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A STUDY ON THE DISASTER MANAGEMENT FRAMEWORK OF JAPAN



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A RESEARCH REPORT PRESENTED BY
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To the Senior Researchers of the
ASIAN DISASTER REDUCTION CENTER

*in partial fulfilment of the requirements
for the award of the completion letter of*

VISITING REASERCHER PROGRAM IN DISASTER RISK MANAGEMENT

of the



**ASIAN DISASTER REDUCTION CENTER
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LIST OF ABBREVIATIONS

ADRC	Asian Disaster Reduction Center
BCMA	Basic Countermeasures Act
BDMP	Basic Disaster Management Plan
BOKOMI	Jishu-bosai-soshiki, voluntary DDR organization in Kobe
BCP	Business Continuity Planning
BRI	Building Research Institute
BSL	Building Standard Law
CBOs	Community Based Organizations
CDMC	Comprehensive Disaster Management Council
DIA	Disaster Impact Assessment
DCBA	Disaster Countermeasures Basic Act
DRR	Disaster Risk Reduction
DRM	Disaster Risk Management
DM	Disaster Management
DMC	Disaster Management Center
DMAT	Disaster Medical Assistance Team
DMP	Disaster Management Plans
EW	Early Warning
EFRT	Emergency Fire and Rescue Team
FCMA	Fire and Crisis Management Agency
GIS	Geographic Information System
GPS	Global Positioning System
GDP	Gross Domestic Product
HFA	Hyogo Framework for Action
IDMP	Institutional Disaster Management Plan
IT	Information Technology
IDA	International Development Association
JDRT	Japan Disaster Relief Team
JICA	Japanese international cooperation agency
JSDF	Japanese Self-Defense Force
JCG	Japan Coast Guard
JMA	Japan Meteorological Agency
JMAT	Japanese Medical Assistance Team
MOFA	Ministry of Foreign Affairs
MLIT	Ministry of Land Infrastructure Transport and tourism
NIDM	National Institute of Disaster Management
NCLS	National Center for Lightning Safety
NCDM	National Council for Disaster Management
NILIM	National Institute for Land Infrastructure Management
NHK	Nippon Hōsō Kyōkai
NPOs	Non Profitable Organizations

RHQ	Regional Headquarters
SOPs	Standard Operation Procedures
UNISDR	United Nations International Strategy for Disaster Reduction
UN	United Nations
UNDP	United Nations Development Program
UNICEF	United Nations International Children's Emergency Fund

1.0 BACKGROUND

After the great civilizations and over the past few decades, losses by natural disasters in the world have recorded substantially. Some countries were prone to natural disasters caused by earthquakes, tsunamis, floods, cyclones, lightning, volcanos, blizzards, landslides, droughts and coastal erosion with increasing instances of environmental pollution related hazards. The devastations caused by the Earthquakes, Tsunami and wars have highlighted that the countries were also vulnerable to significant impacts which cause extensive damages and reverse development gains.



Disaster: A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. (UNISDR 2009)

Disaster risk management: The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster. (UNISDR 2009)

Hazard: A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. (UNISDR 2009)

Vulnerability: The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. (UNISDR 2007)

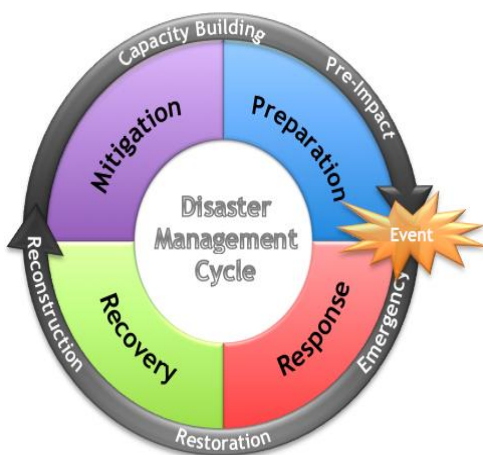


Figure 1. Disaster Management cycle

Disaster Management cycle (is shown in Figure 1):

Mitigation: the lessening or limitation of the adverse impacts

Preparedness: the knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions. (UNISDR 2009)

Response: The provisions of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected. (UNISDR, 2009)

Recovery: The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors. (UNISDR 2007)

Despite there are typical requirements and attributive characteristics of each phase in the DM cycle, implementation of each phase depends on proper planning and elaboration, But emergency response phase is characterized by high uncertainty, limited timeframe, site accessibility problems, and necessity for decision-making, mobilization of forces and resources and quick response. The phase deals with direct or indirect, natural or human induced hazard to human life, property, and the environment. Although the extent the country is exposed to natural and human induces hazards, thus, proper and comprehensive DM mechanism would be the matter of saving lives, property damage, economic loss and the environmental degradation. Depending on country's hazard profile, geographical location and the administrative system every country and region from their historical experiences have established DM mechanisms. Once the system is in place, functional mechanism of coordination –implementation of such DM activities are definitive factors.

Destructive implications of occurrence of all types of natural disasters frequently forced Japan to enhance their disaster management mechanism over time. In doing so, along with organizational changes, introducing legal provinces and revising the DM plans Japan has been integrating and introducing the latest technological advancements for disaster management purposes. Since natural disasters can't be prevented and only the impact of disasters can be mitigated, Japan DRM mechanism represents one of the most holistic disaster management systems in the world.

1.1 International Frameworks in Disaster Management

1.1.1 *Yokohama natural disaster reduction in 1994* - is considered as the first international conference on disaster management in the world. All the members of the United Nations, met at the World Conference on Natural Disaster Reduction, in the city of Yokohama, Japan, from 23 May to 27 May 1994, in partnership with non-governmental organizations, and with the participation of international organizations, the scientific community, business, industry and the media, deliberating within the framework of the International Decade for **Natural Disaster Reduction**, expressed deep concern on continuing human suffering and disruption of development caused by natural disasters. Therefore following principles were inspired by the Yokohama Conference for a Safer World

1. Risk assessment is a required step for the adoption of adequate and successful disaster reduction policies and measures.
2. Disaster prevention and preparedness are of primary importance in reducing the need for disaster relief.
3. Disaster prevention and preparedness should be considered integral aspects of development policy and planning at national, regional, bilateral, multilateral and international levels.
4. The development and strengthening of capacities to prevent, reduce and mitigate disasters is a top priority area to be addressed during the Decade so as to provide a strong basis for follow-up activities to the Decade.
5. Early warnings of impending disasters and their effective dissemination using telecommunications, including broadcast services, are key factors to successful disaster prevention and preparedness.
6. Preventive measures are most effective when they involve participation at all levels, from the local community through the national government to the regional and international level.
7. Vulnerability can be reduced by the application of proper design and patterns of development focused on target groups, by appropriate education and training of the whole community.
8. The international community accepts the need to share the necessary technology to prevent, reduce and mitigate disaster; this should be made freely available and in a timely manner as an integral part of technical cooperation.
9. Environmental protection as a component of sustainable development consistent with poverty alleviation is imperative in the prevention and mitigation of natural disasters.
10. Each country bears the primary responsibility for protecting its people, infrastructure, and other national assets from the impact of natural disasters. The international community should demonstrate strong political determination required to mobilize adequate and make efficient use of existing resources, including financial, scientific and technological means, in the field of natural disaster reduction, bearing in mind the needs of the developing countries, particularly the least developed countries.

1.1.2 *Hyogo Framework for Disaster Risk Reduction (HFA)* - after the catastrophic event happened due to Indian Ocean Tsunami on 26th December 2004. The World Conference for Disaster Reduction, 10-years Hyogo Framework for Action (2005-2015) came out of the world conference held in Kobe, Hyogo prefecture, Japan from 18 to 22 January 2005. Building the Resilience of Nations and Communities to Disasters (HFA) was the first plan to explain, describe and detail the work that is required from all different sectors and actors to reduce disaster losses. It was developed and agreed on with many partners needed to reduce disaster risk - governments, international agencies, disaster experts and many others - bringing them into a common system of coordination. Its goal is to substantially reduce disaster losses by 2015 by building the resilience of nations and communities to disasters. This means reducing loss of lives and social, economic, and

environmental assets when hazards strike. The HFA outlines five priorities for action, and offers guiding principles and practical means for achieving disaster resilience. The five priorities as follows,

Priority Action 1: Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.

Countries that develop policy, legislative and institutional frameworks for disaster risk reduction and that are able to develop and track progress through specific and measurable indicators have greater capacity to manage risks and to achieve widespread consensus for, engagement in and compliance with disaster risk reduction measures across all sectors of society

Priority Action 2: Identify, assess and monitor disaster risks and enhance early warning.

The starting point for reducing disaster risk and for promoting a culture of disaster resilience lies in the knowledge of the hazards and the physical, social, economic and environmental vulnerabilities to disasters that most societies face, and of the ways in which hazards and vulnerabilities are changing in the short and long term, followed by action taken on the basis of that knowledge.

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

Disasters can be substantially reduced if people are well informed and motivated towards a culture of disaster prevention and resilience, which in turn requires the collection, compilation and dissemination of relevant knowledge and information on hazards, vulnerabilities and capacities.

Priority Action 4: Reduce the underlying risk factors.

Disaster risks related to changing social, economic, environmental conditions and land use, and the impact of hazards associated with geological events, weather, water, climate variability and climate change, are addressed in sector development planning and programmes as well as in post-disaster situations.

Priority Action 5: Strengthen disaster preparedness for effective response at all levels.

At times of disaster, impacts and losses can be substantially reduced if authorities, individuals and communities in hazard-prone areas are well prepared and ready to act and are equipped with the knowledge and capacities for effective disaster management.

1.1.3 *Sendai Framework for Disaster Risk Management* –The Third UN World Conference on Disaster Risk Reduction ,The Sendai Framework was adopted by member states on 18th March 2015 in Sendai City of Miyagi prefecture in Japan. The Sendai Framework is a 15-year, voluntary, non-binding agreement which recognizes that the State

has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders.

It aims the following outcome:

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

The Sendai Framework is the successor instrument to the (HFA): Building the Resilience of Nations and Communities to Disasters. It is the outcome of stakeholder consultations initiated in March 2012 and inter-governmental negotiations held from July 2014 to March 2015, which were supported by the UNISDR upon the request of the UN General Assembly. The seven targets and four priorities for action as follows,

The Seven Global Targets

- (a) Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality rate in the decade 2020-2030 compared to the period 2005-2015.
- (b) Substantially reduce the number of affected people globally by 2030, aiming to lower average global figure per 100,000 in the decade 2020 -2030 compared to the period 2005-2015.
- (c) Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
- (d) Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
- (e) Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
- (f) Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030.
- (g) Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

The Four Priorities for Action

Priority 1. Understanding disaster risk

Disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be used for risk assessment, prevention, mitigation, preparedness and response.

Priority 2. Strengthening disaster risk governance to manage disaster risk

Disaster risk governance at the national, regional and global levels is very important for prevention, mitigation, preparedness, response, recovery, and rehabilitation. It fosters collaboration and partnership.

Priority 3. Investing in disaster risk reduction for resilience

Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment.

Priority 4. Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction

The growth of disaster risk means there is a need to strengthen disaster preparedness for response, take action in anticipation of events, and ensure capacities are in place for effective response and recovery at all levels. The recovery, rehabilitation and reconstruction phase is a critical opportunity to build back better, including through integrating disaster risk reduction into development measures.

1.2 Purpose of the Study

The purpose of the study is to elaborate detailed and holistic review of the disaster management plans of Japan as constituent and integral element of the entire disaster management mechanism through the conduct of comprehensive study of disaster management plans related to each level of government, public organizations, public & private partnerships and voluntarism.

1.3 Scope & Limitations of the Study

In fact disaster risk management is new to Sri Lankans. Japanese are the most experienced nation who lives on earth as far as disaster impacts are concerned, since they live on the most vulnerable place on the earth. Therefore to recover and mitigate the impact of natural and human induced disasters Japanese have introduced disaster risk management systems from ancient era. That was revealed by the historical evidence. Also after each catastrophic event Japanese revisit their system with the lesson learnt. Therefore the existing system is addressed fluently despite the natural disaster cannot be prevented. Therefore my scope is to study the disaster management framework from national level to the grass root level. But due to time constraint and the complexity my study was limited to the national level cabinet office and their operations and the municipality of Kobe.

2.0 REVIEW OF LITERATURE

2.1 National Profile of Japan

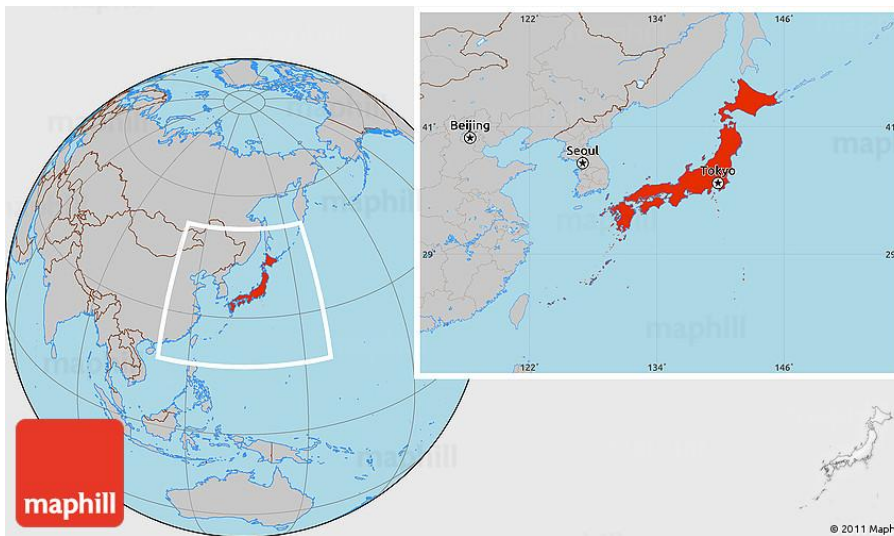


Figure 2. Location of Japan in the world map

General

Japan consists of total of 6,852 islands extending along the Pacific coast of East Asia. Japan lies between latitudes 24° and 46°N, and longitudes 122° and 146°E (as shown in figure 2). The main islands, from north to south, are Hokkaido, Honshu, Shikoku and Kyushu. The Ryukyu Islands, which includes Okinawa, are a chain to the south of Kyushu. Together they are often known as the Japanese Archipelago.

73 percent of Japan is forested and mountainous, therefore lands are scarce for agricultural, industrial, or residential use. As a matter of fact, the habitable zone, mainly located in coastal areas, contains extremely high population densities.

As per the records following three decades of unprecedented growth, Japan's economy experienced a major slowdown starting in the 1990s, Still the country still remains a strong economic. In March 2011, Japan's experience largest-ever earthquake, and an accompanying tsunami, devastated the northeast part of Honshu island, killing thousands and damaging several nuclear power plants (fukushima). The catastrophic event impacted to the Japan's economy and its infrastructure, and tested its ability to withstand to disasters.

Japan is located in eastern Asia, an island chain between the North Pacific Ocean and the Sea of Japan, east of the Korean Peninsula. In 2003 Japan's population was 128 million, and the City of Kobe represented 1.2% of the total. Most of the country's population is urban, accounting for the 78.8% of the total, with a density of 341 persons per square kilometer. Almost 15% of the population is under 15 years old and 23.6% is over 60 years old. In the year 2000 there were 46.78 million households, 58.4% of which were nuclear family and 27.6% one-person households. In 2002 the country GDP was \$38,160 per person.

2.1.1 Physiography

Japan is located in a volcanic zone on Pacific Ring of Fire. It is primarily the a result of large oceanic movements occurring over hundreds of millions of years from the mid-Silurian to the Pleistocene as a result of the subduction the Philippine Sea Plate beneath the continental Amurian Plate and Okinawa Plate to the south, and subduction of the Pacific Plate under Okhotsk Plate to the north. Japan was originally attached to the eastern coast the Eurasian continent. The subducting plates pulled Japan eastward, opening Sea of Japan around 15 million years ago. Subduction zones and four continental plates movements shown in figure 3

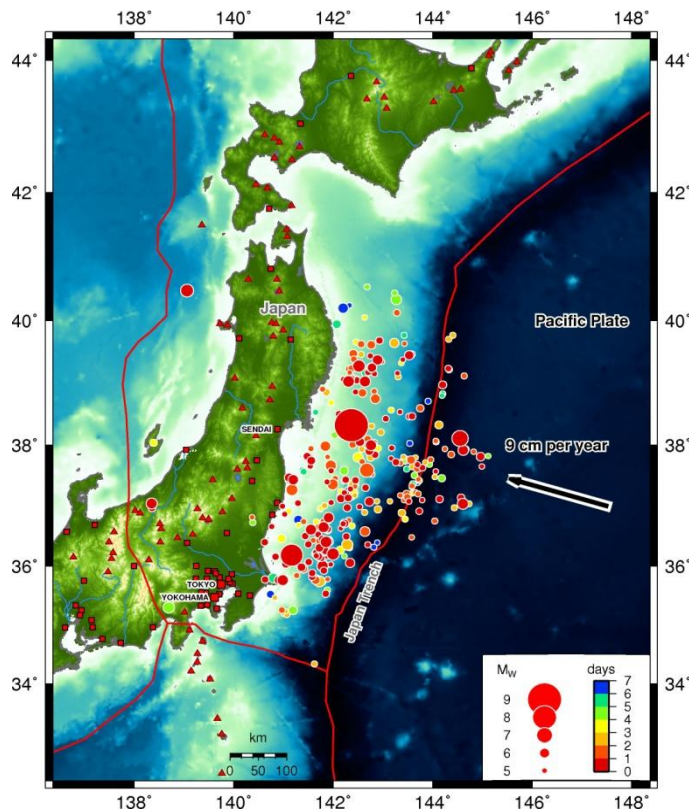


Figure 3. Subduction zones of Japan

Japan has 108 active volcanoes. Destructive earthquakes, often resulting in tsunami, occur several times each century. The 1923 Tokyo earthquake killed over 140,000 people. Recent major quakes are the 1995 The Great Hanshin Awaji earthquake and the 2011 The Great East earthquake, a 9.0-magnitude quake which hit Japan on March 11, 2011, and triggered a large tsunami. Due to its location in the Pacific Ring of Fire, Japan is substantially prone to earthquakes and tsunami, having the highest natural disaster risk in the developed world.

2.1.2 Climatology

The climate of Japan is predominantly temperate, but varies greatly from north to south. The average winter temperature in Japan is 5.1 °C (41.2 °F) and the average summer temperature is 25.2 °C (77.4 °F). A major feature of Japan's climate is the clear-cut temperature changes between the four seasons. In spite of its rather small area, the climate differs in regions from a subarctic climate to a subtropical climate. The side of the country which faces the Sea of Japan has a climate with much snow in winter by seasonal winds from the Siberia. Most of the areas have damp rainy season from May to July by the seasonal winds from the Pacific Ocean.

From July to September, Japan frequently suffers from Typhoon.

Japan's geographical features divide it into six principal climatic zones: Hokkaido, Sea of Japan, Central Highland, Seto Inland Sea, Pacific Ocean, and Ryūkyū Islands. The northernmost zone, Hokkaido, has a humid continental climate with long, cold winters and very warm to cool summers. Precipitation is not heavy, but the islands usually develop deep snow banks in the winter.

2.1.3 Socio-Economic Profile

Japan is an industrial developed country and after World War Two Japan had significantly developed their economy. The socio-economic indicators of Japan is shown in Table.1

Table 1. Socio-economic index of japan

Socio-economic Indicators		
GDP: Gross domestic product (million current US\$)	2011	5870357
GDP per capita (current US\$)	2011	46407.0
GNI: Gross national income per capita (current US\$)	2011	48084.0
Population (millions)	2014	127.14
Urban (% of population)	2014	92.51
Sex ratio (males per 100 females)	2012	94.9
Life expectancy at birth (females/males, years)	2010-2015	87.1/80.1
Adult literacy rate (% ages 15 and older)	2002	99
Expenditure on education (% of GDP)	2014	3.78

Source: http://nidm.gov.in/easindia2014/err/pdf/country_profile/Japan.pdf

2.1.4 Administrative Setup

The government of Japan is a constitutional monarchy whereby the power of the Emperor is limited and is relegated primarily to ceremonial duties. The government, like in most other states, is composed primarily of three branches: the executive branch, the legislative branch and the judicial branch, as defined by the post-war constitution of Japan.

1. Regions and Administrative Divisions of Japan



Figure 4. Regions and administrative divisions of Japan

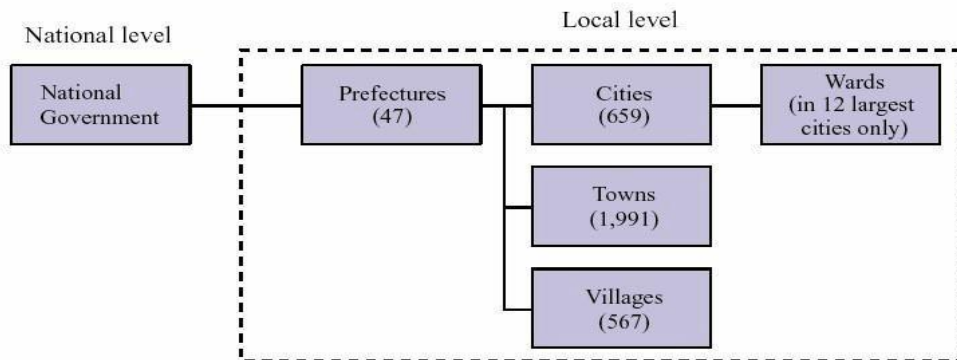
Under the Constitution, the powers of the executive branch of the government is explicitly vested in the Cabinet; of which, must enjoy the confidence to be in office by the National Diet, the organ of the legislative branch. The National Diet is, under the Constitution, known as "the highest organ of state power"; which strictly reflects the Sovereignty of the people as represented by the Diet.

The 47 prefectures of Japan form Japan's first level of jurisdiction and administrative division. They consist of 43 prefectures (ken) proper, two urban prefectures, Osaka and Kyoto), one "circuit" or "territory" Hokkaido) and one "metropolis" (Tokyo). The first prefectures, replacing the provinces of Japan, were created by the Meiji Fuhanken sanchisei administration in 1868 (shown in figure 4).

The chief executive of each prefecture is a directly-elected governor (chiji). Ordinances and budgets are enacted by a unicameral assembly (gikai) whose members are elected for four-year terms.

2. Local Administrative System

Under the current Local Autonomy Law, each prefecture is further divided into cities (shi) and districts (gun) and each district into towns (chō/machi) and villages (son/mura). For example, Hokkaido has 14 sub prefectures which act as branch offices (shichō) of the prefecture. Some other prefectures also have branch offices, which carry out prefectural administrative functions outside the capital. Tokyo, the capital, is a merged city-prefecture; it has features of both cities and prefectures. (Local administration system is shown in figure 5)



Local Administrative Divisions of Japan (Prefectures)

- | | | |
|-------------|--------------|--------------|
| 1 Hokkaido | 19 Yamanashi | 34 Hiroshima |
| 2 Aomori | 20 Nagano | 35 Yamaguchi |
| 3 Iwate | 21 Gifu | 36 Tokushima |
| 4 Miyagi | 22 Shizuoka | 37 Kagawa |
| 5 Akita | 23 Aichi | 38 Ehime |
| 6 Yamagata | 24 Mie | 39 Kochi |
| 7 Fukushima | 25 Shiga | 40 Fukuoka |
| 8 Ibaraki | 26 Kyoto | 41 Saga |
| 9 Tochigi | 27 Osaka | 42 Nagasaki |
| 10 Gumma | 28 Hyogo | 43 Kumamoto |
| 11 Saitama | 29 Nara | 44 Oita |
| 12 Chiba | 30 Wakayama | 45 Miyazaki |
| 13 Tokyo | 31 Tottori | 46 Kagoshima |
| 14 Kanagawa | 32 Shimane | 47 Okinawa |
| 15 Niigata | 33 Okayama | |
| 16 Toyama | | |
| 17 Ishikawa | | |
| 18 Fukui | | |

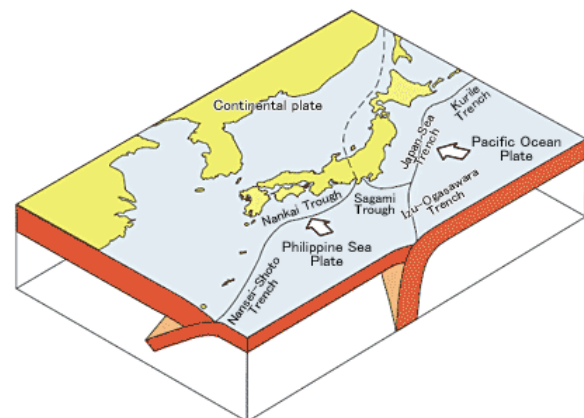
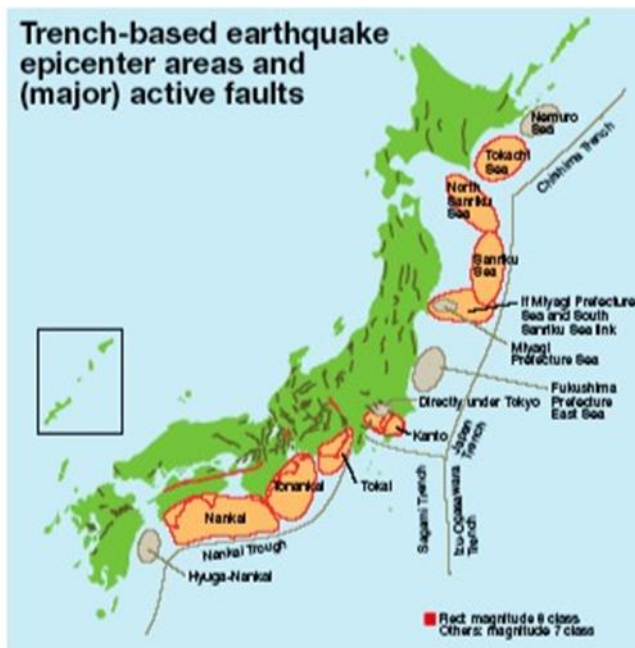


Figure 5. Local administrative divisions of Japan

2.2 Disaster Profile of Japan

Historically, destructive natural disasters have posed greatest challenge for Japanese society. Japan is located in four plates of the Circum-Pacific Mobile belt where seismic and volcanic activities occur constantly which is sometimes called as Pacific Ring of Fire. And Japan covers only 0.25% of the land area on the earth. (As shown in figure 6)

Unfavorable geographical, topographical and meteorological conditions of Japan have made it more disaster prone countries in the world such as typhoons, torrential rains, floods, landslides as well as heavy snows falls and Tsunami.



Source: Materials formulated by the Earthquake Research Committee

Figure 7. Dynamic tectonic plate of Japan

Figure 6. Earthquakes and volcanic activities of Japan compared to the world

As shown in the Figure 7. Japan is located in four tectonic plates – Eurasian Plate, North American Plate, Pacific Plate and Philippine Sea –subducting each other which are the cause of high seismicity of Japan territory. Tsunami tidal waves triggered due to an earthquake at the bottom of the ocean or by landslides in the vicinity of the coast. Earthquakes and tsunamis are the major causes of disasters in Japan as per the historical evident. Although Japanese government spending billions of money for to improve Disaster Management and despite remarkable success have been achieved in increasing disaster preparedness of the country recent big disaster caused by the Great Hanshin-Awaji Earthquake in year 1995 and Great East Japan Earthquake in year 2011 demonstrated that they still remain as the biggest challenge for disaster management system of the country (no of deaths due to past disasters is shown in figure 8). Therefore vital role and responsibility of the JMA, MLIT and BRI before, during and after an emergency must be emphasized in their institutional disaster management plans.

Typhoons (cyclones) and high instance rain due to typhoon system are the main causes of storm, storm surges, flood and sediment related disasters in Japan. Starting from 1945 series of typhoons caused severe damages to Japan by storm, tidal wave and mainly on high tides during the period of May to October and August to September. Year 1959 is the recorded highest death tall due to “Isewan” typhoon and also considered to be the turning point of fighting with typhoons. Since then as a result of typhoon disaster preparedness measures and applications developed by Japan Meteorological Agency (JMA) the number of deaths due to typhoons drastically decreased.

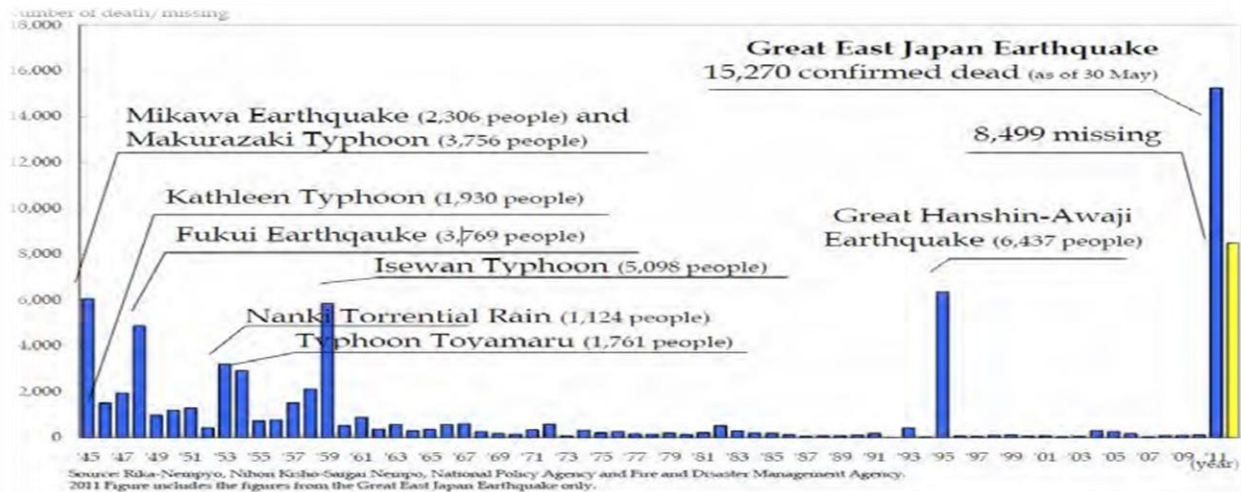


Figure 8. Number of people deaths due to major natural disasters (1945-2011)

Risk of fire hazard is high in Japan. This is mainly due to large forest cover which covered about 70% of Japan, highly industrialized, large number of nuclear & thermal power plants, use of electricity for public utility is high, developed chemical and all kinds of end products, close proximity of buildings in densely populated areas and use of wood for building houses. Moreover, tsunamis and earthquakes are also likely to entail large-scale fires in its immediate aftermath. As per the records 7000 fire cases occurred in immediate aftermath of the Great Hanshin-Awaji earthquake in 1995.

As per the Topography and geography of Japan lead to floods and sediment related disasters due to rapid flow of rivers from the mountains violently. Moreover, ratio between normal volume of flow and that during a storm is extremely disastrous. A high intense rain falls are on the Japanese archipelago during the heavy rainy season (June to July) and typhoons. During periods of intensive rainfall, even a small stream that usually dried may become a raging torrent. Moreover, combination of such factors as steep slopes, fast-flowing rivers, unstable and soft soil, rainy climate and frequent earthquakes often lead to such sediment disasters as debris flows, landslides and slope failures.(shown in figure 9) situation in Japan with regard to floods and sediment disasters.

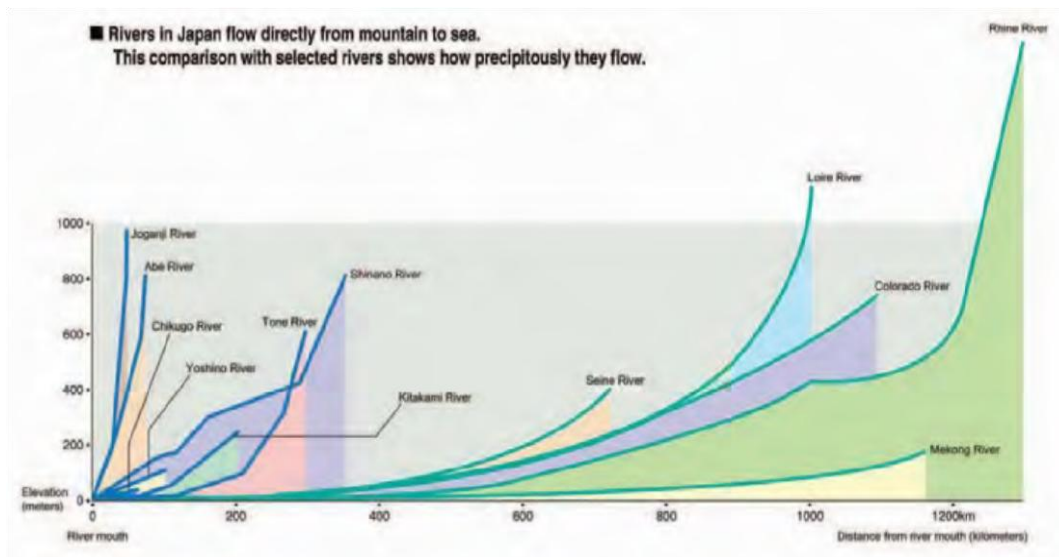


Figure 9. Comparison of steepness of Japanese with other major river around the world

Japan has 108 active volcanoes and has several volcanic regions and it is frequently affected by earthquakes and Tsunami. Volcanic disasters triggered by eruption and disaster happened due to pyroclastic flow. Destructive earthquakes, often resulting in tsunami, occur several times each century. The 1923 Tokyo earthquake killed over 140,000 people.

Also Japanese have experienced pyroclastic flow and debris flow due to volcanic eruption of Mount Unzen-Fugen in 1991 and killed 41 persons whereas damage cost over 220, 0 billion Japanese yen . As per the historical evidence reveal that first eruption was happened in 198 years back and debris flow due to volcanic eruption fall in to Mizunashi river and that generated huge tsunami tidal wave and killed more than 3000 people lived on the other side of the neighboring prefecture. Occasionally heavy snowfalls and blessed warring Japanese as they are witness one of the most vulnerable communities live on earth. Natural disaster occurrence of Japan for last 100 years are shown in figure 10 and number of deaths due to each disasters from 1945-2014 is annexed as an annex 1. The impact of top ten major disaster strikes to japan are shown in & table 2, 3, and 4.

Natural Disaster Occurrence Reported

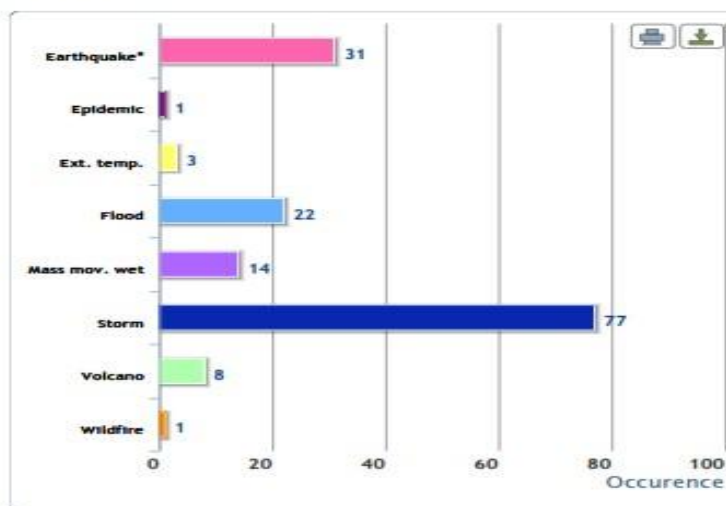


Figure 10. Natural disaster occurrence of Japan from 1900 to 2014 (Source: http://nidm.gov.in/easindia2014/err/pdf/country_profile/Japan.pdf)

Table 2. Numbers of deaths due to top 10 natural disasters in Japan from 1900 - 2014

Disaster	Date	No Killed
Earthquake (seismic activity)	01/Sep/1923	143000
Earthquake (seismic activity)	11/Mar/2011	19846
Earthquake (seismic activity)	17/Jan/1995	5297
Earthquake (seismic activity)	28/Jun/1948	5131
Storm	26/Sep/1959	5098
Storm	Sep/1917	4000
Storm	18/Sep/1945	3746
Earthquake (seismic activity)	02/Mar/1933	3064
Storm	21/Sep/1934	3006
Storm	Sep/1923	3000

Source: http://nidm.gov.in/easindia2014/err/pdf/country_profile/Japan.pdf

Table 3. Economic loss due to top 10 natural disasters in Japan from 1900 - 2014

Disaster	Date	Damage (000 US\$)
Earthquake (seismic activity)	11/Mar/2011	21000000
Earthquake (seismic activity)	17/Jan/1995	10000000
Earthquake (seismic activity)	23/Oct/2004	2800000
Earthquake (seismic activity)	16/Jul/2007	1250000
Storm	27/Sep/1991	1000000
Storm	03/Sep/2004	900000
Flood	10/Sep/2000	744000
Storm	22/Sep/1999	500000
Storm	17/Sep/1990	400000
Storm	22/Sep/1998	300000

Source: http://nidm.gov.in/easindia2014/err/pdf/country_profile/Japan.pdf

Table 4. Summary of natural disasters in Japan from 1900-2014

		No. of Events	Killed	Total Affected	Damage (000 US\$)
Earthquake (seismic activity)	Earthquake (ground shaking)	44	161794	960008	146841400
	ave. per event		3677.1	21818.4	3337304.5
	Tsunami	14	32576	436947	212821000
	ave. per event		2326.9	31210.5	15201500
Epidemic	Bacterial Infectious Diseases	2	1	534	-
	ave. per event		0.5	267	-
	Viral Infectious Diseases	1	-	2000000	-
	ave. per event		-	2000000	-
Extreme temperature	Heat wave	5	616	94300	-
	ave. per event		123.2	18860	-
Flood	Unspecified	31	12814	7015269	268300
	ave. per event		413.4	226299	8654.8
	Flash flood	1	21	25807	1950000
	ave. per event		21	25807	1950000
	General flood	14	232	151034	3214000
	ave. per event		16.6	10788.1	229571.4
	Storm surge/coastal flood	2	34	384143	7440000
	ave. per event		17	192071.5	3720000
Mass Movement wet	Avalanche	1	13	-	-
	ave. per event		13	-	-
	Landslide	21	994	25706	210000
	ave. per event		47.3	1224.1	10000
Storm	Unspecified	24	1890	192814	453500
	ave. per event		78.8	8033.9	18895.8
	Local storm	15	219	116869	770200
	ave. per event		14.6	7791.3	51346.7
	Tropical cyclone	118	32629	7615483	55669900
ave. per event		276.5	64538	471778.8	
Volcano	Volcanic eruption	15	515	99979	132000
	ave. per event		34.3	6665.3	8800
Wildfire	Forest fire	1	-	222	-
	ave. per event		-	222	-

Source: http://nidm.gov.in/easindia2014/err/pdf/country_profile/Japan.pdf

2.3 Disaster Management System of Japan

2.3.1 Legal Basis

To protect national land as well as citizens' lives, livelihoods', and property from natural disasters is a national priority. In Japan, the disaster management system has been developed and strengthened by the following the better experience of large-scale natural disasters and accidents.

1. National Policy, Strategy and Legislation in Disaster Risk Reduction

Various disaster management related laws adopted since late 40s has laid down the legal framework for the disaster management system of Japan. These laws cover all phases of disaster management – preparedness, prevention/mitigation, response and recovery/rehabilitation phases. There are 7 Basic Acts; 18 with regard to Disaster Prevention and Preparedness; 23 Disaster Recovery and Reconstruction and Financial Measures annex as an annex 2.

The cornerstone of legislation on disaster risk reduction is the Disaster Countermeasures Basic Act, enacted in 1961, which set out the basis for measures to reduce disaster risk in Japan. There are also organizations involved in disaster risk reduction, legislation on disaster risk reduction and emergency response to disasters, post-disaster recovery and reconstruction, and all-round legislative provision regarding specific disaster risk reduction activities. Disaster countermeasures and risk reduction are comprehensively covered.

Under the Disaster Countermeasures Basic Act, the Basic Plan for Disaster Management has been introduced, setting out comprehensive and long-term plans for disaster risk reduction in Japan: Based on this Plan, a comprehensive disaster-management planning system has been established.

The lessons learned from the Great Hanshin-Awaji Earthquake (Kobe Earthquake) of 1995 prompted enhancements to Japan's disaster risk reduction legislation and government policy. In recent years, particular priority has been accorded to countermeasures for large-scale earthquake disasters. Specifically, legislation has been passed regarding countermeasures for large-scale ocean-trench type earthquakes such as the anticipated Tokai, Tonankai and Nankai Earthquakes, earthquake countermeasures for large cities where damage is likely to be wide-ranging have been established, and improvements have been made to the overall framework with regard to legislation on disaster risk reduction and disaster countermeasures.

2. Multi-sectorial Coordination and Collaboration in Disaster Risk Reduction

Under the Disaster Countermeasures Basic Act, the Central Disaster Management Council was formed. Its brief being to ensure the comprehensiveness of disaster risk management and to

discuss matters of importance with regard to disaster management. (An organizational diagram and description of roles is included in the documentation attached.)

Within the Cabinet Office, which is the secretariat for this Council, the Minister of State for Disaster Management has been assigned as the Minister State for Special Missions for this issue. This Minister is assisted by the department of the Cabinet Office Director-General for Disaster Management. His mandate being to handle planning and central coordination with regard to matters relating to basic policy on disaster risk reduction, and matters concerning disaster countermeasures in the event of a large-scale disaster. The Minister is also responsible for the integrated handling of information-gathering and other emergency measures, working closely with the Cabinet Secretariat, in the event of a disaster. (Source: White Paper on Disaster Management, 2014.)

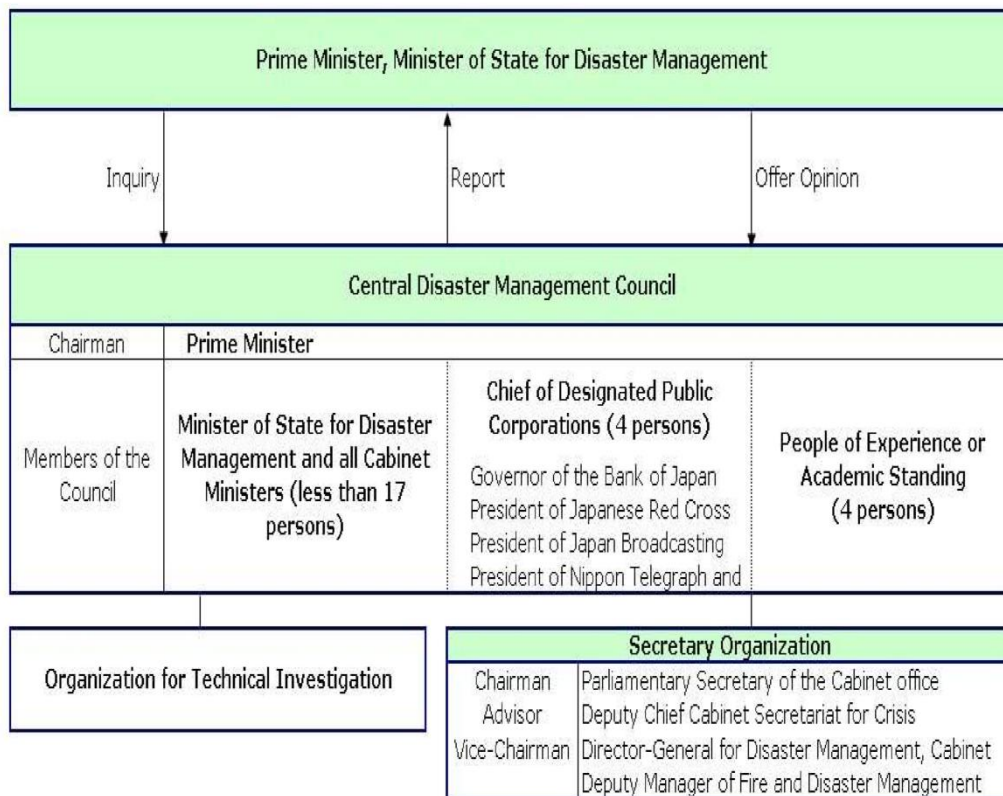
2.3.2 Disaster Management Structure at National Level

The Cabinet Office closely collaborates with relevant ministries and agencies to prevent, respond to, and recover from disasters and works to ensure that the nation prepares strongly for such events.

Under the **Disaster Countermeasures Basic Act of 1961**, the Central Disaster Management Council (CDMC) was formed with the main objective of "ensuring comprehensiveness of disaster management and to discuss matters of importance with regard to disaster management".

The **Central Disaster Management Council** was positioned within the Cabinet Office as one of Cabinet's major policy councils. The Central Disaster Management Council is chaired by the Prime Minister and comprises of Minister of State for Disaster Management, all ministries, heads of major public institutions and experts. Since the reorganization of ministries and agencies in particular, leaders of local public bodies and experts with practical experience have been incorporated as new participants. The council promotes comprehensive disaster countermeasures including deliberating important issues on disaster reduction according to requests from the Prime Minister or Minister of State for Disaster Management. The organization structure of the Central Disaster Management Council is shown in figure 11 and the status of the establishment of CDMC committees is annexed as an annex 3.

Organization Structure of Central Disaster Management Council



Committees for Technical Investigations
On countermeasures for the Tonakai and Nankai Earthquakes (formed October ,2001)
On lessons learned from past disasters (formed July,2003)
On the promotion of Nationwide movement of disaster management (formed December,2005)
On the evacuation measures for the Tokyo inland Earthquake (formed August,2006)
On large scale flood countermeasures (formed August,2006)
On countermeasures for the Tokai Earthquake (formed March,2002-May,2003)
On information sharing of disaster management (formed October,2002-July,2003)
On the promotion of disaster reduction activities by the private sector (September,2003-October,2005)
On countermeasures for the Tokyo inland Earthquake (formed September,2003-July,2005)
On countermeasures for the Trench type Earthquake in the vicinity of the Japan and Chishima Trenches (formed October,2003-January,2006)

Figure 11. Composition of CDMC & Committees for technical investigation

Duties of the CDMC

- Prepare and promote implementation of the Basic Disaster Management Plan and draft the Earthquake Disaster Management Plan.
- Prepare and promote implementation of the urgent measures plan for major disasters.

- Deliberate important matters pertinent to disaster management according to requests from the Prime Minister and/or Minister of State for Disaster Management (general coordination of basic disaster management policies and disaster management measures, declare emergency situations caused by disasters etc.)
- Offer opinions regarding important matters pertinent to disaster management to the Prime Minister and Minister of State for Disaster Management. (DRR Cycle of cabinet office shown in figure 12)

Disaster Risk Reduction Cycle, Cabinet Office, 2005

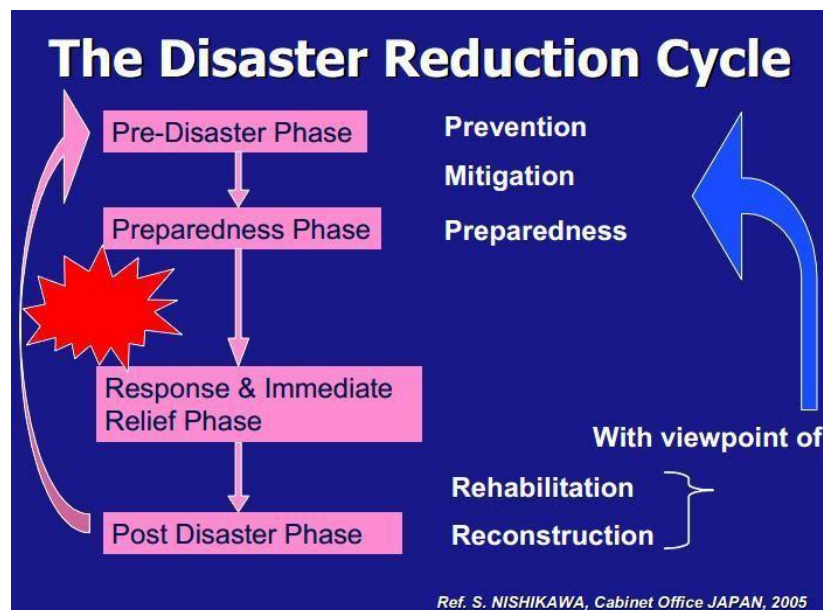
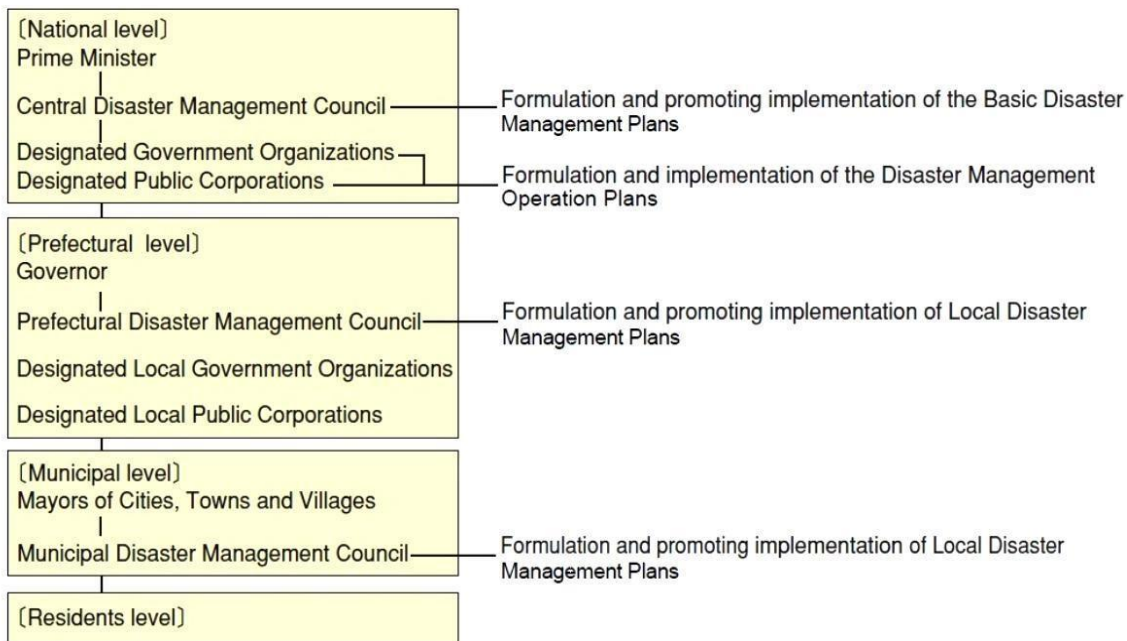


Figure 12. DRR cycle of cabinet office

The DCBA which covers all phases of disaster management and stipulates establishment of disaster management councils at three levels: national – Central Disaster Management Council; Prefectural – Local Disaster Management Council and Municipal Disaster Management Councils as well as defines organization and duties of these councils and defines conditions for establishment of headquarters for disaster control in case of emergency. Structure of disaster management system in Japan is shown in figure 13.

Structure of the Disaster Management System in Japan



Designated government organizations, 23 Ministries and agencies
Designated public cooperation, 63 organizations including bank of Japan, Japanese red cross society, NHK, electric and gas companies and NTT

Figure 13. Disaster management

system in Japan

In prefectures and local municipalities, the prefectural and municipal Disaster Management Councils are established with the members of representatives of local government organizations including police and fire management department, and designated local public corporations. Implementation of disaster risk management measures is based on the Local Disaster Management Plans drafted by the Councils.

2.3.3 Disaster Management Planning

Basic Disaster Management Plan is the master plan and a basis for disaster reduction activities in Japan.

Disaster Management Operation Plan is a plan made by each designated government organization and designated public corporation, and

Local Disaster Management Plan is a plan made by each prefectural and municipal disaster management council, based on the Basic Disaster Management Plan. Structure of Disaster management planning system of Japan is shown in figure 14.

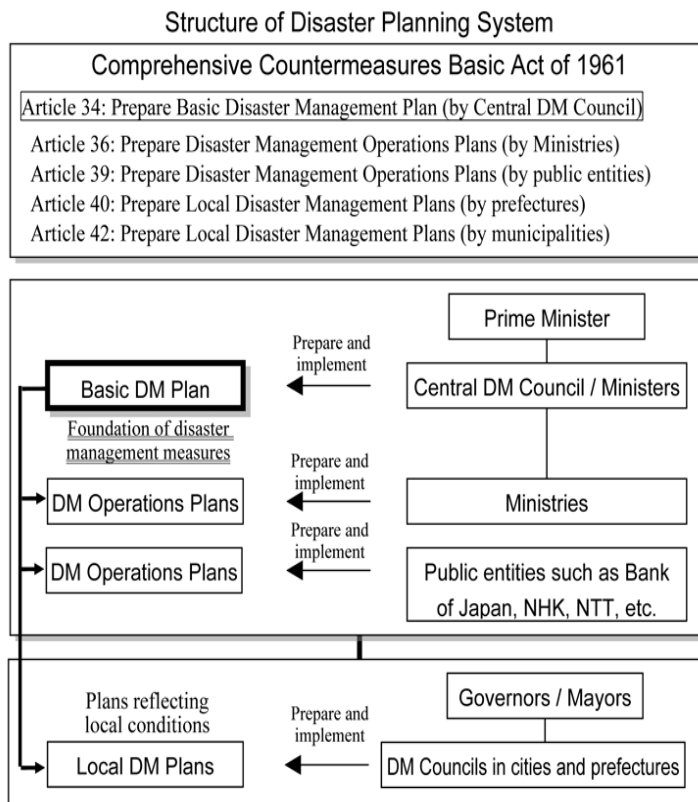


Figure 14. The Structure of disaster management planning

Basic Disaster Management Plan is prepared by the Central Disaster Management Council in accordance with Article 34 of the Disaster Countermeasures Basic Act. The plan clarifies the duties assigned to the Government, public corporations and the local government in implementing measures. For easy reference to countermeasures, the plan also describes the sequence of disaster countermeasures such as preparation, emergency response, recovery and reconstruction according to the type of disaster. The structure of basic disaster management plan is shown in figure 15.



Figure 15. Structure of basic disaster management plan

The Disaster Management Planning System comprises:

- i. The Basic Disaster Management Plan - BDMP sets forth the basic activities for each type of disaster management plan, which is the foundation of the nation's disaster management measures. It was entirely revised on the light of the 1995 Great Hanshin-Awaji Earthquake clarifying roles and responsibilities of every administrative body and providing guidelines for preparedness, emergency response and recovery and reconstruction, according to the type of disaster. (BDMP in each level is shown in figure 16)



Figure 16. BDMP in each level

- ii. The Disaster Management Operation Plan, prepared by different administrative Organizations and Public Corporations according to the guidelines on the BDMP.

- iii. Local Disaster Management Plan, prepared by each prefecture and municipal disaster management council taking into account local conditions and the BDMP.
- iv. The recently revised Disaster countermeasures basic act recommends the development of “Community Disaster Management Plans” for each community which specifies the actions to be taken at the site, or at the community level, during a disaster. Kobe city community disaster management plan is developed for each disaster-safe welfare community called BOKOMI

2.3.4 National Development Plan

The National Development Plan strongly incorporates aspects related to safety, mitigation and risk reduction countermeasures as one of the five fundamental objectives of the country. The national vision of "making Japan a safe and comfortable place to live" is prioritized through a well understood criteria of minimizing the damage caused by earthquakes and other natural hazards. National disaster risk reduction coordination mechanism is shown in figure 17.

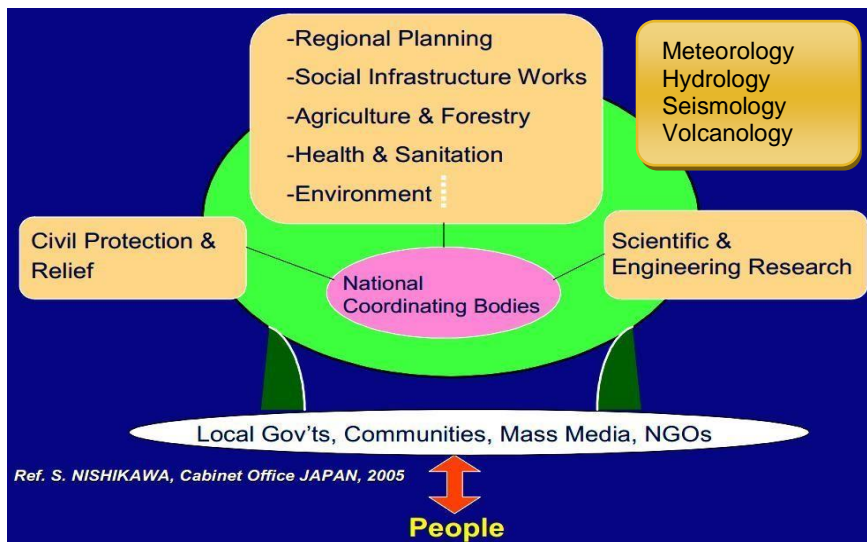


Figure 17. Disaster Risk Management coordination scheme in Japan

1. Sectorial plans which incorporate risk reduction into development

1. Comprehensive National Development Plan (provision of nation-wide spatial plan)

This is a comprehensive plan setting out Japan’s policy on developing its national territory, based on the Comprehensive National Development Act. Drafted in 1998, this Plan identifies “making Japan a safe and comfortable place to live” as one of the five fundamental objectives of national development, and defines its aim as improving the country’s safety

with regard to large-scale earthquakes and other natural disasters. “Disaster mitigation counter risk reduction measures” based on the principle of minimizing the damage caused by disasters prioritized as the main task.

Specific objectives are: establishing a disaster-resilient transport and communications infrastructure; introducing public works design standards commensurate with their importance; promoting the assurance of earthquake-resistance capacity in buildings; establishing an earthquake watch network and other disaster watch systems; promoting research into disasters and their prevention; assessing and publishing the degree of risk of local disasters, and reflecting this information in local development and land use; providing disaster management manuals for local, corporate and administrative bodies, tailored to specific disaster type and scale; establishing systems enabling an appropriate response to be mounted in the event of a disaster, such as strengthening information-relaying systems, evacuation, aid and rescue systems, volunteer-dispatch systems, and backup systems for administrative functions and company activities; and provisions for people requiring help in the event of a disaster.

2. Social Infrastructure Development Priority Plan (provision of social infrastructure)

This is a long-term plan aimed at ensuring that social infrastructure development projects are implemented in a focused, effective and efficient manner. Before March 2002, social infrastructure had been created in accordance with long-term plans specific to operational areas (roads, traffic safety facilities, airports, ports, municipal parks, sewers, flood control, steep slopes, coastal cliffs), but from April 2002 onwards, efforts have been made to improve liaison and efficiency of communication between these operational departments as much as possible, through the implementation of the Social Infrastructure Development Priority Plan. The most important issues are the establishment of facilities to prevent flood damage, facilities and systems for the real-time relaying of information on floods and other natural disasters, evacuation sites and routes, disaster risk reduction facilities, and routes for the provision of aid in the event of disaster.

3. Long-Term Plan for Land Improvement (improvement of agricultural areas and land)

The aims of this Plan are to mitigate disaster-related damage to agricultural industry, and to increase safety and peace of mind in provincial communities. Specifically, it is focused on agricultural areas where flood damage was anticipated.

4. Forestry Maintenance and Conservation Projects Plan (forestry)

This is a long-term plan relating to forest maintenance and afforestation projects aimed at maintaining and conserving forests in an appropriate manner. “Creating a society where citizens can live their lives with peace of mind” by preventing landslide disasters through the regeneration of damaged forests and the prevention of further forest damage was

specified as one of the Plan's objectives. One of its concrete goals was to increase the number of communities whose surrounding forests have been subjected to mountain disaster-proofing.

5. Ministerial Ordinance Governing Technical Standards for Water Supply Facilities (water supply operations)

This Ministerial Ordinance includes the following requirements regarding water supply facilities. Consideration must be given to ensuring that in case of disaster or other emergency, the suspension of the water supply and other adverse effects on the water supply were minimized; consideration must also be given to ensuring that recovery can be achieved speedily.

Bearing in mind topography, geology and other natural conditions, facilities must be structurally safe with regard to their own weight and the loads they were required to bear, water pressure, earth pressure, uplift pressure, buoyancy, seismic force, weight of accumulated snow, ice pressure, thermal load and other foreseeable loads.

Besides having structural safety with regard to seismic force, commensurate with their importance, facility construction must give consideration to the impact of liquefaction, lateral flow and other phenomena produced by earthquakes.

In order to prevent damage spreading in the event of an earthquake or other emergency, cutoff valves and other necessary fixtures must be provided as required.

Other requirements for disaster-proof construction were set out regarding water intake facilities, water storage facilities and other types of facilities.

2.3.5 National Land Use Management System and Relevant Legislation

The Ministry of Land Infrastructure Transport and Tourism (MLIT) was established in 2001, through the consolidation of the former Ministry of Construction, Ministry of Transport, National Land Agency and Hokkaido Development Agency. MLIT's responsibilities include collectively promoting national land planning policies, infrastructure policies, social fund maintenance and transport policies. The Ministry's overall responsibility is to conceive and implement a concrete vision of how to comprehensively harmonize and develop the physical, economic and social infrastructures of Japan. Its purpose is to maintain the viability of the country's land, while ensuring a mobile environment that enables both the government and private sector to develop their potential.

MLIT has established the following five objectives in order to carry out these goals:

- 1) Supporting Joyful Life,
- 2) Enhancing Global Competitiveness,
- 3) National Safety,
- 4) Preserve and Create a Beautiful and Benign Environment, and
- 5) Enhancing Regional Diversity.

National and regional development plans and land use plans based on necessary research are developed every five years. Among the different policies that the Ministry promotes, two have been taken as good examples of comprehensive land use and management practices:

I. Building a favorable urban environment

MLIT pursues zero emissions of waste in metropolitan areas. To this end, the ministry strives to reduce, reuse, and recycle waste to "close the loop" of resource circulation. To revitalize urban environment infrastructure, MLIT implements a number of measures including:

- (i) Conserving, regenerating or creating precious natural environments in metropolitan areas,
- (ii) Creating green zones in waterfront areas and expanding green zones in urban areas,
- (iii) Reviving rivers and seas.

II. Promoting urban development initiatives by the private sector

A total of 63 areas (as of the end of December 2004) have been designated as "the Prompt Development Area for "Urban Renaissance" under the Special Measures Act for Urban Renaissance. In these areas, various projects are well underway. For example, business and commercial buildings opened one after another in the area surrounding Tokyo and Yurakucho stations. A basic plan has been developed to build a hub for international business and cultural exchange in the area around Osaka Station, the Nakanoshima area and the area in and around Midosuji. A redevelopment project has been completed in the area centering on Takamatsu Station and the Marugame-town area.

The National Institute for Land and Infrastructure Management (NILIM), which is part of the MLIT, performs research that contributes to the planning and enactment of technology policies to achieve the goal of creating a beautiful national land with safety and vitality in order to increase the satisfaction of the people who are the end users of housing and infrastructure. To accomplish this goal, NILIM promotes the following:

- Creation of a beautiful national land to support sustainable society in Japan and one that is safe against natural disasters
- Creation of a comfortable living environment
- Regional management interacting with public involvement
- Creation of a comfortable housing market
- Creation of society with vitality and regions with individuality
- Achievement of smooth exchange of people and efficient flow of goods, revitalization of activity in the city and the region
- Improvement of methods of managing housing and infrastructure, technological standard and contract methods and options for evaluating policies and public service
- Creation of society with vitality utilizing IT (Information Technology)

2.3.6 Business Continuity Planning (BCP)

Japanese impacted by large-scale disasters such as Earthquake and Tsunami with the return period of hundred years. Due to such events all the services will be disrupted for an instance transportation disrupted, electricity services disrupted, water, gas, telecommunications and shutdown of all nuclear power plant for checkup. Also the emergency response agencies also struggle to carry out their operations due to the loss of human and equipment. At the same time other organizations such as banks, insurance cooperation's and private sector organizations also struggled to continue their services. After the disaster they suffered to recover the damage of buildings & infrastructures, break of supply chain and loss of livelihoods. Damage to the private sector due the great east earthquake in 2011 is shown in figure 18.

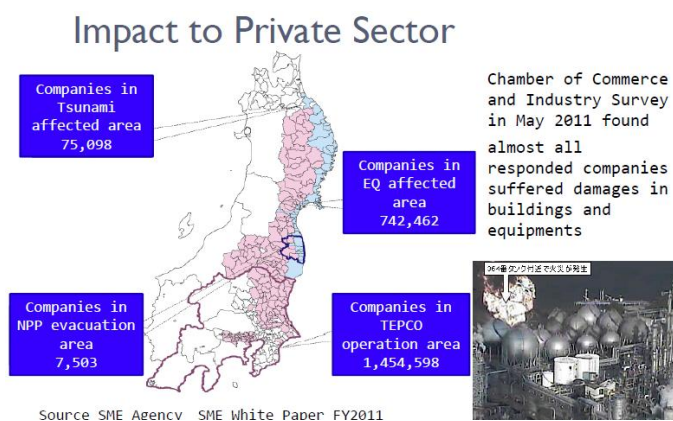


Figure 18. Damage to the private sector due to the great east earthquake

To mitigate the risk of disruption happen to such organizations due to potential threats, need a Plan to pursue business continuity by introducing BCP (the concept of BCP is shown in figure 19).

Basic components of BCP are as follows,

- Policy & strategy
- Damage estimation
- Priority
- Recovery time objective
- Backup system and office
- Keep persons in charge
- Safety confirmation

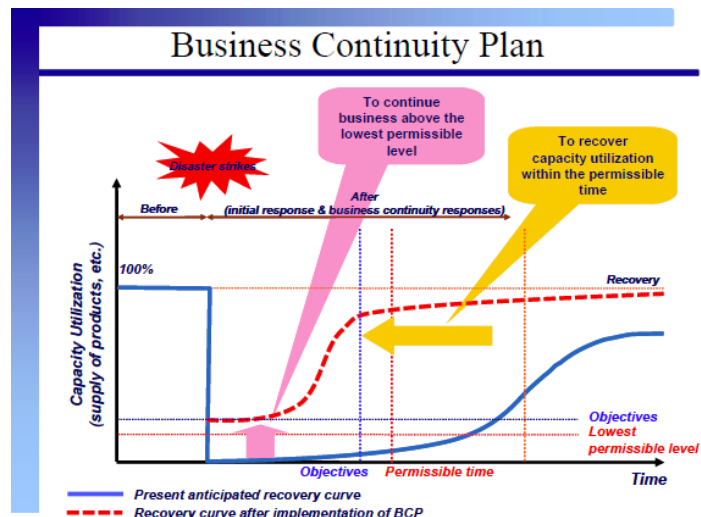


Figure 19. The concept of Business Continuity Planning

2.3.7 Building Standard Law (BSL)

Japan has the Building Standard Law (enacted in 1950) and the Act for Promotion of the Earthquake Proof Retrofitting of Buildings (enacted in 1995). It has been confirmed that buildings constructed under the revised Building Standard Law (known as the “New Seismic Design Method”) enacted in 1981 have adequate earthquake resistance. But Japanese disaster management authorities revisit the BSL after a disaster and introduced new amendments. Following figure 20 is showing the development of earthquake resistance measures

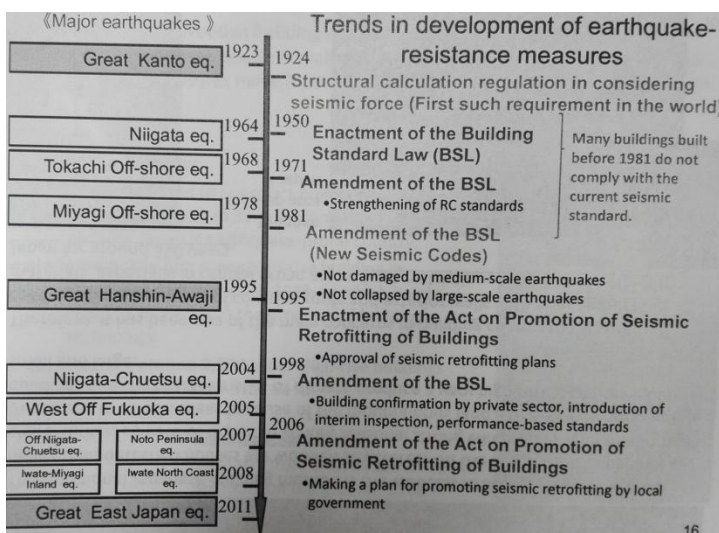


Figure 20. Amendments of BSL towards resilient buildings

On the other hand, many buildings in Japan (roughly one-third of the total) have inadequate earthquake resistance because they had been built before the relevant standards were tightened in 1981; it has been pointed out that little progress is being made in improving the earthquake resistance of these aged buildings.

Building Research Institute

The BRI is actively involved in response measures taken in immediate aftermath of earthquakes, as well as in reconstruction measures. Initially, the BRI conducts preliminary damage assessments of buildings just after an earthquake hit the area thereby defining which buildings is still strong enough to bear the shock which are not capable enough to sustain(As shown in figure 21). Having completed assessment of each building BRI specialist attaches a special sticker on which enables to define vulnerability level of a building. The measure helps to avoid future human injury and loss as well as identify possible evacuations point. As a long term measures the BRI is conducting research for building seismic resistant buildings and seismic retrofiting techniques.

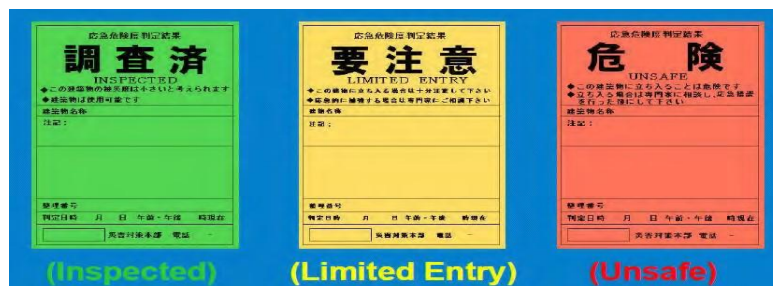


Figure 21. BRI disaster response – building assessment stickers

As it was mentioned above, taking into account of the frequency and the scale of natural disasters in Japan designated public and government organizations both at each level (national, prefectural and municipality) are obliged to integrate disaster management measures to its general activities.

2.3.8 Allocation of the Annual Budget for Disaster Risk Reduction

Disaster risk reduction is covered in the state budget. In fiscal year 2015, the budget for disaster risk reduction was approximately 3.4 trillion yen, which is about 4% of the total general-account budget (from 1962 to 2015, budget allocations for DM activates by the Government of Japan is annexed as annex 4).

2.3.9 Stakeholder Participation in Disaster Risk Reduction

Under the Disaster Countermeasures Basic Act, private sector, persons with responsibilities regarding disaster risk reduction must fulfill their responsibilities faithfully, and local residents, besides taking measures to prepare for disasters, also make efforts to contribute disaster risk reduction by, participating in voluntary disaster risk reduction activities. Specifically, public bodies as well as legal bodies carrying on public business designated by the Prime Minister under the Disaster Countermeasures Basic Act (public institutions such as the Bank of Japan, and corporations running public operations such as electricity and transport) were obliged to participate in the Central Disaster Management Council and draft disaster risk reduction operations plans based on the Basic Plan for Disaster Management, and also bear a range of responsibilities regarding disaster risk reduction activities, including cooperation, in the event of a disaster.

Other private companies were also given more opportunities to participate in evacuation drills and to contribute to society by being involved in disaster risk reduction activities including developing products with extra disaster risk reduction functions.

Academic bodies are playing a major role in carrying out scientific and technical research on disaster risk reduction, and performing voluntary activities including research on natural phenomena such as typhoons, torrential rains, earthquakes and volcanic eruptions. Working in cooperation with the government, they are supplying expert technical knowledge to the Central Disaster Management Council and a range of specialist investigative committees.

As for the mass-media, NHK (Nippon Hoso Kyokai/Japan Broadcasting Corporation) and the commercial TV stations broadcast subtitles for news-flashes, information about earthquakes, tsunami and meteorological disasters, and volcanic eruption warnings. They also broadcast special disaster features as appropriate, and make a concerted effort to raise awareness about disaster risk reduction. At the local community level, fire-fighting and flood protection groups have always been active. Members of volunteer fire-fighting groups carrying out fire-fighting activities usually have full-time jobs, and spring in to action when fires break out, motivated by the desire to protect their homes. In recent years, these groups have been facing a number of problems such as dwindling and ageing membership, and an increase in the proportion of members who have full-time jobs.

All over Japan, initiatives aimed at “creating disaster-proof living zones” in the private-sector, spearheaded by companies, citizens and NPOs working in cooperation. A good example of this

kind of collaboration between the private and public sector, including local public bodies, was the Local Council for Countermeasures Regarding Displaced Residents in the Vicinity of Tokyo Station and Yuraku-cho Station.

2.3.10 Volunteerism in Disaster Risk Reduction

There has been an increase in the number of voluntary disaster risk reduction organizations, including women's and young people's groups, carrying out various disaster risk reduction activities on a regular basis.

Since the Great Hanshin-Awaji Earthquake (1995 Kobe Earthquake), the importance of voluntary activities in disaster risk reduction has become widely recognized, and events revolving around disaster risk reduction and volunteers are now held annually on January 17, which has been designated Disaster Management and Volunteer Day, and over Disaster Management and Volunteer Week, which runs from January 15 to 21.

The Disaster Countermeasures Basic Act explicitly states that national and local public bodies must endeavor to provide an environment conducive to the performance of voluntary disaster risk reduction activities.

Although volunteers also turn out in large numbers in the event of an actual disaster, much remains to be done in terms of creating conditions conducive to the effective utilization of voluntary activities. Depending on the situation in the area, this issue is being addressed by either making sure the community is already aware of the existence and running of volunteer centers, or by setting up and running new volunteer centers based around Community-Based Organizations (COBs), to aid the absorption of volunteers from outside the local area, and to coordinate their activities.

The efforts of disaster risk reduction volunteers are important when things are normal as well as in times of disaster.

2.3.11 International Emergency Response

Japan Disaster Relief Team (JDR)

In case of large-scale disaster strikes in any part of the earth, JDR will be carried out through their emergency relief assistance upon the request of the disaster-affected country through the Ministry of Foreign Affairs of Japan. The JICA based Disaster Relief Team will operate within the framework of its Disaster Relief Program.

To maintain the rapid and reliable needed relief supplies in bulk amount, JICA must reserve large stocks of supplies, also have to procure appropriately stockpiled in advance and locate closest possible place near to disaster affected areas. Accordingly, JICA possessed warehouses in four locations worldwide, Germany (Frankfurt), Singapore, the United States (Miami) and South Africa (Johannesburg). Eight priority goods are stockpiled at these four locations—tents, sleeping pads, plastic sheeting (tarpaulins), blankets, portable water containers (plastic jerry cans), water tanks, water purifiers and electric generators. In cases where other types of supplies are required, JICA takes emergency action, including procurement in affected or neighboring countries. When requested, emergency medical supplies are procured from the United Nations Children's Fund (UNICEF) Supply Division in Denmark or the International Dispensary Association (IDA) in Netherlands and shipped to affected countries.

There are four types of JDR teams as shown in figure 22. They are dispatched as appropriate.





Dispatch Team	Composition	Activity	Duration
 <p>Search and Rescue Team</p>	National Police, Fire and Disaster Management, Coast Guard, MOFA, JICA,	Search and rescue victims trapped in collapsed structures	Approx 7 to 10 days
 <p>Medical Team</p>	Doctors, nurses, pharmacists Team head (MOFA) Team Coordinator (JICA)	Urgent medical assistance including patient treatment	Approx 2 weeks
 <p>Expert Team</p>	Experts provided from 14 related Ministries of Japan	Technical advice or guidance on disaster prevention and damage mitigation based on an assessment of the situation.	Approx 2 weeks
 <p>Self-Defense Force Unit</p>	Ground, Maritime, Air Self-Defense forces 50-1000 persons depends on number of dispatched team	Search and rescue, medical assistance (including disease control) Air and sea transport and water supply	Approx 2 weeks to 2 months

Figure 22. Structure of the JDR

2.3.12 Disaster Assessments

1. Hazard Mapping/Assessment

Japan has carried out hazard mapping with regard to tsunamis, tidal waves, flooding, volcanic eruptions and earthquakes. Progress has also been made in the development of dynamic flood

hazard maps which predict how the flooding will spread over time. The scale of these maps varies from 1/2,500 to 1/25,000 according to purpose.

Many hazard maps have been drafted by municipalities' bylaw: the Cabinet Office, the Ministry of Agriculture, Forestry and Fisheries of Japan, the Fisheries Agency, the Ministry of Land, Infrastructure and Transport and other agencies have drawn up manuals on the subject. Many of these maps have been made available to the general public on the internet and elsewhere. Several examples of hazard maps are attached as annex 5.

2. Vulnerability and Capacity Assessments

- Assessment of vulnerability:

The Central Disaster Management Council and local governments have anticipated the damage that would be caused in the event of a major earthquake, and have assessed vulnerability by, among others, evaluating the earthquake resistance of buildings and infrastructure in as well as by appraising the awareness of community members with regard to disaster risk reduction.

- Assessment of disaster-management capacity:

The Fire and Disaster Management Agency has drawn up a procedure enabling local public bodies to make an objective assessment of their own disaster risk reduction and crisis-management systems. Assessment is carried out using results based on replies to roughly 800 questions.

Department responsible: Disaster Management Division, Fire and Disaster Management Agency, Ministry of Public Management, Home Affairs, Posts and Telecommunications.

- Self-evaluation Method for Disaster Prevention:

The Cabinet Office provides with an efficient methodology to self-evaluate and moreover enhance community-base performance to collect information, foresee probable disaster and ensure quick evacuation. Currently, two evaluation methods/systems for sediment disaster as well as flood are available on Web page.

Department responsible: [Director for Disaster Preparedness, Cabinet Office for Disaster Management.](#)

3. Risk Monitoring and Risk Mapping

Provision for monitoring and hazard mapping and keeping the public informed regarding disaster countermeasures is included in the country's basic disaster-risk reduction plan. The institutions responsible are relevant government agencies and local governments.

4. Disaster Impact Assessment and Damage & loss Assessment

Although Japan's central government did not carry out this kind of analysis regarding all disasters, the competent administrative bodies assess disaster damage with regard to rivers, roads, forestry and fisheries facilities, educational facilities, health and welfare facilities and other public facilities in order to expedite their swift recovery. The stricken area is subjected to disaster damage assessment from the viewpoint of providing state aid for the recovery operation.

In addition to this, loss assessment is carried out by private-sector think-tanks and local government bodies. The damage caused by the Great Hanshin-Awaji Earthquake (1995 Kobe Earthquake), for example, was estimated (by Hyogo Prefectural Government) at approximately 10 trillion yen. In the case of the 2003 Tokachioki Earthquake, damage was estimated (by the Hokkaido Prefectural Government) at approximately 25.4 billion yen. These results have been published and are available for use. For the purpose of inheriting the experiences and knowledge precisely, increasing disaster management consciousness and being useful for disaster management after this on past large disasters, Organization of Central Disaster Management Council established Organization for the Technical Investigation on Disaster Lessons (October 2003). The organization systematically pigeonholes information of the state of the damage, response of authorities, inferences on people living condition and socio-economic impacts.

2.4 Early Warning Systems

All of Japan's national territory was covered by early warning systems for storms, blizzards, torrential rains, heavy snow, landslides of various kinds, tsunamis, tidal waves, inundation and floods, the Ministry of Land, Infrastructure and Transport, the Japan Meteorological Agency and local government bodies being the main institutions involved. Areas deemed to be at particularly high risk of earthquake or volcanic eruptions are also covered by specific countermeasures.

The lesson learned from public reaction to Early Warnings is that evacuation is too slow as per the JMA presented. Another fact that residents of stricken areas who had previously seen the flood hazard map started their evacuating activities about an hour earlier than residents who

had not seen the map. Besides raising individual awareness, more effort needs to be made by those issuing early warnings such as improving the reliability of meteorological warnings.

A system has also been developed whereby the size of an earthquake and its epicenter can be estimated instantly from its preliminary tremors (or “P wave”), enabling alerts to be sent out, mere seconds after the P-wave arrives, to local governments and fire-fighting headquarters all over Japan. This system has been operating on a trial basis since February 2004.



2.4.1 Japan Meteorological Agency

JMA is semi-autonomous agency under the purview of the MLIT. Besides, function as central weather service agency of Japan, the agency is responsible to provide information such as advisories, warnings and other weather related information and established comprehensive surveillance and awareness mechanism with regard to hydro-metrological hazards and seismic hazards like earthquake, tsunami and volcano hazards. Regarding flood forecast Director-General of Japan Meteorological Agency (JMA) in the event of the imminence of a flood or storm surge due to typhoons, informs to the Director-General of MLIT and the prefectural governors about the present state. Figure 23 is showing the roles and responsibilities of JMA while figure 24 showing the framework of forecasting operations. The organization structure of JMA is shown in figure 25.

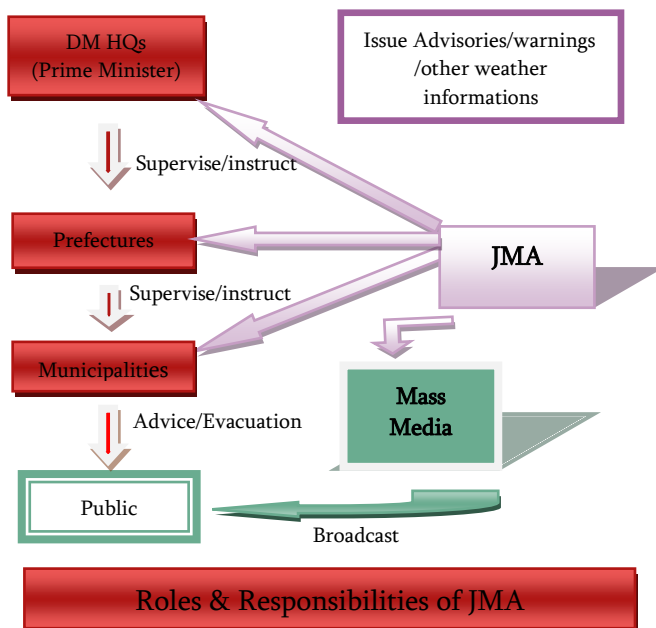


Figure23. Roles & responsibilities of JMA

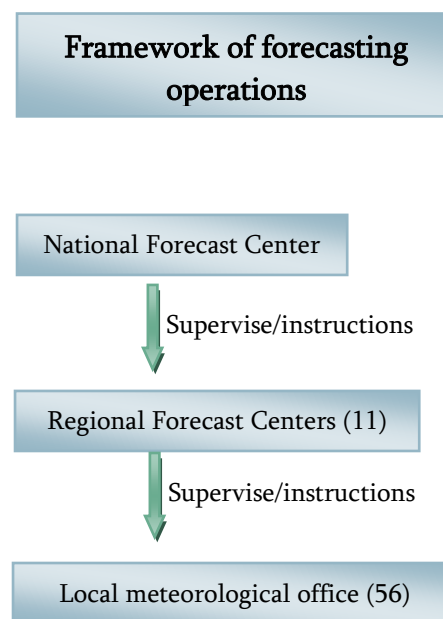


Figure24. Framework of operations of JMA

Organization of JMA

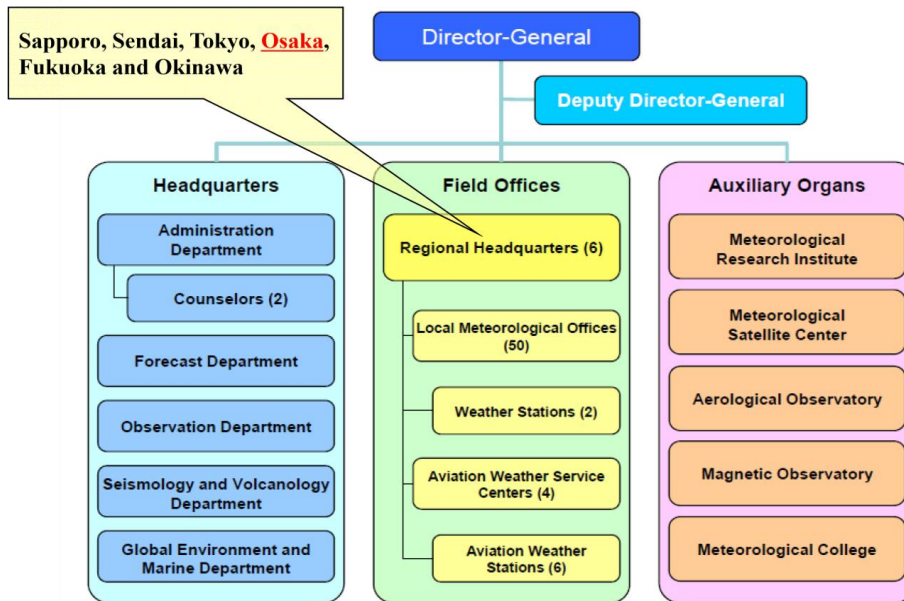


Figure 25. Organization structure of JMA

1. Primary Responsibilities of RHQ

- To direct local meteorological offices, aviation weather service center and aviation weather stations
- To serve as the regional meteorological center for six prefectures.
- To serve as the RHQ for local meteorological offices.
- To provide backup operations for the JMA headquarters in case of its loss of functions (e.g., due to Tokyo inland earthquake).

2. Early Warning dissemination mechanism of JMA

As per the BCMA JMA is the mandated agency for EW dissemination in Japan. Therefore they develop their EW mechanism with all the relevant stakeholder agencies (as shown in figure 26 & 27).

Information Provided by JMA for Weather Disaster Mitigation

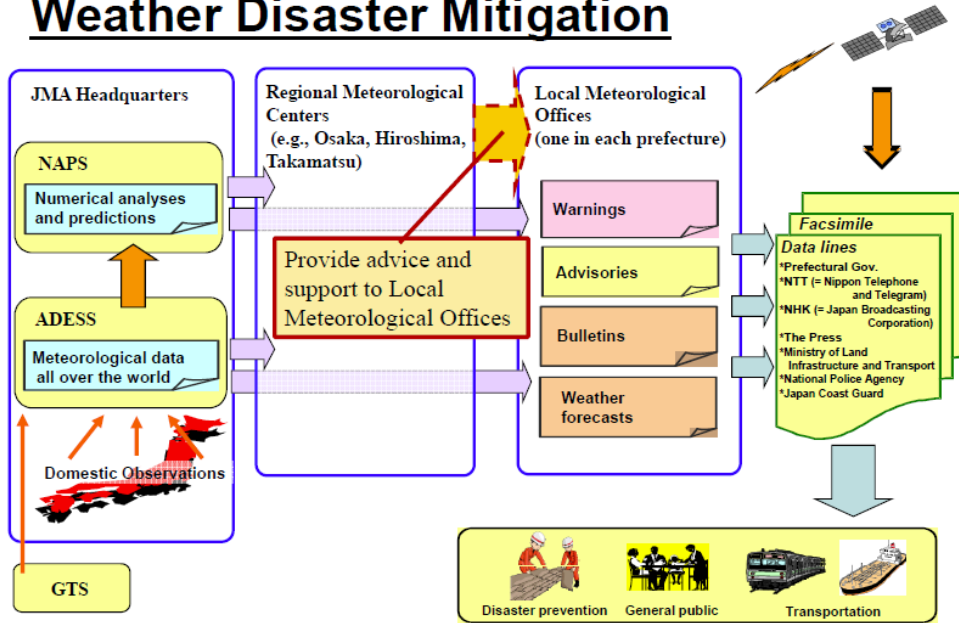


Figure 26. Mechanism of disseminating weather information by JMA

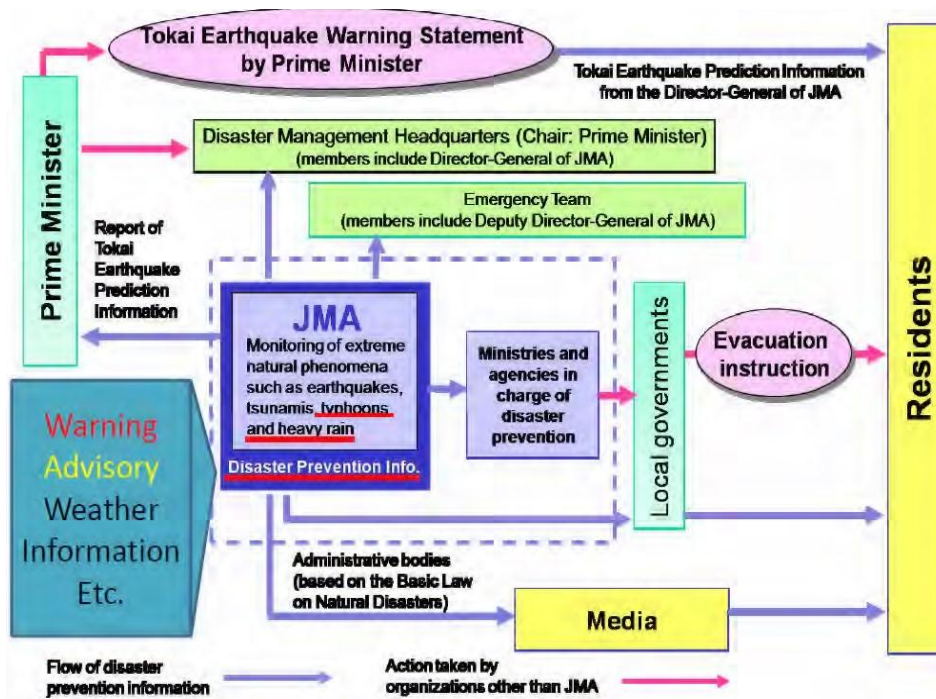


Figure 27. Last mile dissemination of weather information by JMA

Following examples will further elaborate the impact of EW dissemination mechanism of Japan

Example 1: Usuzan Volcanic Eruption (March 2000)

The seismic activity which began on the morning of March 27 became gradually more pronounced, and on March 29, the Coordinating Committee for the Prediction of Volcanic Eruptions deemed the possibility of an imminent eruption to be high. Thus notified, the Japan

Meteorological Agency issued an emergency volcanic alert. In response to this, the relevant local government bodies issued evacuation instructions, and the local residents (numbering up to 15,815) were swiftly evacuated before the eruption took place. Thanks to this, and to the establishment of the Mount Usu On-Site Liaison Association (renamed the Mount Usu On-Site Disaster Management Headquarters after the eruption) comprised of the central and local governments, plus 41 other organizations, and the first such body to be established in Japan before a volcanic eruption sound disaster risk-reduction countermeasures were adopted, and large-scale loss of life was averted.

Example 2: Torrential Rains in Southwest Kochi Prefecture (September 2001)

On September 6, record-breaking rains fell in Tosashimizu, Sukumo, Otsuki Mihara and other parts of southwest Kochi prefecture. However, an alert was issued through the early announcement of a heavy rain warning based on a forecast by the Japan Meteorological Agency. In the course of the warning announcements, disaster alerts specific to the relevant municipalities were also issued with regard to localities where the danger of landslide disasters was deemed to be particularly high, judging from the current rainfall status and forecast. Consequently, the local residents voluntarily completed their evacuation in good time, and although mountain-area ground collapses and debris flow occurred in over 1,000 locations in Kochi prefecture, a damage to human lives was averted.

For Sediment related hazards and revering flood the Director-General of JMA jointly issue the EW with MLIT Regional Bureaus. For a class A river the prefectural governors with handle the,

- ◇ water level or discharge if the possibility of flooding is deemed high or
- ◇ Water level or discharge, or the flood hazard area and the flood water depth if flooding has already occurred.

Prefectural governors communicate the information received from both JMA and MLIT as mention above and deploying flood protection managers, collect analysis of situation ,coordinate response agencies ,sharing information for DIS disaster information system of cabinet office and cooperate with cabinet secretariat and relevant ministries and agencies as shown in figure 28.

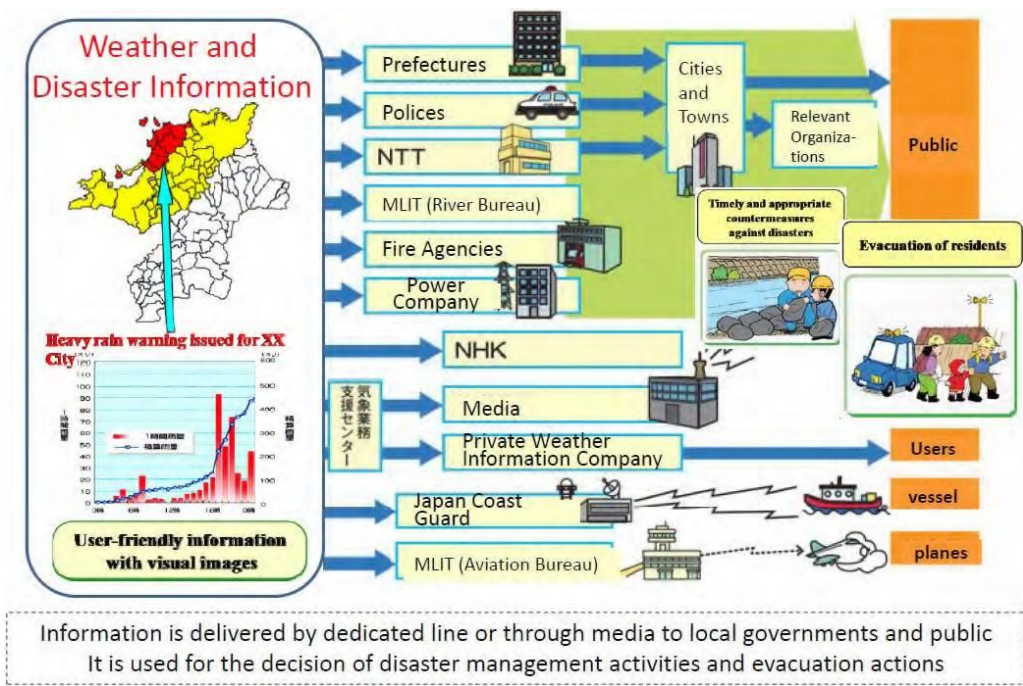
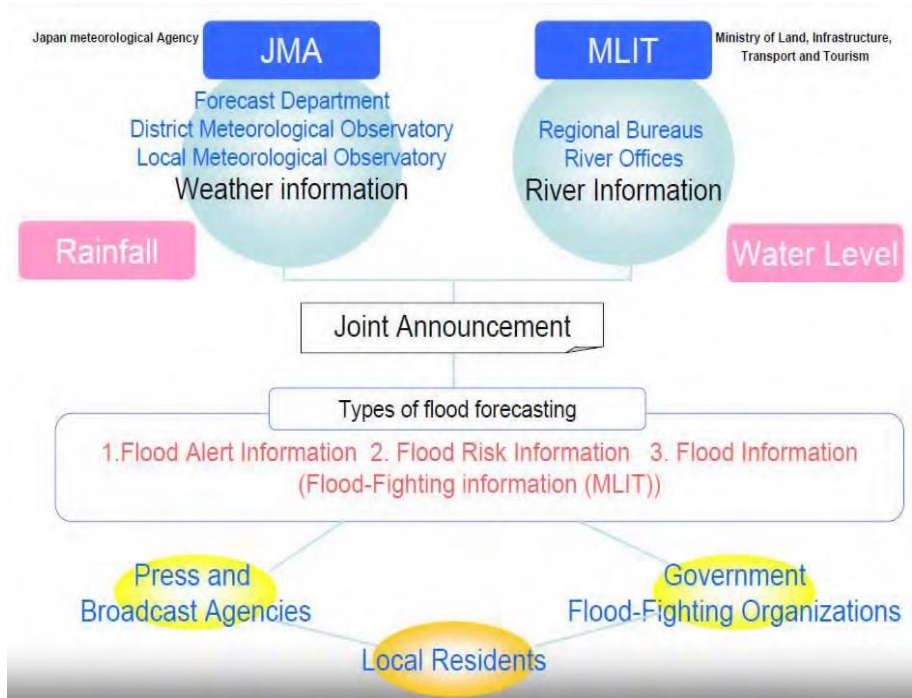


Figure 28. Flood warning Information Dissemination by JMA, Jointly with MLIT



2.4.2 NHK – Japan Broadcasting Company

As one of the public corporations designated for disaster management under the Disaster Countermeasure Basic Act, NHK plays the key role in disaster broadcasting and emergency warning. NHK has dedicated vast resources for emergency response. Also they developed effective coordination mechanism with other stakeholder agencies, mainly with the JMA. If a large-scale earthquake occurs, that information automatically redirected to NHK within few seconds. Moreover, NHK has installed their seismic meters in 73 different locations countrywide. This enables to issue alert & early warning, provide necessary information regarding the magnitude and epicenter of the earthquake as well as tsunami information nationwide. Emergency Warning System (EWS) utilized in JMA is only if special emergency cases such as large-scale tsunami (as shown in figure 29) and earthquake warnings based on the request of governors and mayors. NHK owned 4 TV channels and 3 radio channels, to alert as many people as possible they can switches to television and radios automatically. Since 1985 they broadcast 18 EWS alert for tsunami warnings, while they held transmission in every month and emergency drills every day.



Figure 29. NHK Tsunami warning broadcasting

To broadcast live telecast from site NHK used their own 14 helicopters which are equipped with necessary devices for live broadcasting and stationed at 12 locations. Also 460 remote controlled cameras installed countrywide.

In addition to that NHK launched their official web-page which provides disaster and weather information online. (As shown in figure 30)

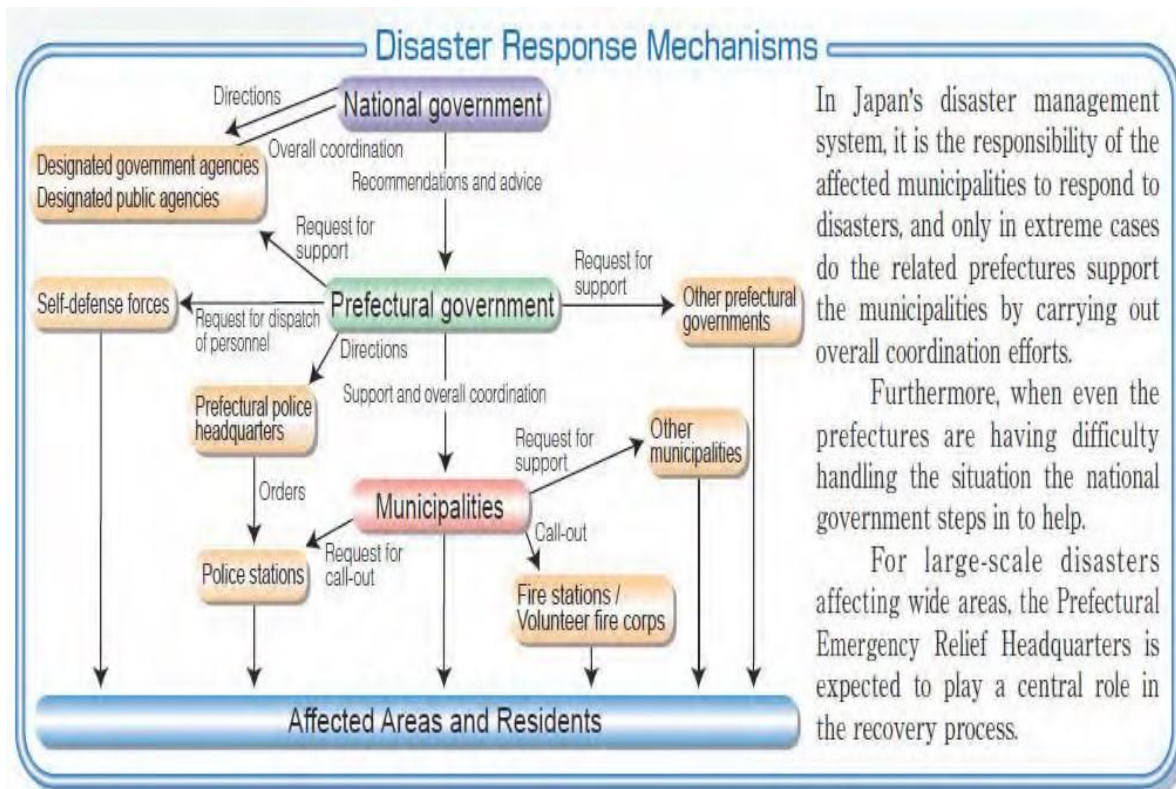


Figure 30. NHK official web-page live volcano eruption broadcasting

2.5 Emergency Response Mechanism at each level

As per the DCBA of Japan entire disaster management framework is divided in to three levels; national, prefectural and municipal levels. Therefore the emergency response phase in Japan is managed at each level. It is the mandated responsibility of municipalities to carry out emergency response activates during emergencies, such as firefighting, search & rescue, ambulance service within its territory whereas prefectural governments are authorized to render assistance. National government and its relevant bodies oversee the whole coordination process during emergency situations and provide local governments with necessary assistance and guidance for the better response. While local governments provide the national government agency with the loss and damage information (As shown in figure 31).

If the disaster event exceeded its coping capacity of the local government national government involve with its own disaster response mechanisms. On-site emergency headquarters of organizations such as electric power corporations, Japan Railway Company etc. were established Depending on the scale of the disaster scenario. The national government collects relevant disaster information at the Cabinet Information Center regularly at the time of a large-scale disaster. The director-generals of the designated emergency response team of the respective ministries and agencies gathers immediately at the Crisis Management Center established in the Prime Minister’s Office to analyze the disaster situation, and advised to the Prime Minister. If necessary senior officials of the relevant stakeholder ministries and agencies gathered to discuss basic response policies needed to implement. According to the severity of damage, the National government may establish a Major Disaster Management Headquarters headed by the Minister of State for Disaster Management or an Extreme Disaster Management Headquarters headed by the Prime Minister. Further, a government investigation team headed by the Minister of State for Disaster Management may be dispatched to the disaster affected area, or an on-site disaster management headquarters will be established. Disaster response mechanism of cabinet office is shown in figure 32.



In Japan's disaster management system, it is the responsibility of the affected municipalities to respond to disasters, and only in extreme cases do the related prefectures support the municipalities by carrying out overall coordination efforts. Furthermore, when even the prefectures are having difficulty handling the situation the national government steps in to help. For large-scale disasters affecting wide areas, the Prefectural Emergency Relief Headquarters is expected to play a central role in the recovery process.

Figure 31. Disaster Response Mechanism in Japan

Disaster response mechanism of cabinet office

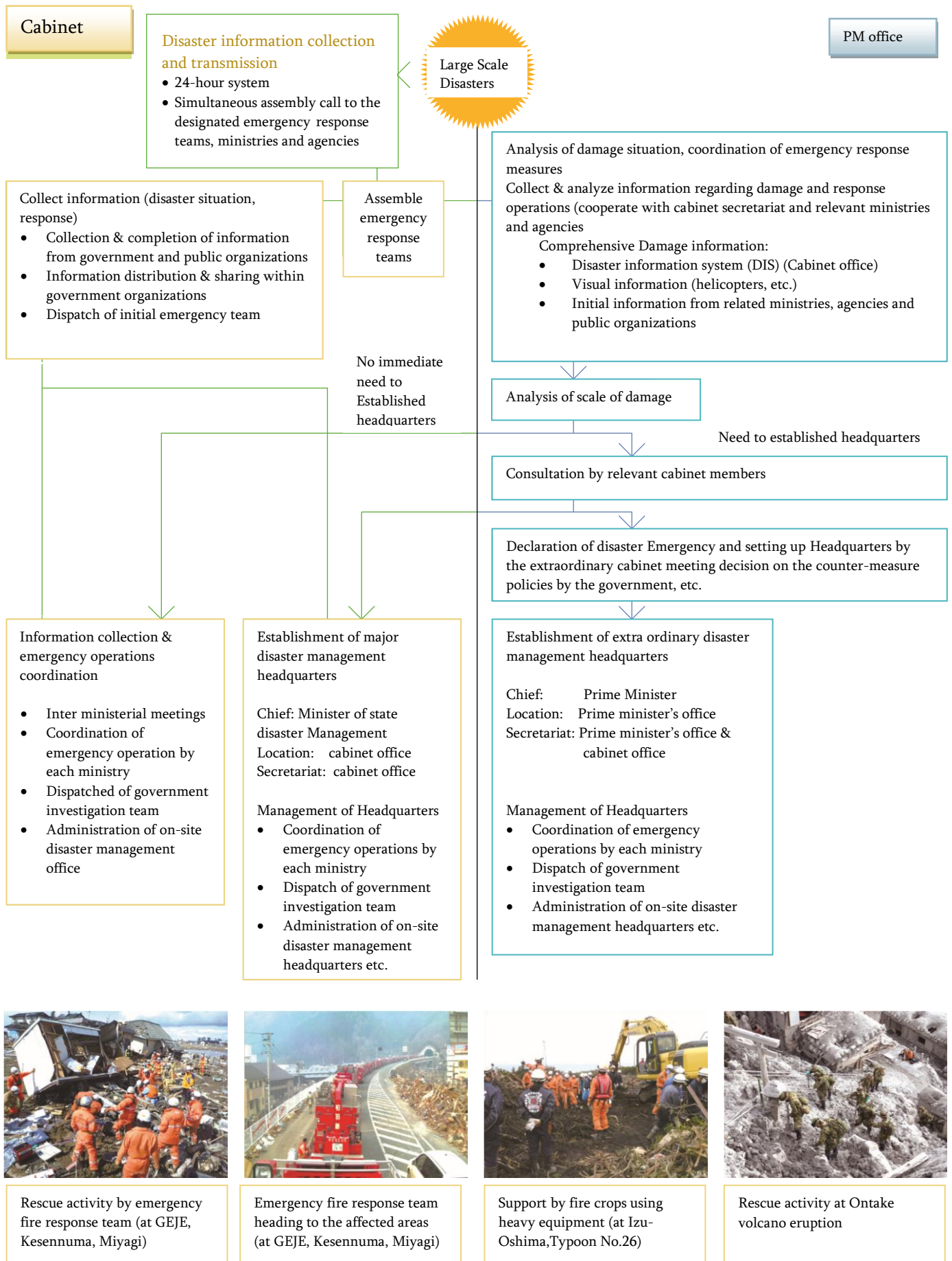


Figure 32. Disaster Response Mechanism of the Cabinet office

2.6 National Level



Fire and Disaster Management Agency
of the Ministry of Internal Affairs and Communications

総務省消防庁

2.6.1 Fire and Disaster Management Agency

Fire services started as an agency in the municipalities with functions closely with local community and have the role and responsibility to ensure the safety and security of the general public of Japan. FDMA is activate in wide range areas from emergency rescue to the handling of hazardous materials, as well as fire prevention and fire fitting .FDMA will expand all effort to full fill its responsibilities in enhancing the current municipality based fire and disaster prevention system that operates around regional fire defense headquarters and volunteers fire crops, and with the cooperation of residents in local communities

Fire and Disaster Management Agency comprised of following divisions:

- General Affairs Division Fire
- Ambulance Service Division
- Fire Prevention Division
- Civil Protection and Disaster Management Department.

Role of the fire and disaster management agency

Safe and secure regional development with the cooperation with residents and national response in time of need (The role of FDMA during disaster and pre-disaster periods is shown in figure 33)



Figure 33. The role of FDMA during disaster and pre-disaster periods

As per the **Fire Defense Organization Law** that the FDMA is responsible to conduct research, formulates plans, etc, in order to strengthen the fire defense capabilities of municipalities. And it provides municipalities by advice, guidance and recommendations regarding their fire service operations and activities. However it does not have the authority to control such organizations and its activities. Below are the main affairs under the Mandate of the FDMA:

- Planning and formulating overall fire services system to respond an emergency
- Preparing guidelines to strengthen the fire service facilities
- Conducting research and development activities in the field of fire service science and technology
- Conducting Training for fire service personnel and volunteer fire corps
- Advice, guidance and recommendations to improve prefectural and municipal fire services
- Requests for the needed support during an emergency for the better response
- Planning, formulation ,coordination and implementing disaster prevention activates granted by local governments

The FDMA is also functions as the Emergency Operation Center for local stakeholder fire-response organizations and as well as the government coordination body during the large scale disasters or an emergency.

Further, if the coping capacity of the local firefighting organization exceeded by the large-scale wide spread disasters, then elite emergency rescue teams known as, Emergency Fire Response Teams (FFRT) will support them.

Also the commanding officer in charge of the municipal teams inspects and controls their activities. Also an officer in charge himself deployed with Command Support Group to disaster affected areas using helicopters and other vehicles in order to gain a better understanding of the disaster situation, and providing instructions and relevant command to local firefighting teams. Since 2004 the Commissioner of the Fire and Disaster Management Agency has the authority to mobilize and control firefighting teams in the event of a large-scale disaster or an emergency. The FDMA controls and manage, from obtaining real-time information of the disaster to instructing Emergency Fire Response Teams to mobilize. As of 2004, 2800 Emergency Fire Response Teams has been registered across the country covering about 15 % all fire brigades in Japan.

Roles & responsibilities of Emergency Response Fire Teams are as follows:

- Firefighting Teams: control and extinguish fire to prevent the spread of flames during large-scale wide spread fire emergency.
- Rescue Teams: Ensure the search and rescue missions in place for to save lives of the disaster affected community.
- Emergency Teams: Ensure the equipment made available and better prepared for the response in an emergency.

- Logistic Teams: Assist each team by providing logistic support in emergency.
- Special Disaster Teams: for responding to chemical Hazards, including poisonous substances, major toxic elements and chemical spills.
- Special Equipment Teams: carrying special equipment for responding to emergencies those required by teams for rescues and also carrying water to remote areas in situation.
- Air Squadrons: Firefighting activities conducted using fire fitting helicopters
- Marine Squadrons: Firefighting activities conducted using fire fitting boats

Emergency Fire Response Teams was temporary established in 1995, after the Great Hanshin-Awaji Earthquake and institutionalized by the **Fire Defense Organization Law** and it was officially amended in 2003. EFRT was officially established in 2004 under The Minister of Internal Affairs and Communications. A basic plan of organization and facility arrangement was prepared by brigading FDMA and EFRT. Communication mechanism of FDMA is shown in figure 34.



Figure 34. Communication mechanism of FDMA

2.6.2 Ministry of Health, Labor and Welfare

Disaster relief and assistance policy including the urgent rescue and evacuation activities of the Ministry are managed by the Social Welfare and War Victims' Relief Bureau through the permanent Disaster Relief Contact-Coordination Council established under the purview of the Ministry. The Council is responsible to operationalize disaster management plan of the Ministry. The members of the Council as well as all other members of the Ministry whose duties are related with disaster management, Therefore during non-emergency times they are responsible to prepare guidelines for the Disaster Response Headquarter of the Ministry. and they are responsible to made available of contact at the same time certain means of transport in order to reach the Headquarter in case of emergency. The Disaster Response Headquarter is set up only during large scale emergencies. They have to perform following functions.

- Summarize information of the emergency as per the given format by the Ministry.
- Control and coordinate disaster response measures.
- Information sharing among the relevant divisions of the Ministry and with other relevant stakeholder agencies.
- Heads of the Ministry should be informed about the situation such as loss & damage, response activities and statistics.

If needed, the Ministry dispatches their officers to disaster affected areas to establish local disaster response headquarters inside the Regional Bureau of Health, Labor and Welfare. The Concept of Emergency Relief under Disaster Relief Act is shown in figure 35.

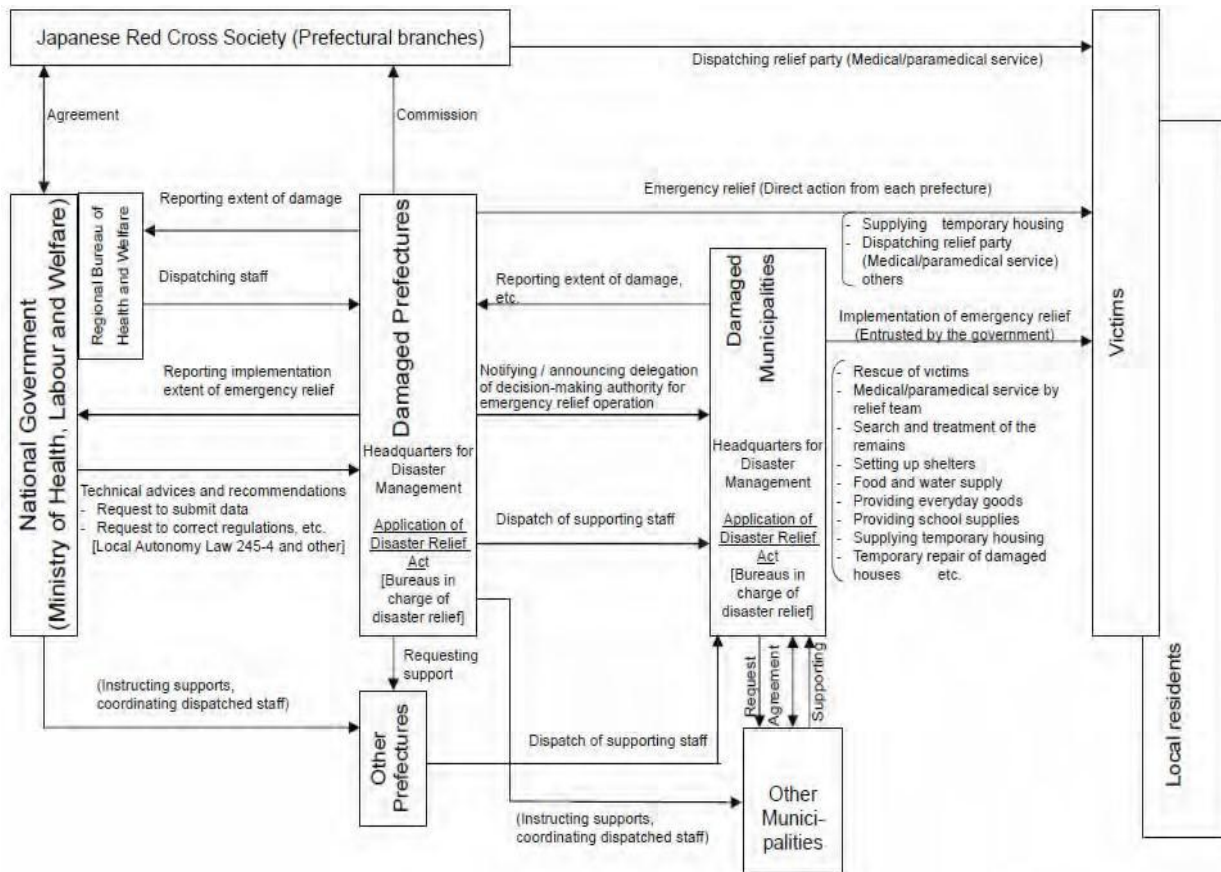


Figure 35. Basic Concept of Emergency Relief under Disaster Relief Act



2.6.3 Ministry of Land, Infrastructure, Transport and Tourism

The MLIT provides disaster management policy at national level related to flood and sediment disasters. Also provides urban development plans which are help to develop disaster resilient cities for both natural and man-made disasters. Disaster prevention center was established under the purview of the ministry to conduct its disaster response activities in case of an emergency.

Functions of the Disaster Prevention Center are as following:

- Mobilizing incident commanders, officials and relevant departmental officers
- Monitoring & Observations of meteorological information, data ,site images, etc. and distributed
- Collecting and sharing information (integrating damage assessment)

- Exchanging relevant information with the ministry office, other stakeholder ministries and agencies, local departments, etc.
 - Providing information to the general public
 - Providing necessary assistance to the regional ,local governments
- (the assistance given by the MLIT in large-scale disasters is shown in figure 36)

The assistance given to the local governments by the MLIT In large-scale disasters:

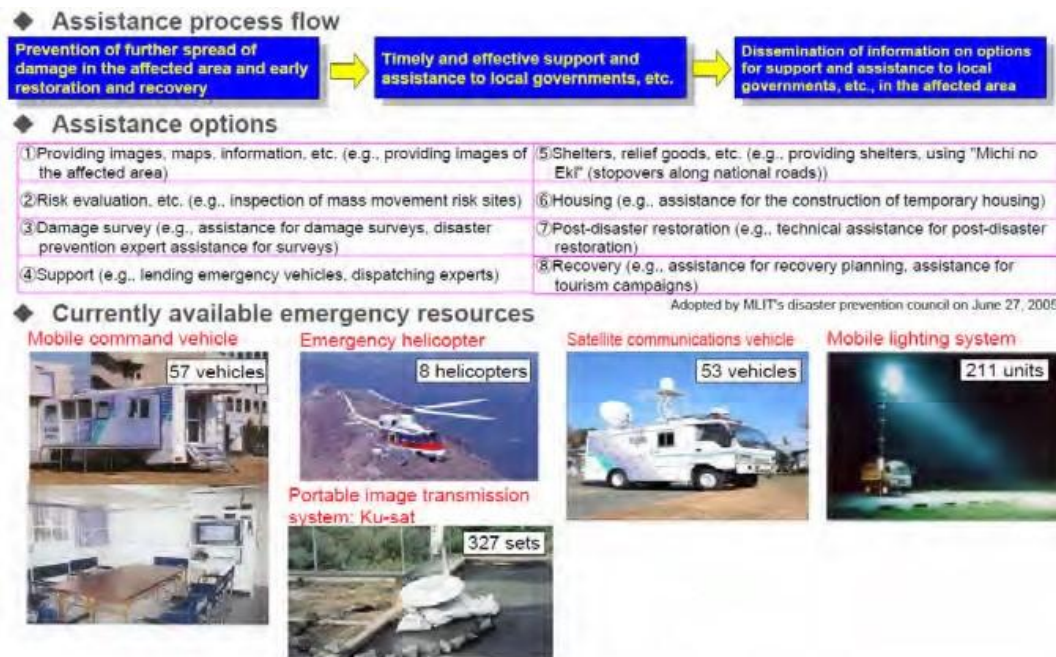


Figure 36. Assistance given by MLIT for disaster response

MLIT is the mandated agency to mitigate the impact due to flood and sediment related disasters caused by intense rainfall and typhoons. Flood forecast center of MLIT will be established in regional development bureaus to mitigate the impact of disasters. They monitor the distribution of flood and providing information to municipal governments, the mass media, etc. Flood forecast centers are responsible to develop an advance flood prediction system by using flood risk evaluation and climate change monitoring. To achieve that task following activities are implemented:

- Collection of point data (e.g. rainfall amounts, water levels and water quality) Rain observation by rain gauges and telemetry system – the data obtained by telemeters are recorded in one designated place, for an instance regional bureau and a prefectural office, through connected network system. Then, they send information to each stakeholder agencies to update the real-time flood prediction calculations.
- Collection of area data (rainfall amounts)

From the Radar, The information of 1-km grid resolution is updated every half an hour and available at the Internet. The radar data are calibrated by using the ground data.

- Collection of image data.

CCTV Network of regional development bureaus under the Ministry of Land, Infrastructure and Transport, have real-time access to 3,900 CCTV cameras and located along the rivers and streams with the length of 12046 km (as of 2006). Those CCTV images are used for developing flood control plans. Also river information systems developed by individual regional development bureaus have been integrated into a national river information system. Regional development bureaus can customize the system according to their requirements.



2.6.4 Japan Coast Guard

Emergency preparedness and marine search and rescue are the major responsibility of JCG .they conduct search and rescue operations once ship wreck occurs. The JCG raise awareness and educate people about the basic principles of self rescue in a marine emergency. Also they make effort to respond promptly to save lives of the passengers and crew of the ship in a wreck. The JCG comprise of various rescue deployments such as mobile boats for to save lives from drowning, rescue helicopters for air search and rescue, scuba diving teams, and emergency first aid teams. they also working to improve the rescue and first-aid capabilities of their divers and emergency medical technicians. The JCG also works together with relevant stakeholder public and private rescue organizations including police and fire departments to cover the areas of Japanese coast. JCG was established 24 hours maritime accident reporting service which is called Global Maritime Distress and Safety System (GMDSS) for the purpose of quick response to maritime accidents reported through 118 or by onboard phones.

Japan Coast Guard is functioning under the purview of MLIT of and their responsibilities as follow: (organization structure of JCG is shown in figure 37)

1. **Administration Department**

Public relation, international relation, personnel management, budget, etc.

2. **Equipment & Technology Department**

Shipbuilding and construction of JCG's airplanes.

- 3. Guard & Rescue Department Maintenance of public order, oil pollution response and Search and Rescue
- 4. Hydrographic and Oceanographic Department Hydrographic surveys, oceanographic observation and provision of navigational charts, publications and information that required ensuring navigational safety.
- 5. Maritime Traffic Department Implementation of navigation safety measures, and construction, maintenance and operation of Aids to Navigation.

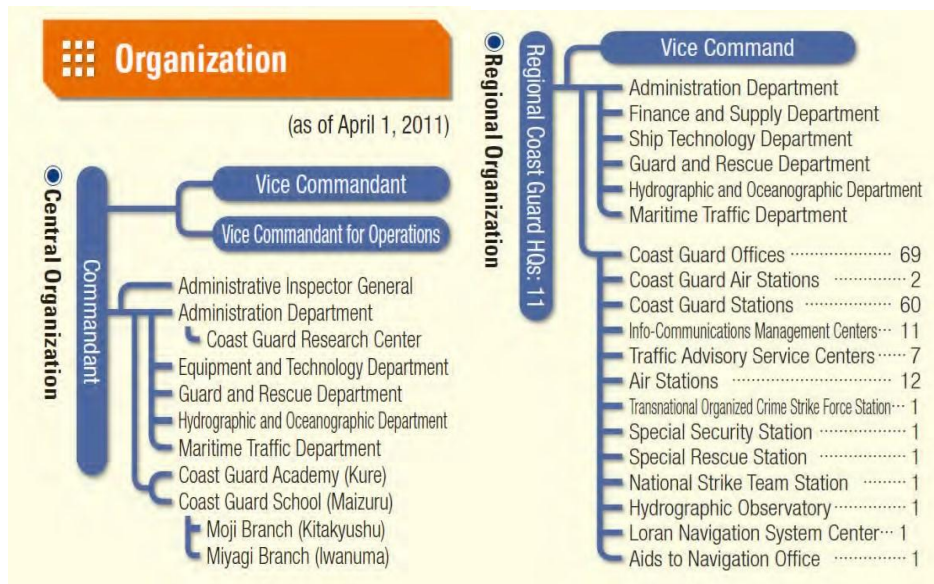


Figure 37. Organizational structure of JCG

Just after the Great East Japan Earthquake of 2011 JCG immediately dispatched their emergency response teams and carried out search and rescue missions, surveillance and protect the area adjoining” fukushima” nuclear power station, securing emergency transport route by ensuring navigation safety, emergency transportation of goods need for field assistance, and they rescued About 360 persons, recovered 302 dead bodies and towed 85 drifting vessels.

To respond for the large-scale oil spills, discharge of hazardous chemical and noxious substances to coast due to maritime accidents and shipboard fires, JCG was mobilized fire-fighting ships and maritime disaster prevention equipment around the country. Also for The effective response JCG conducting simulating exercises with the participation of private-sector disaster prevention organizations in Japan and overseas. Therefore JCG makes effort to keep their systems in function by conducting drills for large-scale wide spread natural disaster and human induced disasters.

They also developed hazard maps of submarine volcanoes, volcanic islands, oil spills and submarine earthquakes by using regular observations, tectonics movements and bathometric

surveys. Also JCG provides “coastal area environmental protection information” through Internet so that when an oil spills occur environmental impact assessment is done by JCG and published. Related damage can be minimized by using organizations involved in oil removal as well as local municipalities and private-sector groups. (Locations of regional stations and the resources of JCG is shown in figure 38)

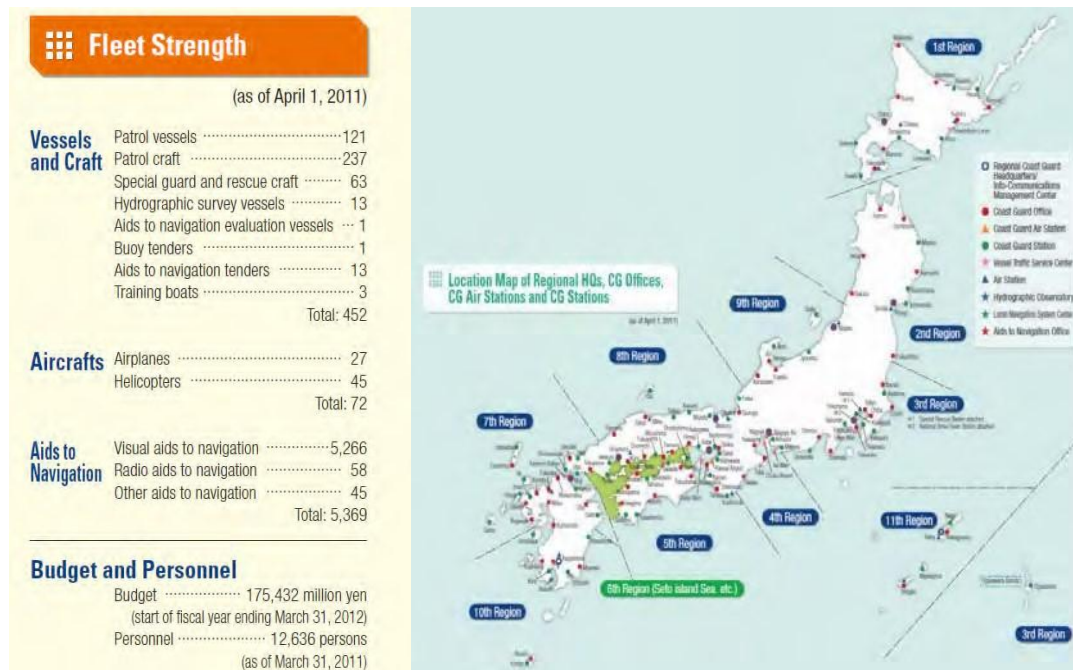


Figure 38. Regional station and resources of JCG



2.6.5 Self Defense Forces (SDF)

As per the definition of Article 83 of the Self-Defense Forces Law of 1954, SDF of Japan has the responsibility to respond to the requests for assistance from prefectural governors to support in fire fighting, disaster response, searches & rescue missions, reinforcement of embankments and in the event of an emergency. The SDF conducts a variety of disaster relief operations in collaboration with municipal governments also when disasters occurs in any part of the country, by engaging in the search and rescue of disaster victims or missing ships or aircraft, controlling floods, offering medical treatment, preventing epidemics, supplying water, and transporting personnel and goods. In particular, over 100,000 SDF personnel were deployed at a peak time of relief operations of the large-scale earthquake and nuclear disaster that was happen due to the Great East Japan Earthquake in March 2011.

SDF can be deployed only upon the request by the prefectural governor. Therefore Municipal mayors have to ask prefectural governors for such request to disaster relief deployment of SDF. If the respective mayors unable to make such request to the prefectural governor because of his absence, then the Mayer can inform the Minister of Defense, or those designated by the Minister. Under the circumstances of extreme urgency when there is no time to wait for a request, the Minister of Defense or those designated by the Minister authorize an exceptional deployment (discretionary dispatch). The Minister of Defense is authorized only to dispatch SDF when an earthquake or nuclear threat alarm is issued, based on the request of Chief of the Nuclear Disaster Countermeasures Headquarters and Chief of the Earthquake Disaster Warning Headquarters (Prime Minister).

2.7 Prefectural Governments

Japan prefectural governments are not directly involved in emergency response since their governing body within its territorial boundaries. But they have the advising, directing, guiding and coordinating authority over municipalities. Roles and Responsibilities of the jurisdiction of prefectures as follows:

- Liaise and coordinate municipal fire services
- Advice, guide and recommend municipal fire services
- requests assistance and give directions during an emergency
- Conduct training and education programs for fire service personnel and volunteers (at prefectural fire academies)
- Preparing of prefectural disaster mitigation plans and implementation of comprehensive disaster countermeasures.

To carry out their mandated responsibilities they established departments and divisions within their prefecture. Although it might slightly vary from prefecture to prefecture due to the risk and vulnerability due to potential Hazards. The following figure 39 describes the general concept of prefecture government with disaster management departments/divisions highlighted.

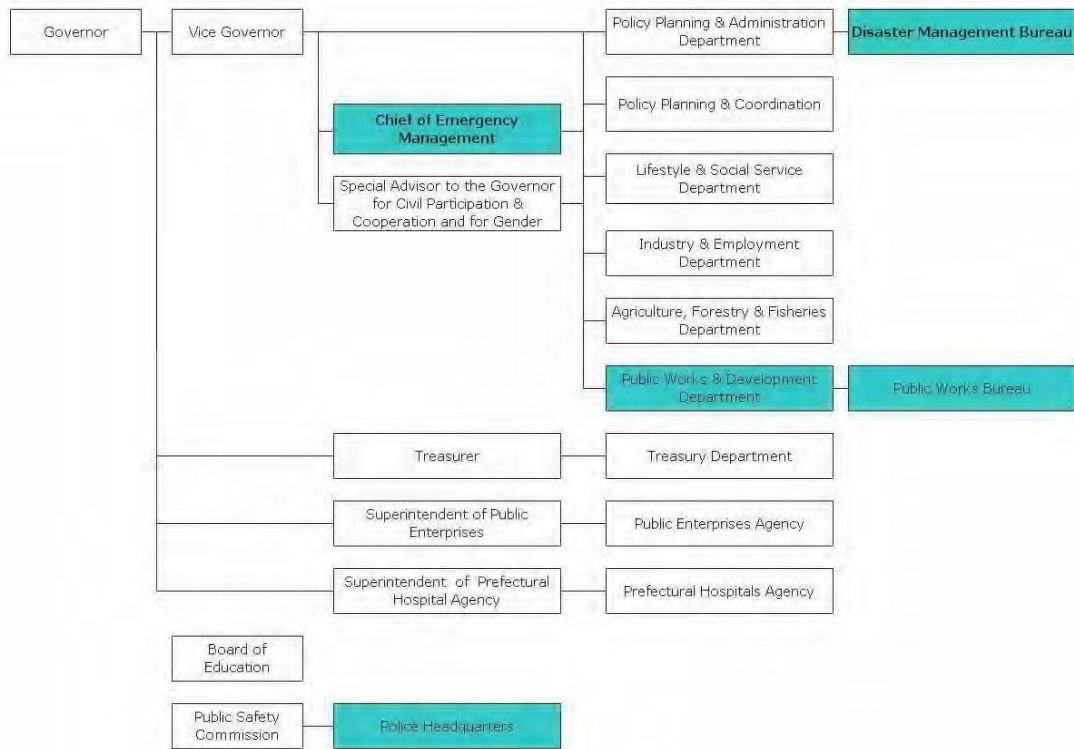


Figure39. Organizational Structure of a Prefecture in Japan

Despite of prefectural governments in Japan has the authority to control police headquarters Police staffs engage in disaster response activates upon the request of the mayor of affected municipality. Following case study is conducted for the better understanding of disaster management mechanism in Japan, in particular, response, recovery, preparedness and mitigation activities carried out by the Hyogo Prefectural government during and after the Grate Hanshin- Awaji earthquake.

3.0 CASE STUDIES



3.1 Case study: Hyogo Prefecture Disaster Management Framework

Location: Honshu Island, Kansai region

Area: 8,393.34 km²

Population: 5, 58 million

Capital and the largest city: Kobe

Hyogo is the 12th largest prefecture of Japan. The prefecture consists of 41 municipalities and 8 districts.

Disaster: The Great Hanshin-Awaji Earthquake summary of the disaster is shown in figure 40

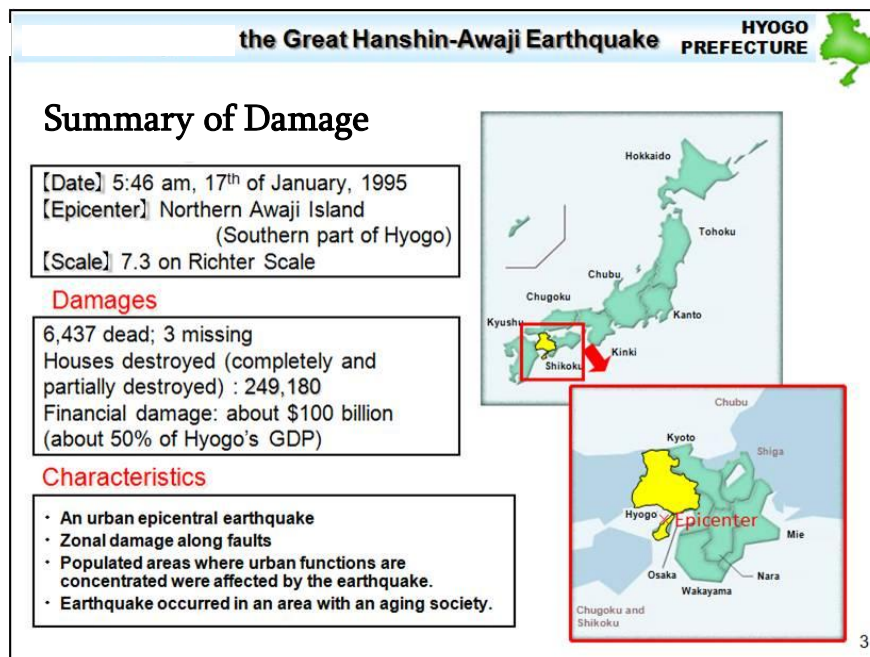


Figure 40. Damage due to The Grate Hanshin-Awaji Earthquake

As a result of comprehensive recovery program conducted by the government of Japan today the city of Kobe is completely restored. It is one of the risk inclusive developed cities of Japan. The earthquake also forced to reconsider basic components of DRR activities, building laws

disaster management mechanism in both prefectural and municipal levels. Prefectural level Disaster Management Planning Bureau and the Disaster Response Bureau were established in 2005. Considering the inconsistencies during disaster response operations by emergency medical services in the Great Hanshin-Awaji earthquake, Hyogo Emergency Medical Center was established for better response on future emergencies. The organization charts of the Disaster Management Bureau and Emergency Relief Headquarters which was temporary established for large-scale emergencies are described in figure 41 & 42.

Disaster Management Bureau of Hyogo Prefectural Government

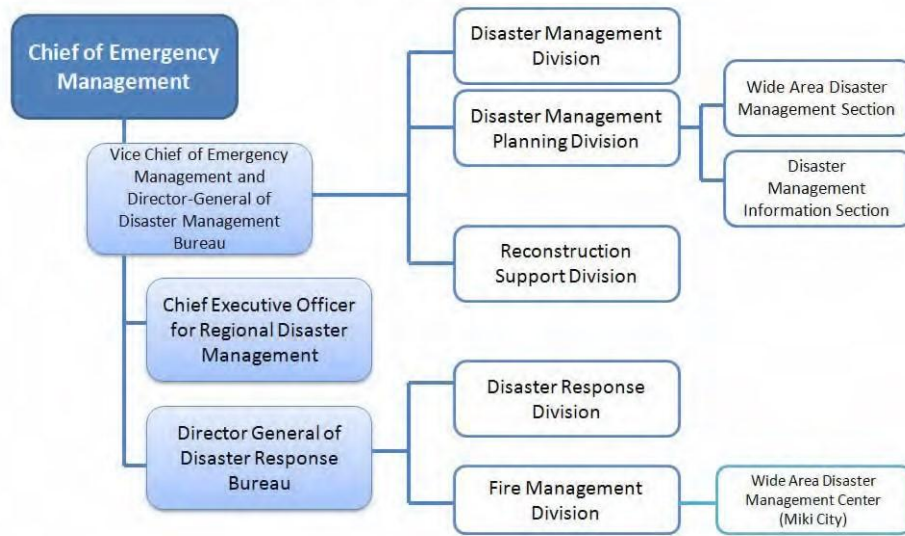


Figure 41. Structure of the Disaster Management Bureau of Hyogo Prefectural Government

EMERGENCY RELIEF HEADQUARTERS

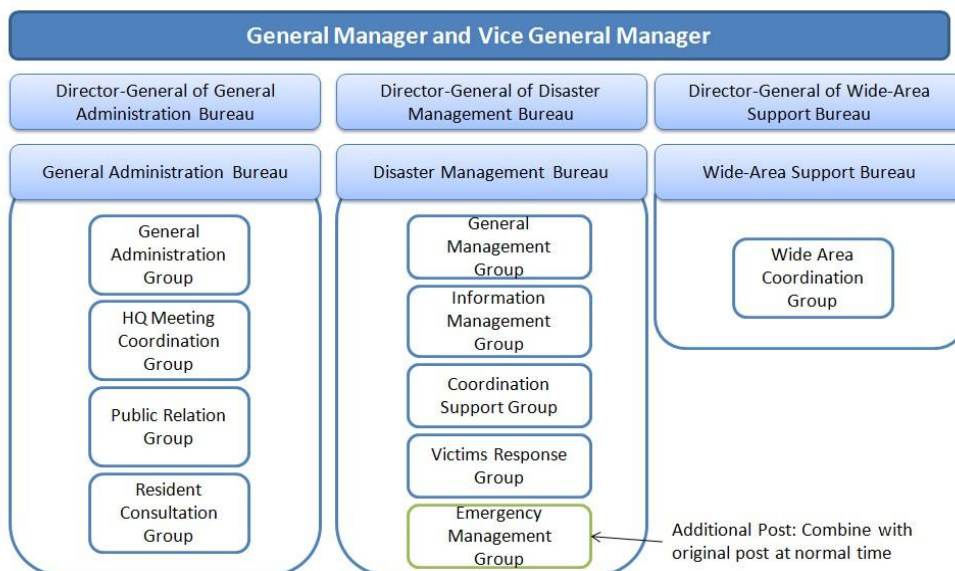


Figure 42. Structure of Hyogo Prefecture Emergency Relief Headquarters

3.1.1 Mechanism of Emergency Risk Management

1. **Disaster Management Center** of Hyogo Prefecture Government was established in August 2000. It was known as the first local government office dedicated to disaster management in Japan. The center is capable to sustain even if the lifelines are disrupted and it was strong enough to withstand earthquakes magnitude 7 on the Japanese intensity scale. The center consists of 7 floors. (shown in figure 43)

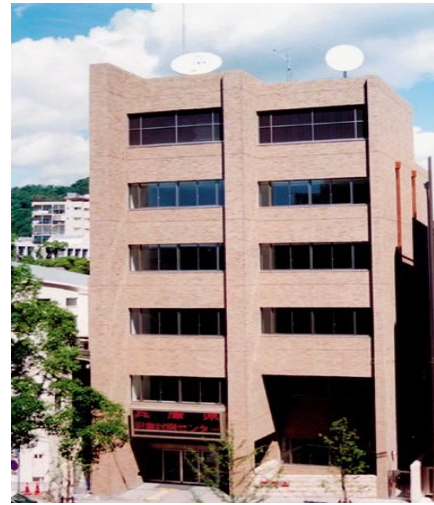


Figure 43. Hyogo DM Headquarters

2. **Emergency accommodation** facility which can accommodate 77 families in case of disasters, also they had built three such facilities within 5 minutes walking distance and one within 30 minutes distance.
3. **Emergency Management System (“PHOENIX”)** was established with aim of improving the initial disaster response mechanism, Phoenix Disaster Management System collects disaster information from 334 terminals installed in all the disaster management agencies in the prefectural governments offices, district administration offices, local administrative organs, municipalities, fire headquarters, police headquarters, police stations, self-defense forces, national government (Fire and Disaster Management Agency, etc.), lifeline providers, etc. In addition earthquake information is received from the automated seismometers installed in the prefecture.

Main function of this system is: collection of observation data, analyze and prediction of earthquake damage. Also for the collection of damage information, geographic information, image information, and estimation of supply for the people affected.

Main broadcasting transmission network is based in prefectural government office and it links with, district administration offices and other relevant units by a loop of dedicated digital line using a fiber optic cable in large-scale network with a total length of 1400 km.

Finally, they introduced the internet service “Hyogo Net” in 2005, which provides the disaster related information to the resident of the Hyogo prefecture (shown in figure 36). Further for

the benefit of foreigners resides in Hyogo prefecture provides information in English, Chinese, Korean, Portuguese and Vietnamese languages.

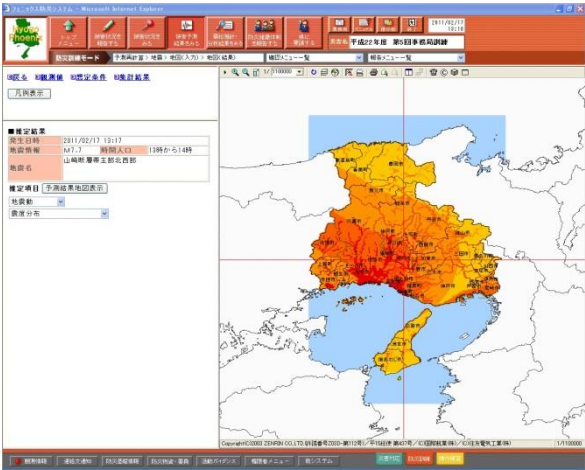


Figure 44. Hyogo web services

4. **Hyogo Satellite Communication Network** consists of 166 satellite based stations installed across the prefecture, which is used to collect and transmit information, alerts and early warning messages.

5. **Video Phone System** has been set up for information exchange between prefectural and municipal disaster management headquarters during disasters.

6. **Helicopter Video Transmission system**

As of 2006, there were 260 designated helipads across the prefecture. Three helicopters owned by Hyogo prefecture and Kobe city are fitted with video transmission system and firefighting tanks. Two additional helicopters can be called into service at any given time.

24-hour monitoring and quick response system is standby for anticipated potential emergencies.

3.1.2 Preparations for Potential Future Disasters

Regional Emergency Management Base is a facility which store rescue equipment and relief supplies for victims. That facility operates to collect and distribute relief supplies, assemble response teams and mobilize emergency relief workers. Currently, 5 regional emergency management bases are under the purview of Hyogo Prefecture government. The largest among them is Miki Earthquake Disaster Memorial Park and it occupied about 220 hectares. Emergency response and relief items store at Miki REMB is shown in Table 6 and figure 45 is showing Hyogo Prefectural REMBs.

Table 6. Stored response and relief items in REMB

As of May 2006

Name of base	Food (dried rice)	Blankets	Lifesaving systems	Plastic sheets
Miki Earthquake Disaster Memorial Park	77,000	50,820	29	5,133
Nishi-Harima	16,000	10,560	7	1,066
Tajima	4,000	2,640	2	267
Awaji	3,000	1,980	2	200
Hanshin-Minami	18,000	11,880	7	1,200
Total	118,000	77,880	47	7,866

*Also stored are temporary toilets, tents, floodlights and generators.

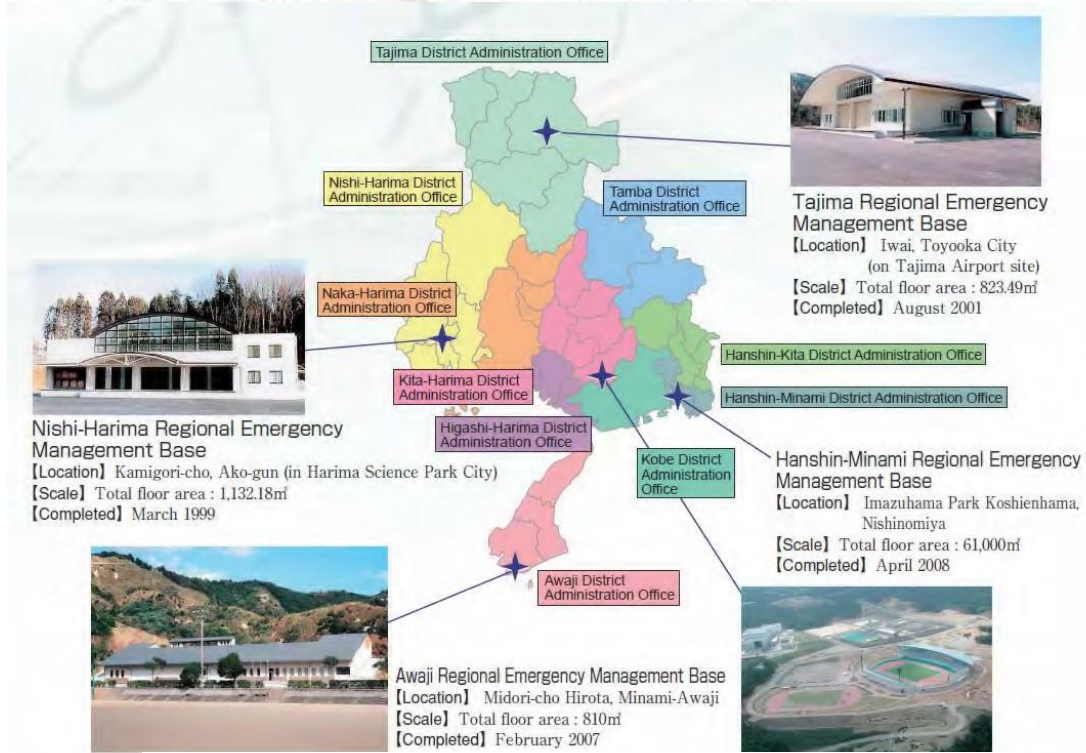
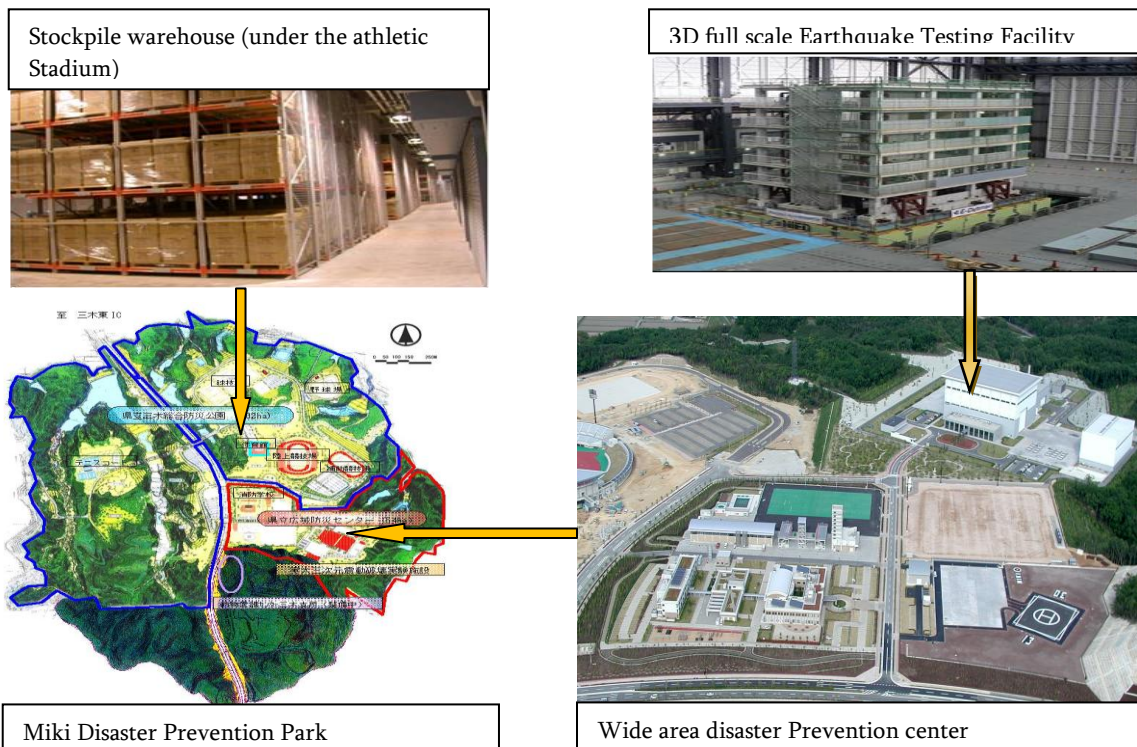


Figure 45. Hyogo prefecture regional emergency management bases



3.2 Municipal Level

Municipalities of Japan are mandated to carry out fire services such as fire fighting, rescue and ambulance services within their administrative boundaries. However, for such activities needed financial allocations and resources, therefore to handle such problems they jointly performed with other municipalities, some municipalities are doing so by establishing “municipal corporations” or “area associations.” The institution assigned for handling the fire services consist of fire departments, fire stations and volunteer fire corps. The main responsibilities of such municipalities are as follows.

- To establish, manage and operate fire services.
- To carry out Fire prevention, fire fighting, search & rescue and ambulance services, response to earthquake, storm and flood damage
- Preparation of municipal disaster mitigation plans and implementation of comprehensive disaster countermeasures.

(Municipal governments EW mechanism and the mode of communication is shown in figure 46)

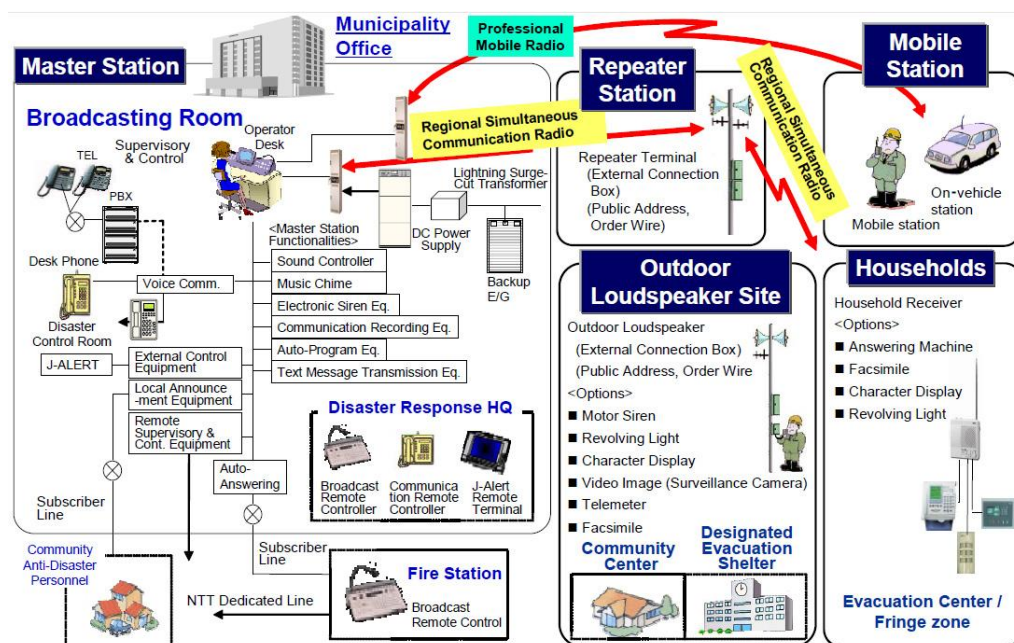


Figure 46. EW mechanism and the mode of communication

But there are exceptions, for an instance all 23 municipality Fire services are handled by the Tokyo prefecture. Also Higashi Kurume City and Inagi City fire service carry out the various activities such as rescue from fire, traffic accidents, water accidents, natural disasters, CBRN

accidents and terrorism caused by human induced disasters and transport community to safe places.

Ambulance service as per the law enforced in 1963 the ambulance service was defined by an operation of the fire service organizations. Prior to this, fire service organizations were providing the ambulance service based on municipal ordinances, regulations, etc. the ambulance service was started Yokohama City in 1933. This was later followed by Nagoya, Tokyo, Kanazawa and Wakayama.

In principle, the ambulance service in Japan transports the sick and injured persons to medical institutions regardless of sickness or accident. While transporting necessary first-aid treatment were given. In addition, qualified paramedics will be able to carry out a wider range of first-aid treatments such as defibrillation.

An ambulance composed of vehicle and no less than three emergency medical technicians (EMS personnel). In case of transport by air, a unit is composed of no less than two EMS personnel per aircraft. The emergency transportation by helicopter is mainly carried out by prefectures and “designated cities”, with their own fire fighting and disaster prevention helicopters.

In 1977, the government established the concept of building emergency medical service centers as tertiary emergency medical facilities in each region of the nation, serving a population of about a million each. Simultaneously, approximately 6,000 medical facilities were reorganized into three levels: primary, secondary and tertiary facilities.



Kobe city Fire Department

3.2.1 Case Study – Kobe Fire Department

Overview of the Kobe Fire Department (As of 1 April 2016)

Kobe City profile

- I. Surface area: 552.83 km²
- II. Population: 1,542,458 people
- III. The number of households: 685,639 households

Resources available in Kobe Fire Department

- (1) **Organizations:**
 - Fire Department Head Quarters (1), Fire Stations (10), Fire Station Division (1), Fire Station Branches (18), First Aid Station (1)
- (2) **Number of employees :** 1,396 people (quorum)
- (3) **Number of resources :** such as fire engines (total: 232 units)
 - Number of fire engines: 133 units (Pumpers, Pumpers with foam, Aerial ladders, Rescue tracks, Special disaster response vehicle, etc.)
 - Number of ambulance: 36 units
 - Number of other vehicles: 63 units (vehicles for inspection and public relations, transportation vehicles, etc.)
 - Fireboat: 1 unit
 - Aircraft (Helicopter): 2 units

Status of Voluntary Disaster Prevention Organizations (BOKOMI)

Already formed: 191 districts (all over the city & school districts)

Status of Volunteer Fire Corps

- (1) Organization: headquarters (10), Divisions (15), Sub-divisions (159)
- (2) Number of members: 4,000 (quorum)

Kobe Fire Department comprised of 24 hours Emergency Operation room and 119 Call center. After they receive an emergency call they coordination and deployed the relevant response teams near to the affected site. Once a call received automated system identifies and displays caller's data and exact location on the digital map. Overall following activities of dispatched

teams take place under supervision and coordination of the Operation Room officer in charge. In order to ensure that all incoming calls are counted there are 126 telephones utilized in the facility. Further, 5 surveillance cameras were located to ensure the safety of critical places Kobe City area, National Broadcasting Channel and JMA.

1. Municipal level voluntary emergency response teams

- **Voluntary Fire fighting Corps** is organized by municipalities in Japan under the supervision of fire departments and fire stations. But they are not professionals and they engaged in fire fighting as secondary occupation, in cases of where the fire corps is called out in emergencies, they must follow the orders of the chief of the fire department or fire station. Basically there is one fire corps in each municipality. However, there are municipalities that have established more than one corps (in most “designated cities”) .but there are exceptions of not having established the corps are Osaka city, and some towns and villages in Aichi Prefecture.
- **Voluntary flood fighting teams** in Japan is known as “Suibo-dan” they play important role in flood fighting activates. These teams are usually established within the municipalities in the vicinity of rivers. The members of “Suibo-dan” normally engaged in different jobs but they are also engage in patrolling, inspecting and levee protection works in close coordination with river administrators and other relevant organizations during flood situations. They still conduct patrols and inspection of levees, provisions for flood fighting warehouses and for communication facilities, drills and other activities in preparation for a flood before the rainy periods and also before typhoon warnings. As of 2009 there were about 900 000 voluntary flood fighters all over Japan.
- **BOKOMI** – BOKOMIs are community based & elementary school district based disaster Preparedness voluntary teams. Based on the lessons learned from the Great East Hanshin-Awaji Earthquake, all the districts in Kobe city that of 191 districts had established BOKOMIs. Before decided to establish BOKOMI there will be a discussion between voluntary local associations, local government organizations and local fire departments. The equipment and materials needed for the activities are provided by the local government and storehouses established in local parks for emergencies. Public Schools in Japan used as evacuation centers during emergencies. In normal times BOKOMI conducts various emergency drill programs such as on how to use the fire fitting equipment and materials (for ex. fire extinguishers, fire hydrants), rescue drills, evacuation drills, information transmission drills, flood control drills and etc. In addition, BOKOMI also conduct welfare activities such as lunch gatherings for the elderly people who live alone.

2. Relationship between Levels

In order to maintain the chain of command of municipal fire servicers, law prescribes such organizations should operate and managed under the purview of municipalities. This means such organizations would not controlled by the national or prefectural governments despite the consideration of personnel management, organization, budget, or fire fighting activities or other acts.

National government can only advise, guide or recommend prefectures and municipalities but cannot control them. However, in case of large scale emergencies such as earthquakes, typhoons, flood and fire disasters, national government can request prefectural and municipal governments to provide assistance.

If the disaster occurs within the jurisdiction of prefecture, the prefectural government can request the municipalities within their administrative boundaries to provide assistance. If the disaster occurs outside of their jurisdiction, the Commissioner of the Fire and Disaster Management Agency can make request to the relevant municipalities for assistance.

The municipalities can assist each other based on agreements. Even in cases where there are no such agreements, they are obliged to make efforts to assist each other.



3.2.2 1. Case Study – Disaster Medical Assistant Teams

Disaster Medical Assistance Teams are specialized and trained medical aid teams which operate during large scale disasters. DMAT was established in 2005 based on the lessons learned on the Great Hanshin Awaji Earthquake. The guidelines for the deployment of DMATs are based on the results of the research conducted by the Ministry of Health Labor and Welfare (MHLW). As per these guidelines, DMATs are defined as “mobile, trained medical teams that can be rapidly deployed during the acute phase of a disaster (within 48 hours). “DMAT Team Member Training Course” is conducted at the National Hospitals of Japan that is known as Disaster Medical Center (an independent administrative agency) and commissioned as DMAT

personnel. DMAT member are specialized to render medical assistance and treatment in acute & during phases of disasters as well as transferring casualties to safe areas.

The role of each stakeholder institution as per the guideline as follows:

1. Prefectures: a. Non-emergency times: formulate operational plans, conclude agreements with medical institutions, and provide training; b. Emergency times: Deploy DMATs and provide necessary support for relief activities. The prefectures must assume the central role.
2. MHLW: a. Non-emergency times: produce operational guidelines, certify personnel, promote education and training; and b. Emergency times: collect information; overall coordination.
3. DMAT-designated medical institution: a. Non-emergency times: prepare for deployment, train personnel; and b. Emergency times: Dispatch DMATs on request.
4. Emergency base hospitals, Japanese Red Cross Society, and the National Hospital Organization: provide necessary support (collect information, provide contacts, coordination, personnel, and materials)

Activation of DMAT is based on the agreement between prefectural governments, medical establishments and DMATs. They are deployed only upon the request of government of disaster affected prefecture in case of large scale disasters such as: an earthquake of Japanese seismic intensity 5 occurring within any of the 23 wards of Tokyo; an earthquake of Japanese seismic intensity of nearly 6 or greater occurring in any other area (outside of the 23 wards of Tokyo); a tsunami alert is issued; an earthquake alert is issued for the Tokai region; or large-scale aircraft crash occurs. MHLW is ensured overall coordination of relief activities collect, share information and assist local government in decision-making. Coordination of MHLW and mechanism of DMAT operation is shown in figure 47.

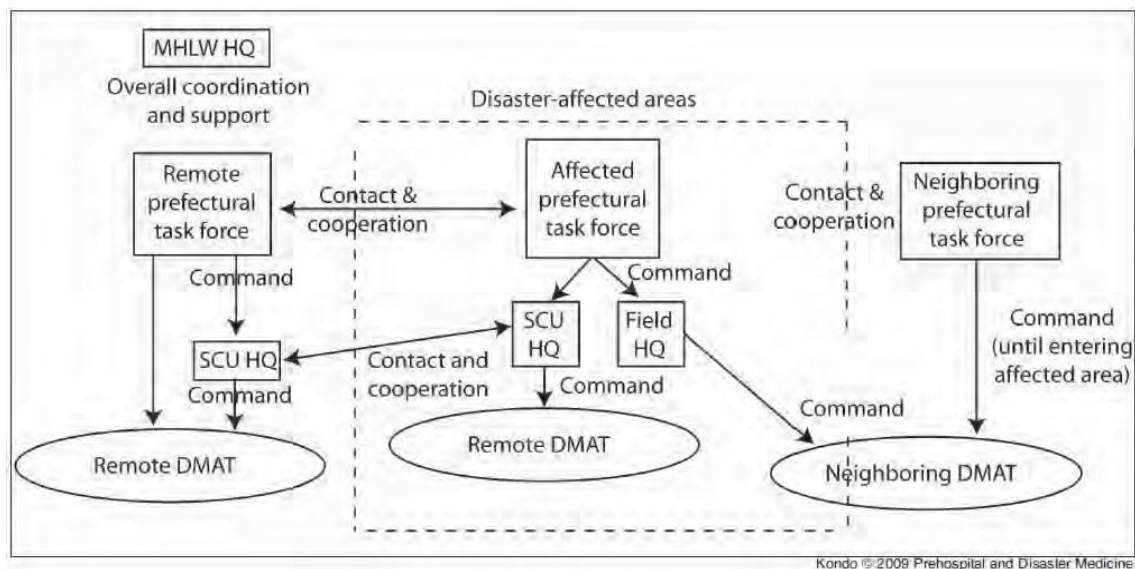


Figure 47. Mechanism of DMAT operation.

- Japan Medical Association Teams

The concept of JMAT had been building up since 2009 by a subcommittee of the Japan Medical Association's Committee on Emergency and Disaster Medicine. For the first time, JMAT came into action in March 2011, when the Great East Japan Earthquake occurred. Triage cards were prepared by the Japan Medical Association for JMAT activities in the Great Eastern Japan Earthquake. Different from triage tags used during the acute phase of a disaster, physicians write their on-the-spot judgments down on these cards and give to patients in evacuation shelters and other locations so that they can be connected later treatment and used by takeover caregivers. Also, the checklists were prepared for each evacuation shelter to enable the easy sharing of information when presiding at the joint conferences held locally every morning and evening, mainly at the local municipal medical associations. (operating system of JMAT is shown in figure 48)

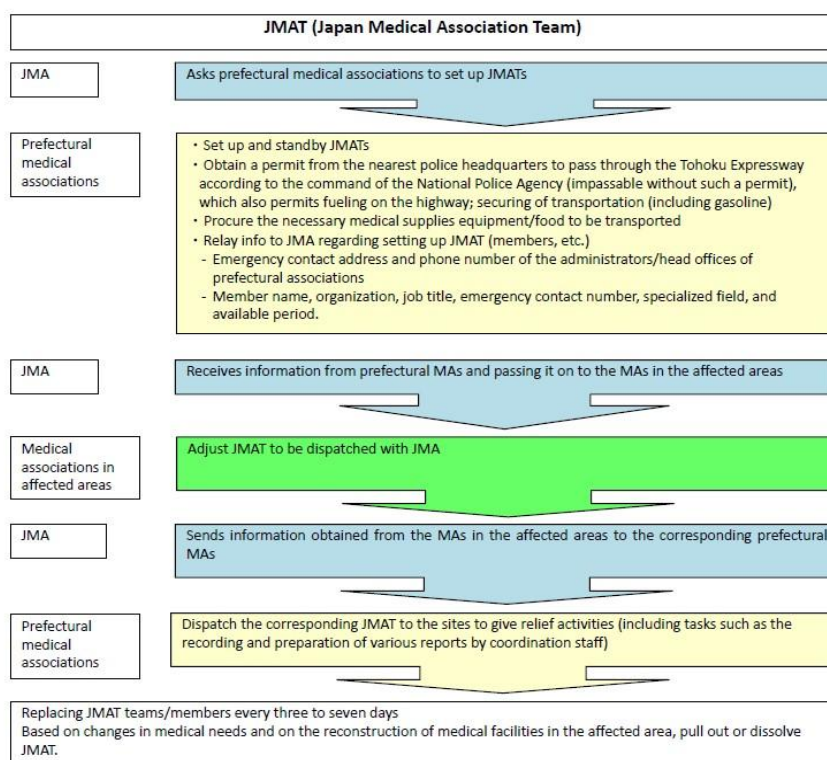


Figure 48. Mechanism of JMAT activation

More detailed information and the organization of JMATS are as described below:

1. Purpose

- Is to provide medical assistance at hospitals and clinics in the disaster-affected areas (and to provide the ongoing medical treatment that needed to be continued even before the disaster occurred)
- Is to provide medical treatment at evacuation sites and first-aid centers

2. Supporting site, supporting medical association (general rule)

Iwate: Hokkaido, Tohoku (Akita), Tokyo, Kanto-Koshinetsu and Kinki blocks (Osaka, Wakayama) Miyagi: Tokyo, Kanto-Koshinetsu, Kinki (Hyogo, Nara), and Chugoku/Shikoku blocks Fukushima: Tokyo, Chubu, Kinki (Kyoto, Shiga) blocks Ibaraki: Kyushu block

3. Team composition (example): Physician: 1; nurses: 2; coordination staff (driver): 1

4. Necessary medical supplies and equipment:

Corresponding to the above tasks, including food and others

5. Dispatching duration of the team:

Approximately three to seven days (depending on discussion with supported sites and supporting associations)

6. Communication method with JMA: Mobile phone

4.0 CONCLUSIONS

Being one of the most disaster prone countries in the world and also the frequently impacted by large scale wide spread natural and human induced disasters, Japan has the vast experience to prevent, response and recover effectively and efficiently. Natural disasters cannot be prevented and only the impact of disasters can be mitigated. With their past experience of compromise with such catastrophic events they developed a comprehensive DRM framework by using the lesson that they learned and knowledge that they gained. National government and the local government of Japan treated the safety of Japanese people as their primary objective. Therefore they implement all possible measures to achieve their objective by research and development on DRM, preparedness at each level and in all sectors, developing emergency response mechanism and Early warning systems, continuous awareness programs and drills, building disaster memorial museums, training facilities and conducting disaster commemoration ceremonies, public & private partnership in DRM and the comprehensive recover with the concept of “built back better”. Formation on 3-layered national government system and administrative delimitation of the country and evolution of the disaster management system in Japan has been heavily influenced by unfavorable geographical position, as well as, meteorological, and topographical conditions. Also various large-scale disasters have been driving the force of new changes and enhancements. Although some basic elements evolve from previous systems, current disaster management of Japan has been formed during last 50-60 years. Rapid development of the country during this period enabled to allocate considerable investments on DRM and integrate latest technological achievements of the country for DRM.

DCBA reflects the importance of DM in Japan by leading prime minister himself as the incharge of DM. Cabinet Office itself gives the relevant guidance and advice to the prefectural government to prepare and maintain disaster management plans at each levels and in all sectors and to carry out DRM activities of their administrative boundaries as per their plan. Also Cabinet Office advises to the relevant stakeholder agencies to prepare their own operational DM plans as per their role in disaster response. Also cabinet office promotes DM plans for public and private organizations for the safety and the continuity of services.

Rather than being managed by one central body disaster management system of Japan is decentralized and growing trend of decentralization is being observed during recent years. As one of the most prominent characteristic features of the system decentralization enables more government agencies to be involved in disaster management bearing various responsibilities, fosters development disaster coping capability of each body or region individually and together enhance overall disaster management framework.

In turn, 3-layered hierarchy of the system fosters comprehensive supervision and management of overall system. It also allows tackling the each disaster and accident on relevant level and with

relevant resources depending on its scale and implications. Activities at national, prefectural and municipal levels are taken in coordinated manner and supervised by the immediate higher level. Such a hierarchical system itself distributes the responsibilities and it will ease the burden of each involved body and enabling each of them to manage specific issues in with more effective and efficient manner. Integration of disaster management measures by specific bodies allows handling specific disaster risk management issues more effectively.

Japan has given the importance for emergency response by introducing various systems to distinguish major, additional, specialized and voluntary response bodies and forces. Earlier they assumed municipalities as the major bodies for holding the primary responsibility of ensuring and carrying out quick response operations, later specialized bodies are trained for emergency medical assistance DMAT and JMAT and specialized teams of several public corporations designated for disaster management under the DCBA. Further, additional forces are introduced by national level government organizations such as FDMA, MLIT, and MHLW. Once, the coping capacity of a municipal government exceed their limits. Then national level supervision and coordination bodies such as MLIT, FDMA, and MHLW will carry out their own emergency response activities during large-scale disasters.

JMA is the key body in prediction and forecasting of major natural hazards such as earthquake, tsunami, typhoon and volcano eruptions while MLIT is doing the forecasting on flood and sediment disasters .Therefore the cooperation between them is essential for municipalities and other disaster response organizations for better response. It must be noted that application of newest sophisticated technologies for disaster warning and communication by JMA had greatly improved their accurate prediction capabilities. In addition, for the quick dissemination of EW for state infrastructure, relevant stakeholder agencies and service agencies such as railway companies and gas & electricity companies, NHK has established quick information sharing system with JMA and other relevant bodies as well as response mechanism within their field of operation. National Police and Self-Defense Forces are playing an important role during large-scale disaster.

Large-scale natural disasters in recent decades, such as, Isewan Typhoon, the Great Hanshin-Awaji Earthquake and the Grate East Earthquake have influenced currents disaster management system in Japan. The system has undergone some organizational changes, new disaster response forces formed (DMAT) and new disaster response mechanisms for an instance Phoenix System and Emergency Medical Information System in Hyogo Prefecture has been introduced.

Establishment of temporary headquarters during large-scale disasters at all levels for disaster response in Japan. Such headquarters serves effectively when mobilizing of forces, better coordination of activities and maintain disaster information sharing. Therefore the potential of large-scale natural disaster recurring is high in Japan, Establishment of permanent bodies is necessary to reduce impact of disasters.

Massive numbers of voluntary response teams and organizations involved in disaster response reflects the high level of dedication, social responsibility and disaster awareness of Japanese. Therefore all phases of disaster management acting in collaboration with the permanent officials' voluntary teams demonstrate their remarkable efforts and that will raise the psychological impact to vulnerable community.

Disaster preparedness is highlighted by remembrance of past catastrophic events. Therefore Japanese build memorial museums, education facilities, training centers using sophisticated technology to increase the disaster awareness and preparedness among Japanese and international community. They conduct drills in all levels and in all sectors frequently for effective response.

Japanese show their preparedness for large scale wide spread disasters by developing simulations for each potential hazard such as earthquake, tsunami, sediment disaster and fire with comprehensive potential damage and loss assessments. They built backup emergency operation facilities, emergency supply stores and resource pools used for potential large scale disasters.

With lesson learned, Japanese understand the importance of resiliency of each sector for effective recovery. Therefore they introduced the public private partnership in disaster risk management and business continuity planning. That will help to continue the services without interruption.

Finally Japanese disaster management framework is more matured with their experience and lesson learned. After each catastrophic events they revisit all the related existing laws and plans by appointing technical advisory committees to fill any existing gap and introduced new laws ,revised and add related chapters to the DM plans to counter future disasters.

Lesson learnt

- The government of Japan, officials, stake holder agencies and the general public learned the lesson of being prepared for natural disasters.
- Public, private & academia partnership in disaster risk Management was advocated by the CDMC.
- Volunteerism & CBDRM approaches were advocated by CDMC as well as Local governments.
- The importance of BCP & Recovery planning with BBB concept in public and private sector disaster preparedness for resilient nation was advocated by the government of Japan.
- Remembrance, commemorations and continuous disaster awareness will be able to raise spirit of culture of safety among vulnerable communities.

How I used the Knowledge that I gained from above Lessons

- Based on my research findings I will make a presentation in front of DMC officials and NDMCC (Major national level stake holder meeting held in once a month in Sri Lanka).
- Advice to establish the provincial & municipal disaster Management setup which was not functioning yet.
- Advice the importance of BCP and recovery planning in disaster preparedness.
- Advice the importance of volunteerism and private sector involvement in emergency response.
- Advice the importance of commemorations days and continuous awareness to achieve the objective of the culture of safety among vulnerable communities in Sri Lanka.

REFERENCES

- i. Disaster Countermeasures Basic Act (No.223, November 15, 1961)
- ii. “BOKOMI” Guidebook. Published by Disaster Reduction Learning Center (DRLC), KOBE City Fire Bureau (KCFB). 2015.
- iii. Disaster Management in Japan hand book. Published by Director General for Disaster Management, Cabinet Office. 2015.
- iv. Available at: http://www.bousai.go.jp/1info/pdf/saigaipanf_e.pdf
- v. National Disaster Risk Profile of Japan. National Institute of Disaster Management (NIDM)
- vi. Available at: http://nidm.gov.in/easindia2014/err/pdf/country_profile/japan.pdf
- vii. Presentation/lecture materials by Cabinet Office, JICA, IRP, JMA, Kobe Fire Department, Hyogo Disaster Prefecture Center, Miki Earthquake Disaster Memorial Park, Hyogo police station, ADRC conference room-BCP, DM planning, Risk mapping & Private sector DRR.
- viii. Defense of Japan 2011. Part III: Measures for Defense of Japan
- ix. Chapter 1 Operations of Self-Defense Forces for Defense of Japan and Responses to Diverse Situations. Ministry of Defense Publication. 2011.
- x. Available at: http://www.mod.go.jp/e/publ/w_paper/pdf/2011/09_Part3_Chapter1.pdf
- xi. Disaster Management in Hyogo Prefecture. Working towards disaster reduction based on experience and expertise. Brochure planned and edited by Disaster Prevention Policy Planning Division, Disaster Prevention Policy Planning Bureau, Hyogo Policy Planning and Civil Affairs Department. Hyogo Prefecture Government.
- xii. Available at: <http://www.drlc.jp/english/wp-content/uploads/english11.pdf>
- xiii. Emergency Disaster Relief by JICA. Official web-page of the JICA.
- xiv. Available at: <http://www.jica.go.jp/english/operations/schemes/emergency.html>
- xv. Establishing Disaster Medical Assistance Teams in Japan. Prehospital and Disaster Medicine Journal. Vol. 24. No. 6. An Official Publication of the World Association for Disaster and Emergency Medicine. Cambridge University Press. 2010. Available at: http://pdm.medicine.wisc.edu/Volume_24/issue_6/kondo.pdf
- xvi. Fire Service Law. Published by International Fire Service Information Center. 2005.
- xvii. Fire Defense Organization Law. Published by International Fire Service Information Center. 2005.
- xviii. Fire and Disaster. Actual Condition and Prospects of Fire and Disaster Management Administration. Fire and Disaster Management Agency.
- xix. HNS Tanker Owners Duty in Japan. Brochure published by Maritime Disaster Prevention Center. Available at: www.mdpc.or.jp

- xx. Japan Medical Association Team. Japan Medical Association Disaster Headquarters Status Report. March 15, 2011. Available at: <http://www.med.or.jp/english/report/JMAT.pdf>
- xxi. Dispatch of Japan Disaster Relief Team. Official web-page of the Ministry of Foreign Affairs of
- xxii. Japan. Available at: <http://www.mofa.go.jp/policy/emergency/assistance1.html>

LIST OF ANNEXURES

Annex 1

Major Natural Disaster in Japan since 1945

Date	Disaster	Main Disaster Areas	Number of Fatalities and Missing
January 13, 1945	Mikawa Earthquake (M6.8)	Southern Aichi	2,306
September 17-18, 1945	Typhoon Makurazaki	Western Japan (Especially in Hiroshima)	3,756
December 21, 1946	Nankai Earthquake (M8.0)	Various Places in West of Chubu	1,443
August 14, 1947	Mt. Asama Eruption	Around Mt. Asama	11
September 14-15, 1947	Typhoon Catherine	North of Tohoku	1,930
June 28, 1948	Fukui Earthquake (M7.1)	Around the Fukui Plains	3,769
September 15-17, 1948	Typhoon Ion	From Shikoku through into Tohoku (Especially in Iwate)	838
September 2-4, 1950	Typhoon Jane	North of Shikoku (Especially in Osaka)	539
October 13-15, 1951	Typhoon Ruth	Nationwide (Especially in Yamaguchi)	943
March 4, 1952	Tokachi-oki Earthquake (M8.2)	Southern Hokkaido, Northern Tohoku	33
June 25-29, 1953	Torrential Rains	Kyushu, Shikoku, Chugoku (Especially Kitakyushu)	1,013
July 16-24, 1953	Torrential Rains	West of Tohoku (Especially in Wakayama)	1,124
May 8-12, 1954	Storm Disaster	Northern Japan, Kinki	670
September 25-27, 1954	Typhoon Toyamaru	Nationwide (Especially in Hokkaido and Shikoku)	1,761
July 25-28, 1957	Torrential Rains	Kyushu (Especially around Isahaya)	722
June 24, 1958	Mr. Aso Eruption	Around Mt. Aso	12
September 26-28, 1958	Typhoon Kanogawa	East of Kinki (Especially in Shizuoka)	1,269
September 26-27, 1959	Typhoon Ise-wan	Nationwide (Except for Kyushu, especially in Aichi)	5,098
May 23, 1960	Chile Earthquake Tsunami	Southern Coast of Hokkaido, Sanriku Coast, Shima Coast	142
January 1963	Snow Disasters	Hokuriku, Sanin, Yamagata, Shiga, Gifu	231
June 16, 1964	Niigata Earthquake (M7.5)	Niigata, Akita, Yamagata	26
September 10-18, 1965	Typhoons 23, 24, 25	Nationwide (Especially in Tokushima, Hyogo, Fukui)	181
September 23-25, 1966	Typhoons 24, 26	Chubu, Kanto, Tohoku (Especially in Shizuoka, Yamanashi)	317
July to August 1967	Torrential Rains	West of Chubu, Northern Tohoku	256
May 16, 1968	Tokachi-oki Earthquake (M7.9)	Southern Hokkaido and Tohoku Area centering around Aomori	52
July 3-15, 1972	Typhoons 6, 7, 9 and Torrential Rains	Nationwide (Especially in Kitakyushu, Shimane, Hiroshima)	447
May 9, 1974	Izu-hanto-oki Earthquake (M6.9)	Southern Tip of Izu-hanto	30
September 8-14, 1976	Typhoon 17 and Torrential Rains	Nationwide (Especially in Kagawa, Okayama)	171
January 1977	Snow Disaster	Tohoku, Northern Kinki, Hokuriku	101
August 7, 1977- October 1978	Mr. Usu Eruption	Hokkaido	3
January 14, 1978	Izu-Oshima-kinkai Earthquake (M7.0)	Izu-hanto	25
June 12, 1978	Miyagi-ken-oki Earthquake (M7.4)	Miyagi	28
October 17-20, 1979	Typhoon 20	Nationwide (Especially Tokai, Kanto, Tohoku)	115
December 1980 - March 1981	Snow Disasters	Tohoku, Hokuriku	152
July to August 1982	Torrential Rains and Typhoon 10	Nationwide (Especially in Nagasaki, Kumamoto, Mie)	439
May 26, 1983	Nihon-kai-chubu Earthquake (M7.7)	Akita, Aomori	104
July 20-29, 1983	Torrential Rains	East of Sanin (Especially in Shimane)	117
October 3, 1983	Miyake Is. Eruption	Around Miyake-jima Island	—
December 1983 - March 1984	Snow Disasters	Tohoku, Hokuriku (Especially in Niigata, Toyama)	131
September 14, 1984	Nagano-ken-seibu Earthquake (M6.8)	Western Nagano	29
November 15 - December 18, 1986	Izu-Oshima Eruption	Izu Oshima Island	—
November 17, 1990	Mr. Unzen Eruption	Nagasaki	44
July 12, 1993	Hokkaido-nansei-oki Earthquake (M7.8)	Hokkaido	230
July 31 - August 7, 1993	Torrential Rains	Nationwide	79
January 17, 1995	Great Hanshin-Awaji Earthquake (M7.3)	Hyogo	6,437
March 31, 2000 - June 28, 2001	Mt. Usu Eruption	Hokkaido	—
June 25, 2001 - March 31, 2005	Miyake Is. Eruption and Niijima and Kozushima Is. Earthquake	Tokyo	1
October 20-21, 2004	Typhoon 23	Nationwide	98
October 23, 2004	Niigata-ken-Chuetsu Earthquake (M6.8)	Niigata	68
December 2005 - March 2006	Heavy Snowfalls	Japan Sea Coast centering around Hokuriku Area	152
July 16, 2007	Niigata Earthquake (M6.8)	Niigata	15
June 14, 2008	Iwate-Miyagi Inland Earthquake (M7.2)	Tohoku (Especially in Miyagi, Iwate)	23
December 2010 - March 2011	Snow Disasters	From Northern Japan through into Kanto-Koshinetsu Area (Especially in Yamanashi)	131
March 11, 2011	Great East Japan Earthquake (Mw9.0)	Eastern Japan (Especially in Miyagi, Iwate, Fukushima)	21,839
August 29 - September 7, 2011	Typhoon 12	Kinki, Shikoku	94
November 2011 - March 2012	Deep Snowfall from November 2011 Onwards	From Northern Japan through into West Japan on the Japan Sea Coast	132
December 2012 - March 2013	Deep Snowfall from December 2012 Onwards	From Northern Japan through into West Japan on the Japan Sea Coast	101
November 2013 - May 2014	Deep Snowfall from November 2013 Onwards	From Northern Japan through into Kanto-Koshinetsu Area (Especially in Yamanashi)	93
August 20, 2014	Torrential Rains of August 2014	Hiroshima	74
27 September, 2014	2014 Eruption of Mt. Ontake	Nagano, Gifu	63

*Mw: Moment Magnitude

Notes:

- The disasters listed resulted in fatalities and missing persons as follows: 500 or more for storm and flood disasters, 100 or more for snow disasters, and 10 or more for earthquakes, tsunamis, and volcanic eruptions. It also includes disasters for which governmental Major Disaster Management Headquarters were established based on the Disaster Countermeasures Basic Act.
- The number of fatalities and missing persons for the Great Hanshin-Awaji Earthquake is the current figure as of December 22, 2005. The number of deaths directly caused by structural collapse, fire, and other factors caused by seismic shaking on the day of the earthquake, excluding so-called related deaths, is 5,521.
- The number of fatalities from the Miyake Is. Eruption and Niijima and Kozushima Is. Earthquake is from the earthquake of July 1, 2000.
- The number of fatalities and missing persons since 2014 is from flash bulletins based on Cabinet Office summaries.
- The number of fatalities (including earthquake-related fatalities) and missing persons resulting from the Great East Japan Earthquake is the current figure as of March 1, 2015.

Source: Created by the Cabinet Office based on the meteorological almanac of Japan, Chronological Scientific Tables, National Police Agency materials, Fire and Disaster Management Agency materials, Extreme Disaster Management Headquarters materials, and Hyogo Prefecture materials

The Status of establishment of Central Disaster Management Committees

Name of Committee for Technical Investigation	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	
Committee for the Technical Investigation of Tokai Earthquakes (total 11 meetings)		Mar. 14, '01	Dec. 11, '01													
Committee for the Technical Investigation of Future Earthquake Measure Effective Practices (total 11 meetings)		Sep. 17, '01	Jun. 26, '02													
Committee for the Technical Investigation of Tonankai and Nankai Earthquakes (total 36 meetings)		Oct. 3, '01	Tohankai and Nankai Earthquake Measures (meetings 1-16)										Nov. 26, '04	Chubu and Kinki Inland Earthquake Measures (meetings 17-36)		Dec. 2, '08
Committee for the Technical Investigation of Basic Disaster Management Plans (total 9 meetings)		Oct. 11, '01	Jun. 28, '02													
Committee for the Technical Investigation of Tokai Earthquake Measures (total 10 meetings)		Mar. 4, '02		May 12, '03												
Committee for the Technical Investigation of the Cultivation of Disaster Management Human Resources (total 5 meetings)		Sep. 25, '02		May 13, '03												
Committee for the Technical Investigation of Disaster Management Information Sharing (total 12 meetings)		Oct. 3, '02		Jul. 16, '03												
Committee for the Technical Investigation of the Dissemination of Lessons Learned from Disasters (total 15 meetings)			Jul. 31, '03										Dec. 22, '10			
Committee for the Technical Investigation of Tokyo Inland Earthquake Measures (total 20 meetings)			Sep. 12, '03		Jul. 22, '05											
Committee for the Technical Investigation of Improving Disaster Resilience Using the Power of the Markets and Private Sector (total 5 meetings)			Sep. 18, '03		Oct. 14, '05											
Committee for the Technical Investigation of Trench-type Earthquakes in the Vicinity of the Japan and Chishima Trenches (total 17 meetings)			Oct. 27, '03		Jan. 23, '06											
Committee for the Technical Investigation of the Promotion of Citizen Campaigns to Reduce Disaster Damage (total 14 meetings)					Dec. 9, '05		Dec. 13, '06									
Committee for the Technical Investigation of Tokyo Inland Earthquake Evacuation Measures (total 14 meetings)						Aug. 16, '06		Oct. 21, '08								
Committee for the Technical Investigation of Large-Scale Flood Measures (total 20 meetings)						Aug. 29, '06					Mar. 18, '10					
Committee for the Technical Investigation of Effective Practices for Earthquake Disaster Management in Regional Cities (total 10 meetings)										Apr. 26, '10		Mar. 12, '12				
Committee for the Technical Investigation of Disaster Evacuation (total 8 meetings)										Aug. 26, '10		Mar. 22, '12				
Committee for the Technical Investigation of Earthquake and Tsunami Measures Based on Lessons Learned from the Great East Japan Earthquake (total 12 meetings)										May 28, '11		Set. 28, '11				
Committee for Policy Planning on Disaster Management (total 13 meetings)											Oct. 28, '11		Jul. 31, '12			
Disaster Management Implementation Committee															Jul. 14, '13	

(Source: Cabinet Office)

In Japan disaster preparedness measures are taken based on the Disaster Countermeasures Basic Act and various disaster management laws and regulations derived based on DMCA

Major Disaster Management Laws by Type of Disaster					
Type	Prevention	Emergency Response	Recovery/Reconstruction		
Earthquakes, Tsunamis	Disaster Countermeasures Basic Act	<ul style="list-style-type: none"> Disaster Relief Act Fire Service Act Police Law Self-Defense Forces Act 	<p>General Relief and Assistance Measures Act on Special Financial Support to Deal with Extremely Severe Disasters</p> <p>General Relief and Support Measures</p> <ul style="list-style-type: none"> Small and Medium-sized Enterprise Credit Insurance Act Act on Financial Assistance for People Affected by Natural Disasters Act on Equipment Installation Support for Small Enterprises Act on Provision of Disaster Condolence Grant Employment Insurance Law Act on Support for Reconstructing Livelihoods of Disaster Victims Japan Finance Corporation Act <p>Disposal of Disaster Waste</p> <ul style="list-style-type: none"> Waste Management and Public Cleansing Act <p>Disaster Recovery Work</p> <ul style="list-style-type: none"> Act on Temporary Measures for Subsidies from National Treasury for Expenses for Project to Recover Facilities for Agriculture, Forestry and Fisheries Damaged by Disaster Act on National Treasury's Sharing of Expenses for Project to Recover Public Civil Engineering Works Damaged by Disaster Act on National Treasury's Sharing of Expenses for Recovery of Public School Facilities Damaged by Disaster Act on Special Measures concerning Reconstruction of Urban Districts Damaged by Disaster Act on Special Measures concerning Reconstruction of Condominiums Destroyed by Disaster <p>Insurance and Mutual Aid System</p> <ul style="list-style-type: none"> Act on Earthquake Insurance Agricultural Disaster Compensation Act Act on Government-Managed Forest Insurance <p>Laws relating to Disaster Taxation</p> <ul style="list-style-type: none"> Act on Reduction or Release, Deferment of Collection and Other Measures Related to Tax Imposed on Disaster Victims <p>Other</p> <ul style="list-style-type: none"> Act on Special Measures for the Preservation of Rights and Interests of the Victims of Specified Disasters Act on Special Financial Support for Promoting Group Relocation for Disaster Mitigation Act on Special Measures for Land and Building Leases in Areas Affected by Large-scale Disaster Act on Reconstruction from Large-Scale Disasters 		
	Act on Special Measures Concerning Countermeasures for Large-Scale Earthquakes				
	Act on the Promotion of Tsunami Measures				
	<ul style="list-style-type: none"> Act on Special Financial Measures for Urgent Earthquake Countermeasure Improvement Projects in Areas for Intensified Measures Act on Special Measures for Earthquake Disaster Countermeasures Act on Special Measures for the Promotion of Nankai Trough Earthquake Disaster Management Act on Special Measures against Tokyo Inland Earthquake Act on Special Measures for Promotion of Disaster Management for Trench-type Earthquakes in the Vicinity of the Japan and Chishima Trenches Act on Promotion of the Earthquake-proof Retrofit of Buildings Act on Promotion of Disaster Resilience Improvement in Densely Inhabited Areas Act on Development of Areas Resilient to Tsunami Disasters 				
	Volcanic eruptions			Act on Special Measures for Active Volcanoes	
	Windstorms, flooding			River Act	Flood Control Act
Landslides, rockfalls, debris flow	<ul style="list-style-type: none"> Erosion Control Act Forest Act Landslide Prevention Act Act on Prevention of Disasters Caused by Steep Slope Failure Act on Promotion of Sediment Disaster Countermeasures in Sediment Disaster Prone Areas 				
	<ul style="list-style-type: none"> Act on Special Measures for Heavy Snowfall Areas Act on Special Measures concerning Maintenance of Road Traffic in Specified Snow Coverage and Cold Districts 				
Heavy snowfall					
Nuclear power	Act on Special Measures Concerning Nuclear Emergency Preparedness				

Basic Acts

1. Disaster Countermeasures Basic Act (1961)
2. Acts on Prevention of Marine Pollution and Marine Disaster(1970)
3. Act on Disaster Prevention in Petroleum Industrial Complexes and other petroleum Facilities(1975)
4. Acts on Special Measures for large-scale Earthquakes(1978)
5. Acts on Special Measures for Nuclear disasters(1999)
6. Acts on Special Measures for promotion of Tonankai and Nankai Earthquake Disaster Management(2002)
7. Acts on Special Measures for Promotion of Disaster Management for Trench-type Earthquakes in the Vicinity of the Japan and Chishima Trenches (2004)

Disaster Prevention and Preparedness

1. Erosion Control Act(1870)
2. Building Standard Law(1950)
3. Forest Act(1951)
4. Act on Temporary Measures for Disaster Prevention and Development of Special Land Areas(1952)
5. Meteorological Services Act(1952)
6. Seashore Act(1956)
7. Landslide Prevention Act(1958)
8. Act on Special Measures for Disaster Prevention in Typhoon-prone Areas(1958)
9. Act on Special Measures for Heavy Snowfall Areas(1962)
10. River Act(1964)
11. Act on Prevention of Steep Slope Collapse Disaster(1969)
12. Act on Special Measures for Active Volcanoes(1973)
13. Act on Special Financial Measures for Urgent Earthquakes Countermeasures Projects in areas for intensified Measures(1973)
14. Act on Special Measures for Earthquake Countermeasures(1995)
15. Act on Promotion of Earthquake-proof retrofit of building(1995)
16. Act on Promotion of Disaster resilience improvement of densely inhabited areas(1997)
17. Act on Promotion of Sediment Disaster Countermeasures for sediment disaster prone areas(2000)
18. Specified Urban River Inundation Countermeasures Act(2003)

Disaster Recovery and Reconstruction, and Financial Measures

1. Forest National Insurance Act (1937)
2. Agriculture Disaster Compensation Act(1947)
3. Housing Loan Corporation Act(1950)

4. Act on Interim Measures for Subsidizing Recovery Projects for Agriculture, Forestry and Fisheries Facilities Damaged Due to Disasters(1950)
5. Small-Medium Business Credit Insurance Act(1950)
6. Act on National Treasury Share of Expenses for Recovery Projects for Public Civil Engineering Facilities Damaged Due to Disasters(1951)
7. Public Housing Act(1951)
8. Fishing Boat Damage Compensation Act(1952)
9. Agriculture, Forestry and Fisheries Finance Cooperation Act(1952)
10. Railway improvement Act(1953)
11. Act on National Treasury Share of Expenses for Recovery of Public School Facilities Damaged Due to Disasters(1953)
12. Act on Interim Measures for Financing Famers, Woodsmen and Fishermen Suffering from Natural Disasters(1955)
13. Airport Improvement Act(1956)
14. Small-Scale Business Equipment Installation Financial Support Act(1956)
15. Act on Special Financial Support to Deal with Extremely Severe Disasters(1962)
16. Fisheries Disaster Compensation Act(1964)
17. Act on Earthquake Insurance (1966)
18. Act on Special Financial Measures for Group Relocation Promotion Projects for Disaster Mitigation(1972)
19. Act on Payment of Solatia for Disasters(1973)
20. Act on Special Measures for Reconstruction of Disaster-Stricken Urban Areas (1995)
21. Act on Special Measures for Reconstruction of Jointly Owned Buildings in disaster-Stricken Areas(1995)
22. Act on Special Measures for Prevention of Rights and Profits of the Victims of Specified Disasters(1996)
23. Act on Support for Livelihood Recovery of Disaster Victims(1998)

Fig. A-35 Disaster Management Budgets by Year

Fiscal Year	Science and Technology Research		Disaster Prevention		Land Conservation		Disaster Reconstruction		Total (JPY million)
	(JPY million)	Share (%)	(JPY million)	Share (%)	(JPY million)	Share (%)	(JPY million)	Share (%)	
1962	751	0.4	8,864	4.3	97,929	47.1	100,642	48.3	208,006
1963	1,021	0.4	8,906	3.7	116,131	47.7	117,473	48.2	243,522
1964	1,776	0.7	13,724	5.4	122,409	48.3	115,393	45.6	253,302
1965	1,605	0.5	17,143	5.6	147,858	48.3	139,424	45.6	306,030
1966	1,773	0.5	20,436	5.9	170,650	49.0	155,715	44.7	348,574
1967	2,115	0.6	23,152	6.1	197,833	52.3	154,855	41.0	377,955
1968	2,730	0.7	25,514	6.8	207,600	55.4	138,815	37.1	374,659
1969	2,747	0.7	30,177	7.5	236,209	59.0	131,270	32.8	400,403
1970	2,756	0.6	36,027	8.2	269,159	60.9	133,998	30.3	441,940
1971	3,078	0.5	50,464	8.6	352,686	60.3	178,209	30.5	584,437
1972	3,700	0.4	93,425	10.3	488,818	54.1	316,895	35.1	902,838
1973	6,287	0.7	111,321	12.4	493,580	54.9	287,082	32.0	898,270
1974	14,569	1.5	118,596	12.1	505,208	51.5	342,556	34.9	980,929
1975	17,795	1.5	159,595	13.3	615,457	51.3	405,771	33.9	1,198,618
1976	21,143	1.3	186,297	11.5	711,159	43.9	700,688	43.3	1,619,287
1977	22,836	1.4	234,409	13.9	904,302	53.6	525,886	31.2	1,687,433
1978	29,642	1.7	307,170	17.3	1,093,847	61.6	345,603	19.5	1,776,262
1979	35,145	1.6	435,963	20.4	1,229,401	57.6	432,759	20.3	2,133,268
1980	29,929	1.2	456,575	18.9	1,229,615	50.8	705,168	29.1	2,421,287
1981	29,621	1.2	474,926	18.9	1,240,788	49.5	761,950	30.4	2,507,285
1982	28,945	1.1	469,443	17.2	1,261,326	46.3	963,984	35.4	2,723,698
1983	29,825	1.1	489,918	18.4	1,268,712	47.6	875,851	32.9	2,664,306
1984	28,215	1.2	485,219	20.7	1,350,592	57.7	475,878	20.3	2,339,904
1985	27,680	1.1	512,837	20.2	1,355,917	53.5	640,225	25.2	2,536,659
1986	28,646	1.2	482,889	19.7	1,354,397	55.3	581,462	23.8	2,447,394
1987	38,296	1.4	612,505	21.9	1,603,599	57.2	548,337	19.6	2,802,737
1988	31,051	1.1	587,073	20.8	1,550,132	54.9	657,681	23.3	2,825,937
1989	34,542	1.2	588,354	20.7	1,638,104	57.5	587,819	20.6	2,848,819
1990	35,382	1.1	625,239	20.0	1,669,336	53.4	796,231	25.5	3,126,188
1991	35,791	1.1	628,596	19.8	1,729,332	54.3	788,603	24.8	3,182,322
1992	36,302	1.1	745,405	22.8	2,017,898	61.6	475,411	14.5	3,275,015
1993	43,152	0.9	866,170	18.6	2,462,800	52.9	1,280,569	27.5	4,652,691
1994	40,460	1.0	747,223	18.9	1,945,295	49.1	1,230,072	31.0	3,963,050
1995	105,845	1.4	1,208,134	16.0	2,529,386	33.5	3,696,010	49.0	7,539,375
1996	52,385	1.2	1,029,658	24.5	2,156,714	51.3	968,182	23.0	4,206,938
1997	49,128	1.2	1,147,102	28.2	2,014,695	49.4	864,370	21.2	4,075,295
1998	62,435	1.1	1,228,539	22.3	2,905,921	52.8	1,310,515	23.8	5,507,411
1999	78,134	1.7	1,142,199	25.0	2,400,534	52.6	941,886	20.6	4,562,752
2000	73,502	1.8	1,011,535	24.4	2,376,083	57.3	689,225	16.6	4,150,346
2001	49,310	1.2	1,060,445	26.7	2,238,816	56.4	618,427	15.6	3,966,998
2002	48,164	1.3	1,202,984	31.9	1,981,686	52.5	543,949	14.4	3,776,783
2003	35,133	1.1	814,101	25.7	1,625,670	51.4	689,255	21.8	3,164,159
2004	30,478	0.7	815,059	19.3	1,753,418	41.5	1,622,112	38.4	4,221,067
2005	11,097	0.4	866,290	28.6	1,426,745	47.0	728,606	24.0	3,032,738
2006	11,627	0.4	689,505	25.1	1,439,129	52.3	610,302	22.2	2,750,563
2007	9,687	0.4	706,853	29.0	1,332,222	54.6	391,637	16.0	2,440,399
2008	8,921	0.4	819,359	33.2	1,275,135	51.7	363,471	14.7	2,466,886
2009	8,761	0.4	498,397	23.0	1,383,254	63.7	279,789	12.9	2,170,201

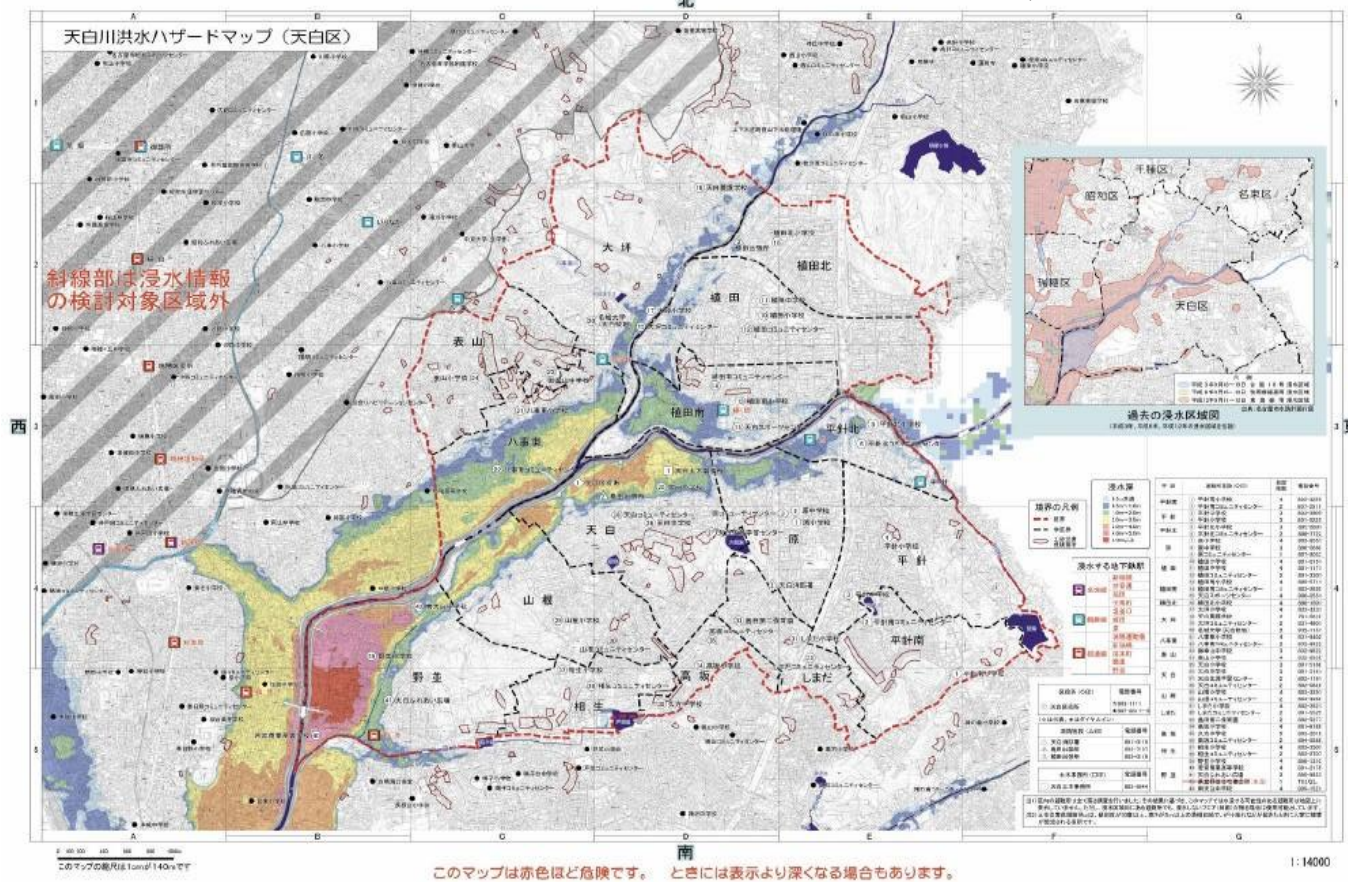
Fiscal Year	Science and Technology Research		Disaster Prevention		Land Conservation		Disaster Reconstruction		Total (JPY million)
	(JPY million)	Share (%)	(JPY million)	Share (%)	(JPY million)	Share (%)	(JPY million)	Share (%)	
2010	7,695	0.6	224,841	16.9	813,359	61.1	285,038	21.4	1,330,933
2011	28,072	0.6	376,169	8.0	743,936	15.9	3,536,475	75.5	4,684,652
2012	29,422	0.6	561,021	12.0	790,422	17.0	3,129,561	67.2	4,656,656
2013	15,339	0.3	788,576	14.1	879,932	15.8	3,883,911	69.6	5,578,036
2014	12,683	0.3	412,904	11.0	803,404	21.3	2,535,673	67.4	3,764,664
2015	9,966	0.3	495,654	14.7	137,192	4.1	2,733,771	81.0	3,376,583

Notes:

1. These are adjusted budget (national expenditures) amounts. However, the FY 2014 figures are preliminary figures reflecting the initial budget.
 2. The reduced amount allocated to science and technology research in FY 2007 is largely due to the structural conversion of national lab and research institutions into independent administrative agencies (the budgets of independent administrative agencies are not included in this table).
 3. The amount allocated to disaster prevention in FY 2009 is reduced because a portion of the revenue sources set aside for road construction were converted to general fund sources making it impossible to allocate certain portions to the disaster management budget.
 4. The reduced amount allocated to disaster prevention and land conservation in FY 2010 is due to the fact that, following the creation of the General Grant for Social Capital Development, some disaster prevention policies and many subsidy programs in land conservation were established using those grants.
 5. The reduced amount allocated to land conservation in FY 2011 is a result of the fact that relevant personnel expenses were accounted for separately.
- Source: Cabinet Office using materials from various ministries and agencies.

Developed Risk Maps

1. Flood Hazard Map –Tenpaku River- Tentative Hazard Map of Mt.Fuji



富士山火山防災マップ

富士山火山防災マップを作成した目的

- 富士山は、多くの市民の生活圏に立地し、噴火活動が頻りに行われ、被害が拡大する恐れがあります。また、富士山の噴火による被害は、周辺地域に及び、甚大な被害をもたらす可能性があります。そのため、噴火による被害を軽減し、被害を最小限に抑えることが目的です。
- 噴火による被害を軽減し、被害を最小限に抑えることが目的です。
- 噴火による被害を軽減し、被害を最小限に抑えることが目的です。

富士山火山防災マップ制作委員会 (委員長：環境局長 奥野 賢二、副委員長：環境部長 山田 泰史、委員：環境部長 山田 泰史、環境部長 山田 泰史、環境部長 山田 泰史)

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どのような現象が起こる? どのような注意が必要?

噴火
噴火は、火山から火や灰が噴き出ることによって起こります。噴火の種類には、大規模な噴火、中規模の噴火、小規模の噴火があります。噴火の種類によって、被害の範囲や程度が異なります。

火山灰
火山灰は、火山から噴き出た灰や石の粉です。火山灰は、呼吸器や目、肌を刺激します。また、火山灰は、電線や配線に付着し、断線の原因となります。

噴石
噴石は、火山から噴き出た石や岩の塊です。噴石は、非常に危険で、命を奪う可能性があります。

洪水
洪水は、火山から噴き出した泥流や、大雨による洪水です。洪水は、家や車を流し去る可能性があります。

火災
火災は、火山から噴き出した火や、雷による火災です。火災は、命を奪う可能性があります。

火山灰や噴石を出す大規模な噴火の場合 広い地域に火山灰が降ります

噴火によって噴き出た火山灰は、広い地域に降り注ぎます。火山灰は、呼吸器や目、肌を刺激します。また、火山灰は、電線や配線に付着し、断線の原因となります。

火山灰が降ったら...

- 呼吸器を保護するために、マスクを着用してください。
- 目を保護するために、ゴーグルを着用してください。
- 肌を保護するために、長袖の服を着用してください。
- 電線や配線に付着した火山灰を除去してください。

過去にはこんなことも起こっています

別号と色の意味

- 別号: 噴火の種類、噴火の規模、噴火の回数
- 色: 噴火の種類、噴火の規模、噴火の回数

ここに噴出した噴火の種類や規模の異なる噴火がいくつかあります。また、噴火の種類や規模が異なる噴火が、同じ地域に降り注いだこともあります。

富士山が噴火しそうならば、公的機関からの情報に注意し、万が一に備えて避難の準備をすること、適切に行動しましょう。

注意

富士山が噴火しそうならば、公的機関からの情報に注意し、万が一に備えて避難の準備をすること、適切に行動しましょう。

富士山の噴火の種類

- 大規模な噴火: 噴火の種類、噴火の規模、噴火の回数
- 中規模の噴火: 噴火の種類、噴火の規模、噴火の回数
- 小規模の噴火: 噴火の種類、噴火の規模、噴火の回数

避難の準備

- 避難の準備: 避難の準備、避難の準備、避難の準備

富士山の豊かな自然との共生

富士山の豊かな自然との共生

富士山は、豊かな自然を育んでいます。富士山の豊かな自然を保護し、未来世代に伝えることが重要です。

富士山の豊かな自然との共生のために、私たちは、自然を保護し、環境を改善する必要があります。

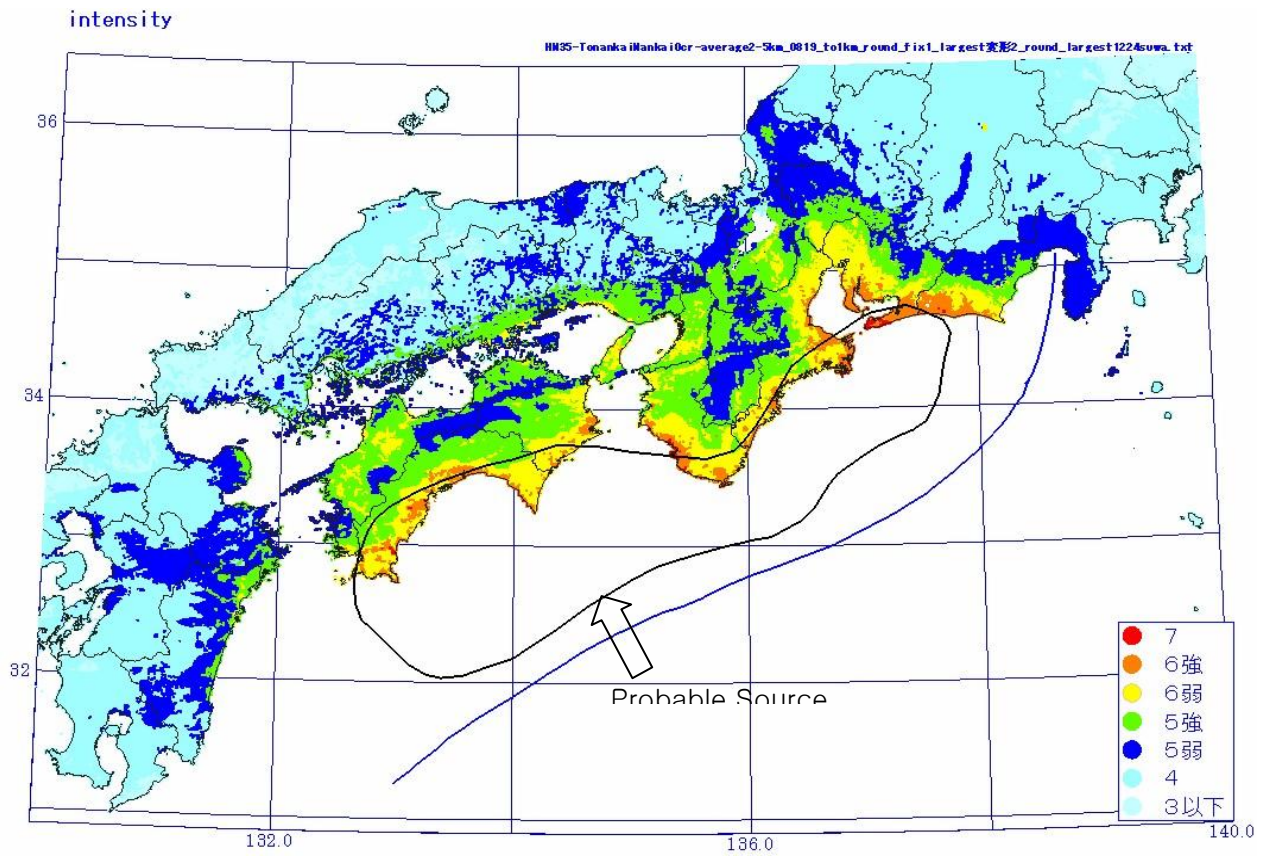
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2. Estimated Distribution of Seismic Intensity of The Tohnankai and Nankai Earthquakes



Estimated Height of Tsunami at high tide –The Tohnankai and Nankai Earthquakes

