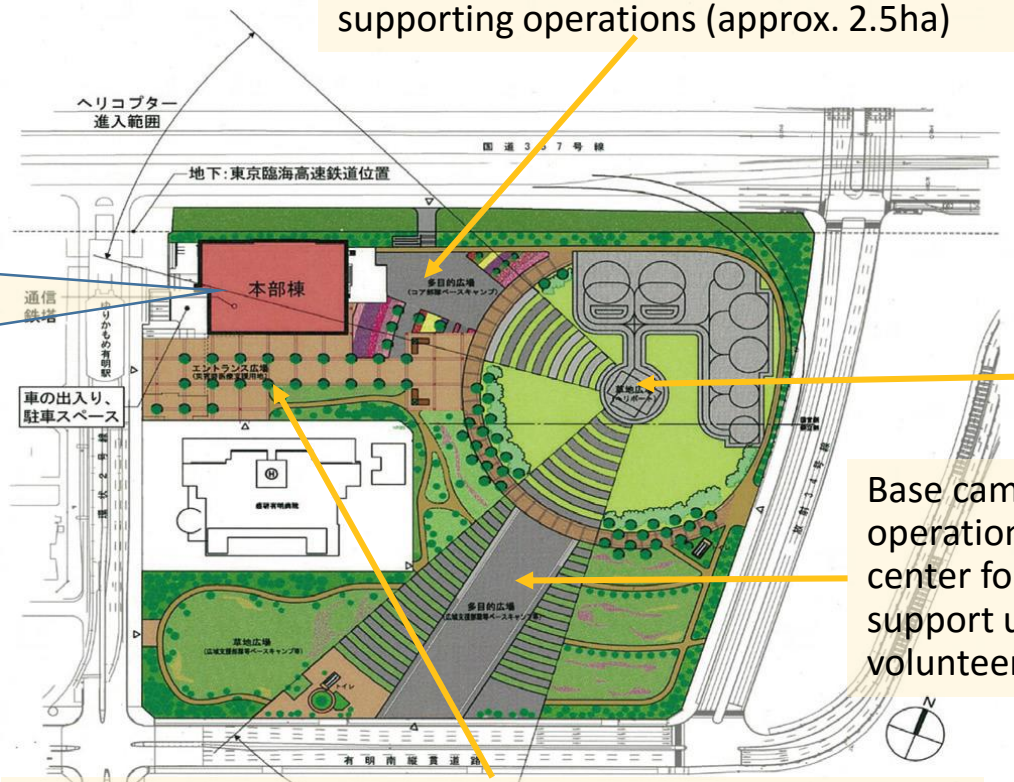
Headquarters building (approx. 1.0ha)

Disaster management facilities with:
An operations room; Conference room; Communications facility for the activities of the joint on-site DM headquarters; Operation room; Other facilities for processing of logistics functions
Public facilities (to be used for disaster reduction exhibits and education programs, etc. in the ordinary time)

Operation room

Meeting Room

Base camp for core units of wide area supporting operations (approx. 2.5ha)



Heliport, 2.6ha

Base camp and Field operations control center for wide-area support units and volunteers. 6.5ha

Medical support, 1 .0ha
Base camp and Information exchange for collaboration between SAR and medical activities, 6.5ha

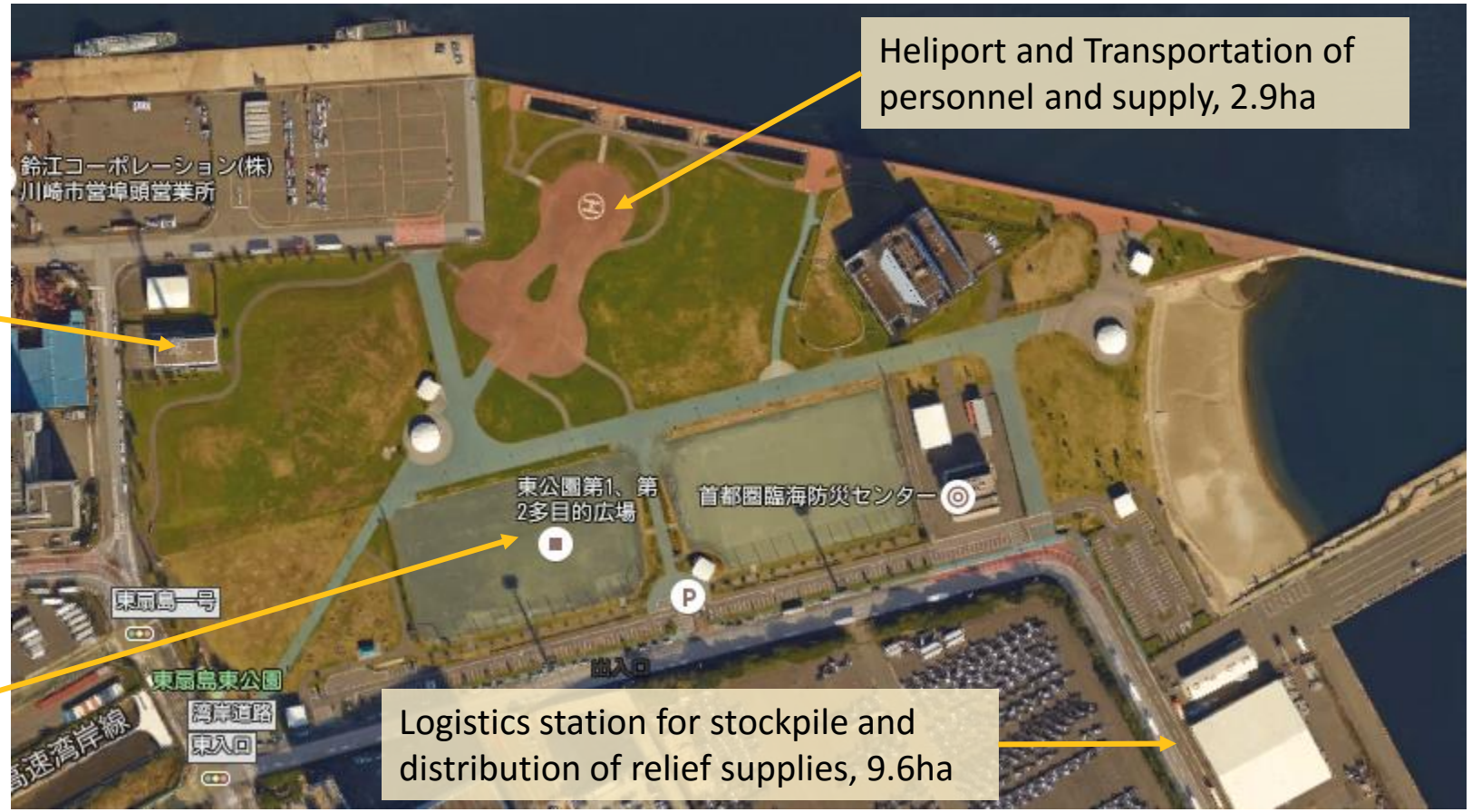
Disaster Management Base Facilities

Control Center of the Physical Distribution for the Emergency Materials

(Main Wide-area Disaster Management Base Facility in the Tokyo Bay Waterfront area, Higashi Ohgijima, Kawasaki city, Kanagawa Prefecture)

Operation and communications Room, other facilities for processing logistics functions, 640m^2 in 0.3ha area for logistics

Base camp for wide-area support units, 6.5ha



Heliport and Transportation of personnel and supply, 2.9ha

Logistics station for stockpile and distribution of relief supplies, 9.6ha

3. Recovery and Reconstruction

In recovering and reconstructing from disasters, the aim is not merely to restore public buildings to their original state. Rather, these efforts encompass a more comprehensive range of measures, including legal, tax-related and budgetary measures. Among other objectives, these measures are taken to create the basic conditions for local recovery, with **greater consideration of safety issues**; to conduct reconstruction in disaster-stricken zones **in a planned manner**; to rebuild disaster-affected people's abilities to live autonomously; to provide disaster-affected people with shelter, and to **revitalize the local economy**.

In the case of the Great Hanshin-Awaji Earthquake in 1995, to achieve smooth and rapid recovery and reconstruction from disaster, the Headquarters for Reconstruction of the Hanshin-Awaji Area (headed by the Prime Minister) was established. In the case of the Great East Japan Earthquake in 2011, the Reconstruction Agency was newly established and the entire government has coped with various measures as one of the top priority issues of the government.

In preparation for anticipated Tokyo Inland Earthquake and Nankai Trough Earthquake, the Act on Reconstruction after Large-scale Disaster has been enacted so that pre-disaster formulation of recovery plans and exempted utilization of land may be made possible.

Structure of Recovery and Reconstruction

1. **Improvement of conditions for pre-planned recovery**
   - Setting up a recovery headquarters and its coordination with relevant institutions
   - Organizing a team for development of a recovery plan; study on recovery policies
   - PR and communications; receiving of consultation requests and applications
   - Emergency financial measures; securing financial sources for recovery; setting up a reconstruction fund
2. **Reconstruction of houses and livelihoods**
   - Reconstruction of houses and livelihoods
   - Construction of temporary emergency housing; provision of public housing; financial aid for housing repair and reconstruction
   - Maintenance of employment; support to displaced workers for their reemployment and lives
   - Granting subsidies to disaster victims; reduction, exemption and postponement of various taxes; disaster relief funds
   - Improvement of mental healthcare; collaboration with volunteers
3. **Development of a safe community**
   - Reconstruction of disaster-stricken public facilities and farmlands
   - Improvement for safe cities/towns and public facilities; development of policies on community development for recovery and disaster reduction
   - Recovery of roads and traffic facilities, logistic centers, lifeline facilities
   - Response to cultural assets; the succession of disaster memory and experience
4. **Recovery of industry and economy**
   - Understanding financial demands; dissemination of various financial aids; business consultation
   - Extending recovery loans to small and medium-sized business; promotion of tourism
   - Recovery of infrastructures for agriculture, forestry and fisheries; stimulation of agriculture, forestry and fisheries

Good practice of Recovery of roads and traffic facilities

Restoration of the Highway which Collapsed in the Great East Japan Earthquake:

Prompt restoration of a highway under the cooperation between the public and private sectors

Photo: East Nippon Expressway Company Limited.

March 11, 2011

Six days later

March 17, 2011

Example of Granting subsidies to disaster victims

Act on Support for Livelihood Recovery of Disaster-affected People

The Act on Support for Livelihood Recovery of Disaster Victims was enacted in 1998 following the Great Hanshin-Awaji Earthquake of 1995.

With this Act, it is intended to contribute to **stabilization of victimized residents' lives** and to a quick recovery of the disaster stricken area. A "Livelihood Recovery Support Grant for Disaster Victims" is disbursed to persons whose livelihoods are severely damaged by disasters, in order to support victims in recovering their normal life, bring stability to the life of residents, and facilitate the quick recovery of disaster-stricken areas.

Specifically, the Livelihood Recovery Support Grant for Disaster Victims is disbursed **to households whose homes are destroyed** in disasters of a certain scale or greater, up to a maximum of three million yen.

3. Recovery and Reconstruction

Outline of the Basic Act on Reconstruction

1. Organization concerning recovery

- In the event that a major disaster occurs, the Prime Minister may **set up the headquarters for recovery** within the Cabinet Office as he deems necessary to specially attend to the recovery from such disaster.
- The Government shall **establish the basic policies** for recovery measures from such disaster

2. Development of the recovery plans

- Recovery policies should allow municipalities struck by a major disaster to develop a recovery plan based on and in line with the **Government's basic policies** for recovery, so that prompt recovery could be planned including **re-definition of the land use plan**.
- Recovery policies should allow prefectures struck by a major disaster to set up their own recovery policies in line with the Government's recovery policies.

3. Special measures in the recovery plan

- The framework should allow a conference concerning the recovery plan to be set up through which a recovery plan be known to public, so that the alteration of the land use plan be dealt with at a single entity.
- A special exemption shall be provided for ease of permits and approvals with regard to the recovery project listed in the recovery plan.
- A city development plan shall be established concerning a cluster of urban district for recovery to be a base for recovery, so that the area could work as a base for recovery of the entire area.
- Upon request from the municipality struck by a major disaster, it shall be allowed that prefectures may decide on the city development plan on behalf of such municipalities.

4. Execution of the recovery construction project by the national government on behalf of local governments

- In order to compliment the local public entities struck by a major disaster, the national government may, upon request, execute and implement the reconstruction projects of fishery harbors, roads, shore protection works and rivers.

5. Others

- Upon occurrence of a major disaster, the national government shall, as deemed necessary and as stipulated by law separately, promptly take actions for providing the necessary funding for recovery. etc.

Action for Build Back Better

A concept of “Build Back Better” is an approach to build up more resilient community during the reconstruction phase after the disaster has struck. In order to reduce the potential risk of disaster damages, it is necessary to construct houses in the area of lower disaster risk, and to build the urban structure resilient to such disaster. The reconstruction phase from the disaster is **an opportunity to take fundamental approach** including the land use plan and building of disaster-resilient structures, with lessons learned from the disaster experience.

Build Back Better

The safety of the town was improved after rebuilding roads as wider ones Photo: Kobe city

Build Back Better

Devastated Rikuzentakata City and its re-development plan considering re-setting of the risk area, re-planning land use, reconstruction of the embankment, business resumption and economic recovery

Action for Build Back Better

The Great Hanshin-Awaji Earthquake in 1995 was an inland earthquake that occurred right beneath the densely populated urban area. The number of totally collapsed residential houses alone exceeded 100,000 units. Since then, with concerted efforts of those involved in the disaster, reconstruction of the disaster resilient community is underway with earthquake resistant buildings built. Also, triggered by this incident, renovation of houses and public buildings to make them earthquake resistant is going on nationwide.

Also, in the area struck by the Great East Japan Earthquake, as in the philosophy statement of the Miyagi Prefecture Plan for Recovery from the Earthquake Disaster, “creation of a disaster resilient and safe community”, “fundamental ‘reconstruction’ beyond a mere ‘reversion,’”, “construction of a recovery model from devastating damage” are sited as philosophy of the plan, prompting to relocate the entire community to a highland area, to increase height of the seawall, as well as constructing the dual-purpose main road system to function as seawall, etc.

This “Build Bank Better” principle is well reflected in the recovery and reconstruction from Typhoon Haiyan which caused devastating damages to the Philippines in 2013. The Japanese Government assisted the Philippines’ development of a hazard map, a land use plan and medium to long-term plans for development of disaster resistant cities. Also, with a recovery program by the Japanese grant, the ground floor of public buildings along the shoreline is designed as pilotis, providing shaded sporting ground and meeting place in normal times and the second floor functions as an emergency shelter once disaster occurs. With such aids from Japan, there is a phrase “Build Back Better” clearly printed on the cover of the Philippines Government’ Recovery Plan, a sign that action of Japanese origin is spreading to the world.