

**ASIAN DISASTER REDUCTION CENTER
Visiting Researcher Program FY2011A**

EMERGENCY RESPONSE MANAGEMENT IN JAPAN

FINAL RESEARCH REPORT

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BACKGROUND

“Emergency management, as it is defined by FEMA, is the managerial function charged with creating the framework within which communities reduce vulnerability to hazards and cope with disasters”.

Four phases and eight core principles of emergency management is distinguished:

- 1) *Mitigation/Prevention,*
- 2) *Preparedness,*
- 3) **Response**
- 4) *Recovery.*

Response is defined as the actions taken to save lives and prevent further damage in a disaster or emergency situation. Response is putting preparedness plans into action. Response activities may include damage assessment, search and rescue, fire fighting, and sheltering victims. Response activities take place during an emergency.

As to the principles, the emergency management should be *Comprehensive, Progressive, Risk-driven, Integrated, Collaborative, **Coordinated**, Flexible and Professional.* Principle of being coordinated implies that *“emergency managers synchronize the activities of all relevant stakeholders to achieve a common purpose”.*

Typical requirements and attributive characteristics of emergency response make it rather different from other phases. Whereas, implementation of other phases depends on proper planning and elaboration, emergency response phase is characterized by such features as 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 technical hazard to human life, infrastructure, industry and environment. Although to various extent every single country is exposed to natural and technical hazards, thus, proper and comprehensive management of the response activities it the matter of saving lives, environment, economy and national security. Depending on its national hazard profile, geographical conditions and administrative organization every various countries and regions has established tailored emergency management system. Once system is in place, functional mechanism of emergency response - coordination of response activities and communication system are definitive factors.

Destructive implications of recurring natural disaster forced Japan to enhance its emergency management system over time. In doing so, along with organizational changes Japan has been integrating and latest technological advancements for disaster management purposes. Today, it represents one of the most holistic disaster management systems in the world.

The purpose of the research is to elaborate detailed and holistic view of the emergency response system of Japan as constituent and integral element of the entire emergency management system through the conduct of comprehensive study of emergency response related government bodies and public organizations.

1. DISASTER PROFILE OF JAPAN

Historically, destructive natural disasters have posed greatest challenge for Japanese society. Unfavorable geographical, topographical and meteorological conditions of the country have made it one of the most disaster prone countries in the world. Although its territory accounts merely for the 0,25 % of the planet's land area, Japan is subject to about 20,5 % earthquakes with the magnitude 6 or more and 7 % the world's active volcanoes is located on its territory.

The most frequent natural hazards in Japan are *earthquakes, tsunamis, typhoons, volcano eruptions, floods and landslides*. Occasional *torrential rains and heavy snows* are another challenge for the country. The high number of earthquakes, tsunamis and active volcanoes are the conditioned by the fact that territory of Japan forms the part Circum-Pacific Seismic Belt which is sometimes called as Pacific Ring of Fire.

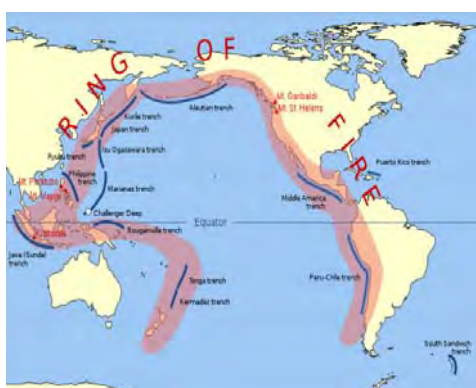


Figure 1. Ring of Fire

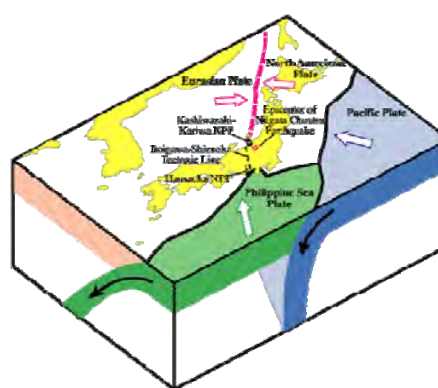


Figure 2. Junction of plates

As it is described in the Figure Japan is located at the junction of 4 tectonic plates – *Eurasian Plate, North American Plate, Pacific Plate and Philippine Sea* –which is the cause of high seismicity of its territory. Tsunamis are triggered by strong earthquakes at ocean bottom or huge landslides in the vicinity of the coast. As it is indicated in charts below, earthquakes and tsunamis are the major causes of disasters. Although remarkable successes has been achieved in increasing preparedness of the country –crucial role of the JMA, MLIT and BRI is must be emphasized in disaster preparedness – to earthquakes and tsunamis, recent big disaster caused by them –Great Hanshin-Awaji Earthquake and Great East Japan Earthquakes demonstrated that they still remain as biggest challenge for disaster management system of the country.

Typhoons and rain front are the main causes of storm and flood disasters in Japan. About 10 typhoons hit Japan causing storm, tidal wave and high tides mainly during the period between May and October with August and September.1959 year is considered to be turning point in fighting with typhoons – in that after Isewan typhoon which caused to the death of more than 5000. Since then as a result of set of measures taken and application new technological advancements by Japan Meteorological Agency (JMA) number of dead or missing peoples in the result of typhoons sharply decreased.

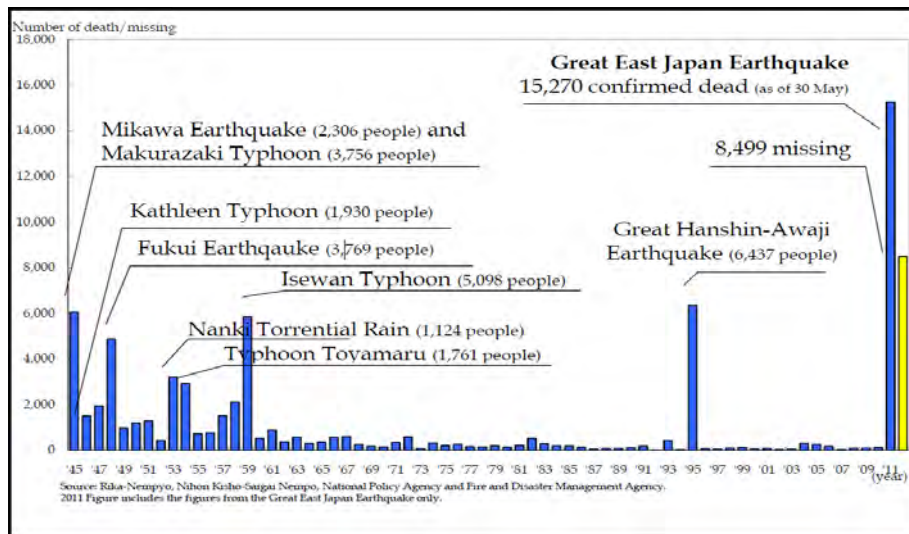


Figure 3. Number of dead/missing persons as a result of various major natural disasters (1945-2011)

Fire vulnerability and risk in Japan is high. This is mainly due to large forest areas which cover about 70% of its total area, highly developed chemical and high-technology industries and close proximity of buildings in densely populated areas. Wildfires in Japan occur usually in dry seasons, mainly in summer. Moreover, tsunamis and earthquakes are also likely to entail large-scale fires in its immediate aftermath. About 7000 fire cases occurred in immediate aftermath of the Great Hanshin-Awaji earthquake in 1995.

Rivers in Japan are short and steep and flow rapidly and violently. Moreover, ratio between normal volume of flow and that during a storm is extremely great. A great amount of rain falls on the Japanese archipelago during the rainy season (heavy rains of June and July) and typhoon seasons; and during periods of intensive rainfall, even a small stream that usually runs low may become a raging torrent. Moreover, combination of such factors as steep mountains, fast-flowing rivers, unstable and soft ground, rainy climate and frequent earthquakes often lead to such sediment disasters as debris flows, landslides and slope failures. Charts and maps below explain situation in Japan with regard floods and sediment disasters.

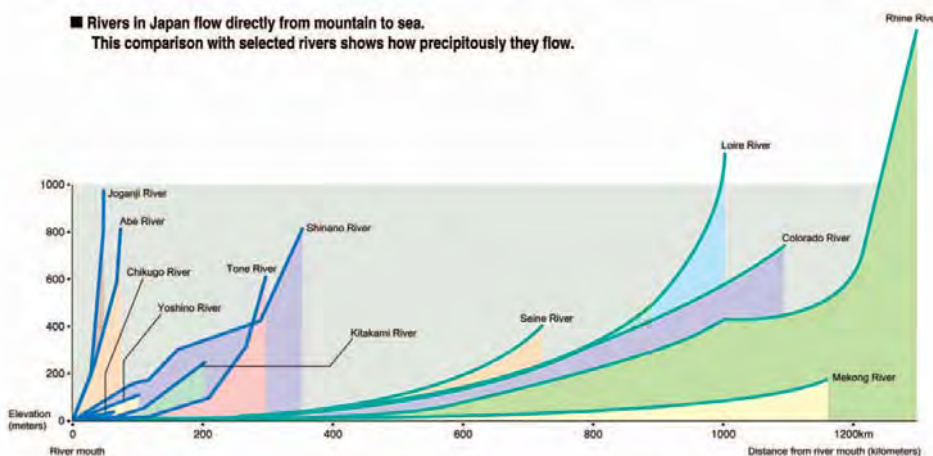


Figure 4. Comparison of steepness of Japanese with other major river around the world

2. DISASTER MANAGEMENT SYSTEM OF JAPAN

2.1 LEGAL BASIS

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. According to the latest brochure of Disaster Management System in Japan, only 3 laws has been enacted to regulate disaster response activities at national level: 1) **Disaster Relief Act - 1947 year** 2) **Fire Services Act -1948 year** 3) **Flood Control Act – 1949 year** - whereas the numbers of the laws regulating other phases of disaster management are considerably more: 7 *Basic Acts*; 18 *with regard to Disaster Prevention and Preparedness*; 23 *Disaster Recovery and Reconstruction and Financial Measures* [5; 6-7 p.] Given the interconnectedness of these laws, major aspects of some other laws will also be highlighted, while the main focus will be put on disaster response laws.

The enactment of the **Disaster Countermeasures Basic Act (DCBA)** is considered to be the turning point in the history of modern disaster management system of Japan. Adopted in 1961, two years after the Ise-wan Typhoon which caused tremendous destructions and loss of more 5000 people, the DCBA defined *protection of national land as well as citizens' lives, livelihoods, and property from natural disasters* as a national priority. The DCBA lays down the national level framework for the disaster management. The act has provisions governing the following matters: Definition of responsibilities of disaster management, Disaster Management Organizations, Disaster Management Planning System, Disaster Prevention and Preparedness, Disaster Emergency Response, Disaster Recovery and Rehabilitation, Financial Measures, State of Disaster Emergency. [5; 8p] The Disaster Countermeasures Basic Act and related laws complement each other as general legislation and detailed legislation, the latter consisting of specific laws established in response to various specific needs. In the event of a disaster, specific laws are first applied depending on the nature of the disaster, and the Disaster Countermeasures Basic Law is only invoked where there are no provisions in these laws. 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.

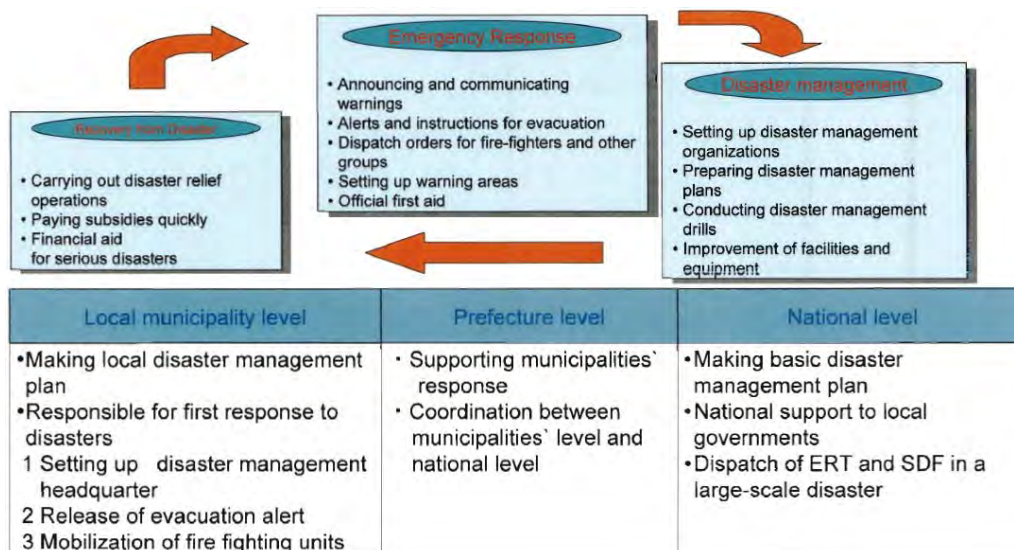


Figure 5. Basic Scheme of the DCBA

Fire Services Act, enacted in July 24, 1948, is the main law to regulate fire service within the entire territory of the country as well as functioning of fire service related state agencies [9] whereas the organization of the fire defense system in the country is based on the **Fire Defense Organization Law** enacted in December 23, 1947. The law defines the roles of the national fire defense agencies both at national and local levels. Duties of the Fire Service in Japan is defined by the law as follows: *with its equipment and personnel, the fire service shall perform the duties of protecting peoples' lives, person and property from fire, and of preventing and minimizing damage due to fire, flood, earthquake and other disasters.* Based on the law the Fire and Disaster Management Agency (FDMA) is established as an external organ of the Ministry of Internal Affairs and Communications and head of the FDMA is the Commissioner of the FDMA. As stipulated by the law *municipalities are obliged to fully carry out the fire services in their areas.* [10] The main affairs under the jurisdiction of **prefectures** regarding **fire service** are as follows: *prefectures are expected to provide municipalities with the advice and guidance so that they can fully carry out their fire service activities. The main affairs include liaison with municipalities and promotion of education and training for fire service personnel and members of volunteer fire corps by establishing fire academies (or "fire training schools"). In general, the prefectural organization for fire service is the division in charge of fire service established as part of the prefectural government organization.* The role of the FDMA and municipalities, as well as the role of the prefectures in fire service of Japan will be viewed in the next subchapter more broadly. Besides firefighting, fire prevention and investigation and guarding against fire the Fire Service Act of Japan lay down legal basis for government policy in relation to the areas of Hazardous Materials, Hazardous Materials Safety Techniques Association, Fire Protection Equipment, Inspection of Fire Equipment, Japan Fire Equipment Inspection Institute, Ambulance Service as well as miscellaneous provisions and penal provisions included. [9] With regard to **guarding against fire** Fire Service Act defines the legal framework for the cooperation among prefectural and municipal governments and other relevant bodies. The Article 22 of the FSA stipulates the following: *When Director-General of the Meteorological Agency, the Director of a District Meteorological Observatory, the Director of the Okinawa Meteorological Observatory, the Director of a Local Meteorological Observatory or the head of a Weather*

Station finds the meteorological conditions in a certain area to be dangerous from a fire prevention perspective, he/she shall immediately report such condition to the prefectural governor who has jurisdiction over said area. Having received the report the prefectural governor should inform concerned municipal governor which in turn is obliged to issue an alarm.

Disaster Relief Act – The purpose of the law is to provide essential emergency relief in the event of a disaster through the cooperation of local governments, non-governmental organizations, such as the Japanese Red Cross Society, and the general public, so as to protect the disaster victims and maintain social order. Chapter 3 and Chapter 4 of the DRA set the framework for the government policy with regard to costs management and reimbursement and penal provisions related with disaster relief activities. [8] In the case of emergency relief, the Disaster Relief Law is referred to for matters such as rescue operations and the state contribution to relief expenses, for which the law has specific provisions. Under the law, relief is provided only in the event of, for example, the destruction of a certain number of houses relative to the population of the municipality or municipalities concerned due to a disaster. (Example: At least 30 households have their dwellings destroyed through total structural collapse in a municipality with a population of less than 5,000). The extent, methods and duration of relief are to be specified by the Minister of Health, Labour and Welfare (MHLW). The MHLW plays key role in implementation of DRA during disaster times as a central supervisory and coordinating body.

As stipulated by the law, relief is provided by a **prefectural governor** with the assistance of his municipal mayors. Where necessary, the prefectural governor may delegate part of his authority to municipal mayors. The Act defines the responsibility of the prefectural governor as follows;

The prefectural governor shall constantly endeavor to formulate required plans, establish powerful relief organizations, and provide for labor, facilities, equipment, supplies and funding to ensure fully effective.

The following types of relief activities are defined by the Disaster Relief Act: *setting up of places of refuge and emergency temporary housing; supply of food and water; supply of clothing, bedding, etc; rescue of disaster victims; emergency repair of houses. Provision of school supplies Burial arrangements; search for deceased victims and body treatment; removal of debris and other obstacles in and around dwellings*

River and Flood Management in Japan is regulated based on the **River Act and Flood Control Act** respectively. The River Act, besides setting the basic rules for river administration defines major flood prevention measures whereas the purpose of the Flood Control Act, aka, Flood Fighting Law is to watch for and guard against water-related disasters caused by floods or storm surges and mitigate damage in order to maintain public safety. According to the River Act, the rivers in Japan are classified into 2 groups: Class A and Class B. And also there are independent rivers which are managed either by municipalities or cities. The entire river administration system based on the River Act looks as follows:

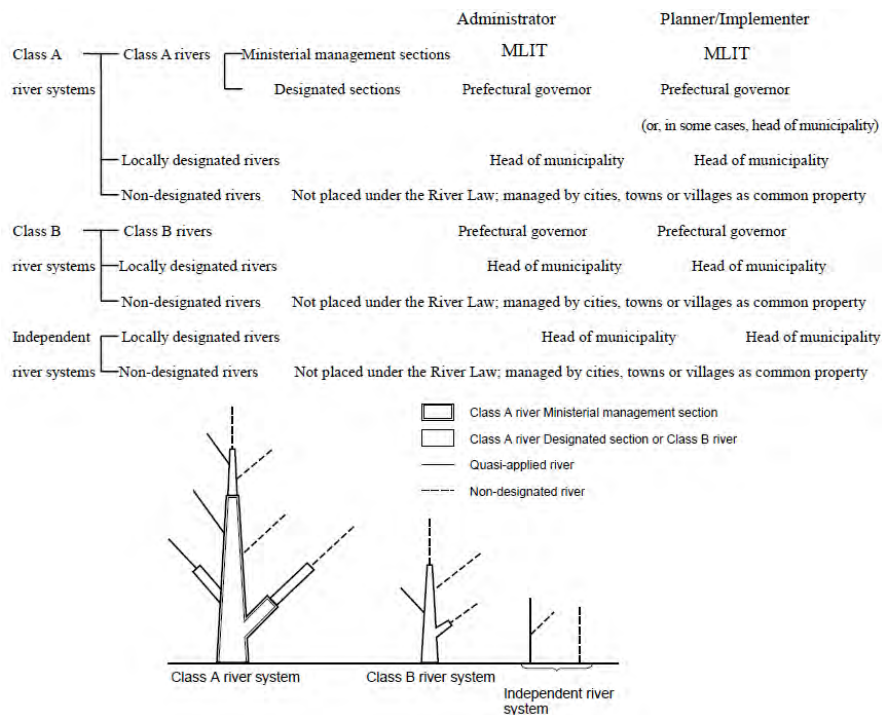


Figure 6. Classification and Administration of rivers in Japan

The river administrator may use or expropriate necessary land, earth materials, bamboos, wood or other materials and use vehicles or other transportation equipment or devices, or dispose of structures or other obstacles or have people who live near or are present at the flood hazard site perform the flood protection activities. In the event that a disaster has occurred or is likely to occur because of a flood, storm surge, etc. and it is deemed necessary in order to prevent or mitigate such disaster, the Minister of Land, Infrastructure, Transport and Tourism may direct the prefectural governor who performs part of the management of a Class A river in a designated section or the management of a Class B river to take necessary measures.

Flood fighting and preparedness are regulated under the Flood Fighting Act and Specified Urban River Inundation Prevention Act. According to Flood Control Act the municipalities assumes the primary and full responsibility for flood fighting activities within their respective territories. The following flood mitigation measures are conducted based on the Flood Control Act: Patrol of river, Mobilization of flood-fighting and fire-fighting organizations, Ordering residents to evacuate, Reporting and publishing water levels, Reporting levee breaches.

The Act plays an important role in the reduction of flood damage. It has provisions governing the following matters.

1. Flood forecast to guide evacuation, etc. (jointly issued by a river administrator and the Japan Meteorological Agency).
2. Flood fighting warning to guide flood fighting activities (issued by a river administrator).
3. Public announcement by a river administrator of flood prone areas along each major river and preparation of a hazard map by each municipality based on the assumed flood prone are

2.2 OVERVIEW OF THE DISASTER MANAGEMENT SYSTEM

Likewise, its national government system, disaster management in Japan is also vested on 3-layered system – national, prefectural and municipal layers. Disaster management system of Japan has undergone tremendous advancement throughout the past 5-6 decades. Disaster Management Councils established at each level and each council is responsible for the implementation of all disaster management related issues under its authority. The comprehensive coordination and communication system has been put in place to foster holistic and effective management at each level. The outline of Disaster Management System of Japan, the structure of Central Disaster Management Council established under the DCBA as well as Disaster Management Planning System based on the same law is shown below:

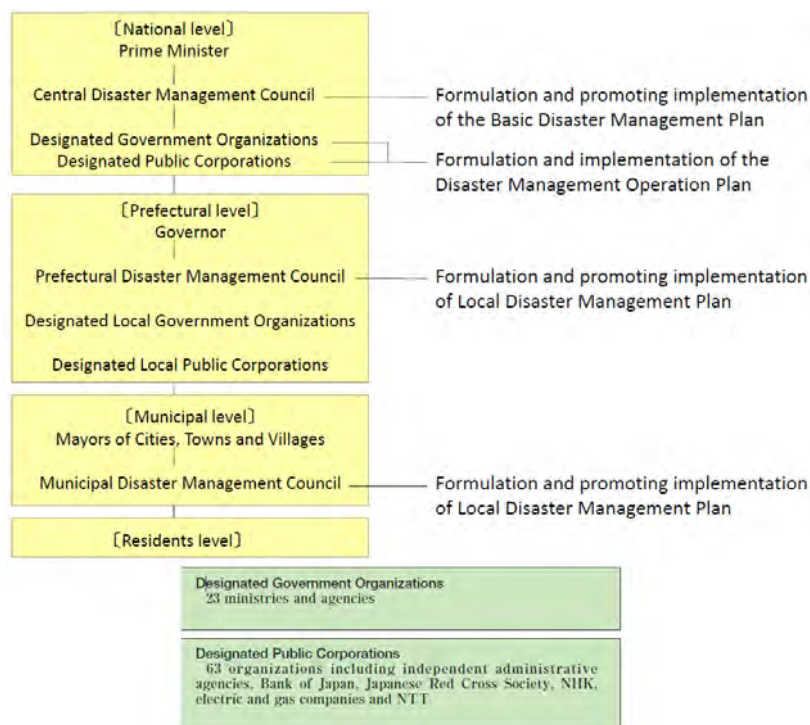


Figure 7. Outline of the disaster management system in Japan

Central Disaster Management Council consists of the prime minister, who is the chairperson, Minister of State for Disaster Management, all ministers, heads of major public institutions and experts. 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.

Duties of the council include formulating and promoting implementation of the Basic Disaster Management Plan and Earthquake Countermeasures Plans, formulating and promoting and promoting implementation of the urgent measures plan for major disasters, deliberating important issues on disaster reduction according to requests from the Prime Minister or Minister of State for Disaster Management (basic disaster management policies, overall coordination of disaster countermeasures and declaration of state of disaster emergency) and offering opinions regarding important issues on disaster reduction to the Prime Minister and Minister of State for Disaster Management.



Figure 8. Composition of CDMC



Figure 9. CDMC Committees for technical investigation

Disaster management planning in Japan is implemented at three levels:

1. *Basic Disaster Management Plan* is prepared by the Central Disaster Management Council and basis plan for disaster management activities. The plan must be based on Disaster Countermeasure Basic Act. The structure of it is as shown in the figure below:



Figure 10. Structure of Basic Disaster Management Plan

2. *Disaster Management Operation Plan* is made by each designated government organization and designated public corporation based on the Basic Disaster Management Plan
3. *Local Disaster Management Plan* is made by prefectural and municipal disaster management councils, subject to local circumstances and based on Basic Disaster Management Plan.

Mission of Cabinet Office - Along with a series of reforms of the central government system in 2001, the post of Minister of State for Disaster Management was newly established to integrate and coordinate disaster reduction policies and measures of ministries and agencies. In the Cabinet Office, which is responsible for securing cooperation and collaboration among related government organizations in wide-ranging issues, the Director-General for Disaster Management is mandated to undertake basic disaster management policies and response to large-scale disasters, as well as conduct overall coordination.

Additionally, taking into account lessons learned from the Great Hanshin-Awaji Earthquake, the Cabinet Secretariat System was strengthened, including the appointment of the Deputy Chief Cabinet Secretary for Crisis Management and the establishment of the Cabinet Information Collection Center, to strengthen risk management functions to address emergencies such as large-scale disasters and serious accidents. Thereby, the Cabinet Office has a role in supporting the Cabinet Secretariat regarding disaster management matters.

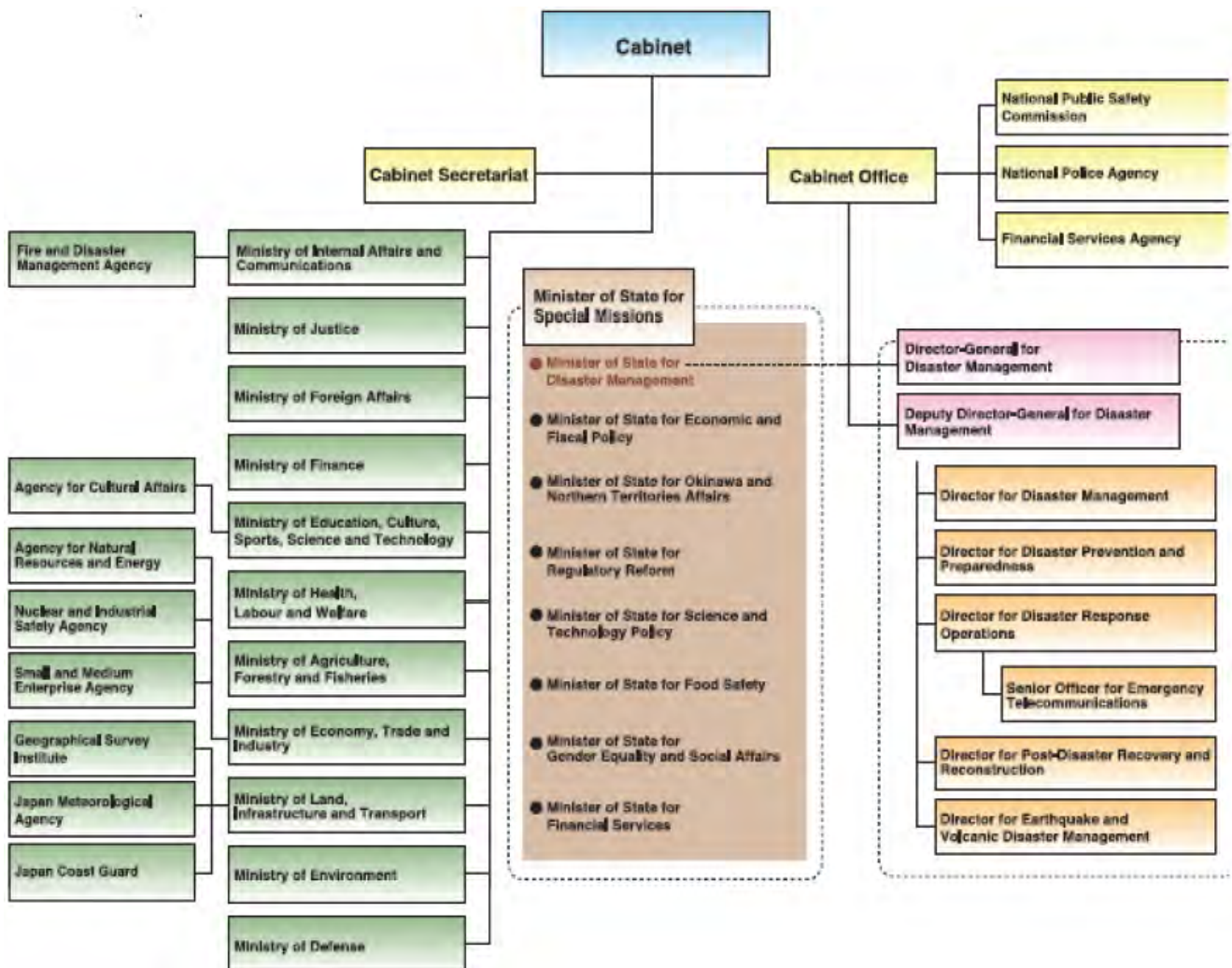


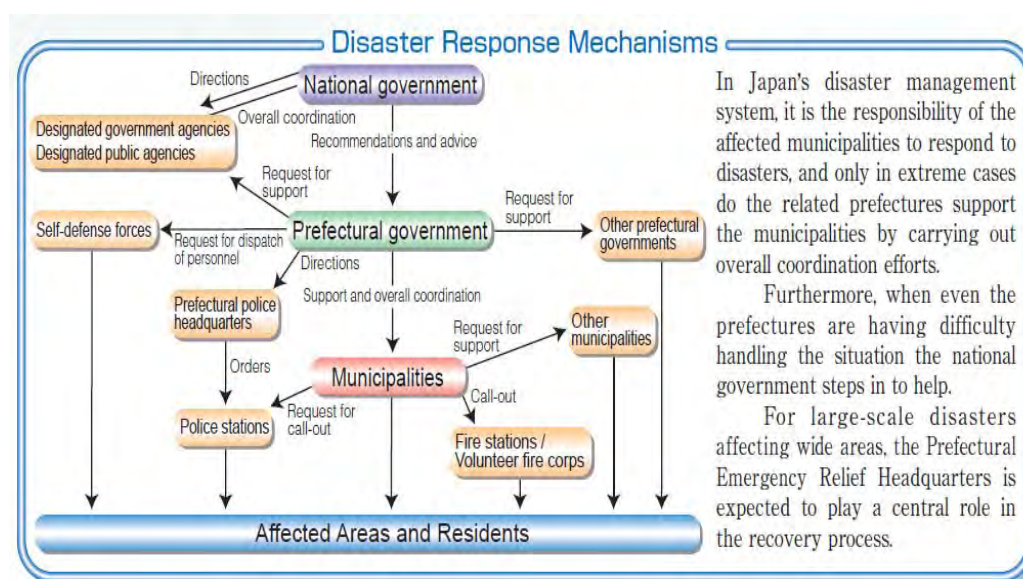
Figure 11. Organization of National Government and Cabinet Office (Disaster Management)

3. EMERGENCY RESPONSE MANAGEMENT AT THREE LEVELS

LEGAL BASIS AND THE ROLES OF INVOLVED BODIES

3.1 OUTLINE OF EMERGENCY RESPONSE SYSTEM

As a constituent element of the entire disaster management system, emergency response phase in Japan is managed at 3 levels. It is the direct responsibility of municipalities to carry out emergency response operations, such as firefighting, 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 the phase and provide local governments with necessary information about the hazard while local governments provide the national government agency with the damage information, and if the scope of the disaster elevates beyond the response capabilities of the municipality puts in action its own disaster response forces. Depending on the scale of the disaster, ad hoc emergency headquarters on all 3 levels, within designated public organizations if there is such a need, (electric power corporations, Japan Railway Company etc.) as well as on-site response headquarters are established. The national government collects disaster information at the Cabinet Information Collection Center 24 hours a day, and at the time of a large-scale disaster, the designated emergency response team comprised of the director-generals of the respective ministries and agencies gathers immediately at the Crisis Management Center in the Prime Minister's Office to grasp and analyze the disaster situation, and report to the Prime Minister. Inter-ministerial meetings at the ministerial or high-ranking senior official level are held to decide basic response policies if necessary. According to the level of damage, the 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). Additionally, a government investigation team headed by the Minister of State for Disaster Management may be dispatched, or an on-site disaster management headquarters may be established.



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 12. Outline of Disaster Response Mechanisms in Japan

Cabinet Office Disaster Response Mechanism

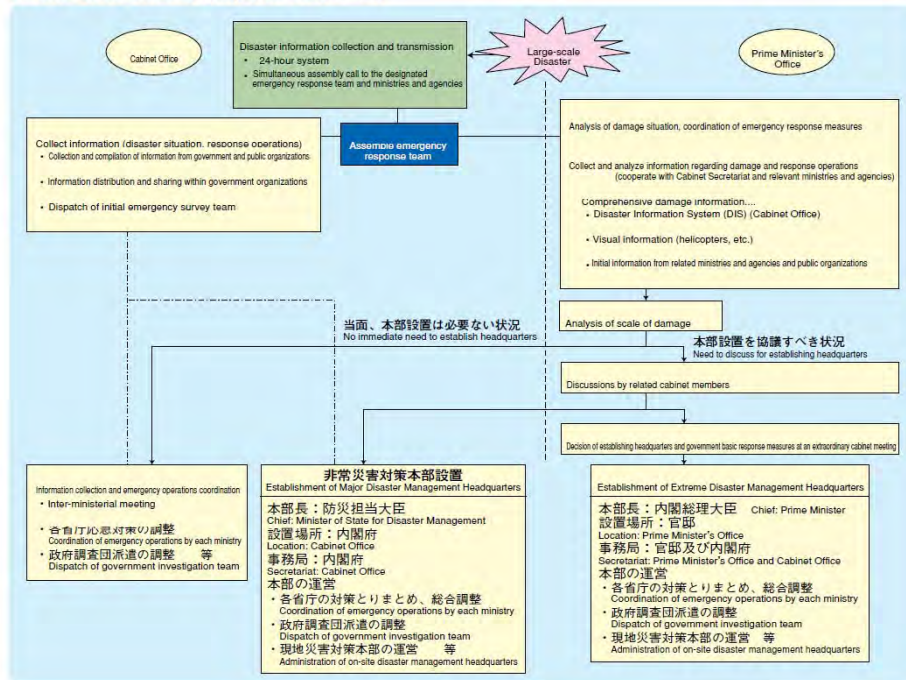


Figure 13. Cabinet Office Disaster Response Mechanism

3.2 NATIONAL LEVEL

3.2.1 FIRE AND DISASTER MANAGEMENT AGENCY

The Fire Defense Organization Law prescribes that the FDMA conducts research, formulates plans, etc, concerning fire service systems in order to strengthen the fire defense capabilities of municipalities. To this end it provides, it provides municipalities with advice, guidance and recommendations concerning their fire service organizations and activities. It however does not have the power to control such organizations and activities. Below are the main affairs under the jurisdiction of the FDMA:

- Planning and formulation of the overall fire service system
- Guidance for and assistance in strengthening fire service facilities
- Research concerning fire service science and technology
- Training for fire service personnel and officers in the volunteer fire corps
- Advice, guidance and recommendations regarding prefectural and municipal fire services
- Requests for assistance measure during an emergency
- Planning, formulation and coordination in relation to disaster prevention measures taken by local governments

The FDMA also functions as a contact center between local fire-defense related organizations and government and coordination body during the large scale disasters and accidents



Figure 14. The role of FDMA during disaster and peace-time

Moreover, in the case of large-scale disasters when firefighting organizations cannot cope alone, elite emergency rescue teams of the FDMA, known as, Emergency Fire Response Teams assist them.

Leader of the municipal teams supervise municipal teams and manage their activities whereas the Leader of the Command Support Group deploys teams swiftly to disaster areas using helicopters and other vehicles in order to gain a better understanding of disaster conditions, contacting and liaising with the Fire and Disaster Management Agency, and providing instructions and support 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 accident. The FDMA controls all aspects of management, from obtaining real-time information on 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. Below the structure of Emergency Response Fire Teams is described:

- Firefighting Teams: Assist in putting out fires to prevent the spread of flames during large-scale fires.
- Rescue Teams: Ensure preparation of equipment used for advanced rescue, search for persons requiring rescuing and assist in rescue efforts.
- Emergency Teams: Ensure preparation of equipment used for high-level emergencies and assist in emergency activities
- Logistical Support Teams: Assist in required transport and resupply using vehicles equipped with water supply systems to support the activities of each team.
- Special Disaster Teams: Firefighting teams for responding to special types of disasters, including poisonous substances and major toxic spills.
- Special Equipment Teams: Firefighting teams for responding to special equipment, including those required by teams for rescues in flooded areas and carrying water to remote areas.
- Air Squadrons: Firefighting activities conducted using fire protection helicopters
- Marine Squadrons: Firefighting activities conducted using fireboats

Emergency Fire Response Teams was founded in 1995, after the Great Hanshin-Awaji Earthquake and institutionalized by the Fire Defense Organization Law as amended in 2003. Officially, EFRT founded in 2004. The Minister of Internal Affairs and Communications formulates a basic plan of organization and facility arrangement and FDMA Director-General registers the brigade according the plan.

3.2.2. MINISTRY OF HEALTH, LABOUR 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 authority of the Ministry. The Council elaborates disaster management plan of the Ministry and ensures it's duly implementation. The members of the Council as well as all other members of the Ministry whose duties is related with disaster management during non-emergency times are obliged to carry the guideline of the Disaster Response Headquarter of the Ministry and ensure availability of constant contact between them carrying mobile phones, etc. and ensure constantly ensure the availability of certain transport means in order to reach the Headquarter in time in the case of emergency. The Disaster Response Headquarter are set up only during the big emergencies which perform the following functions – summarize the information of the disaster compiled by the relevant bodies of the Ministry, control and coordinate disaster response measures, share of the information among the structural bodies of the Ministry and with other relevant bodies and organizations, constantly contact with heads of the Ministry, control over the regular compilation of awareness and informational materials regarding the situation with the damage and disaster response activities and measures. In addition, the Ministry dispatches its employees to damaged regions and establishes local disaster response headquarters within the Regional Bureau of Health, Labor and Welfare if needed.

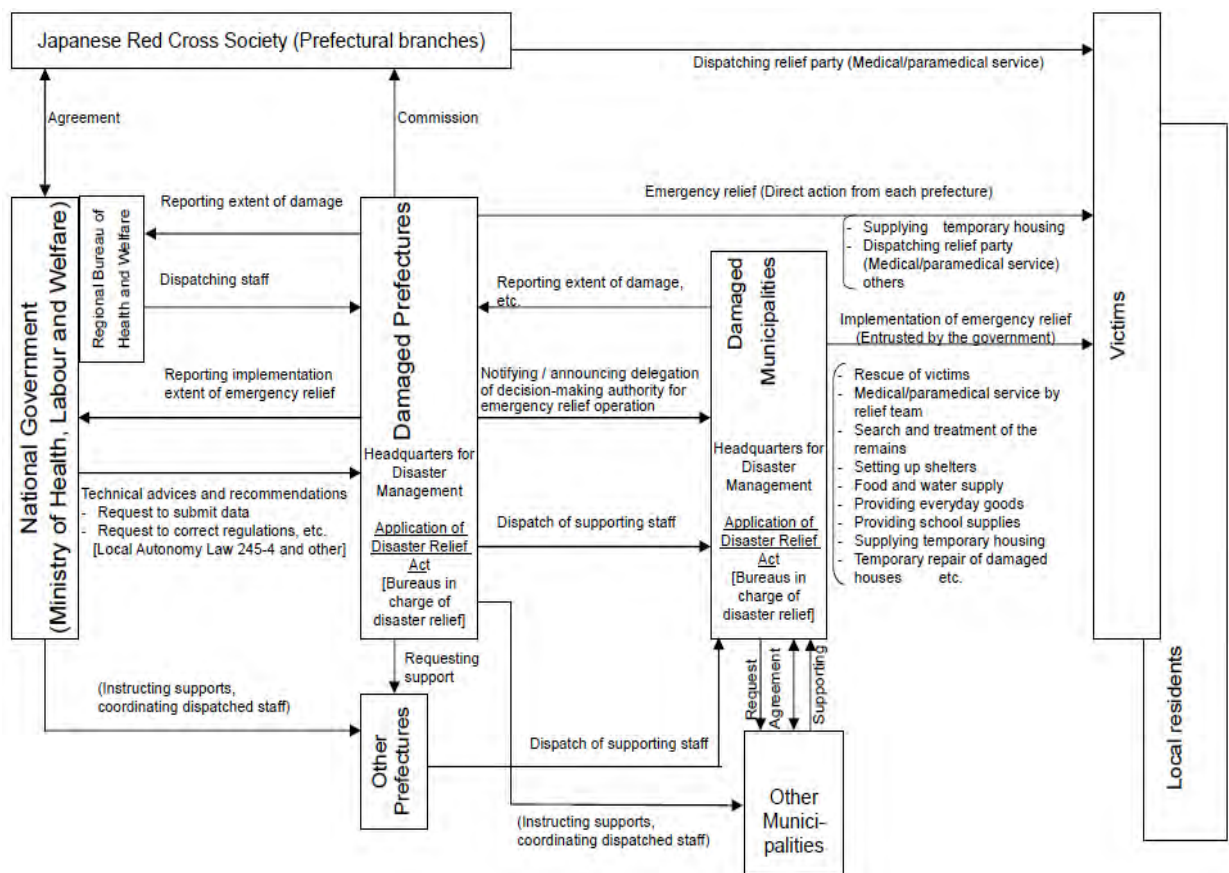


Figure 15. Basic Concept of the Emergency Relief under Disaster Relief Act

3.2.3 MINISTRY OF LAND, INFRASTRUCTURE, TRANSPORT AND TOURISM

The MLIT conducts disaster management policy at national level in relation to flood and sediment disasters as well as town development with regard to safety for both natural and man-made disasters. Alongside with other phases of emergency management the ministry also actively involved in response phase and to this end Disaster Prevention Center was established.

Disaster Prevention Center established in the MLIT performs the following functions:

- Mobilizing leaders, staff members and related department members
- Observing and distributing meteorological information, site images, etc.
- Collecting and sharing information (integrating damage information)
- Exchanging information with ministers' offices, other ministries and agencies, local departments, etc.
- Providing information to the public
- Regional assistance, assistance to local governments

In case of the large-scale disasters MLIT renders assistance to local governments:

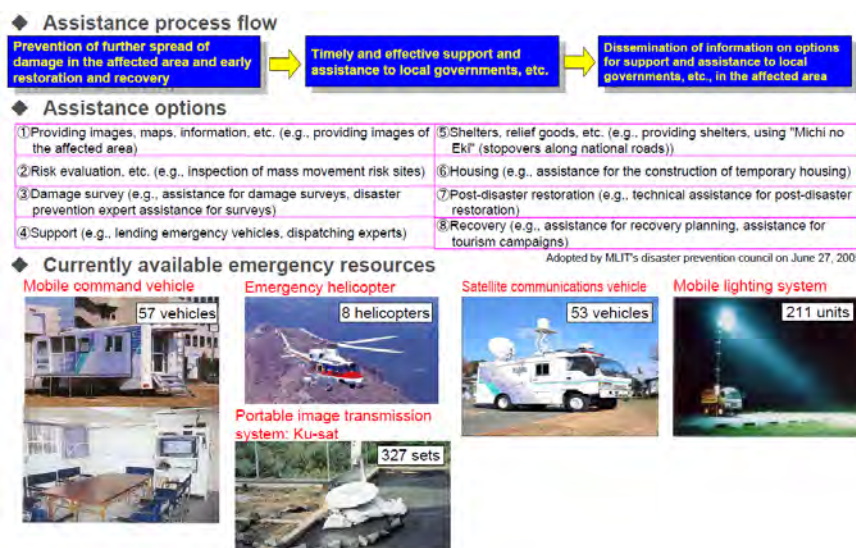


Figure 16. Outline of disaster response by MLIT

In order to achieve the "zero victim" goal in the face of increasingly intense floods and localized heavy rains caused by climate change, flood forecast centers (provisional name) will be established in regional development bureaus to strengthen risk management measures in, for example, monitoring floods and providing information to municipal governments, the mass media, etc. Flood forecast centers are to perform such tasks as climate change monitoring, flood risk evaluation and the development of an advanced flood prediction system. To the end following activities are implemented:

- ◇ Collection of point data (e.g. rainfall amounts, water levels and water quality)
Rain observation by ground gauges and telemetry system – the data obtained by telemeters are consolidated in one site, such as a regional bureau and a prefectural office, through the linking station. Then, they are sent to each office to update the real-time flood prediction

calculations.

◇ Collection of area data (rainfall amounts)

Radar rain gauges have been installed at 26 locations throughout the country. The information of 1-km mesh resolution is updated every half an hour and available on the Internet. The radar data are calibrated using the ground data.

◇ Collection of image data.

CCTV Network - Ministry of Land, Infrastructure and Transport, Regional Development Bureaus and River Offices have real-time access to 3,900 CCTV images available on IP (Internet protocol) network. CCTV images are used for developing disaster control plans. Fiber-optic network - River Bureau and Road Bureau have jointly laid fiber optics network lines with the total length of 12046 km (as of 2006).

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.

3.2.3.1 JAPAN METEOROLOGICAL AGENCY

JMA is semi-autonomous agency of the MLIT. Besides, function as central weather service agency of Japan, the agency has established comprehensive surveillance and awareness providing mechanism with regard to earthquake, typhoon 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, the Director-General of JMA informs the Minister of Land, Infrastructure, Transport and Tourism and the prefectural governors concerned of the present state.

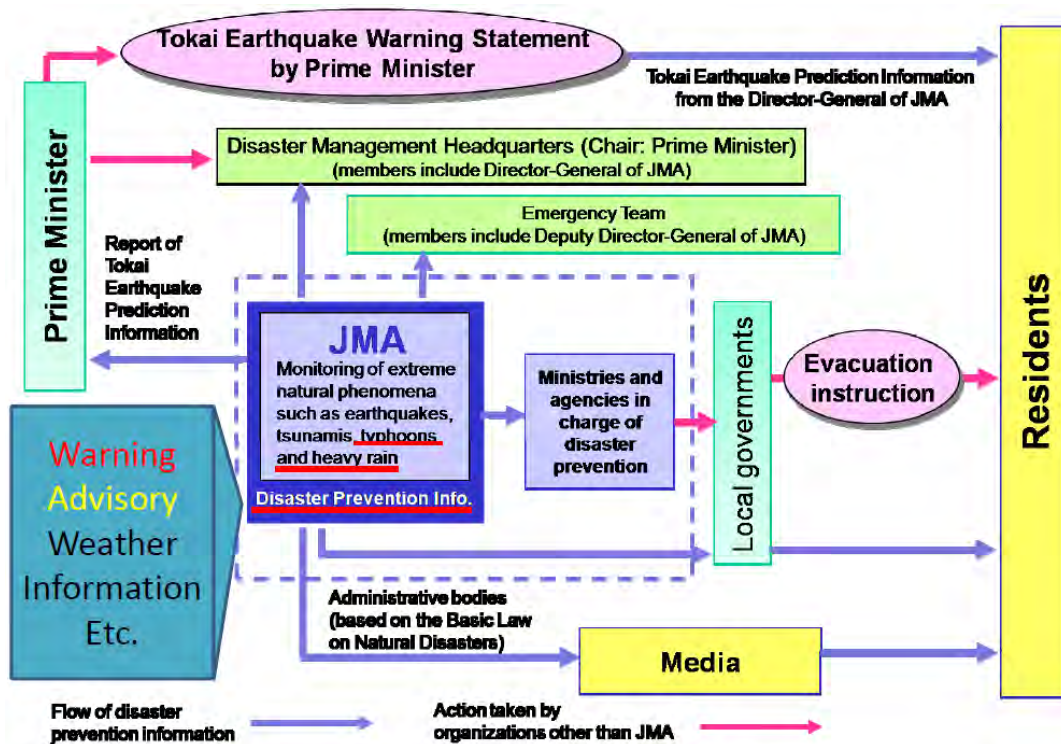


Figure 17. The role JMA in Disaster Management System of Japan

MLIT informs, jointly with the Director-General of JMA, for a class A river (excluding designated sections), the prefectural governors concerned of

- ◇ 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 as described above to the flood protection managers and stage gauge managers.

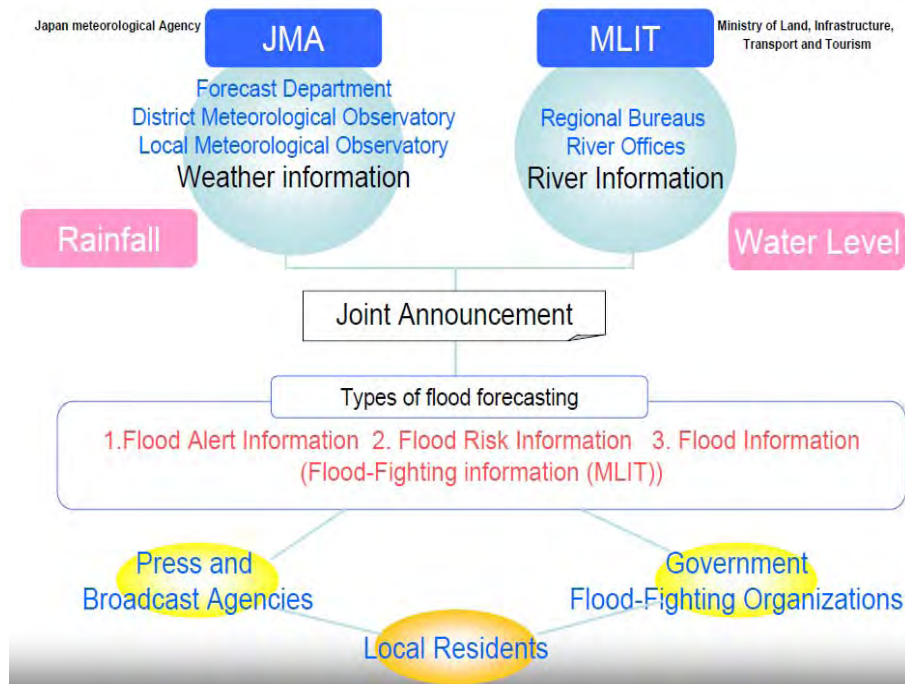
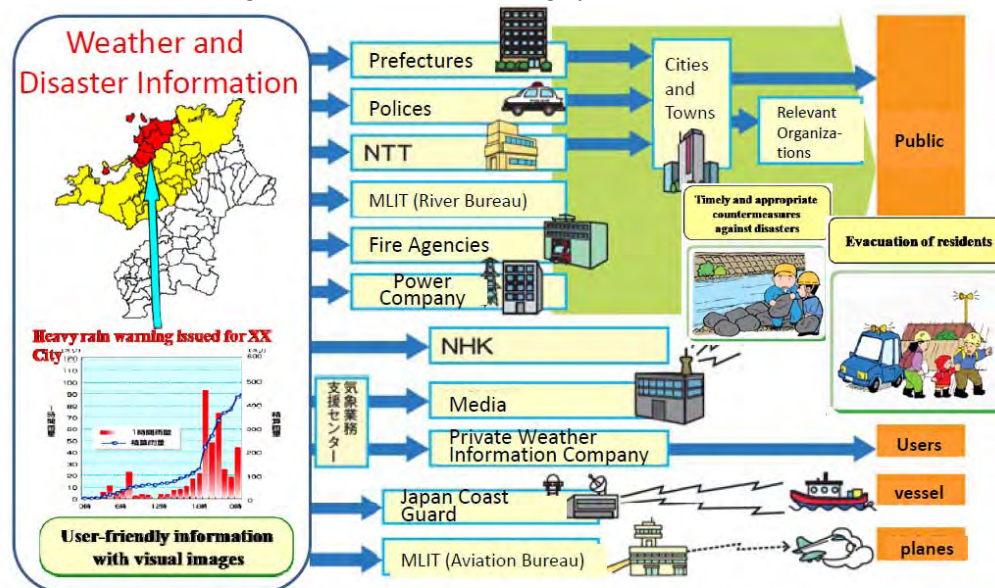


Figure 18. Joint flood warning by MLIT and JMA



Information is delivered by dedicated line or through media to local governments and public
It is used for the decision of disaster management activities and evacuation actions

Figure 19. Weather and Disaster Information Dissemination by JMA

3.2.3.2 JAPAN COAST GUARD

Alike the JMA, Japan Coast Guard (the JCG) is the external organ of the MLIT. The main responsibilities of JCG include:

Maintaining maritime order
Guarding territorial seas and EEZ
Protecting the marine environment
Taking marine disaster preparedness measures
Exploring the territorial waters
Ensuring Maritime Traffic Safety

Disaster preparedness and marine search and rescue – it is the responsibility of JCG to conduct search and rescue operation once accident such as boat/vessel involved accidents occur. The JCG works to raise awareness and educate people about the dangers of the sea and the principles of self rescue. It also makes every effort when accidents do occur to respond promptly and save lives. The JCG is increasing its deployments of mobile rescue personnel skilled at descending from helicopters and bringing people back up, scuba diving, and providing emergency first aid treatment. It is also working to improve the rescue and first-aid capabilities of its divers and emergency medical technicians. The JCG also works together with other public and private rescue organizations including police and fire departments to cover the vast areas of sea that surround Japan. It is important that the JCG be notified as soon as possible when trouble occurs in seas far from land. For that reason, the JCG operates a maritime accident reporting service 24 hours a day by radio based on the Global Maritime Distress and Safety System (GMDSS). Reports of incidents and accidents and requests for help can also quickly be made to the JCG when the need arises by dialing 118 on a mobile or onboard phone. Calls from landline are received by the respective regional centers, whereas, the calls from onboard phones are directed to headquarters.

In response to the Great East Japan Earthquake the forces of the organization was dispatched immediately and has been engaged in the set of emergency response and response-related activities such as search and rescue, surveillance and lookout in sea area adjoining nuclear power station, securing emergency transport route, ensuring navigation safety, emergency transportation, field assistance, restoration of channel navigation markers and etc. About 360 persons were rescued, 302 bodies recovered, 85 drifting vessels towed by JCG forces.

To respond to such maritime disasters as large-scale oil spills, the discharge of hazardous and noxious substances, and shipboard fires, the JCG has stationed fire-fighting ships and disaster mitigation equipment around the country. This provides the JCG with a system that is always ready to mobilize and is also useful for such tasks as predicting how an oil spill will spread and drift in order to allow its effective removal. The JCG also works for maritime disaster prevention by conducting exercises with private-sector disaster prevention organizations in Japan and overseas. The JCG makes every effort to keep its systems in good order and conducts drills so that when a major natural disaster occurs it is ready to quickly carry out such emergency relief operations as rescuing disaster victims, providing emergency transportation for personnel and relief supplies, and conducting surveys of stricken areas. It also compiles disaster prevention maps for public use and has been building a database of information acquired from its regular observations and emergency surveys of submarine volcanoes and volcanic islands. Furthermore, to obtain the basic information necessary for predicting major earthquakes, the JCG conducts topographical and geological surveys of the seabed in those areas where earthquakes are forecast to

occur and monitors crustal movements in the seabed that shed light on crustal plate tectonics. The JCG compiles “coastal area environmental protection information” so that when oil spills occur their environmental impact can be promptly assessed and analyzed and their damage minimized. This information is made available over the Internet so that it can be put to use by organizations involved in oil removal as well as local municipalities and private-sector groups.



Figure 20. Organizational structure of JCG

Fleet Strength
(as of April 1, 2011)

| Vessels and Craft | Count |
|---------------------------------------|------------|
| Patrol vessels | 121 |
| Patrol craft | 237 |
| Special guard and rescue craft | 63 |
| Hydrographic survey vessels | 13 |
| Aids to navigation evaluation vessels | 1 |
| Buoy tenders | 1 |
| Aids to navigation tenders | 13 |
| Training boats | 3 |
| Total: | 452 |

| Aircrafts | Count |
|---------------|-----------|
| Airplanes | 27 |
| Helicopters | 45 |
| Total: | 72 |

| Aids to Navigation | Count |
|---------------------------|--------------|
| Visual aids to navigation | 5,266 |
| Radio aids to navigation | 58 |
| Other aids to navigation | 45 |
| Total: | 5,369 |

Budget and Personnel

| | |
|-----------|--|
| Budget | 175,432 million yen (start of fiscal year ending March 31, 2012) |
| Personnel | 12,636 persons (as of March 31, 2011) |

Figure 21. Fleet Strength of JCG



Figure 22. Regional Centers of JCG.

3.2.3.2.1 MARITIME DISASTER PREVENTION CENTER

Maritime Disaster Prevention Center (MDPC) is the only legitimate organization set forth by the Law to carry out prevention and elimination operation to response with any Oils (According to the Japanese domestic law, "Oils" were divided into two categories such as "persistent oils" and "non-persistent oils" Persistent oil (= specific oil) includes crude oil, heavy oil, lubricating oil and etc. Non-persistent oil includes gasoline, kerosene, light oil, oil refuse and refined products etc.) and HNS (Hazardous and Noxious Substances (HNS) includes Non-persistent oil and Noxious liquid substance.) spill incidents, including marine fire fighting, associated with shipboard disasters of HNS tankers along the Japanese coastal line, entrusted by the ship owner of the tanker and instructed by the Japan Coast Guard. MDPC was established in 1976.

In the event that an HNS spill incident actually occurs or is anticipated, MDPC will immediately respond to the incident site at the request of the captain or ships owner, and take initial pollution prevention and elimination measures including putting out the fire or preventing the spread of the fire, or any other actions against potential danger. In Japan, the domestic law relating to the Prevention of Marine Pollution and Maritime Disaster was revised in 2006 due to accession to the Protocol on Preparedness, Response and Co-ordination to Pollution Incidents from Hazardous and Noxious Substances, 2000" (OPRC-HNS Protocol). The following is a part of the provision of this revised law. Since April 1st 2008, when the owner of HNS tankers of more than 150GT sails in specified areas (Tokyo-bay, Ise-bay and Seto inland sea) while carrying HNS, the owner has to keep onboard appropriate accident response materials, equipment and experts necessary for removal of the said HNS, and be able to reach the site with such materials, equipment the location of the said vessel within approximately two hours. Depending on the characteristic of the HNS, it is necessary to keep the removal materials or vessel with capability to squirt water, oil boom, oil skimmer etc, and keep the experts.

When the owner of the vessel, is sailing in the specified areas when carrying cargoes of HNS, the owner has to have the certification of accident response materials, equipment and experts.

According to the law the Center shall perform the following services in order to achieve the purposes of Article 42-13:

- (1) Taking measures to remove discharged specific oil in accordance with the instruction of the Commandant of the Japan Coast Guard as provided in the following Article and collecting the expense spent for the measures in accordance with Article 42-38:
- (2) Preventing the spread of discharged oil and subsequent discharge of oil (referred to as "discharged oil control" in Article 43-2 and Article 43-3), putting out fire and preventing the spread of fire by fire-fighting vessels, and taking other measures for maritime disaster prevention as commissioned by a ship-owner or any other person :
- (3) Possession of oil recovery boats, machines and equipments for the recovery of oil, oil booms and other vessels, machines, equipments and materials, necessary for maritime disaster prevention measures, and furnishing them for use by ship-owners and other persons ;
- (4) Training for maritime disaster prevention measures;

- (5) Making research on the machines, equipments and materials necessary for maritime disaster prevention measures and on the technology concerning the measures and promulgating the results;
- (6) Collecting, reviewing and providing information on maritime disaster prevention measures ;
- (7) Providing guidance and advice on maritime disaster prevention measures under the commission of ship owners and other persons;
- (8) Providing guidance and advice on maritime disaster prevention measures in foreign countries, providing foreign trainees with education and training to the trainees from foreign countries regarding maritime disaster prevention measures, and performing other services contributing to the promotion of international cooperation concerning maritime disaster prevention ;
- (9) Performing services incidental to the services specified in the preceding items;
- (10) Performing other services necessary for achieving the purposes of Article 42-13 in addition to those of the preceding items.

3.2.4 SELF-DEFENSE FORCES (SDF)

The SDF disaster relief role is defined in Article 83 of the Self-Defense Forces Law of 1954, requiring units to respond to calls for assistance from prefectural governors to aid in fire fighting, earthquake disasters, searches for missing persons, rescues, and reinforcement of embankments and levees in the event of flooding. The SDF conducts a variety of disaster relief operations in collaboration with municipal governments when disasters such as natural disasters occur 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 dispatched at a peak time for relief operations for the large-scale earthquake and nuclear disaster based on the Great East Japan Earthquake in March 2011.

SDF are deployed only upon the request of prefectural governor. Municipal mayors can ask prefectural governors to request a disaster relief dispatch by the SDF. In the event that mayors are unable to make such a request to the prefectural governor, they can inform the Minister of Defense, or those designated by the Minister of the disaster conditions. After receiving such requests from governors, the Minister of Defense or other personnel designated by the Minister can immediately dispatch units as necessary according to the disaster situation. Under circumstances of particular urgency when there is no time to wait for a request, the Minister of Defense or those designated by the Minister may authorize an exceptional dispatch (discretionary dispatch). The Minister of Defense is authorized to dispatch SDF once 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 (both –the Prime Minister)

3.3 PREFECTURE LEVEL

As it was mentioned in previous chapters, in Japan prefectures are not directly involved in emergency response but have advisory and coordinating authority over municipalities. The following responsibilities fall under the jurisdiction of prefectures:

- Liaison and coordination among municipal fire services
- Advice, guidance and recommendations regarding municipal fire services
- Direction regarding disaster prevention measures and requests for assistance measures during an emergency
- Education and training for fire service personnel and volunteers (at prefectural fire academies)
- Formulation of prefectural disaster prevention plans and implementation of comprehensive disaster countermeasures.

To carry out its responsibilities relevant departments and divisions is established within each prefecture. Although it might slightly vary from prefecture to prefecture the following figure describes the general outline of prefecture government with disaster management departments/divisions highlighted.

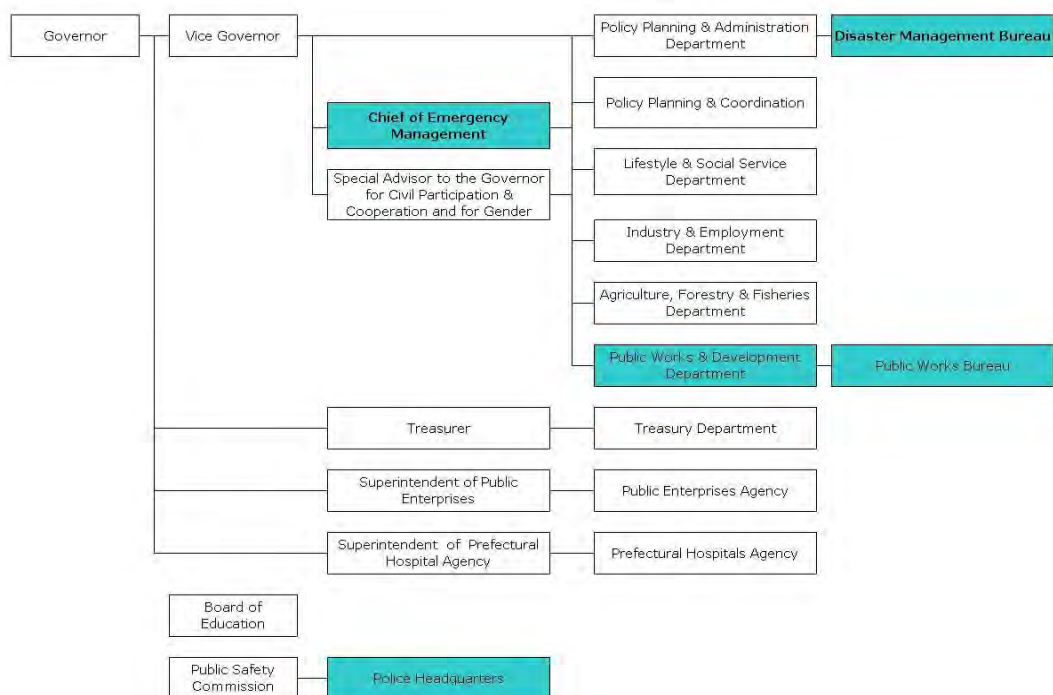


Figure 23. Organizational chart of prefectures in Japan (might slightly vary from prefecture to prefecture) (disaster management involved division highlighted)

As it is indicated prefectural governments in Japan has the authority to control over police headquarters. Police staffs which engage in search-rescue operations during disasters join emergency response upon the request of prefectural government which in turn usually acts so upon the request of mayor of affected municipality. For the better understanding of prefecture level emergency management, in particular, emergency response activities the case study of the Hyogo Prefecture Disaster Management System is conducted.

3.3.1. Case study: Hyogo Prefecture Disaster Management System

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.

In 1995, strong earthquake with the magnitude hit the Kobe city. The earthquake, which is known as the Great Hanshin-Awaji Earthquake caused death of more 6500 people and massive destructions. As a result of comprehensive recovery program conducted by the government today the city is completely restored and is one of most internationalized cities of Japan. The earthquake also forced to reconsider some aspects of the emergency management system both at prefectural and municipal levels. At prefectural level, the Post of Superintendent of Emergency Management (in 1996) - emergency management assistant to the governor, Disaster Management Planning Bureau and the Disaster Response Bureau was established. (in 2005). Alongside with other major advancement measures, taking into the account inconsistencies during disaster response operations by emergency medical services during the Great Hanshin-Awaji earthquake, Hyogo Emergency Medical Center was established, Emergency Medical Information System was elaborated and introduced. The organization charts of the Disaster Management Bureau and Emergency Relief Headquarters which is established ad hoc – only in the case of large-scale emergencies are described in the following 2 figures.

Disaster Management Bureau of Hyogo Prefectural Government

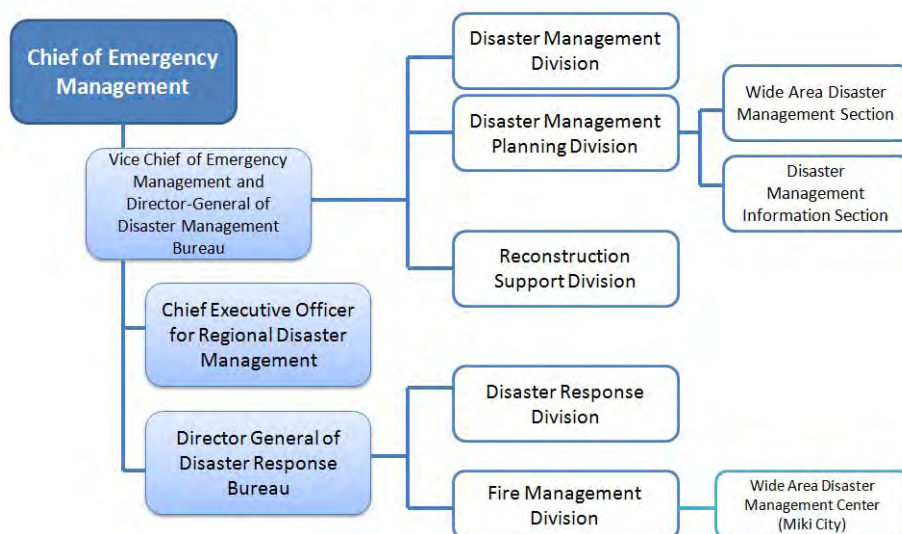


Figure 24. Organizational chart of the Disaster Management Bureau of Hyogo Prefectural Government

EMERGENCY RELIEF HEADQUARTERS

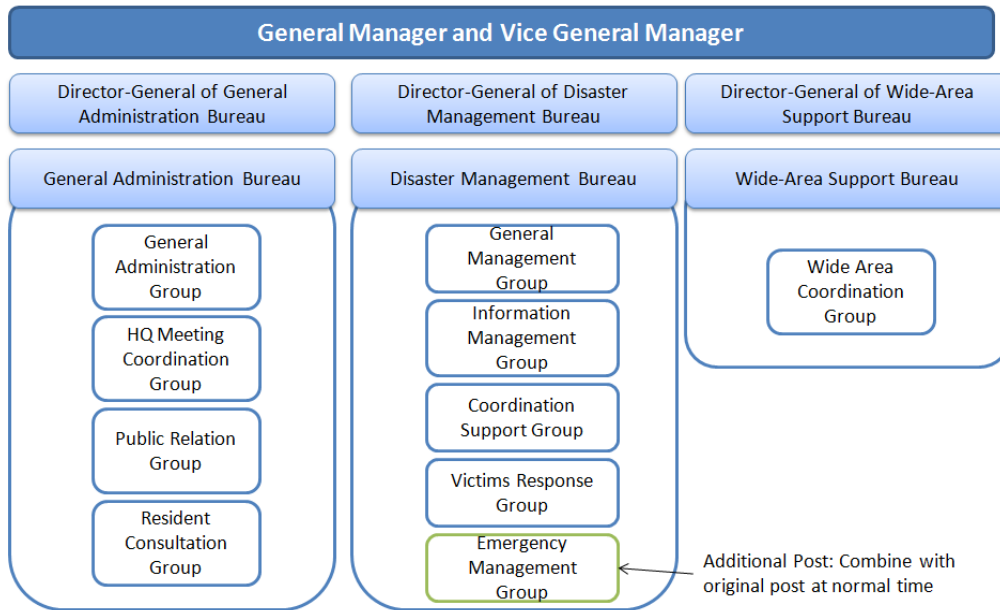


Figure 25. Organization chart of Hyogo Prefecture Emergency Relief Headquarters

Disaster Management Center of Hyogo Prefecture Government was established in August, 2000. It was the first local government office dedicated to disaster management in Japan. The center is able to function even if the lifelines are disrupted and withstand the earthquakes measuring 7 on the Japanese intensity scale. The center consist of 7 floors one if which is above the ground.

Phoenix Disaster Management System – Established with aim of enhancement of initial disaster response mechanism, Phoenix Disaster Management System collects disaster information from 334 terminals installed in such disaster management agencies as 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 seismometers installed throughout the prefecture.

Main function of the system are: collection of observation data, prediction of earthquake damage, collection of damage information, geographic information, image information, estimation of demand and supply of people and goods, etc.

As the key transmission channel, bases in prefectural government offices, district administration offices and other points are linked in a loop by a dedicated digital line, using the Hyogo information highway (connecting key bases in prefecture by fiber optic cable in a large-scale network with a total length of 1400 km) or prefectural office WAN.

Additionally, in 2005, internet service - the Hyogo Net - to provide the prefecture residents with earthquake, meteorological and other disaster-related information was launched. Except Japanese, the Hyogo Net provides information in English, Chinese, Korean, Portuguese and Vietnamese)

Hyogo Satellite Communication Network – 166 satellite-based stations across the prefecture has been installed to collect and transmit emergency contacts, meteorological, disaster and other information (transmission of voice, video, facsimiles and other data) via disaster administration wireless system that connects the prefectural office, district administration offices, municipalities, fire headquarters, and other points using satellite communications.

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

Helicopter Video Transmission system – Besides the prefectural police helicopter system, prefectural fire and disaster-prevention helicopters are utilized to transmit video images to the Disaster Management Center

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 – 24-hour monitoring and quick-response system is maintained in anticipation of the occurrence of a disaster or other emergency, by means of a duty rotation system as well as a standby system with both designated and regular personnel residing in standby accommodation.

Regional Emergency Management Bases – Regional emergency management bases store rescue equipment and relief supplies for victims, collect and distribute relief supplies, and assemble and mobilize emergency relief workers. Currently, 3 regional emergency management bases are at the disposal Hyogo Prefecture government, while one more base is under construction and the construction of another is planned. The area of the largest base – Miki Earthquake Disaster Memorial Park is about 220 hectares.

【Stored items (including planned items)】

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.

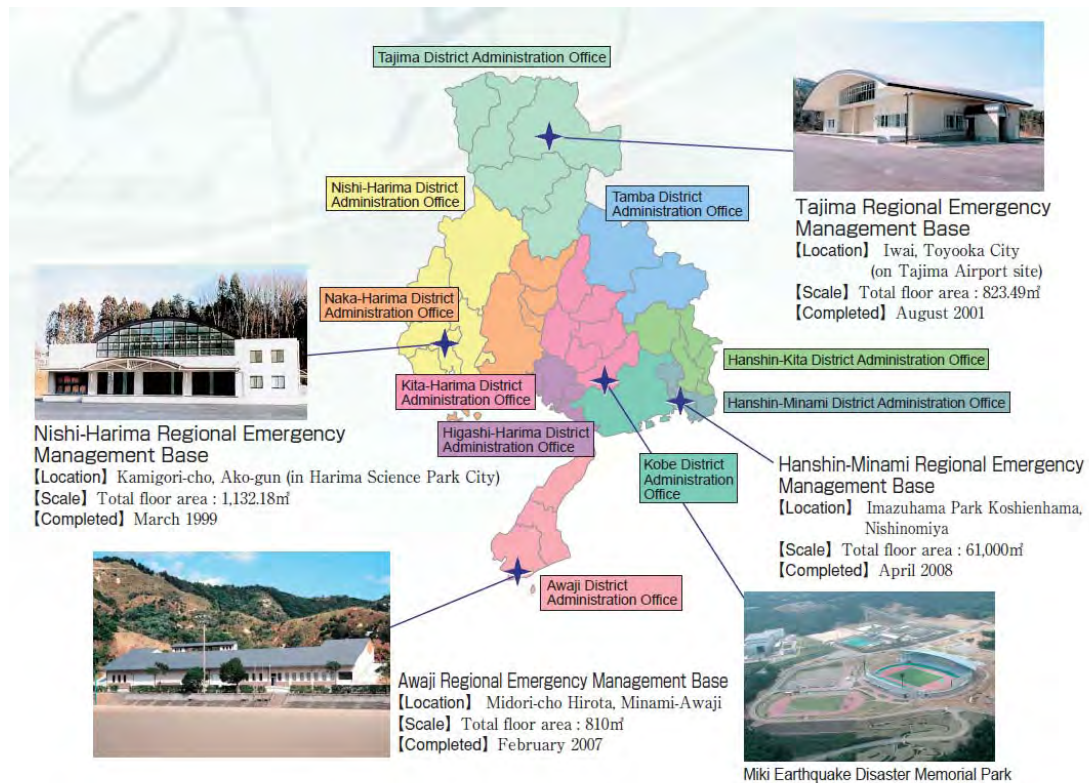


Figure 26. Outline of the Hyogo Prefecture Regional Emergency Management Bases

3.4 MUNICIPAL LEVEL

In Japan, the municipalities are obliged to fully carry out the fire services in their areas. They implement the actual fire service affairs such as fire fighting and rescue and ambulance services. However, for such reasons as finances, if it is deemed more efficient and rational to handle such affairs jointly with other municipalities, some municipalities are doing so by establishing “municipal corporations” or “area associations.” The organizations for handling the fire services consist of fire departments, fire stations and volunteer fire corps. The municipalities are required to organize some or all of these organizations. Main affairs handled by the municipalities are:

- Establishment, management and operation of fire service organizations.
- Fire prevention, fire fighting, rescue and ambulance services, and response to earthquake, storm and flood damage
- Formulation of municipal disaster prevention plans and implementation of comprehensive disaster countermeasures.

The 23 wards of Tokyo are exceptions. Fire services of these municipalities are handled by the Tokyo prefecture. The system of handling fire services also includes entrustment. In the case of Tokyo, municipalities other than 23 wards are entrusting the fire service operations to Tokyo Prefecture, with some exceptions such as Higashi Kurume City and Inagi City.

Rescue service – rescue services carried out by fire service organizations comprise the activities to rescue people from fire, traffic accidents, water accidents, natural disasters, or

accidents caused by machinery using human and mechanical power, and to transport the victims to safe places. Recently, rescue services are also implementing measures to cope with NBC (Nuclear, Biological, Chemical) disasters and terrorism.

A rescue team is ordinarily composed of one rescue and utility truck, rescue equipment, and no less than five rescue personnel. The kinds and numbers of vehicles owned nationwide are as follows: 1191 rescue and utility trucks, 322 pumpers, 308 tank cars, 110 chemical pumpers and 310 others. As of April 2002, there were 864 fire departments which carry out rescue operations, 1488 rescue teams, 23645 rescue personnel. The rescue and utility trucks are equipped with rescue equipment such as hydraulic spreaders, hydraulic cutters and power-saws.

Ambulance service – it was in 1963 that the ambulance service was defined by law as an operation of the fire service organizations. Prior to this, fire service organizations were providing the ambulance service based on municipal ordinances, regulations, etc., or in effect. To go back in history, the ambulance service started in Yokohama City 1933. This was later followed by Nagoya, Tokyo, Kanazawa and Wakayama, etc. In 1946, ambulance services were provided in nine cities and towns.

In principle, the ambulance service in Japan transports the sick and injured to medical institutions regardless of whether sickness or accident occurred indoors or outdoors. While transporting, if necessary, minimum, necessary first-aid treatment are administered. In addition, qualified paramedics can administer a wider range of first-aid treatments such as defibrillation.

An ambulance unit is ordinarily composed of vehicle and no less than three emergency medical technicians (EMS personnel). The required period of time for an ambulance to arrive the site is about 6 minutes. In the case of transportation by helicopter, a unit is composed of no less than two EMS personnel per craft. The emergency transportation by helicopter is mainly carried out by prefectures and “designated cities” that 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. Primary-care facilities refer to clinics without beds that are assigned to treat low-acuity patients who can be safely discharged home. Only walk-in patients visit primary-care facilities, and only during nights and holidays. Secondary-care facilities are assigned to provide care for moderate-acuity patients who require admission to a regular inpatient bed. Both walk-in patients and ambulance-transported patients are treated at secondary-care facilities. Tertiary-care facilities are emergency medical service centers assigned to provide care for high-acuity patients who require admission to the intensive care unit or emergency surgery. In 2010, there were 605 primary-care, 4,169 secondary-care and 220 tertiary-care facilities in Japan. An emergency medical service center exists as a part of any major hospital in most urban areas; such centers are accredited by the government and receive grant money for their services. Most have 10 to 30 ICU beds and staffing ranges from several doctors to more than 30 doctors per center; however the focus remains on burn care and traffic accident trauma as the most prestigious services.

3.4.1 Case Study – Kobe Fire Department

Overview of the Kobe Fire Department (As of 1 April 2011)

1. Outline of Kobe City

- (1) Surface area: 552.83 km²
- (2) Population: 1,542,458 people
- (3) The number of households: 685,639 households

2. Status of Kobe Fire Department

(1) Organization

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

3. Fire Fighting Water Source Facilities (Total: 33,521 units)

(1) Number of hydrants: 29,936 units

(2) Number of tank for firefighting: 2,257 units (of the number of earthquake-proof tank: 259)

(3) Number of other water source facilities: 1,328 (pools, ponds, rivers, etc.)

4. Number of reported receiving of “119” call: 184,681 (2010)

5. Status of Fire in 2010

- Number of fires: 631 (2009: 648, 2008: 758, 2007: 709, 2006: 647)

[Details] Building Fire: 341, Forest fires: 28, Vehicle fires: 74, Ship fire: 0, Others: 188

[Cause of the fire] Arson or arson in suspected: 171, Tobacco: 77, Stove: 79, Electrical: 58, bonfire: 47, Playing with fire: 23, Others: 176

6. Status of Emergency Services (in 2010)

- Number of dispatched emergency services: 69,993 (2009: 64,849, 2008: 63,232, 2007: 67,292)

- Number of transported personnel: 60,424 people

[Details] Sudden illness: 39,466, general injury: 9,195, traffic accidents: 5,536, self-loss behavior: 859, inflicted: 533, work-related accidents: 395, others: 4,440

7. Status of Rescue (in 2010)

- Number of dispatched rescue services: 1,587 cases (persons rescued: 829 people)

[Details] Construction accidents: 555, fire: 205, traffic accidents: 37, drowning 37, machinery accidents: 18, other accidents: 206, others: 372

8. Status of Voluntary Disaster Prevention Organizations (BOKOMI)

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

9. Status of Volunteer Fire Corps

(1) Organization: headquarters (10), Divisions (15), Sub-divisions (159)

(2) Number of members: 4,000 (quorum)

Operation room of the Kobe Fire Department serves as a coordination and emergency hotline center. Based on a 119 emergency call received in the operation room relevant response teams are dispatched to accident site. Once a call received automated system identifies and displays caller's data and exact location at the digital map. Overall following activities of dispatched teams take place under supervision and coordination of the Operation Room. In order to ensure that all incoming calls are received 126 telephones lines are being utilized. In addition, 5 surveillance cameras to ensure safety situation at strategic places are managed by the Operation Room, meteorological situation in Kobe City area, National Broadcasting Channel – NHK are observed.

For the purpose of coordination of emergency medical service daily information on medical staff shifts, vacant rooms, etc are received from designated hospitals.

Moreover, the department has taken some measures in order disabled and aging persons to be able to call 119 hot line easily. To this end special fax sheets, landline telephones which enable one to call 119 hot line with the click of just a button has been elaborated - or ordinary landline telephones reconfigured to support the same function - and distributed to registered persons. Once such a call received all the personal and health data are displayed automatically.

3.4.2 MUNICIPAL LEVEL VOLUNTARY EMERGENCY RESPONSE TEAMS

VOLUNATRY FIREFIGHTING CORPS - Likewise the fire departments and stations, volunteer fire corps in Japan also are organized by municipalities. Different from the first two, volunteer fire fighters are not professionals and engaged in fire fighting as secondary occupation. The fire corps are independent from the fire departments and fire stations and there are no top-down relationships between these two. However, in cases of where the fire corps are called out in emergencies, they must follow the orders of the chief of the fire department or fire station. For the volunteer fire corps, the basic rule is one corps in one municipality. However, there are municipalities that have established more than one corps (most of “designated cities”) and those that have not established the corps (Osaka city, and some towns and villages in Aichi Prefecture).

SUIBO-DAN – VOLUNTARY FLOOD FIGHTING TEAMS - Voluntary flood fighting teams, known as “suibo-dan” play important role in flood fighting system of Japan. These teams are usually established within the municipalities in the vicinity areas of rivers. The members of “suibo-dan” normally engaged in different jobs but are also involved in patrolling, watching out and levee protection works in close coordination with river administrators and other related organizations during floods. During periods without flooding, 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. As of 2009 there were about 900 000 voluntary flood fighters nationwide.

BOKOMI – BOKOMIs are community based - elementary school district based disaster prevention organizations. Since 1995, based on the lessons learned from the Great East Hanshin-Awaji Earthquake, all of the districts of Kobe city – 191 districts have established BOKOMIs. To establish BOKOMI, firstly, it is discussed and decided on by local government organizations including the local city office and the local fire station, together with leader of

local residents associations, women's associations, elderly associations, voluntary fire corps and etc. The equipment and materials needed for the activities are provided by the local government and storehouses installed in local parks, in preparation for emergencies. Schools in Japan also serve as evacuation sites during emergencies. In normal times BOKOMI conducts various emergency drill programs such as on how to use the provided equipment and materials (for ex. Water fire extinguishers, powder fire extinguishers), rescue drills, evacuation drills, information transmission drills, flood control drills and etc. In addition, BOKOMI also conduct welfare activities (such as keeping in touch with and holding lunch gatherings for the elderly people who live alone) as an effort to cover both community welfare activities and community disaster prevention activities.

3.5 RELATIONSHIP BETWEEN LEVELS

In order to maintain the independence of municipal fire service organizations, the law prescribes that such organizations need not follow the operation and management or administrative control of national or prefectural governments. This means that such organizations are not controlled by the national or prefectural governments concerning such matters as personnel management, organization, budget, or fire fighting activities or other acts.

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

Likewise, the prefectural governments cannot control municipalities, but can provide advice, recommendations or guidance. In case of emergencies such as earthquakes, if the disaster occurs within the jurisdiction of prefecture, the prefectural government can request the municipalities within its jurisdiction to provides assistance. If the disaster occurs outside its jurisdiction, it can request the relevant municipalities for assistance, if so requested by the Commissioner of the Fire and Disaster Management Agency.

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.

4. EMERGENCY RESPONSE BY OTHER ORGANIZATIONS AND TEAMS

4.1 DISASTER MEDICAL ASSISTANCE TEAMS

Disaster Medical Assistance Teams are specialized and trained medical aid teams which operate during large-scale disasters. DMAT system was established in 2005 based on the lessons of Great Hanshin Awaji Earthquake.. The guidelines for the deployment of DMATs are based on the results of research funded by a Health and Labour Sciences research grant from the, the Ministry of Health Labour and Welfare (MHLW). In 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 Hospital Organization’s Disaster Medical Center (an independent administrative agency) for certification of DMAT personnel. DMAT member are specialized to render medical assistance and treatment during the acute phases of disasters as well as transferring casualties to safe areas.

The role of each institution affected by these guidelines is:

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)

Functioning of DMAT are based on the agreements between prefectural governments and medical establishments and DMATs are deployed only upon the request of government of disaster affected prefecture unless the one following conditions is not the case: 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. In turn MHLW ensures overall coordination of relief activities, collect and share information and assist local government in decision-making. As of March 2008, 305 medical facilities, 442 teams, and 2,609 individuals had been trained.

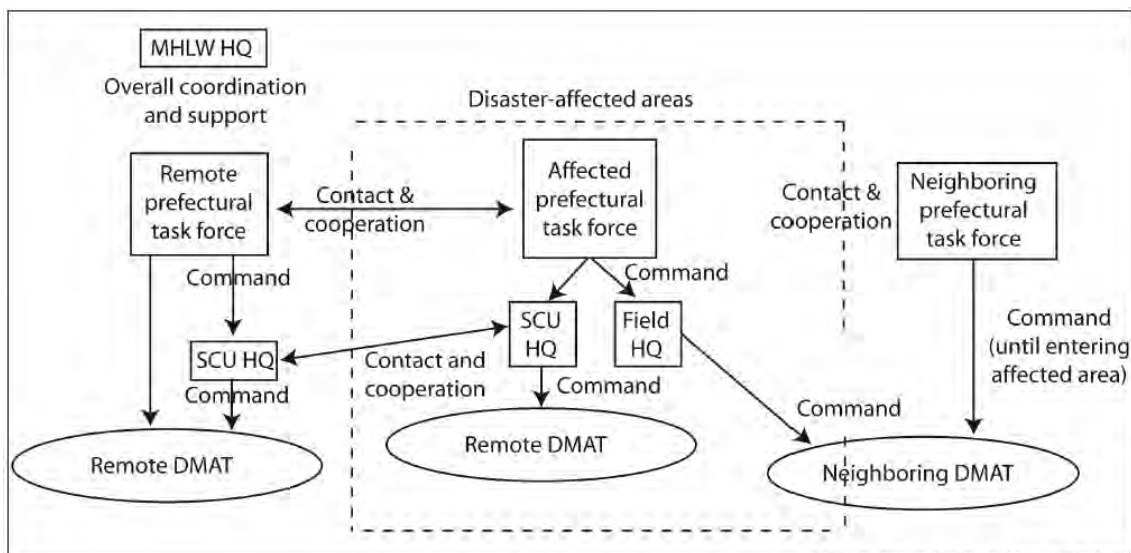
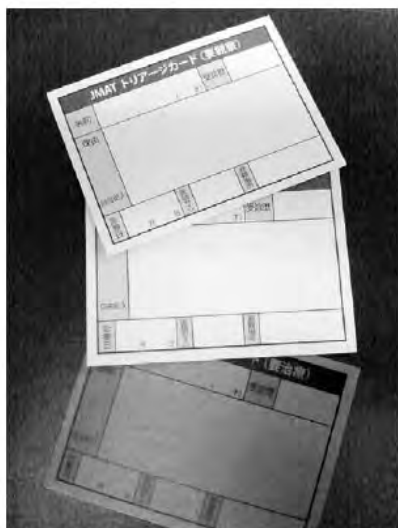


Figure 27. Outline of the DMAT operation.

4.2 JAPAN MEDICAL ASSOCIATION TEAMS – JMAT

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. Over 230 such teams are currently organized.



(From top) White card: needs observation, Yellow card: needs attention, Red card: needs treatment

Figure 28. JMAT Triage tags

Table 2 Items included in the JMAT Evacuation Center Checklist

| |
|---|
| Prepared by: _____ of the _____ Medical Association |
| Date prepared: |
| Shelter name: |
| Shelter address: |
| Capacity: |
| Gender ratio: |
| Vulnerable people (elderly, children, pregnant women, dialysis patients, determination of treatment necessity): |
| Medical needs (including sufficiency of drugs): |
| Possibility of radiation exposure: |
| Water/food: |
| Toilet/hygiene: |
| Persons needing nursing care: |
| No. of JMAT Evacuation Center Triage Cards: Red , Yellow , White |
| Other: |

These checklists were prepared by the Japan Medical Association following the Great Eastern Japan Earthquake to be used by JMATs for making simple activity records and for handing over duties to successor teams.

Figure 29. JMAT Checklist

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

1. Purpose

- 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)
- 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

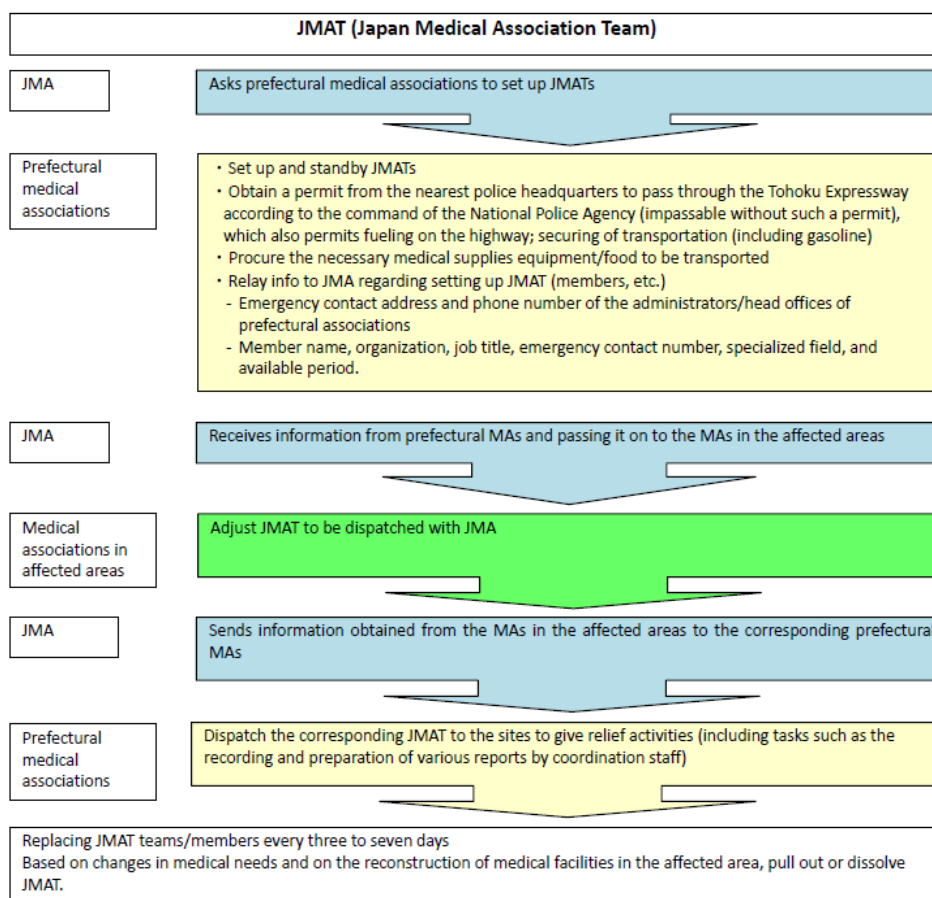


Figure 30. Outline of JMAT functioning

4.3 JAPAN RED CROSS SOCIETY

The JRCS has a well-organised disaster response regime, with 488 response teams throughout the country with 6,844 medical relief personnel registered as standard. Each team consists of six personnel: a doctor, a head nurse, two nurses, and two administrators.

The Society has undertaken a number of disaster relief activities at home since 1888, when it sent its first medical relief team to assist the victims of the Mt. Bandai eruption. The JRCS conducted disaster relief operations after the Great Kanto (1923), Great Hanshin Awaji (1995) and Niigata Chuetsu (2004) earthquakes, the Unzen-Fugen (1991) and Usu (2000) volcanic eruptions, and other natural disasters. The organisation is also involved in rescue operations following transportation accidents, such as aeroplane and train crashes, and industrial disasters, such as gas explosions.

These disaster relief activities are conducted as a mission of the Red Cross under the Japanese Red Cross Law and its statutes. In addition, the JRCS is designated as a “Designated Public Corporation” by the Disaster Countermeasures Basic Act and the Disaster Relief Act, and is required to co-operate with the Government to offer relief

assistance in times of disaster. The contents of such assistance are provided for under an agreement with the Minister of Health, Labour and Welfare.

The domestic disaster relief activities of the JRCS are as follows:

- Medical relief and psychological care
- Storage and distribution of relief goods
- Provision of blood products
- Collection and distribution of voluntary donations

Activities by Red Cross volunteers include collection of information, first aid, provision of hot meals, tracing services, transportation and distribution of relief goods, and caring for those who evacuate to shelters.

4.4 BUILDING RESEARCH INSTITUTE

The BRI is actively involved in response measures taken in immediate aftermath of earthquakes, as well as in long term measures. As to immediate measures, the BRI conducts preliminary damage assessments of buildings just after an earthquake hit the area thereby defining which buildings is still can be exploited which are not. Having completed assessment of each building BRI specialist attach an special sticker on what enables one to define vulnerability level of a building. The measure helps to avoid future human injury and loss as well as identify possible evacuations spots. As to the long term measures the BRI is main institute who conducts research for building seismic resistant buildings and seismic retrofitting of buildings.



Figure 31. BRI disaster response – building assessment stickers

As it was already mentioned above, taking into account the high-frequency of large-scale natural disasters in Japan designated public and government organizations both at national and prefectural level are obliged to integrate disaster management measures to its general activities. Below measures taken by one of such local government organization – Osaka Gas Engineering Co. LTD is described.

4.5 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. To this end, the corporation has dedicated vast resources to disaster response and established effective coordination mechanism with other disaster management related organizations, mainly with the JMA. Small quakes detected the JMA before strong earthquake occurs, automatically redirected to NHK within a few seconds, (moreover, NHK has installed seismic intensity meters at 73 locations countrywide) what enables it to issue public alert promptly and provide necessary information regarding the magnitude and precise location of the earthquake as well as tsunami information nationwide. Emergency Warning System (EWS) utilized in collaboration the JMA is carried out only in special emergency cases such as large-scale tsunami and earthquake warnings or based on the request of governors and mayors. In striving to alert as many people as possible, the system switches on tv sets and radios – 4 tv channels and 3 radio channels belong to NHK - automatically. Since 1985 they EWS alert has been issued 18 times – all of them for tsunami warnings, while the test transmission is conducted every month and emergency drills held every day by NHK.



Figure 32. NHK Tsunami warning broadcasting

To ensure quick and live broadcasting from disaster hit areas NHK owns 14 helicopters – which are equipped with necessary devices for live broadcasting – stationed at 12 locations and 460 remote controlled cameras installed countrywide.

In addition, the official web-page of NHK also provides disaster and weather information and enables watching two channels – General TV and NHK World TV - online.

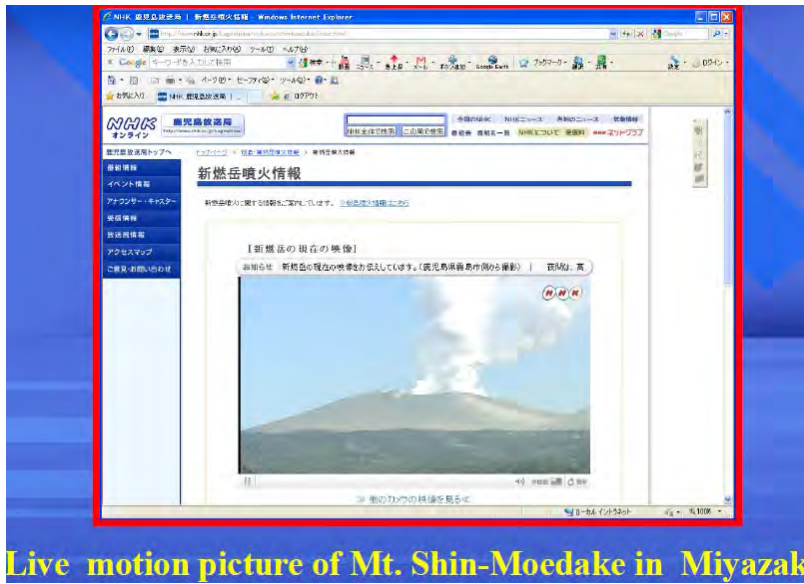


Figure 32. NHK official web-page live volcano eruption broadcasting

4.6 Case Study: Osaka Gas Engineering Co., Crisis Management System.

Osaka Gas basically has the below three disaster prevention measures for earthquakes. Each consists of training and drills with hardware and software.

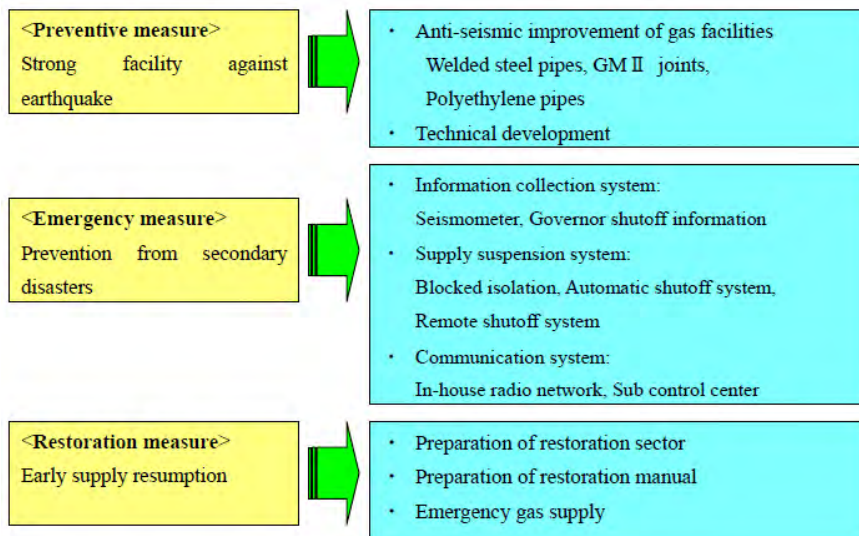


Figure 33. Outline of the Osaka Gas Engineering Crisis Management Measures

Emergency measures:

Seismometer

In order to determine whether damage has been caused by earthquakes or not and quickly estimate the extent of that damage, gas companies in Japan use seismometers that can measure SI as an indicator of gas pipeline and structural damage. The seismometers are tied into an automatic shutoff system that triggers under high SI capable of causing damage in an earthquake.

SI calculation

$$SI = \frac{1}{2.4} \int_{0.1}^{2.5} Sv(h = 0.2, T) dT$$

Sv: Speed response vector

h: Attenuation constant

T: Natural period

※ SI is an indicator advocated by American seismologist Dr. G. W. Housner in 1951.

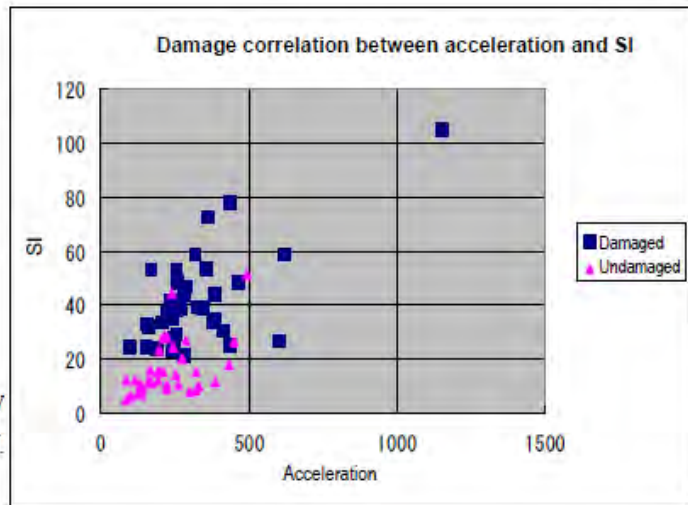


Figure 34. Osaka Gas Engineering Seismometer SI calculation

Shut-off system

Safety is ensured in areas heavily damaged by earthquakes by stopping city gas supply. The intelligent gas meters installed at each customer's location automatically shut off at 200 (gal). Furthermore, low pressure gas supply is automatically shut off in earthquakes capable of damaging pipelines and structures by an automatic shut-off system installed at medium pressure governor B. Moreover, in extreme cases (widespread damage), city gas supply can be shut off remotely from the Central Control Center and Back-Up Center.

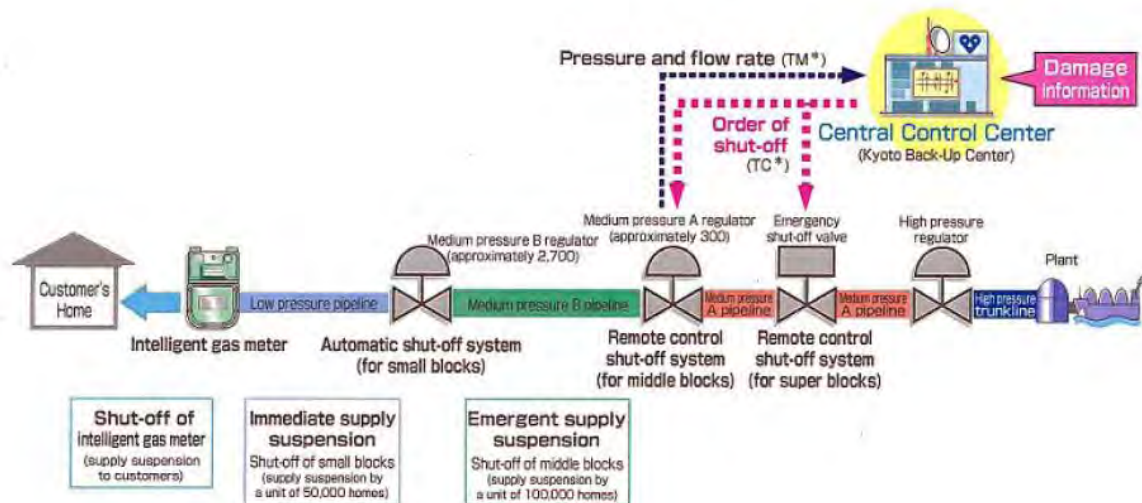


Figure 35. Outline of the Osaka Gas Engineering Automatic Shut-Off System

In-house radio network

In order to smoothly produce and supply city gas, Osaka Gas remotely monitors and controls city gas supply 24-hours a day. Because around-the-clock operation is necessary as much in an earthquake as on a regular basis, Osaka Gas introduced a radio network that works by radio waves and satellite.

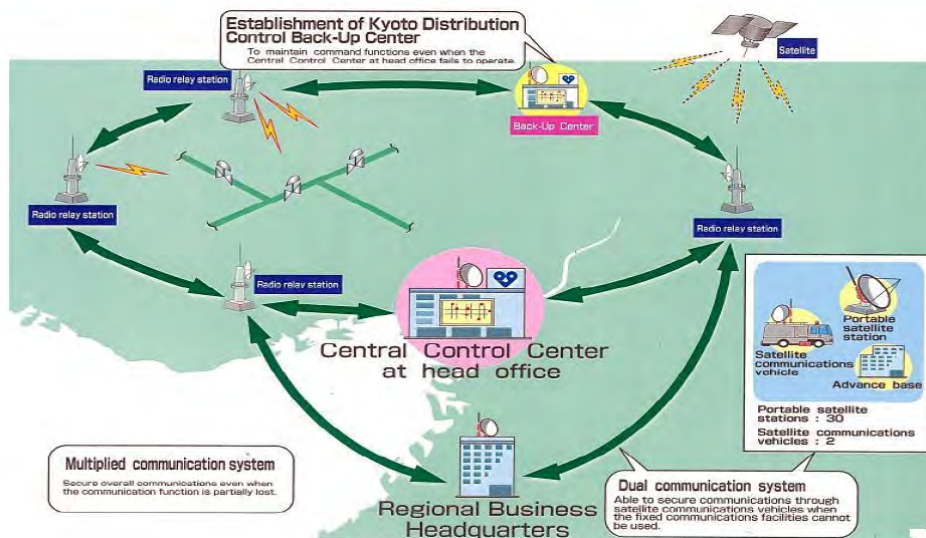


Figure 36. Outline of the Osaka Gas Engineering In-house Radio Network

Back-Up Center

To ensure customers absolute safety and convenience in their use of city gas, it is necessary to remotely monitor and control city gas supply at all times, and, in the event of an earthquake, collect damage information and operate the system from remote. The Control Center is capable of this, but should it be damaged, a Back-Up Center built with aseismic systems and other state-of-the-art technology for 24-hour operation can take over control.



Figure 37. Seismic resilience measures by Osaka Gas Engineering

5. INTERNATIONAL EMERGENCY RESPONSE

JAPAN DISASTER RELIEF TEAM (JDR)

In the case large-scale disaster in foreign countries JDR join emergency relief operations upon the request of the government of the disaster-affected country to the Ministry of Foreign Affairs of Japan. Dispatch is carried out by JICA based on Disaster Relief Team Law within the framework of its Disaster Relief Program.

To facilitate the rapid and reliable supply of the large-volume of relief items, reserve supplies must be procured and appropriately stockpiled in advance at locations as close as possible to disaster areas. Accordingly, JICA has warehouses in four locations worldwide, namely 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 the Netherlands and are rapidly shipped to affected countries.

There are four types of JDR teams. One or more types of the teams are dispatched as appropriate.




| Dispatch Team | Composition | Activity | Duration |
|--|---|--|----------------------------|
| Search and Rescue Team  | National Police, Fire and Disaster Management, Coast Guard, MOFA, JICA, | Search and rescue victims trapped in collapsed structures | Approx 7 to 10 days |
| Medical Team  | Doctors, nurses, pharmacists Team head (MOFA) Team Coordinator (JICA) | Urgent medical assistance including patient treatment | Approx 2 weeks |
| Expert Team  | 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 |
| Self-Defense Force Unit  | 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 38. Outline of the JDR

CONCLUSION

Being one of the most disaster prone countries in the world Japan has developed sophisticated and all-embracing disaster management system. Based on 3-layered national government system and administrative delimitation of the country, formation and evolution of the disaster management system in Japan has been heavily influenced by unfavorable geographical position, as well as, meteorological, and topographical conditions and various large-scale disasters have been driving force of new changes and enhancements to it. Although inheriting some basic elements of previous systems, current disaster management of Japan has been formed during the last 50-60 years. Rapid development of the country during this period enabled it to make considerable investments on DMS and integrate latest technological achievements of the country to it.

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

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 are taken in concerted and coordinated manner and supervised by the higher level. Such a hierarchical system and distribution of responsibilities is likely to ease the burden each involved body enabling each of them to manage specific issues with more engagement and efficacy given the high frequency of natural disasters in Japan. Integration of disaster management measures by specific bodies allows handling specific disaster management issues more professionally.

Talking about disaster/emergency response in Japan it is important to distinguish major, additional, specialized and voluntary response bodies and forces. By major bodies we assume municipalities and Japan Coast Guard the former holding the primary responsibility of ensuring and carrying out quick response operations on the land area, the latter within the territorial waters of Japan. Specialized bodies are trained emergency medical assistance teams – DMAT and JMAT and specialized teams of several public corporations designated for disaster management under the DCBA. In turn, additional assistance forces are managed by national level government organizations such as FDMA, MLIT, and MHLW which take disaster response actions once the scale of the disaster is out of response capabilities of a municipal government. At the same time, MLITT, FDMA, MHLW are central bodies for national level supervision and coordination of emergency response activities as well as response assistance during large-scale disasters.

JMA is the key body in prediction major natural hazards such as earthquakes, tsunamis, typhoons and volcano eruptions while MLIT is for flood and sediment disasters and cooperation with them is essential for municipalities and other disaster response organizations. It must be noted that application of latest technologies for disaster warning

and communication by JMA had greatly improved disaster response system in Japan. In addition, state lifeline agencies, railway companies, NHK has established quick information sharing with JMA and other relevant bodies as well as response mechanism within respective fields of activity. Although playing important role during large-scale disaster National Police and Self-Defense Forces are additional response forces as join the response activities only upon request.

Large-scale natural disasters in recent decades, such as, Isewan Typhoon, Great Hanshin-Awaji Earthquake have influenced current disaster response system in Japan. The system has undergone some organizational changes, new disaster response forces – DMAT, and disaster response mechanisms – ex, Phoenix System and Emergency Medical Information System in Hyogo Prefecture – has been introduced and integrated.

Establishment of ad hoc headquarters during large-scale disasters at all levels peculiar indicator of the disaster response in Japan. Such headquarters serves for quick mobilization of forces, better coordination of response activities and disaster information sharing. Because Japan is subject to recurring large-scale natural disaster additional measures other than permanently functioning bodies are necessary to reduce impact of disasters.

Massive numbers of voluntary response organizations and people involved in voluntary disaster response shows high level of disaster awareness and social responsibility for disaster reduction in the country. During disaster times acting in collaboration with the professional responders, voluntary teams demonstrate remarkable efforts in psychological support of the affected people and provided basic utilities.

The existing response system, although, has been formed during relatively short time period put in place sophisticated mechanism which enables Japan to mobilize forces and resources and respond in a comprehensive manner any large-scale disasters promptly, considerably decreasing damage and loss. Although, complicated at first glance, comprehensively elaborated coordination enables relevant bodies take concerted actions what increases response efficiency. In turn hierarchical supervision granting response bodies with great independence keeps accountability of them high.

Notwithstanding, high frequency and unprecedented levels of recurring natural disasters keep on challenging disaster response system of Japan. The recent Great East Japan Earthquake and following tsunami which caused massive destructions and human loss demonstrated urgency of being alert and further enhancing disaster preparedness and response capacity of the country.

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