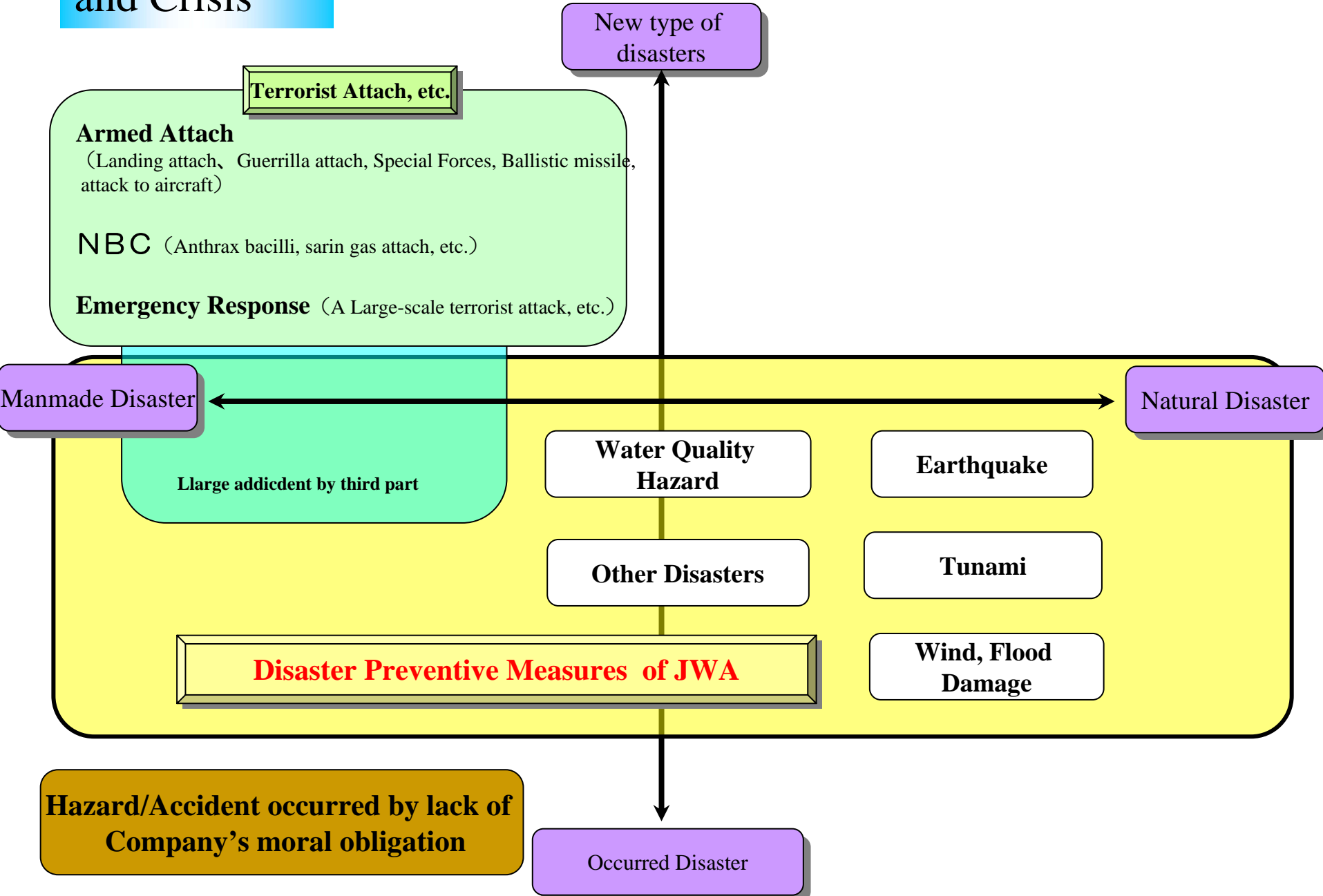


# *Crisis Management of JWA*

*November 2007*

# Disaster and Crisis



# ◇ Disaster Countermeasure Basic Act

## ❖ Disaster Countermeasure Basic Act (Nov.15, 1961)

[Central Meeting for Disaster Prevention]  
Basic Plan for Disaster Prevention

[Prefecture-level]  
Disaster plan

[Municipality]  
Disaster plan

[Designated  
administrative  
agency]  
Disaster plan

JWA  
Disaster plan

Regulations of Disaster Plan

It is enacted after Ise Bay typhoon hit Wakayama Pref. in 1959

■ Law and regulations on disaster prevention measures in Japan (Basic Act)

◇ Definition of Disaster Prevention Measures:

「Prevent disaster and mitigate possible damages when disasters occurs, and conduct disaster recovery operation. 」

■ Basic Plan for country's disaster prevention

■ Prefectural government, municipality, designated administrative agency, should prepare preventive plans based on the basic plan as follows:

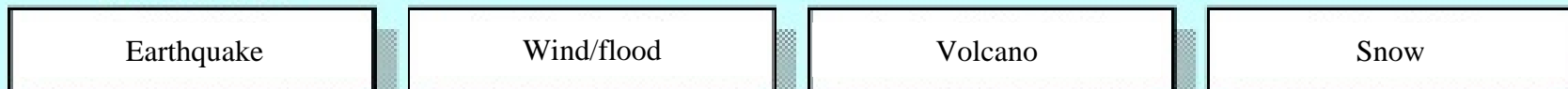
- (1) Plan related to agency's operation should be prepared
- (2) Plan should be prepared based on coordination with prefectures and municipality
- (3) Plan should be prepared to be able to contribute to the benefits of general public as mission.

## ■ Japan Wager Agency

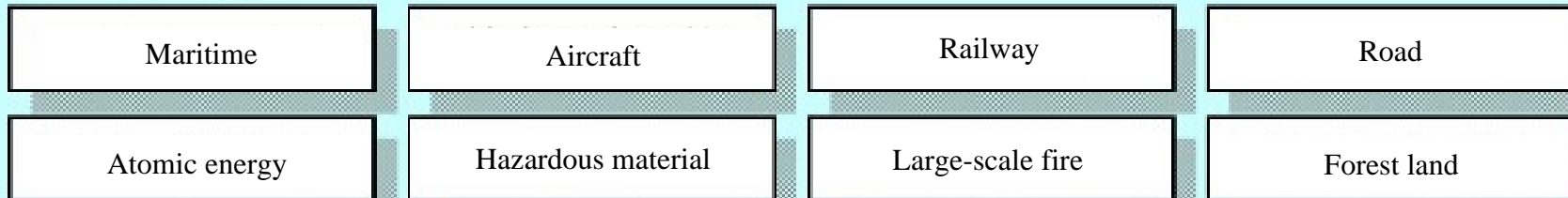
As designated administrative agency, JWA prepares basic plan for disaster prevention

## Structure of Basic Act for Disaster Preventive Measures by category

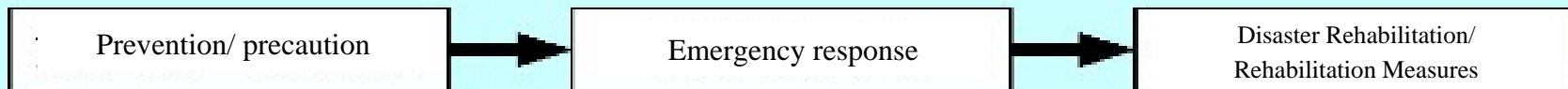
### Natural Disaster



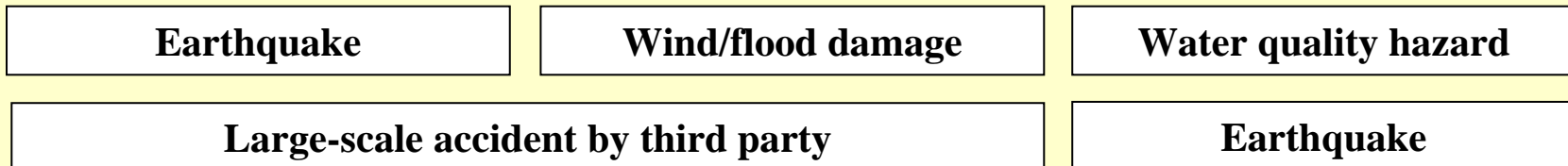
### Disaster by accident



(It is described according to proceedings of disaster prevention)



## Structure of disaster plan of JWA



# ◇ *Disaster Plan of JWA*

## JWA's disaster plan and regulations

### Organization/ operation

- The agency determines warning standard.
- The agency sets up a head office to prepare operation when it issues warning.
- The agency operates it by team

### Measures:

#### Earthquake disaster

- Investigate facilities after earthquake occurs
- Monitor flood situation including front line and typhoon
- Collect information, establish communication channel
- Develop communication tool
- Coordinate with parties concerned
- Establish emergency rehabilitation system
- Establish prevention system for second disaster
- Conduct disaster drill

#### Wind/flood damage

#### Water quality hazard

#### Large-scale disaster by third party

#### Other disasters

## Numbers that disaster prevention were undertaken in 2006

	Wind/flood	Earthquake	Water quality hazard	※Others	Total
JWA's headquarters	27	6	5	1	39
Kanto	153	0	10	11	174
Chubu	269	8	5	14	296
Kansai	101	1	14	26	142
Shikoku	127	6	6	0	139
Kyushu	69	0	4	1	74
Total	746	21	44	53	864

(Management Org. =59)

### ※Others

- Malfunction of facility equipment
- Special operation
- Seepage from facilities
- Damage from floods
- Preannouncement of bursting non-JWA owned facilities

## ❖ Response to seismic disaster

### ❖ How to dealt with disaster after earthquake

#### ★ Collect information about earthquake

▪ from TV ▪ radio, etc

#### ★ Gather at headquarters of JWA

① Collect earthquake-related information and determine warning standard

② When the earthquake intensity is greater than 4, check the safety of surrounding, and **JWA employees immediately gather at the head office to prepare the operation.**

③ In case that those who are unable to show up at the head office because they are far away from the head office, **then, they have to inform the head office about their whereabouts.**

④ Use message board service for disaster prevention  
**Dial 171 to record their well-being**

#### ★ Facility Inspection

- Inspect affected facilities and areas
- Secure lifeline (water supply)

#### ★ Devastated situation after earthquake



Express way was collapsed by  
Great Hanshin-Awaji Earthquake

## ❖ Response to wind/flood damage

### ❖ How to deal with wind/flood damages

#### ★ Collect meteorological information

- Meteorological information equipment (MICOS, information on weather and water management)
- Weather report (TV, Radio, etc)

#### ★ Facility Inspection

- ① Facility inspection of dam operating facilities
- ② Design discharge amount
- ③ Warning/patrol, discharge operation
- ④ Report to related agencies
- ⑤ Inspect affected area
  - Dam facility and the surrounding of reservoir
  - Road and the surface of lake
  - Downstream river

#### ★ Monitor the safety of river

- Prevent damages to downstream area with dam operation

#### ★ Example of wind/flood damages



Discharging from spillway at Sameura Dam



## ❖ Respond to water quality accident (accident of oil spill)

### ❖ How to deal with water quality accident ~ When oil spill occurs into canal ~

#### ★ Communication with related organizations

- Report promptly to Coordinating Council for Water Quality Control of government and water users)

- Inform to water purification plant: the amount of oil spill and the expected time to be affected

#### ★ Examples of water quality accident (dealing with oil spill in canal)



Set up vertical fence



Oil mattress to remove spilled oil

## ❖ Response to other accident (by third party, etc)

### ❖ How to deal with other accidents

#### ★ Response to accidents

- Detect suspicious person at an early stage
- Report from third party, police or fire department to JWA office ⇒

Conduct site inspection

▪ When detect an accident on patrol ⇒ Immediate action. First priority is to rescue people from the accident and take an necessary action.

#### ★ Report to head office/related organizations when an accident occurs

- Location, time (when it was found), situation hearing from informant

⇒ **Firstly report to head office and related organizations**

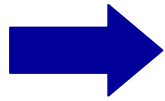
- Impact on water supply

⇒ **Check the situation of oil spill, determines whether water supply should stop or not**

# Features of natural disaster

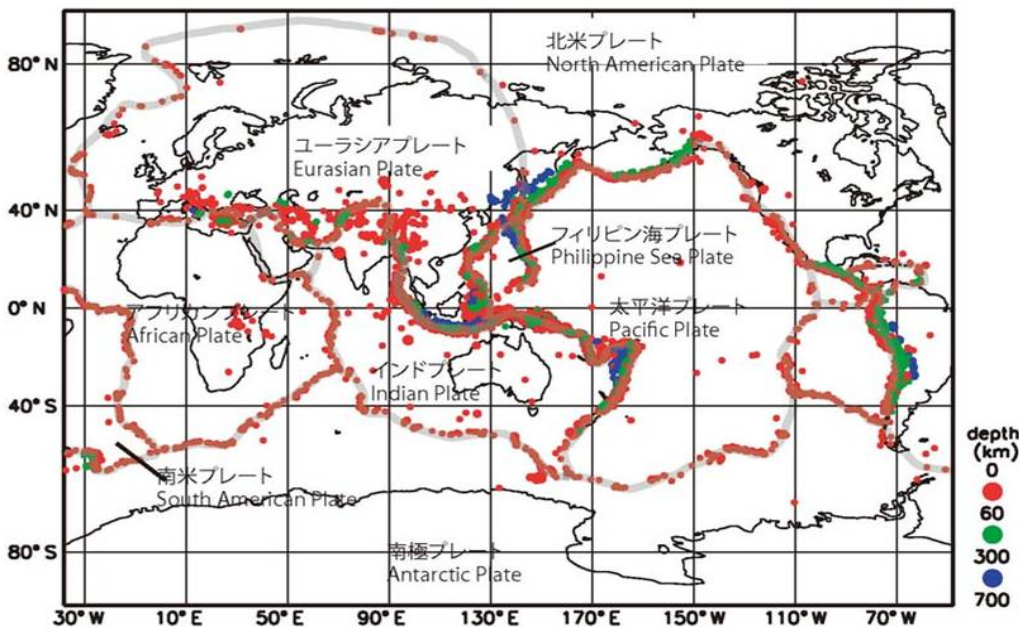
Seismic center,  
locations of volcano

It spindles in the form of zone or line



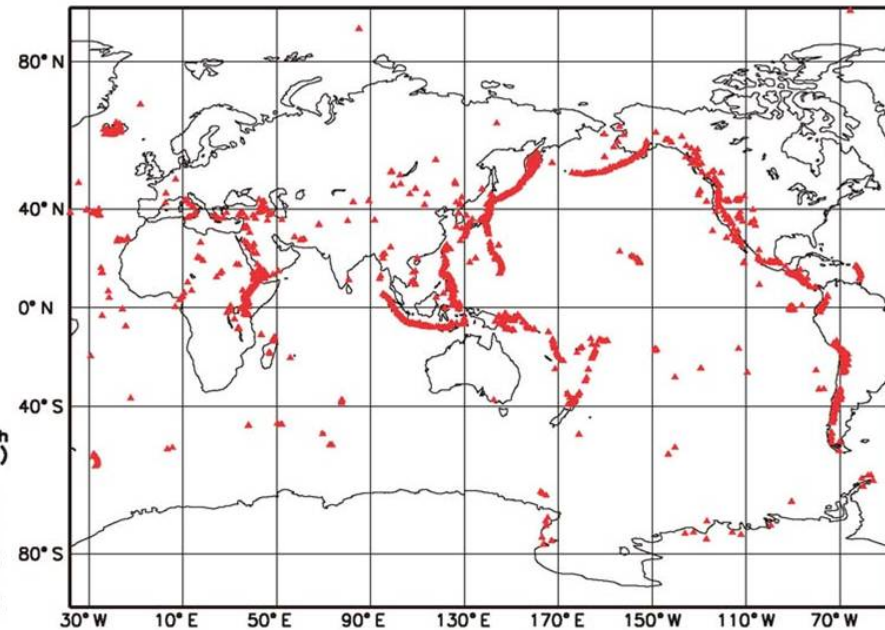
Majority of the countries  
has plate boundary

【Seismic center, plates worldwide】



注) 1996～2005年, マグニチュード5以上。  
資料: アメリカ地質調査所の震源データをもとに気象庁において作成

【World's major volcano】

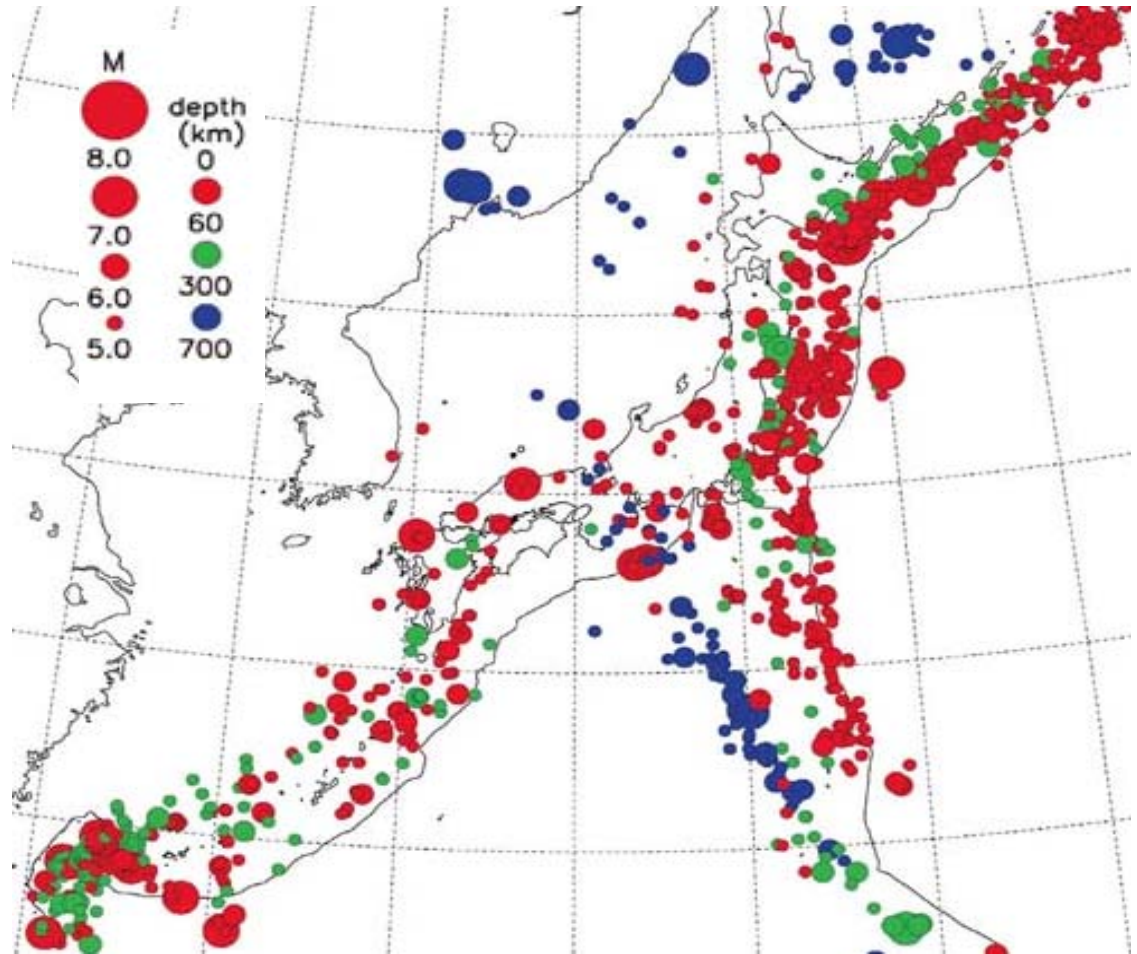
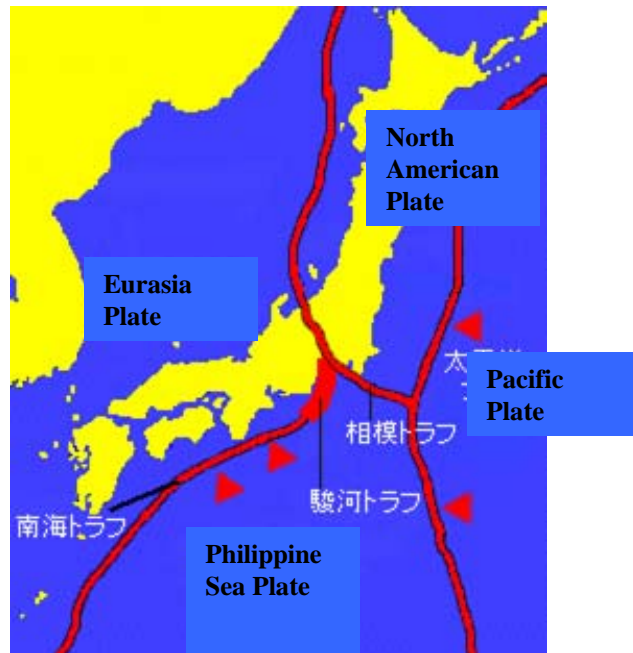


注) 火山は過去おおむね一万年間に活動のあったもの。  
資料: スミソニアン自然史博物館(アメリカ)のGlobal Volcanism Programによる火山データをもとに気象庁において作成

# 【 Plates surrounding Japan and locations of earthquake occurred 】

## ●Plats existing in Japan

- ①North American Plat
- ②Eurasia Plate
- ③Pacific Plate
- ④Philippine Sea Plate



❖Note: This seismic centers were determined by the Meteorological Agency when the magnitude 5 or more earthquake occurred during 1997-2006.

# *Explanation Table of JMA Seismic Intensity Scale*

<b>JMA Scale</b>	<b>People</b>	<b>Indoor Situations</b>	<b>Outdoor Situations</b>	<b>Wooden Houses</b>	<b>Reinforced-Concrete Buildings</b>
<b>0</b>	Imperceptible to people.				
<b>1</b>	Felt by only some people in the building.				
<b>2</b>	Felt by most people in the building. Some people awake.	Hanging objects such as lamps swing slightly.			
<b>3</b>	Felt by most people in the building. Some people are frightened.	Dishes in a cupboard rattle occasionally.	Electric wires swing slightly.		
<b>4</b>	Many people are frightened. Some people try to escape from danger. Most sleeping people awake.	Hanging objects swing considerably and dishes in a cupboard rattle. Unstable ornaments fall occasionally.	Electric wires swing considerably. People walking on a street and some people driving automobiles notice the tremor.		
<b>5 Lower</b>	Most people try to escape from a danger. Some people find it difficult to move.	Hanging objects swing violently. Most Unstable ornaments fall. Occasionally, dishes in a cupboard and books on a bookshelf fall and furniture moves.	People notice electric-light poles swing. occasionally, windowpanes are broken and fall, unreinforced concrete-block walls collapse, and roads suffer damage.	Occasionally, less earthquake-resistant houses suffer damage to walls and pillars.	Occasionally, cracks are formed in walls of less earthquake-resistant buildings.
<b>5 Upper</b>	Many people are considerably frightened and find it difficult to move.	Most dishes in a cupboard and most books on a bookshelf fall. Occasionally, a TV set on a rack falls, heavy furniture such as a chest of drawers falls, sliding doors slip out of their groove and the deformation of a door frame makes it impossible to open the door.	In many cases, unreinforced concrete-block walls collapse and tombstones overturn. Many automobiles stop because it becomes difficult to drive. Occasionally, poorly-installed vending machines fall.	Occasionally, less earthquake-resistant houses suffer heavy damage to walls and pillars and lean.	Occasionally, large cracks are formed in walls, crossbeams and pillars of less earthquake-resistant buildings and even highly earthquake-resistant buildings have cracks in walls.
<b>6 Lower</b>	Difficult to keep standing.	A lot of heavy and unfixed furniture moves and falls. It is impossible to open the door in many cases.	In some buildings, wall tiles and windowpanes are damaged and fall.	Occasionally, less earthquake-resistant houses collapse and even walls and pillars of highly earthquake-resistant houses are damaged	Occasionally, walls and pillars of less earthquake-resistant buildings are destroyed and even highly earthquake-resistant buildings have large cracks in walls, crossbeams and pillars.
<b>6 Upper</b>	Impossible to keep standing and to move without crawling.	Most heavy and unfixed furniture moves and falls. Occasionally, sliding doors are thrown from their groove.	In many buildings, wall tiles and windowpanes are damaged and fall. Most unreinforced concrete-block walls collapse.	Many, less earthquake-resistant houses collapse. In some cases, even walls and pillars of highly earthquake-resistant houses are heavily damaged	Occasionally, less earthquake-resistant buildings collapse. In some cases, even highly earthquake-resistant buildings suffer damage to walls and pillars.
<b>7</b>	Thrown by the shaking and impossible to move at will.	Most furniture moves to a large extent and some jumps up.	In most buildings, wall tiles and windowpanes are damaged and fall. In some cases, reinforced concrete-block walls collapse.	Occasionally, even highly earthquake-resistant buildings are severely damaged and lean.	Occasionally, even highly earthquake-resistant buildings are severely damaged and lean.

# ◇ Natural Disaster (2006 ~2007)

平成19年(2007年)能登半島地震による人的被害 死者1名  
 発 生 日:平成19年3月25日9:41  
 震 源 地:能登半島沖  
 震源の深さ:11km  
 規 模:マグニチュード6.9  
 最大震度:6強(石川県七尾市、輪島市、穴水町)

台風第13号による人的被害  
 (延岡市で竜巻発生)  
 広 島 県:死者・行方不明者2名  
 福 岡 県:死者1名  
 佐 賀 県:死者3名  
 大 分 県:死者1名  
 宮 崎 県:死者3名  
 -----  
 合計10名  
 発生期間:平成18年9月15日  
 ~9月20日

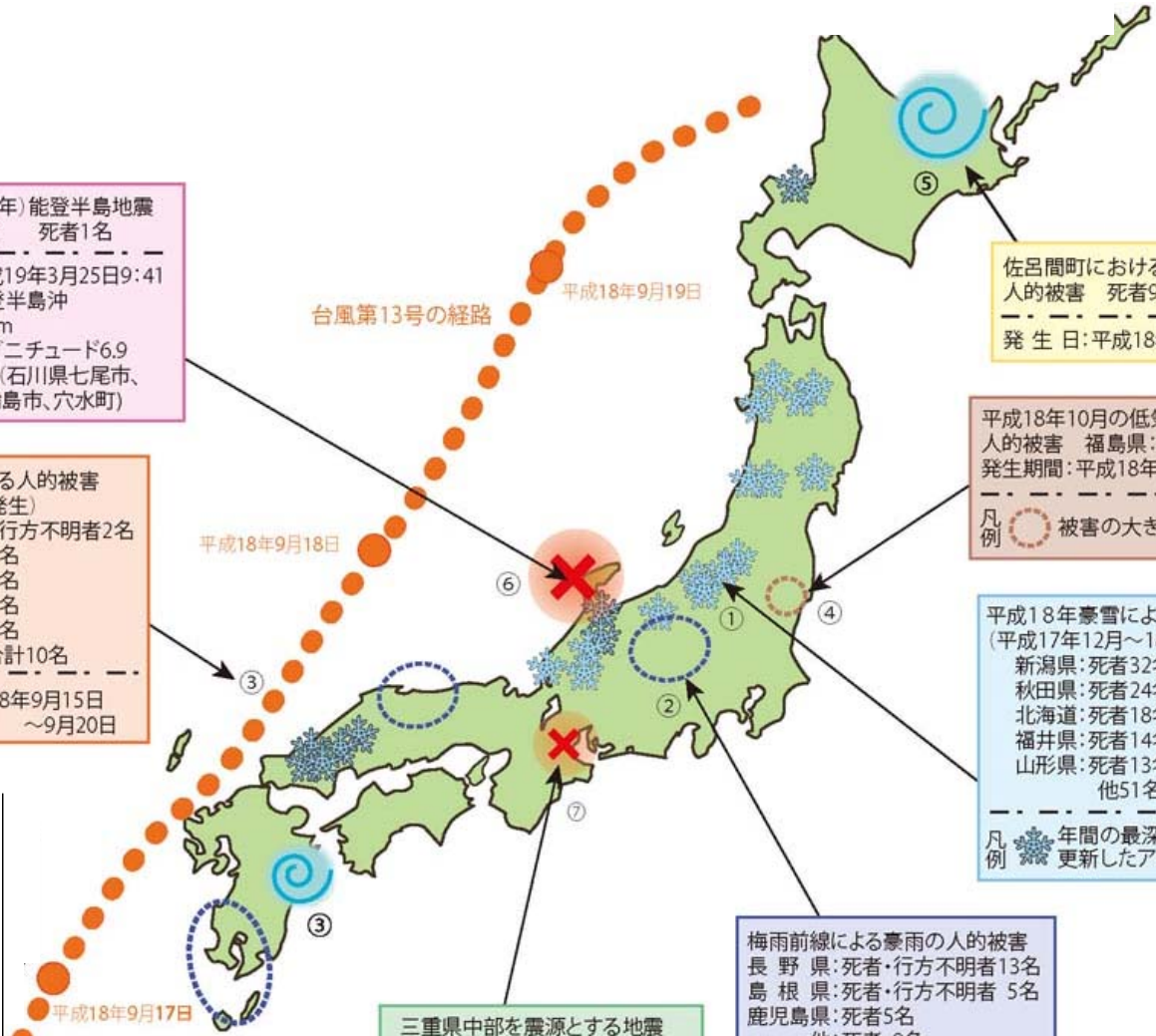
三重県中部を震源とする地震による人的被害 負傷者13名  
 発 生 日:平成19年4月15日12:19  
 震 源 地:三重県中部  
 震源の深さ:16km  
 規 模:マグニチュード5.4  
 最大震度:5強(三重県亀山市)

佐呂間町における竜巻による人的被害 死者9名  
 -----  
 発 生 日:平成18年11月7日

平成18年10月の低気圧による人的被害 福島県:死者1名  
 発生期間:平成18年10月6~9日  
 -----  
 凡例 ○ 被害の大きかった地域

平成18年豪雪による人的被害  
 (平成17年12月~18年3月)  
 新潟県:死者32名  
 秋田県:死者24名  
 北海道:死者18名  
 福井県:死者14名  
 山形県:死者13名  
 -----  
 他51名 合計152名  
 -----  
 凡例 ❄ 年間の最深積雪記録を更新したアメダス地点

梅雨前線による豪雨の人的被害  
 長 野 県:死者・行方不明者13名  
 島 根 県:死者・行方不明者 5名  
 鹿児島県:死者5名  
 他:死者 9名  
 死者・行方不明者 合計32名  
 発生期間:平成18年6月10日  
 ~7月29日  
 -----  
 凡例 ○ 被害の大きかった地域

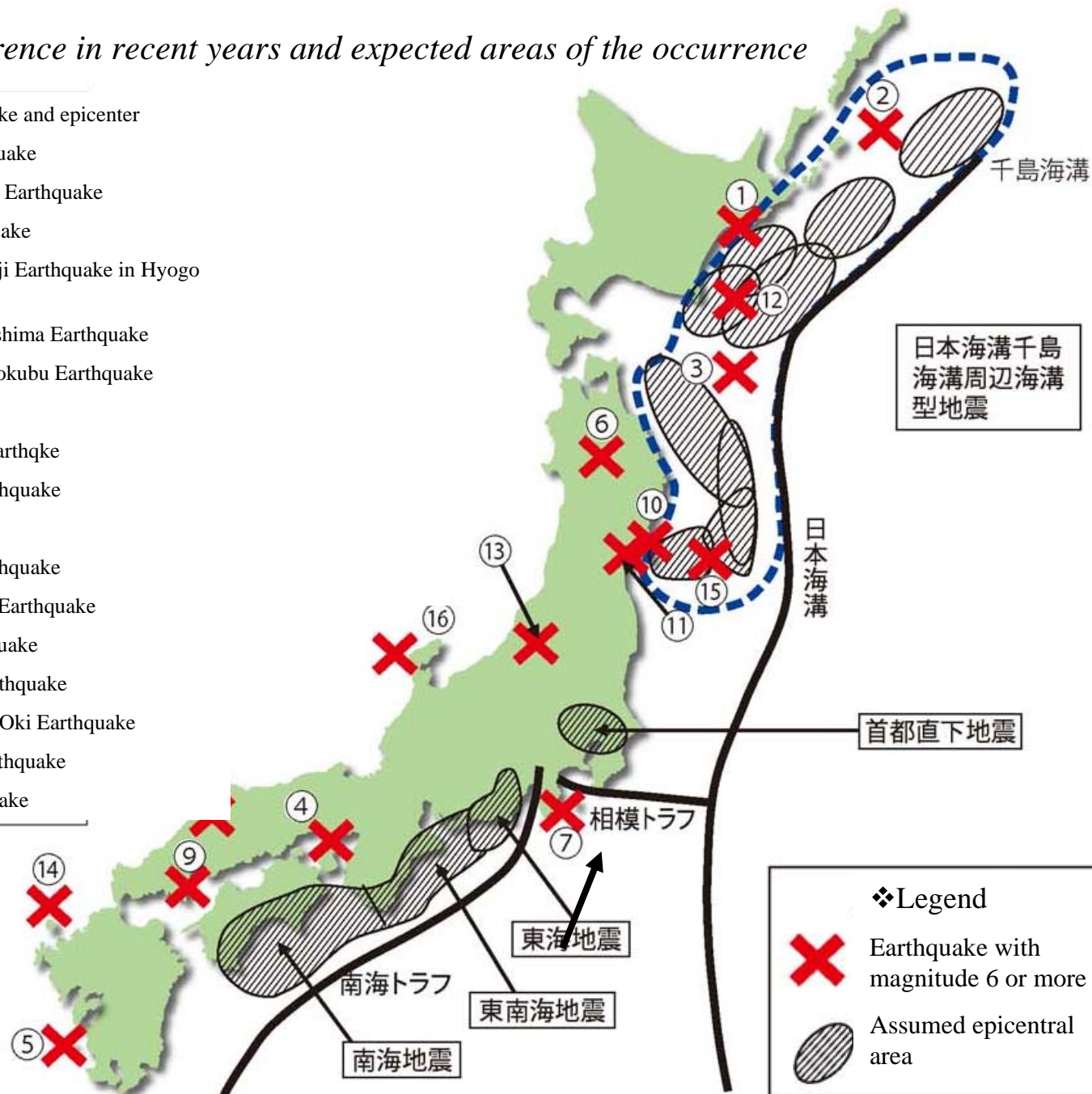


- ❖ Names of Serious Disasters
- 1. Heavy snowfall in 2006
- 2. Heavy rain by rain front
- 3. Typhoon no. 13
- 4. Low pressure in Oct. 2006
- 5. Tornado stricken in Saroma town, Hokkaido
- 6. Noto Hanto Earthquake in 2007
- 7. Earthquake, epicenter of the central part of Mie Pref.



# Earthquake occurrence in recent years and expected areas of the occurrence

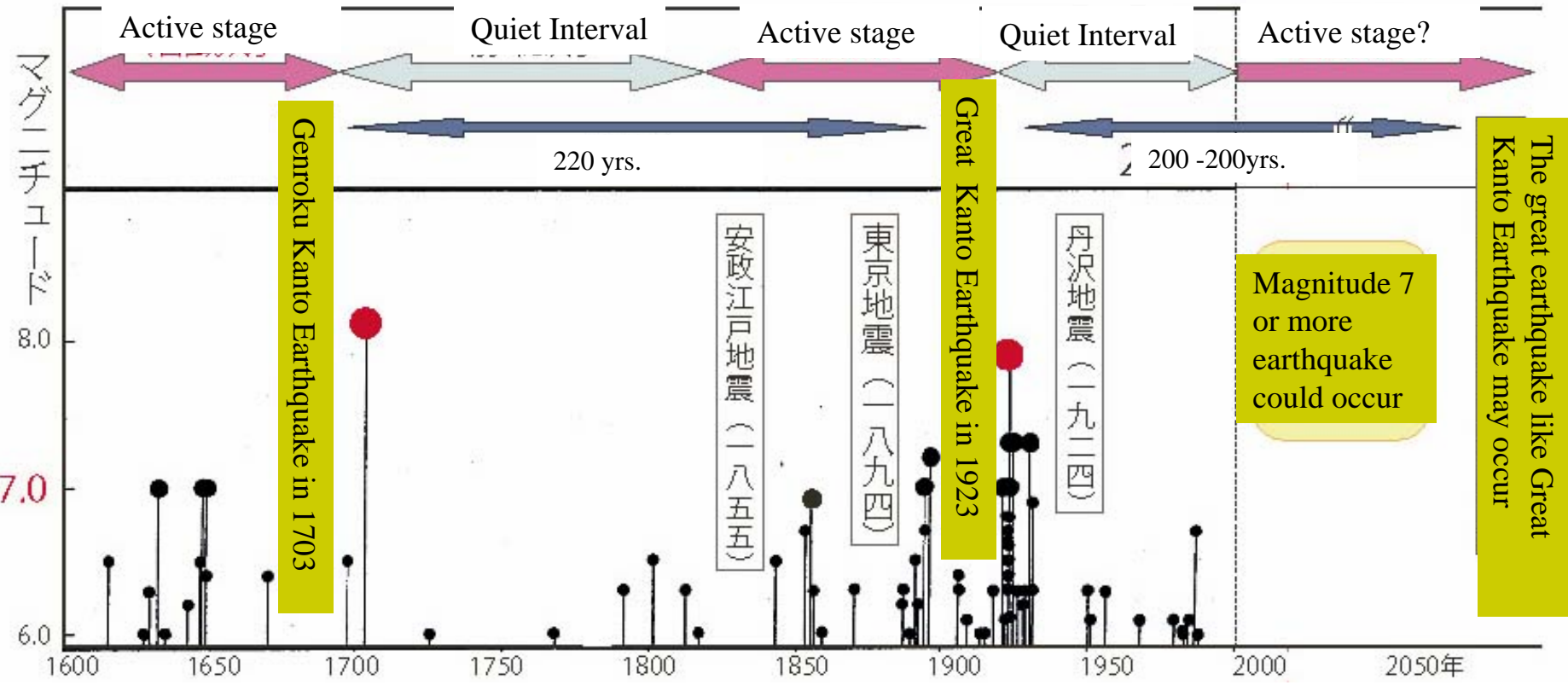
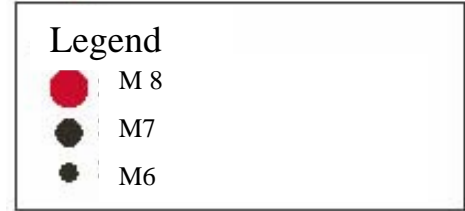
	Date	❖Name of earthquake and epicenter
①	1993.01.15	Kushiro-Oki Earthquake
②	1994.10.04	Hokkaido Toho-Oki Earthquake
③	1994.12.28	Haruka-Oki Earthquake
④	1995.01.17	Great Hanshin-Awaji Earthquake in Hyogo region
⑤	1997.05.13	Northwestern Kagoshima Earthquake
⑥	1998.09.03	Iwateken Nairiku Hokubu Earthquake
⑦	2000.07.01	Niijima Earthquake
⑧	2000.10.06	Tottori-ken Seibu Earthqke
⑨	2001.03.24	Tottori Nishibu Earthquake
⑩	2003.05.26	Geiyo Earthquake
⑪	2003.07.26	Miyagiken-Oki Earthquake
⑫	2003.09.26	Miyagiken Hokubu Earthquake
⑬	2004.10.23	Tokachi-Oki Earthquake
⑭	2005.03.20	Fukuoka-ken Seiho-Oki Earthquake
⑮	2005.08.16	Miyagi-ken Oki Earthquake
⑯	2007.03.25	Noto Hanto Earthquake



❖Legend

- Earthquake with magnitude 6 or more
- Assumed epicentral area

# ◇ Great Earthquakes Hit in Major Cities (Epicentral earthquake)



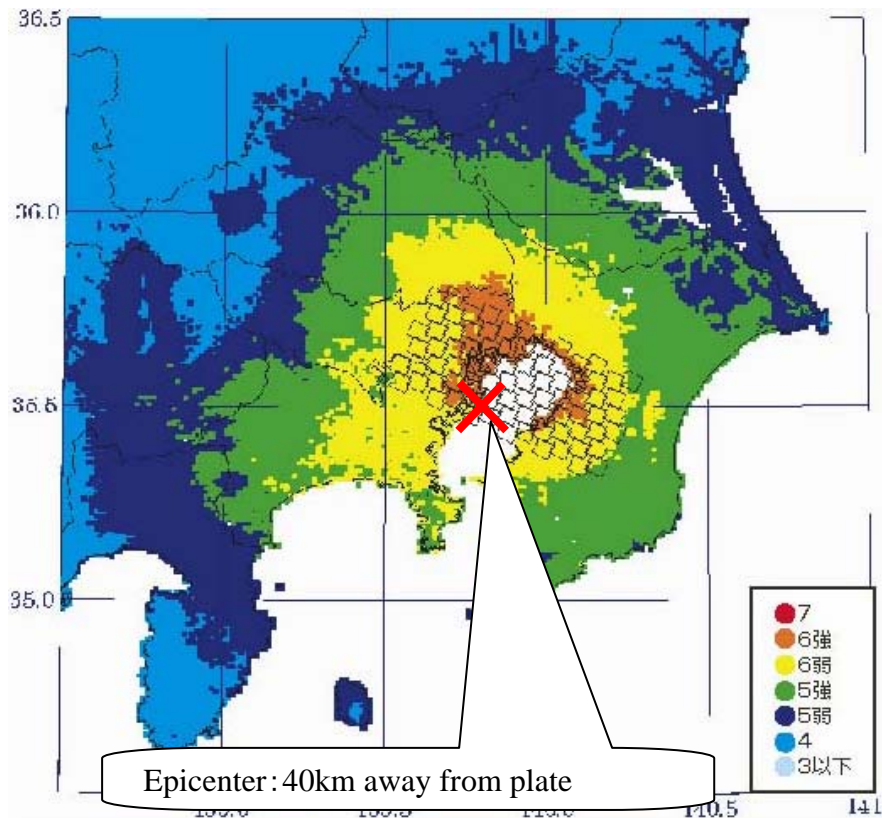
**Epicentral earthquake in major cities**  
 : Magnitude 7 or more...Probability is once in 100 years  
 Magnitude 8 or more...Probability is once in 200 years



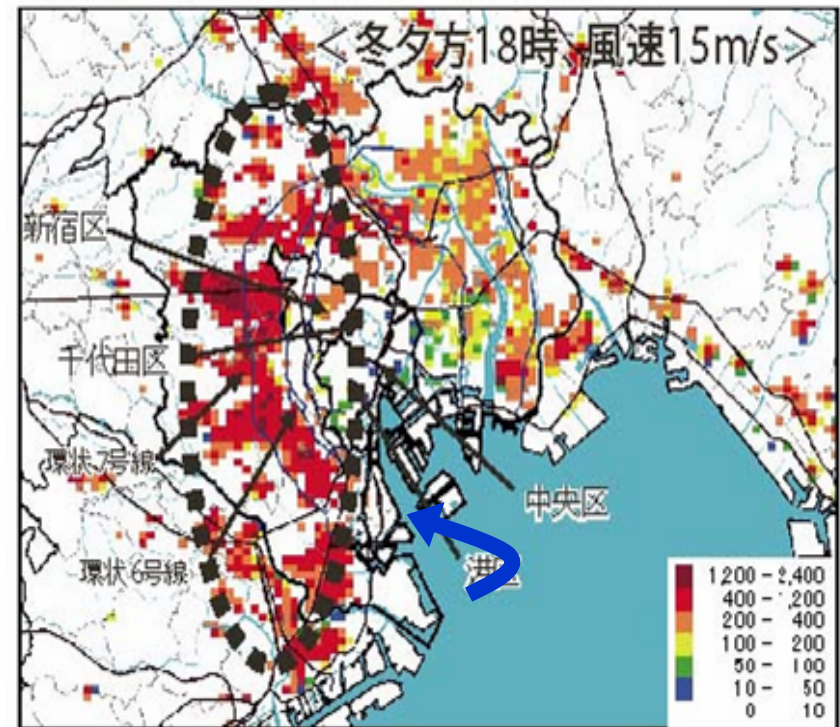
## ◇ Possible damages when epicentral earthquake hit major city

### Estimated distribution of seismic intensity in the Northern part area of Tokyo Bay where a magnitude 7.3 of earthquake strikes

- Buildings will be collapsed and many people will die by fire spread
- Number of the death: Approx. 11,000 people in case of 15m/s of wind speed  
Approx. 7,300 people in case of 3m/s of wind speed
- Fire will spread through buildings in east parts of the city along Ara River

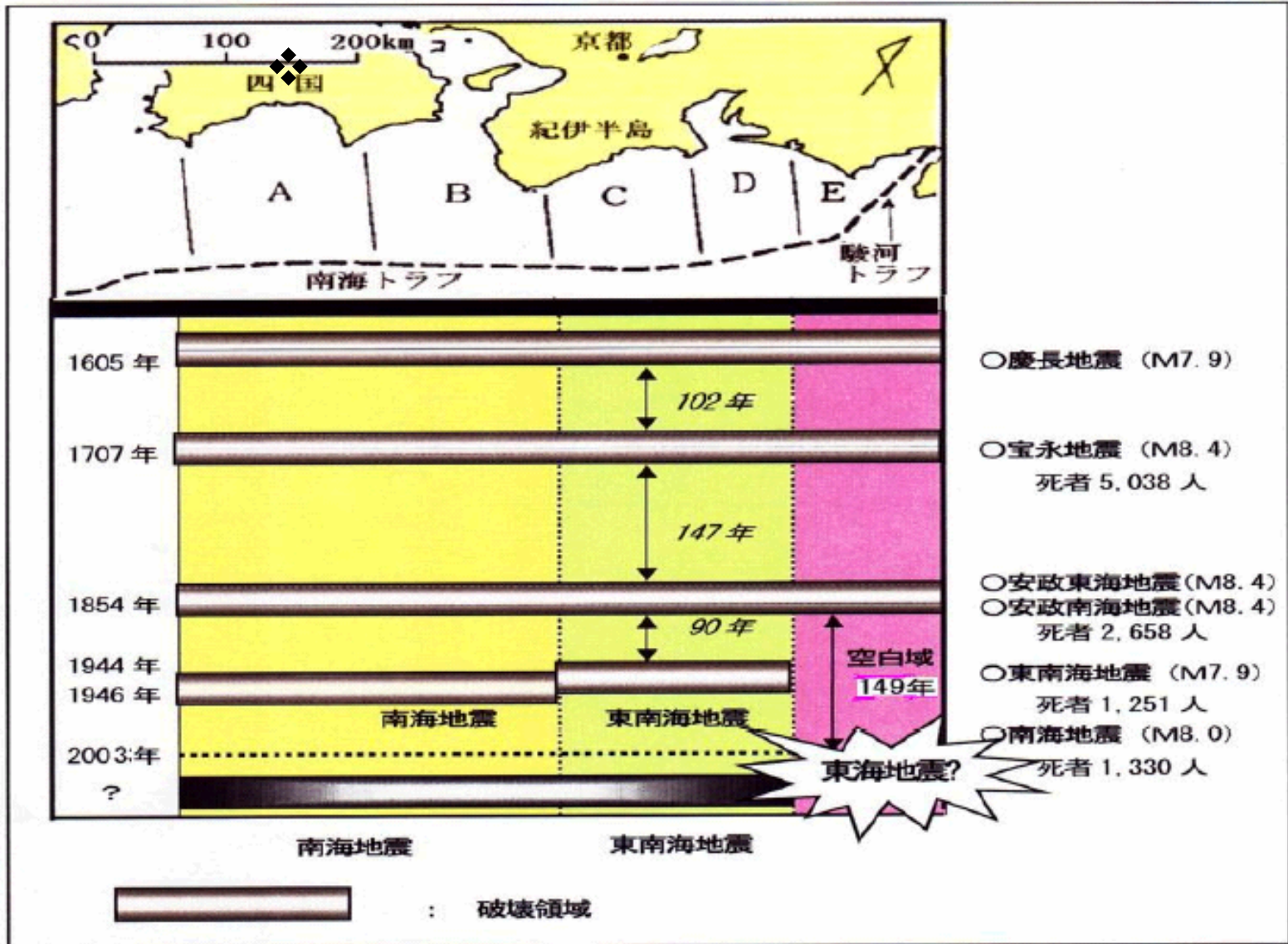


### ② ❖ Estimated distribution of fire spread in cities



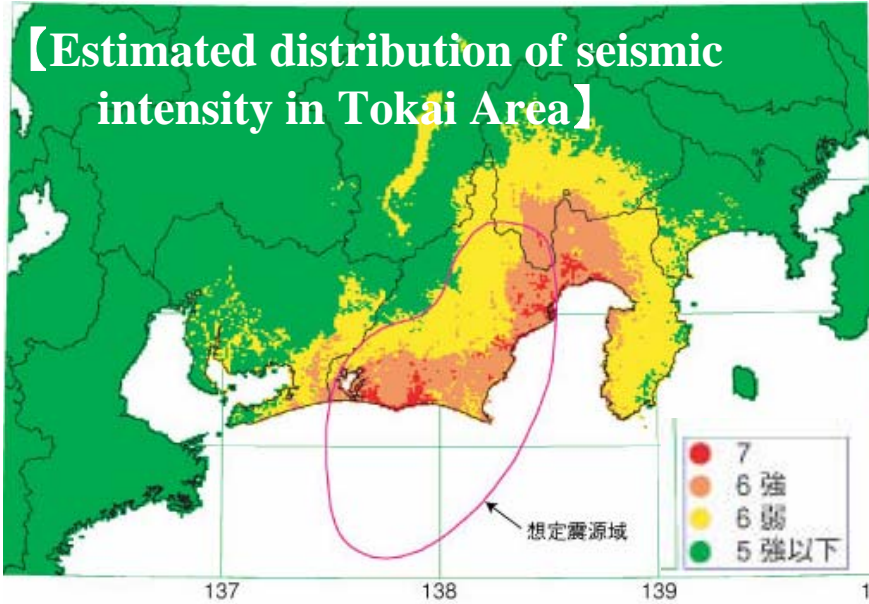
## ■ About Tonkai Earthquake and Tonankai/Nankai Earthquakes

Due to Tonankai Earthquake in 1944, troughs were destructed, but some were not destructed. It is concerned that Tonnakai Earthquake will be occurring in the unbroken area. Also, earthquakes in Tonnakai and Nankai areas had occurred every about 100-150 years, there is concern that next earthquake will hit the area, probably within the first half of 21<sup>st</sup> century.

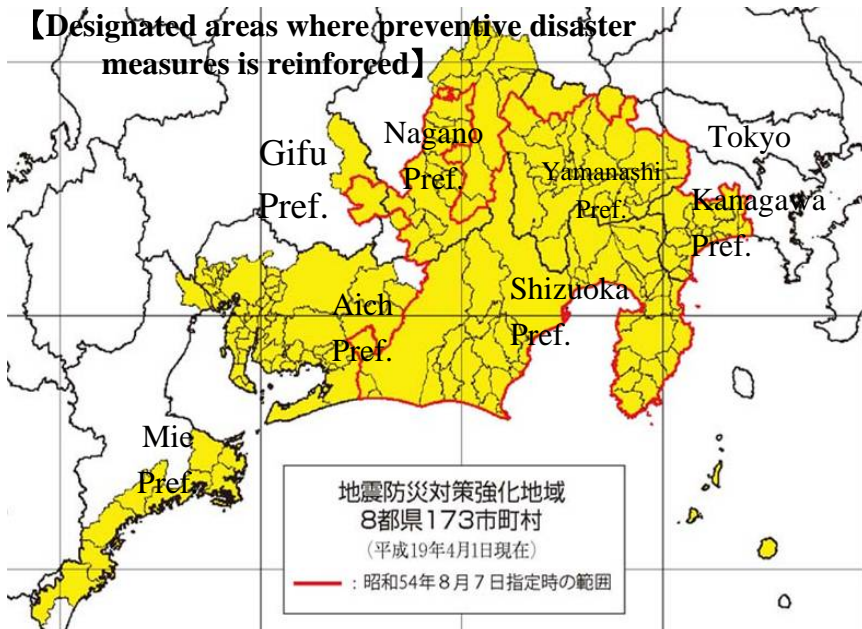


# ◇ Disaster assumption when earthquake hit Tokai Area

【Estimated distribution of seismic intensity in Tokai Area】



【Designated areas where preventive disaster measures is reinforced】

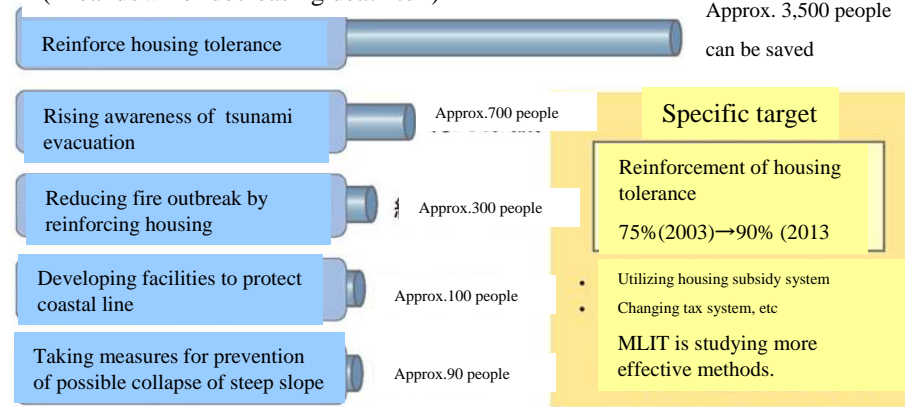


## ❖ Target

Halve death toll/damage for the next 10 yrs.

Death toll will be reduced by 4,700  
from 9,200 to 4,500

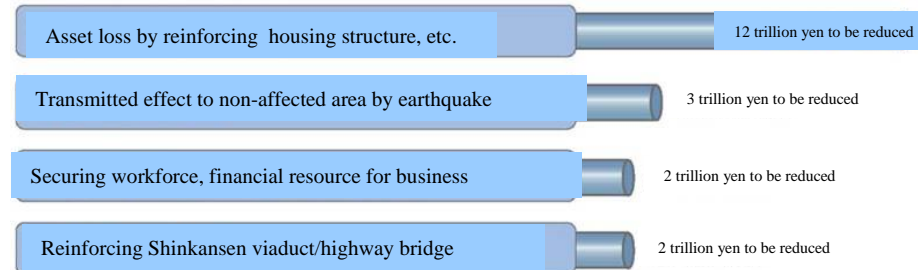
(Breakdown of decreasing death toll)



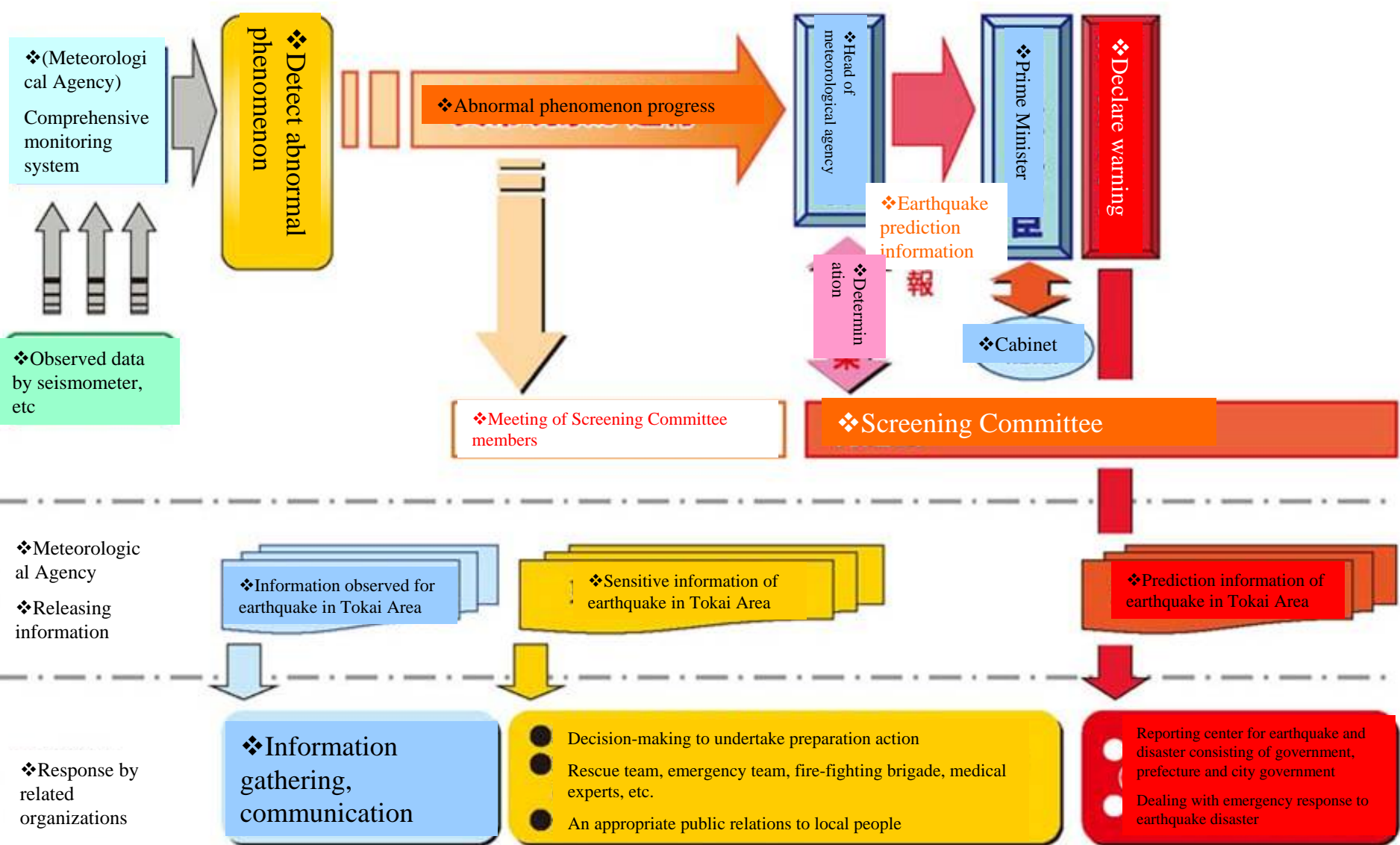
## ❖ Economic Damage

From 37 trillion to 19 trillion 18 trillion to be reduced

(Breakdown of reducing damages to approx 18 trillion yen)



# ◇ Flow of how warning will be issued when earthquake hit Tokai Area



## ◇ *Efforts of JWA*

- No one can predict precisely when earthquake occurs
- No one can stop the occurrence of natural disaster like earthquake

「Well-preparation」 enables to mitigate damages to significant extent

### 【Efforts of JWA】

Acquire disaster prevention → 「Training」, 「Lecture」

Visualize how to deal with disasters → 「Drill」

Disasters, accidents occurred in the past → 「Reflect in improving facility management」

# ◇ *Learning from past*

## Employee was injured while on patrol

**Oct. 19, 2004**

- **In Kagawa Prefecture, rainfall was recorded at all time high due to typhoon**
- **A slope along Gagawa Canal facilities was collapsed**

## **【 Lesson - Improvement in Management 】**

- ◆ **Improve collecting information**
  - **Situation of road**
  - **Communication with municipal**
  - **Communication method when evacuation is instructed**
- ◆ **Strengthen communication system**
  - **Frequently contact with personnel on patrol and gate operator**
  - **Inform whereabouts whenever moves**
- ◆ **Be confident what action should be taken at a time of disaster**
  - **Preparing a patrol car**
  - **Inspect affected area by a patrol car working as a couple**
- ◆ **Review and check dangerous locations**
- ◆ **Review patrol route, considering alternative patrol routes, and familiar with road situation**

# Learning from earthquake disaster (1)

## Great Hanshin-Awaji Earthquake in the southern part of Hyogo Prefecture in 1995

Date: Jan. 17, 1995 Scale: **M=7.2**

Epicentral earthquake by activity of active fault

Intensity 6 in Suhon, Kobe (**Old intensity scale**)

Part of Awaji Island, Kobe, Takarazuka Cities: Intensity 7

A great number of wooden houses, concrete buildings, express high way, railways were damaged and collapsed.

Damages (as of Jan. 11, 2000)

Death toll: 6432 people, missing: 3 people

Injured 40,000 or more people

Half-damaged houses 240,000 houses

Damaged houses completely: over 6000 houses



What We Have to Learn from  
the Experiences

**Majority people died by the collapse of  
houses or fire spread**

**A lack of rescue workers at the disaster**

→ Increase rescue team or workers

Mutual assistance with both sides of  
neighbors



# Learning from earthquake disaster (2)

## Niigata Chuetsu Earthquake in 2004

- ❖ Date: Oct.23, 2004 Scale:**M=6.8**
  - ❖ Epicentral earthquake by activity of active fault
  - ❖ Intensity 7 in Kawaguchi town (**New intensity scale**)
- A great number of wooden houses, concrete buildings,
- ❖ express high way, railways were damaged and collapsed
- ❖ Damages
- ❖ Death toll:51 people in Nagaoka and Ojiya City, Injured 4,800 people
  - ❖ Half damaged houses 1,7000,
  - ❖ Damaged houses completely: over 6000 houses
  - ❖ About9,100 people of 2,800 households in 9 municipalities were forced to live in shelters

What We Have to Learn from  
the Experiences

Quick response  
(Response by disaster medicine)





# Nagano Seibu Earthquake

(Sept. 14, 1983) M6.8



Crest of Makio Dam was damaged by the earthquake.



Head of the mountain was collapsed



Higashi region was collapsed

# Sediment control measures in dam reservoir

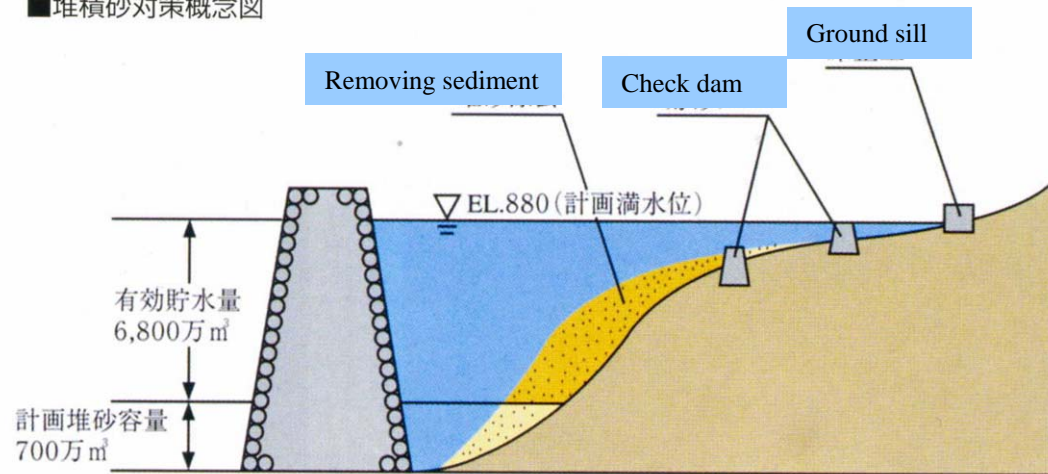
## Overview of sediment control measures/purpose

This measure is conducted to remove accumulated sediment in dam reservoir, and improve and maintain the function of Makio Dam reservoir, and prevent disaster by controlling the sediment inflow from upstream area.

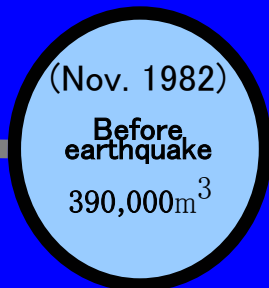
### Project outline

Excavated amount of sediment	548,000,000 m <sup>3</sup>	
Structure	Ground sill	1 site
	Check dam	2 sites
Construction Period	1995-2006	

■堆積砂対策概念図

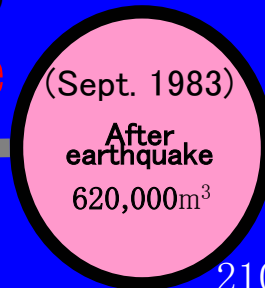


(Oct. 1979)  
Mt. Ontake erupted

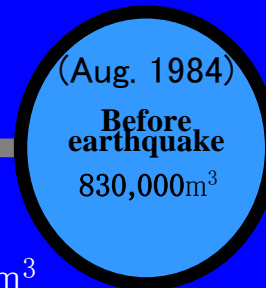


(Sept. 14, 1983)  
Nagano Seibu Earthquake

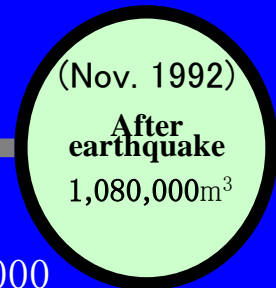
230,000m<sup>3</sup>



210,000m<sup>3</sup>



250,000m<sup>3</sup>



# Response to Water Quality Accident



General people, people on patrol or police, inspect the affected area

Inform



Instruct

- ◎Collect information
- ◎Study source of outbreaks and cause
- ◎Conduct water quality survey



- ◎River office managed by MLIT
- ◎Prefecture-run civil engineering offices
- ◎City office, etc
- ◎Public health center
- ◎Fire department
- ◎JWA offices, etc.

Inform



Coordinating committee for Water quality control



Report



Instruct



◎Claim compensation for damage/loss

- ◎Measures to prevent the spread
- ◎Remove/collect
- ◎Take protection measures

Announcement to mass media at press conference

# Water Quality Accident

Measures for a fallen truck in a river or canal



# *Initial action after accident*

*Undertake emergency response after the occurrence of the accident*

- 1. Analyze information, check the impact on JWA's facilities**
- 2. Undertake measures to mitigate damages**
  - ① Set up oil fence, float oil removal mattress**
  - ② Reduce or stop water intake**

## *Communication System after Accident*

**Report to related water users**

- 1. Users for irrigation water (Land Improvement District, etc.)**
- 2. Users for domestic water (Public sector)**
- 3. Users for industrial water (Public sector)**



# Preventive measures

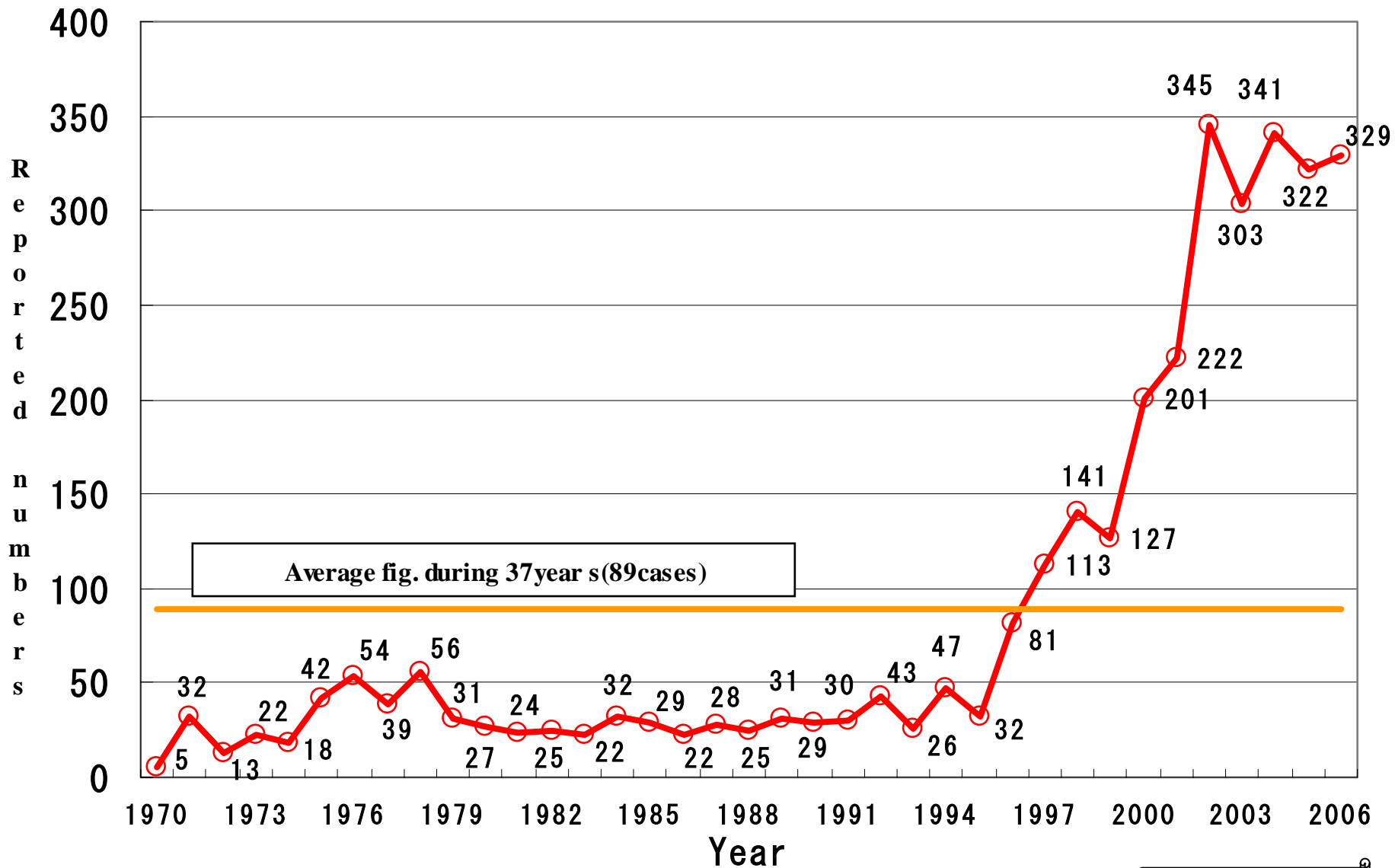
Setting up oil fence at intake and floating oil removal mattress



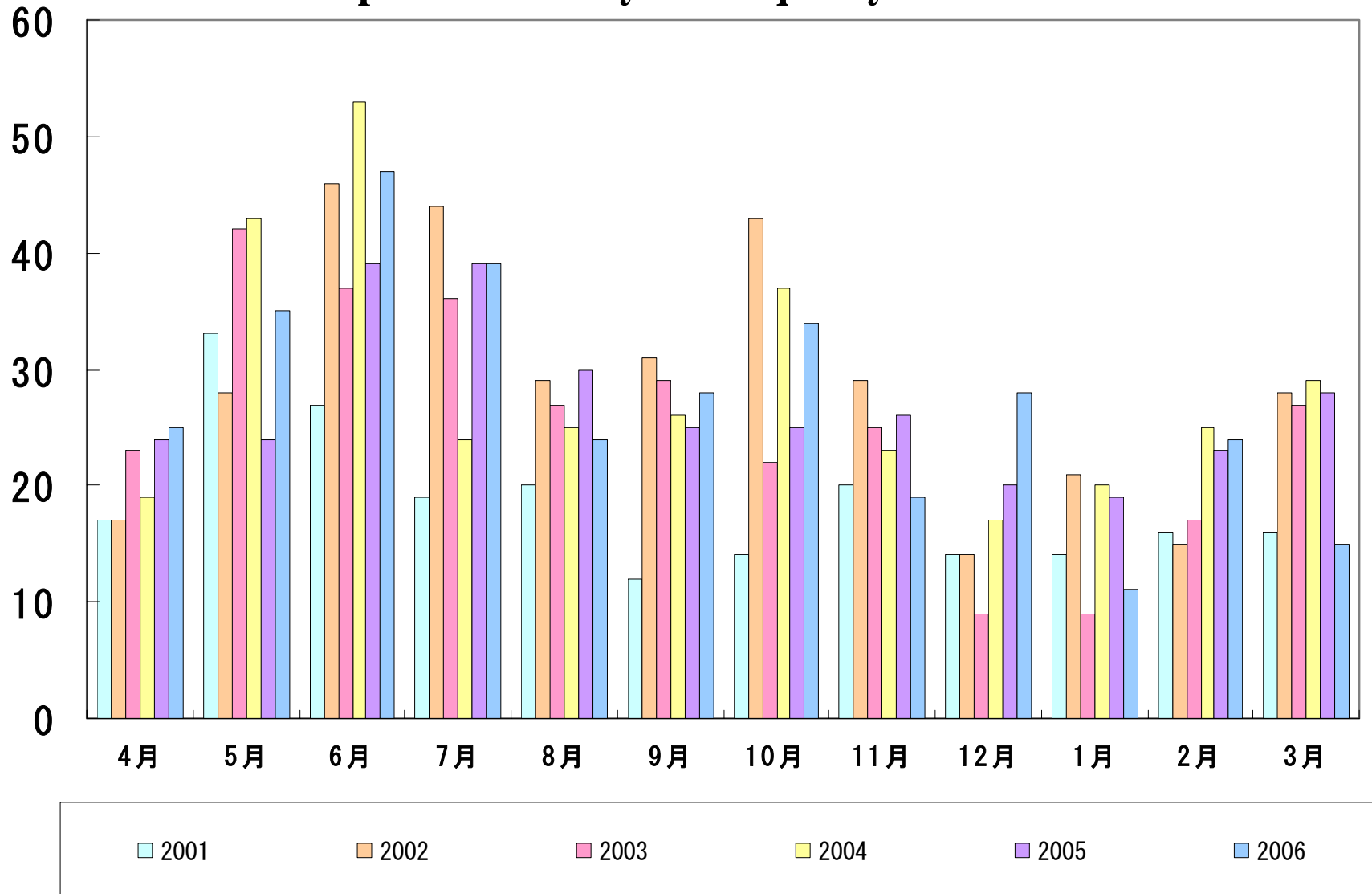
Flushing water at intake weir



# Reports on water quality accident in Kanto area by years

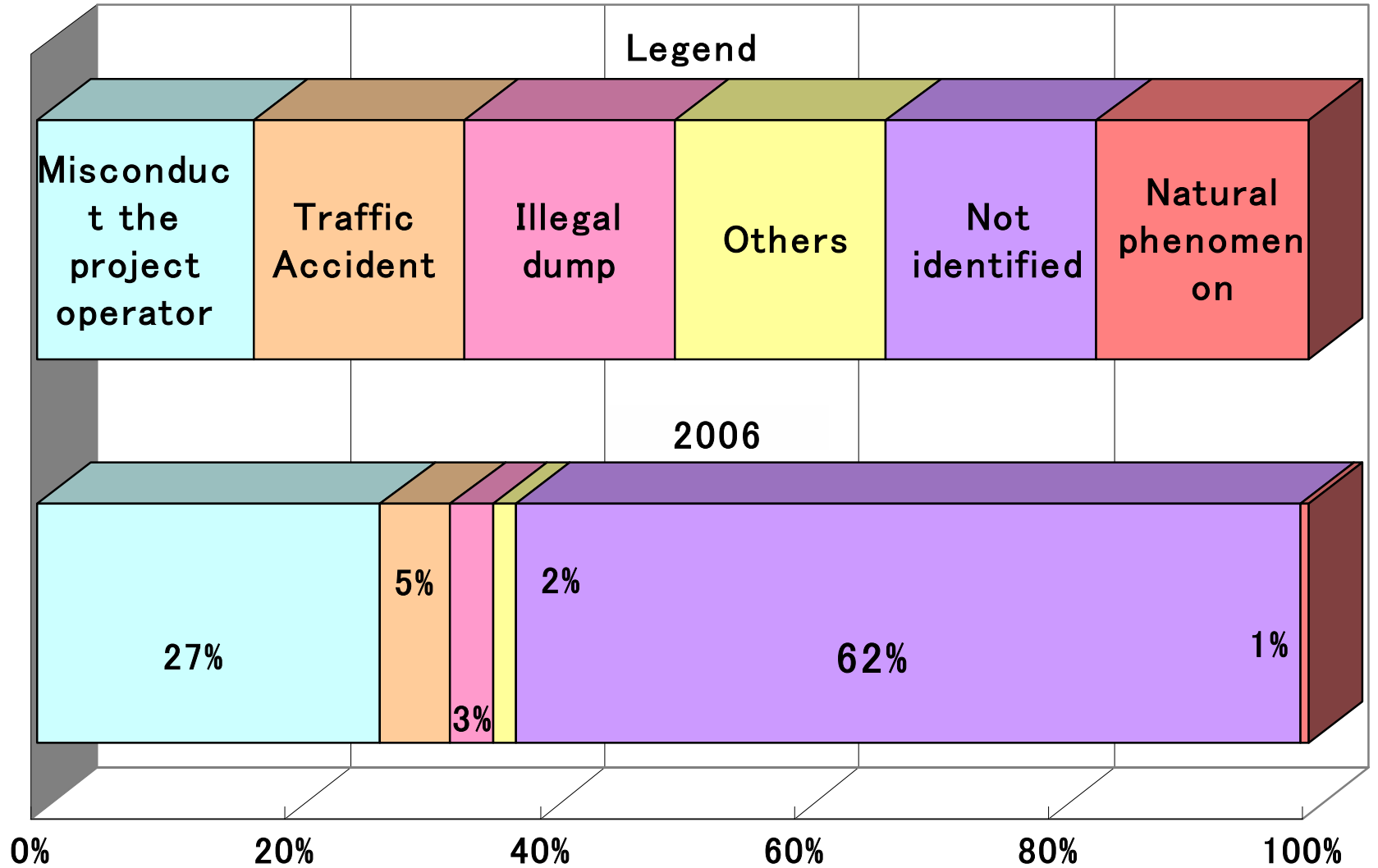


## Reports on montly water quality accident





# Classification by causes



# Classification by substances

