

**Research disaster reduction and prevention
management in Japan and lessons learned**

(FINAL RESEARCH REPORT)



Submitted by

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Table of Contents

1. Disaster reduction and prevention background
2. Disaster reduction and prevention management in china
 - 2.1. Disaster management system and disaster law
 - 2.2. Disaster risk assessment
 - 2.3. Disaster early warning
 - 2.4. Disaster reduction and prevention project
 - 2.5. Disaster reduction activity
 - 2.6. Disaster education
 - 2.7. Challenges in disaster reduction and prevention management
3. Disaster reduction and prevention management in Japan
 - 3.1. Disaster law and disaster management system
 - 3.1.1 Disaster law
 - 3.1.2 Disaster management systemCase research 1: Disaster management planning system in Japan
 - 3.2. Disaster information system and risk assessment
 - 3.2.1. Disaster Information system
 - 3.2.2. Disaster risk assessmentCase research 2: the hazard map in Japan
 - 3.3. Disaster early warning
 - 3.3.1. Disaster early warning profile
 - 3.3.2. Disaster early warning system
 - 3.3.3. Flood early warning
 - 3.3.4. Earthquake early warning
 - 3.3.5. Tsunami early warningCase research 3: Utilization of Earthquake Early Warnings An earthquake early warning (EEW)

3.4. Disaster reduction and prevention project

3.4.1. Improvement of disaster prevention facilities

3.4.2. Construction of disaster prevention projects

Case research 4: soil erosion control dam (prevent debris flow)

Case research 5: seawall in Japan (prevent tsunami and typhoon)

Case research 6: Miki Earthquake Disaster Memorial Park

3.5 Disaster reduction activity

3.5.1. Disaster drill

3.5.2. Disaster Volunteer Training

Case research 7: Himeji city disaster drill

3.6. Disaster education and research

3.6.1. Disaster education

3.6.2. Disaster research

Case research 8: Nojima Fault Museum in Hyogo Prefecture

Case research 9: Community-Based Disaster Reduction Activities (use Hazard map)

4. Conclusion and Lesson learning

5. References

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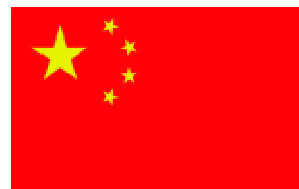
I also sincerely grateful to the Government of Japan, Company of Japan, Kobe University and more other organization to give me chance to visiting and lecture. Let me research deeply and study more advanced technology before I never hear about that.

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1. Disaster reduction and prevention background

Three phases in disaster management is distinguished:

Disaster reduction and prevention

Disaster response and rescue

Disaster recovery and reconstruction

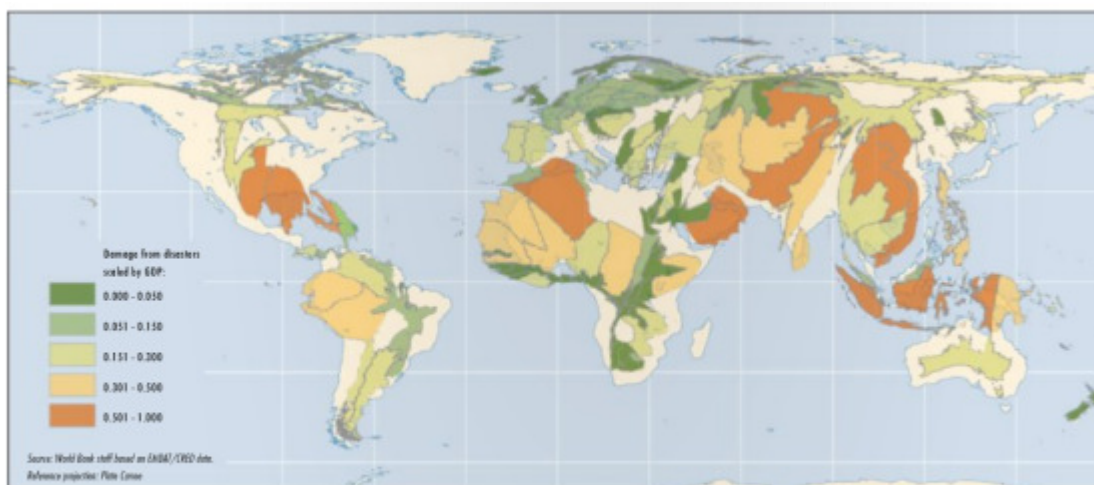
In Chinese word “don't fight without any preparation”. The same principle applies to disaster. In my mind, disaster reduction and prevention is more important than other phases.

According to world bank data, damage from all hazards between 1970 and 2008 totaled \$2,300 billion (in 2008 dollars), or 0.23 percent of cumulative world output.

Even when scaled by output, poor countries with few assets incur little damage, and rich countries (with more capital) effectively prevent damage. Middle-income countries incur the greatest proportional damage (image1), suggesting why absolute damage has been rising.

Institutions that reduce damage develop more slowly than assets as countries urbanize and prosper. But this is not immutable, even poor countries can undertake effective reduction, and more can rise to the challenge of doing so.

Image 1 Damages shrink Africa but expand middle-income countries



Nature disaster is inevitable. Natural disasters prevention-oriented rather than passively wait until after the disasters to take urgent action. Disasters such as disease, if person always pay attention to their own health, the disease is not likely to have the chance of invasion. However, although the reaction of the international community is in time, but the investment in disaster reduction is far from adequate. If the investment in disaster reduction will be pay more, then return in the future will be several times.

2. Disaster reduction and prevention management in china

2.1. Disaster management system and disaster law

2.1.1 Disaster management system

China has established the disaster reduction and relief leading system characterized by unified leadership, departmental accountability, graded management and local operational control. Under the unified leadership of State Council, the range of disaster reduction and relief agencies at the central level were erected including National Committee for Disaster Reduction, State flood control and drought relief headquarter, State Council's earthquake rescue and relief headquarters, Headquarter of China Forest Fire Prevention and Integrated National Disaster Relief Coordination Office etc to fulfill the responsibilities of coordination and organization of disaster reduction and relief operation, in correspondence, the local governments also structured the disaster reduction and relief coordinative agencies with the similar functions.

2.1.2 Disaster reduction state plan

October 2006, China promulgated << The State Science and Technology Development Plan for "the Eleventh Five Year">> that placed national public security response technical system setup and capacity-building of addressing public security disastrous accidents and unexpected public accidents as one of priorities of future development. Nature disaster monitoring and prevention topped the agenda of public security issues in "Program outline for national medium and long term scientific and technical development (2006-2020)" with disaster reduction and prevention posed as the filed that scientific support focuses on. August 2007 China issued <<Comprehensive disaster reduction plan for "the Eleventh Five Year">> with the precise requirements to local governments to mainstream disaster reduction into local economical and social development, which represents the significant move of Chinese government to echo the World Conference on Disaster Reduction and <<"Hyogo Framework for Action.">> by making effort to build disaster risk reduction (DRR) into national sustainable policies, plans, and actions. The plan emphasized the importance of disaster prevention, disaster reduction, disaster preparedness and vulnerability decrease, targeting the capacity-building, involving the aspects of disaster early warning and forecast, emergency response command, institutional and legislation building, risk management, community DRR, scientific support and advocacy and education, it presented from comprehensive perspective the guiding ideas, objective of the plan, major work and projects, implementation measures; the plan call for all regions and departments to compile the disaster reduction plan in conformation with local conditions and bring it into local economical social development plan with the highlighted tasks to address the inadequate disaster reduction work and substantially uplift the capacity of integrated disaster reduction. Acting upon the requirements of the plan, China's government stressed the effort on disaster

monitoring and early-warning, emergency relief command, disaster management, urban-rural community disaster reduction, scientific support and advocacy and education to proactively improve country's capacity in dealing with disasters.

“National earthquake prevention plan(2006-2020),” “National geographic disaster prevention ‘eleventh-five-year ’plan”, “metrological development ‘the eleventh five year ’plan ”, “hydrological development ‘eleventh-five-year ’plan” as well as other specific plans with detailed work assigned to prevent and respond disasters. Now, the ministry of civil affairs works together with national development and reform commission to compose <<Comprehensive disaster reduction plan for "the twelfth Five Year"(2011-2015)>> with the overall arrangement of disaster reduction capacity-building work.

2.1.3 Disaster reduction law

China pays great attention to legislation of disaster reduction activities with the series of laws and regulations issued and enforced and mainstream the disaster reduction operation into legalization. In recent years, about 30 laws or regulations related to disaster prevention and reduction have been enacted and implemented or revised such as “unexpected accidents response laws in People’s Republic of China”, “earthquake prevention and disaster reduction law in People’s Republic of China”, “flood resistance law in People’s Republic of China”, “sand prevention and resistance law in People’s Republic of China”, “fire prevention law in People’s Republic of China”, “nature disaster relief regulation”, “drought relief regulation in People’s Republic of China”, “flood prevention regulation in People’s Republic of China”, “forest fire prevention regulation”, “grassland fire prevention regulation”, “geographic disaster prevention regulation”, “destructive earthquake emergency response regulation” and others suchlike. According to the actual work, China will further intensify legislation of disaster reduction.

2.2. Disaster risk assessment

China is planning to launch the comprehensive investigation project of disaster risks and disaster reduction capacity in key areas. This project aims to investigate the nature disaster risks and disaster reduction capacity in key areas at all aspects to identify major underlying risks and determine the disaster reduction resources and capacity limits in order to build the database for underlying risks and disaster reduction capacity with the risk evaluation model to set disaster risk management platform of national level and in key areas to form risk monitoring and evaluation operation system at national level and in key areas.

2.3. Disaster early warning

Based on the metrological, hydrological, earthquake, geological, maritime, environmental

observation network, the government has continued to intensify density of monitoring, and built nature disaster dynamic monitoring system including ocean bed observation and space-ground observation. The primary disaster monitoring and early-warning system has been formed.

--Disaster remote-sensing monitoring system: 6th September 2008, China successfully launched the small satellites constellation of environment and disaster monitoring A, B, which enabled China to move significant step forward in building disaster remote sensing system. Constellation and other disaster reduction application operative systems provided sound platform for disaster monitoring, early-warning, assessment and emergency relief command.

--Metrological early-warning and forecast system. After successful launch of "Feng Yun" series of satellites, altogether 146 weather radar of new generation, 91 high altitudes metrological detection station with "L wave" system and 25420 regional metrological observation stations will be constructed. The primary specialized metrological observation network was built targeting atmosphere ingredients, acid rain, sand storm, thunder and lightening, agricultural metrology and traffic metrology. The digital forecast and prediction system was developed to deliver disastrous weather approaching early-warning information with metrological early-warning information release platform shaped through radio, TV, Newspaper, cell phone, internet and others covering rural-urban communities.

--Water and flood monitoring and forecast, early-warning system. The hydrological monitoring system was established comprising 3171 hydrological stations, 1244 water level station, 14602 rainfall station, 61 hydrological laboratory and 12683 underground water observation wells. Flood early warning and forecast, underground monitoring system and water resource management system and water resource data have been built.

--Earthquake monitoring and forecast system. 937 fixed stations and 1000 mobile stations were set up that could accurately and timely monitor the earthquake with 3 magnitude and higher. 1300 fixed stations for pre-earthquake observation and mobile 4000 points were fitted. Earthquake prediction and forecast analysis consultation platform at the national level and provincial level have been formed. High speed earthquake data information network consisting of 700 information panel points has been constructed and earthquake rapid information SMS delivery service of cell phone has been provided.

--Geographic disaster monitoring system. Since 2003, the government started geographic disaster early-warning and forecast work, about 12000 points of underlying geographic risk has been identified. Special monitoring network for collapse and flash in "three gorges" areas, as well as specialized ground settlement observation network were created in Shanghai, Beijing, Tianjin etc.

--Marine disaster forecast system. The previous marine observation facilities, equipments and apparatus have been retrofitted and upgraded to increase the capacity of observation and

monitoring off shore. The floating buoy observation capacity and facet investigation capacity entered into the advancement stage. The butch of marine observation stations has been transformed and some center stations were converted with communication systems. Sea-gas interaction and sea weather change observation and evaluation system is undergoing construction. The operative observation on marine disasters such as sea level rising, sea water invasion, and salty wave and others related to climate changes will be proactively processed.

--Fire early-warning and monitoring system in forests and grasslands. To better dynamic monitoring system on forest and grassland fire by applying satellites remote-sensing, aircrafts navigation, video surveillance, observation and ground patrol. The forest fire graded early-warning response and evaluation technology system for forest fire.

--Sand storm monitoring and evaluation system. Sand storm satellites remote-sensing evaluation system and cell phone MSM platform were erected with the sand storm ground monitoring stations in key north areas. Four-level teams of National, provincial, city and county will be organized with the primary coverage of sand storm monitoring network involving north areas in China.

The government has reinforced the research on disaster early-warning with the focus on last kilometer of disaster information passage to guarantee the public's access to information. Meanwhile, fully employ scientific resources, conduct disaster consultation, carry out evaluation and identification. To utilize the satellites and other technologies for transforming risk assessment, monitoring and early-warning to timely issue the early-warning and offer the decision-making support for disaster relief and social-economical development.

2.4. Disaster reduction and prevention project

In recent years, the government has implemented a series of major disaster reduction projects related to flood prevention, drought relief, wind and sand storm prevention, ecological recovery.

--Management project of rivers. The government increases its input to the rivers management through dynamic finance policies, national debt issuance to accelerate the process of rivers management. At the present time, the big dam on middle and down Stream of Yangzi River has been fully restored; standard dam construction on down Stream of Haunches River is fully unfolded. 19 major projects for Huaihe river management were beacially completed. Three gorges projects, Xiao langdi project on Huanghe River and Linhuai project on Huaihe River and other nexus projects have been fully brought into practical use. The capacity against flood in major rivers has been significantly uplifted with parts of rivers capability to resist the flood which occurs once in 100 years. The capability of flood prevention in middle and small rivers also has seen the improvement. Sea dam in some key areas has raised its standards to meet the flood in 50 years record high.

--Restoration project of dangerous houses of low-income rural families. The government pays attention to improve dwelling houses capacity to resist the disasters by carrying out technological instruction and quality inspection during the process of houses reconstruction in the affected areas in terms of site selection, housing design and construction and completion check. The government also links the poverty alleviation work with disaster reduction housing settlement. From 2005-May 2009, total capital investment 1753.5 billion Yuan were transferred to the various parts of country for 5.8016 millions houses of low-income rural families restored or newly built which benefit 1.8051 million families and 6.4965 million people.

--Restoration school buildings, since 2001, the government started to reconstruct and solidify the middle and primary school buildings across the country. By 2005, the central budget dedicated 9 billion Yuan for the designated project containing 40 000 schools with buildings repaired or rebuilt. Since 2006, the middle and primary school buildings renovation costs have been covered into the funds for rural compulsory education security mechanism.

--Security projects of middle and primary schools building, since 2009, the government takes three years to implement the projects to consolidate school buildings and enhance the disaster resistance capacity in middle and primary schools in order to afford the school buildings to fit the earthquake resistance and prevention standards as well as fit the requirements for landslide, rock collapse, mud and rock flow, tropical circle and fires precaution.

--Consolidation project of risky water reservoirs. In March 2008, the government issued specific plan on risk removal and consolidation project of risky water reservoirs that rendered the tasks to finalized risk removal and consolidation project of risky water reservoirs of large-medium-sized and small major water reservoirs in three years. In 2008, the government has earmarked the special plan on 4035 suchlike projects accounting for 65% of the total 6240 risky water reservoirs.

--Drinking water safety project. During the period of “eleventh five year” (2000-2005), the government diverted 22.3 billion Yuan to address the drinking water needs of 67 millions people, which marked the end of the history of extremely insufficient drinking water in rural areas. From 2006, the work related to drinking water in rural areas has moved into new stage of ensuring the safety of drinking water. In 2006-2008, the central government committed 23.8 billions Yuan to deal with drinking water safety issues in rural areas to satisfy 109 millions of people’s need with subsidies of local governments in the worth of 22.6 billions Yuan

--Water and soil erosion recovery projects, in the 80s of 20 century, the government began to conduct the recovery projects in key areas of Huanghe River and Yangzi River with serious water and soil erosion. At the end of “Ninth five period”(1996-2000), the government expanded the input on the management of recovery projects with the coverage extending to upper and middle streams of 7 big rivers in China including Yangzi River, Huanghe River,

Huaihe River, Haihe River, Songliao River, Taihu River. By 2008, the key prevention and recovery projects covered 260 thousands of kilo squares water and soil erosion areas with 70% of recovered areas in key projects and 40% sand reduction. The soil erosion reduction in the Jialing River –upper stream of Yangzi River reached one third. The Huanghe River has seen silt and sand volume decrease of 3 tones every year since then.

--Farmland irrigation work, since “Ninth five period”(1996-2000), the country raised the input of the resources to carry out installation of the farmland engineering irrigation facilities focusing on extent supportive projects in large irrigation areas and water efficient use to improve the irrigation capacity and enhance the strengths to cope with flood and drought.

--Ecological and environment management projects. At the beginning of 21 century, the government continues its effort to protect the nature forest resources, recover the forest land from cultivation land, “three north forest belt building”, plant the forests in key areas of Yangzi River, Address the sand storm source in Beijing, Tianjin regions, deal with the desertification in karst areas, preserve wild animals and plants, build nature preservation areas, build seashore forest belt, covert pastoral areas into grassland in order to curb the desertification and desert expansion and lessen the damages inflicted by extreme weathers. The government also engaged in ecological recovery projects, it designated 6 ecological recovery pilots such as Shanxi province with coal extraction areas. Meanwhile, the effort also is delivered to create ecological province, city and county as well as to build better ecological prefectures and villages with 103 counties of key ecological-building demonstrative projects promoted.

--Prevention projects on construction. The government has adopted<<Management regulation on public facilities of city’s administration >>, and issued <<Planning standards on earthquake resistance and disaster prevention in the cities>>, <<Earthquake resistance design regulation in prefectures and villages>>, <<Demarcation map of dynamic diameters of China’s earthquake>> to refine management regulation on safety rating of major construction projects. The government forwarded the implementation of earthquake resistance project for dwelling houses in rural areas and about 6.6 million earthquake resistance houses were constructed and renovated. After the “Wechuan” earthquake, <<Classification standards of earthquake prevention on construction projects>> and <<Design regulation of earthquake prevention on buildings>> were modified.

--Disaster prevention on roads, since 2006, the government began to operate disaster prevention projects on roads based on the road conditions affected by earthquake and flood. Up to 2008, 1.54 billion Yuan was intended to comprehensively treat the facilities installed on road sides, constructing stuff of the bridges and water drainage (water-proof) with focusing on add and renew the disaster prevention facilities equipped with roads in mountainous areas to enable the improvement of disaster prevention capacity of the roads.

--Disaster emergency relief materials reserve. The disaster emergency relief materials reserve network based on material reserve warehouses have been created and National emergency relief materials reserve system continues to be transformed. Now, altogether 17 central level relief materials reserve warehouses for life need were built. Disaster relief warehouses are also set up in some provinces, cities and counties which shaped the primary emergency relief materials reserve system. The emergency relief materials provision mechanism also is improved through the contract with manufactures for urgently needed products and index setup of disaster relief products manufacture.

2.5. Disaster reduction activity

To build the professional personnel development into the national professional personnel development plan, and eventually construct the disaster reduction education system and training platform.

--To embed the disaster reduction into national education system and strengthen the professional personnel development by fully utilizing disaster reduction researches and scientific advantages to foster multi-level qualified disaster reduction personnel. To enhance the disaster reduction and prevention subject-building based on currently fiscal management systems available that support technological universities and institutions of disaster prevention and reduction as well as facilitate to open colleges of technology and management of disaster prevention and reduction management in order to increase the education quality.

--Integrate the disaster prevention and reduction into cadre's training program. Administrative institutions at all levels, cadre institutions launch the specific training programs on disaster prevention and reduction as well as emergency management in accordance with the need to create the professional teams. To make the effort to build the national emergency management personnel training base to provide the trainings of disaster prevention and reduction emergency management for senior management personnel and senior researchers of the institutional agencies or enterprises. The national earthquake emergency rescue training base has been established and put into use.

--Trainings with specific theme of emergency management for leaders. "Disaster emergency management workshop for provincial governors" and "Unexpected accidents emergency management workshop for provincial governors (ministerial level)". Leaders who are responsible for disaster prevention and reduction as well as emergency management of all provinces as well as from counterpart departments of the State Council took part in workshops. Since 2005, the special Disaster emergency management training programs have been proactively conducted that effectively raise the comprehensive quality and capability of disaster management personnel to address the nature disasters and other unexpected accidents.

2005-2006, four times of Disaster emergency management trainings for city leaders, since 2006, four times of flood resistance and drought relief trainings for administrative leaders of the city level were held.

--Emergency rescue capacity trainings for rescue teams and enterprises. The governments at all level work together with relevant departments organize and conduct the disaster prevention and reduction, emergency management trainings for enterprises directors and management personnel by applying the methods of assembly trainings or self-trainings. The trainings could improve the capabilities of those participated in operating rescue effort, self-prevention and coordinative work.

2.6. Disaster education

First, the “National day for disaster prevention and reduction” was settled. 12th May 2008, after the “Wenchuan” destructive earthquake, the disaster prevention and reduction draw great attention of society in China. Approved by the State council, since 2009, the day of 12th May has become “National day of disaster prevention and reduction”. All regions and all departments regard this day as a platform to strengthen disaster prevention and reduction education by popularize relevant knowledge and skills to public in order to increase the awareness and address the emerging problems in dealing with disasters in the very region or departments. On the first “day of disaster prevention and reduction” in 2009, the member departments of the National committee for disaster reduction sophisticatedly organized and devised the various advocacy and education activities with designated theme, rich contents and diverse forms supported by enhanced local leadership across the country.



Image 2 National day of disaster prevention and reduction Icon

Second, the China’s government attached great attention to the disaster prevention and reduction publicity and education. On “International disaster reduction day” in October every year the country holds diverse substantial disaster reduction publicity and education programs. The relevant departments and local governments place the disaster reduction publicity bulletin in public areas, newspaper, magazines, TV, radio, internet all launch the special column to spread

the disaster reduction knowledge and provide public non-profitable ad to teach people practical disaster prevention and danger avoidance skills. The middle and primary schools open the disaster prevention and reduction curriculums and conduct various drills. The National committee for disaster reduction authorized competent organizations and experts to compile a great amount of publicity materials, practical manuals, mutual and self assistance materials, as well as maps, video disks, animation works to extend widely knowledge of disaster reduction and prevention. Red Cross and other NGOs dynamically hold first aid trainings for popularize knowledge and skills of rescue which has played vital roles in raising disaster prevention and reduction awareness and capacity of whole society. Since 2005 the education of disaster prevention and reduction has been incorporated into annual working plan of all departments with wide-spread public access to disaster prevention and reduction knowledge for awareness rising.

2.7. Challenges in disaster reduction and prevention management

China faces lots of challenges in its work of disaster reduction and prevention in the future.

First is the density of monitoring network for natural disasters, the accuracy of early-warning and forecasting, level and timeliness of information dissemination need to be further improved.

Second is these are no disaster risk assessment database and hazard map in china. That is why Chinese government will build disaster risk assessment database in the future.

Third is in some areas, urban infrastructure standards for disaster prevention and reduction are low; the construction of shelters is lagging behind; and the abilities of disaster prevention and reduction is still relatively weak.

Fourth is the supply of emergency relief materials is not enough to meet the needs of disaster relief in variety and quantity; emergency equipment, technical means, telecommunication and emergency broadcasting facilities for disaster relief are out-of-date. The support abilities of science and technology for disaster prevention and reduction need to be further improved.

Fifth is central government and local government do not care disaster drill, most of public people never participated in disaster drill in their life.

Sixth is the development of talents for disaster prevention and reduction is lagging behind; inter-departments and trans-regional cooperation mechanism need to be further improved; the

system of publicity, education and training for disaster prevention and reduction must still be improved; and public awareness and ability of disaster prevention and reduction needs to be raised.

3. Disaster reduction and prevention management in Japan

In Japan, each year due to natural disasters will cause a large number of personnel casualties and property losses, due to the special geographical environment. Japan occurred 1923 mid-off East earthquake, 1995 Great Hanshin-Awaji earthquake, 2011 East Japan earthquake that suffered heavy casualties and huge economic losses, so the Japanese government and the whole society to give special attention to natural disasters.



Image 3 Japan Geographical environment

3.1. Disaster law and disaster management system

3.1.1: Disaster law

Without excellent disaster legal system, excellent disaster management system cannot exist. Disaster management system in Japan is gradually formed on the basis of the legal system of disaster prevention and mitigation Japan to pass legislation to ensure that the disaster countermeasures various measures and undertaking implementation.

Japan's disaster management and legal system can be traced back to<<prepare against natural disasters Reserve Act>> in 1880, the law to pass legislation in order to ensure adequate supply of food and supplies in case of a disaster or famine when food and material reserves. After 100 years of development in Japan is not only to establish the basic disaster prevention law<<Disaster Countermeasures Basic Act>> and implementation of each phases of disasters law, such as disaster preparedness, emergency response, disaster recovery and reconstruction, gradually formed legal system of disaster management.

A)Clear responsibility of <<Disaster Countermeasures Basic Act>>

After vote by Congress, <<Disaster Countermeasures Basic Act>> promulgation and implementation on October 31, 1961, this is the one including the provisions of the General Provisions (Disaster Basic Law and the definition of the disaster, as well as all levels of government, government agencies and organizations and civic responsibility and obligations), disaster prevention and relief group relations, disaster planning, disaster prevention, disaster emergency response and post-disaster reconstruction, fiscal and financial measures, disaster emergency and so on. This act include in 10 categories and 117 legal provisions as well as all previous modified to illustrate the Annex, the purpose of the act is to make up for the deficiencies of the old and mitigation framework to promote the government to carry out comprehensive disaster management system. After the <<Disaster Countermeasures Basic Act>> the promulgation of the Central Disaster Management Council faced a variety of problems encountered in the practical application of, in particular, has experienced valuable lessons in the actual disaster response based on the number of different modifications of the Basic Law.

<<Disaster Countermeasures Basic Act>> has five goals .1. Clear and mitigation responsibilities, preparedness, emergency response and disaster recovery and reconstruction program. 2. Promote the administration of disaster reduction. 3. Promote the administrative disaster management efforts. 4. Provide public financial resources. 5. Establish procedures to enter disaster emergency.

<<Disaster Countermeasures Basic Act>> main features of disaster prevention and accountability, which rely on countries, social organizations and all citizens of the concerted efforts of the disaster prevention system. Behind more details:

1. Central government's Disaster Prevention and responsibility. the central government-makers and implementation of the national disaster planning and disaster prevention measures.
2. Prefectural responsibilities and obligations. Japan is a system of local autonomy, therefore regional disaster prevention must rely on the local government's financial and material resources to implement.
3. Municipal obligations. As the basic level of local government, make sure that the disaster from the loss of life and property of the residents of the region, as much as possible to get the assistance of the relevant authorities and other local public bodies, the development of the region's disaster prevention planning, and to promote the implementation of the contents of disaster planning.
4. Obligations of public authorities. the development of the business scope of the authority or the industry-related disaster planning, the disaster prevention activities in accordance with the contents of the Basic Law of disasters and other disaster-related laws and regulations. In order

to ensure that national and local governments to the smooth implementation of disaster planning, the designated public authorities have the responsibility and obligation to provide the assistance within the scope of its business to the local government.

5. Civic responsibility. <<Disaster Countermeasures Basic Act>> stipulates that the local public bodies, common groups in the area of disaster prevention facilities managers, the general public responsibilities in disaster preparedness. As well as the responsibility and the public in the process of disaster prevention and mitigation performance reward and punishment provisions.

B) Perfect legal system

In the promulgation and implementation of the <<Disaster Countermeasures Basic Act>>, Japan has also developed a variety of specialized laws and regulations, and gradually established a relatively perfect legal system of disaster management.

Japan's Disaster Countermeasures legal in accordance with the content and nature of the law, can be divided into the basic law, the relevant laws of the disaster prevention and disaster planning, disaster contingency corresponding to the relevant laws, the law of the post-disaster reconstruction and rehabilitation law, disaster management organizations. These regulations not only become disasters the basis of the various phases of disaster management activities, also legal protection and the basis for the establishment of a disaster management organization system.

C) Characteristics of the legal system of Japan disaster

Characteristics of the legal system of Japan disaster, first is established the basic law <<Disaster Countermeasures Basic Act>>, clear from the responsibility of government to ordinary citizens of different groups of disaster prevention, and to promote the administration of the Comprehensive Disaster Prevention and financial assistance.

Second is established around the cycle of the disaster preparedness, emergency response, disaster recovery and reconstruction of a variety of specialized legal or legal, legal support to make all kinds of disaster-related activities, not only standardize the various activities, but also actively promote disaster manage the rapid development.

Third is disaster events to promote disaster legal construction Throughout the development of disaster management in Japan, can be said is a time of disaster events to promote the establishment and gradual improvement of Japan's disaster management system which is reflected in the construction of the legal system of disaster management in Japan, institution-building, management mechanism and so on, such as the Asian Disaster Reduction Center in Kobe, Japan established an important international disaster relief organizations after

the 1995 Great Hanshin-Awaji earthquake.

Fourth is disaster management laws to abide by established laws, visit some of Japan's disaster management agency, able to see most of the relevant legal texts on the file cabinet is very eye-catching, relevant laws and regulations of Japan's disaster management has become Japan to carry out various the basis and foundation of the disaster management activities.

3.1.2: Disaster management system

A) Central government disaster management

According to <<Disaster Countermeasures Basic Act>> and the administrative system in Japan, the Japanese government establish from the central to the municipal disaster management administrative system. The Central government established the Central Disaster Management Council. Central Disaster Management Council is the Japan disaster preparedness highest administrative authority responsible for the formulate the Disaster Prevention basic plan as a basis for mitigation procedures, and to discuss other important issues on disaster reduction. Meanwhile, Central Disaster Management Council have important organization and coordinating role, responsible for coordination between the central government departments, the relationship between central government agencies and local governments, as well as local public agencies on disaster prevention, to assist local governments and administrative authorities to develop and implementation of the areas disaster planning and disaster prevention and business planning. In the central level, the cabinet office build up minister of state for disaster management, special Setting up director-general for disaster management and deputy director-general for disaster management. In the next level, setting up director for disaster management, director for disaster prevention and preparedness, director for disaster response operations, director for post-disaster recovery and reconstruction, director for earthquake and volcanic disaster management. So we can see the visible Japanese government emphasis disasters.

In the local level, established a Prefectural (Municipal) Disaster Management Council, it members from local government agencies, to specified institutions local officials of public agencies and other organizations. Council is responsible for designating places basic disaster prevention plan and other plans. Because the implementation of local self-government system in Japan, the place to be in accordance with the requirements of the national basic disaster prevention plan, combined with the characteristics of the region to develop a disaster plan for the region, in the area of disaster prevention and career, in addition to the part of the country rely on the cause of disaster prevention budget of will be based primarily on the characteristics

and needs of the region, the establishment of the region through local budget disaster emergency response, disaster recovery and disaster countermeasures system, When disaster occurs, if the disaster reached the central, prefectural, Municipal government standards, each levels government need to establish disaster countermeasures headquarters to provide disaster rescue.

Outline of the Disaster management system



Image 4 outline of the disaster management system

B) Specialized mechanism in disaster management

Each levels of government to establish the appropriate disaster countermeasures system, at the same time, Japanese government has also established various specialized agencies, disaster management agencies with clearly defined functions.

1. Preparedness system

In Japan, the Japan Meteorological Agency, the Ministry of Land, Infrastructure and Transport and its outer Bureau is a major disaster information management department, including disaster forecasting, disaster prediction and disaster management disaster information collection released. The Ministry of Land, Infrastructure and Transport is also responsible for involving the construction and management of the river, transport, urban and regional development infrastructure.

2. Rescue system

Police, military, and medical institutions responsible for the rescue of the disaster in Japan, These constitute the Japan disaster rescue system.

Case research 1: Disaster management planning system in Japan

Many disasters and losses seriously makes Japan attaches great importance to the establishment of disaster management planning, <<Disaster Countermeasures Basic Act>> to develop a disaster plan to make specific provisions,, the Central Government must formulate a nation disaster management planning, public utility agencies and organizations must development of business-related disaster prevention and business plans, local governments must establish a place within the scope of this administrative disaster plan.

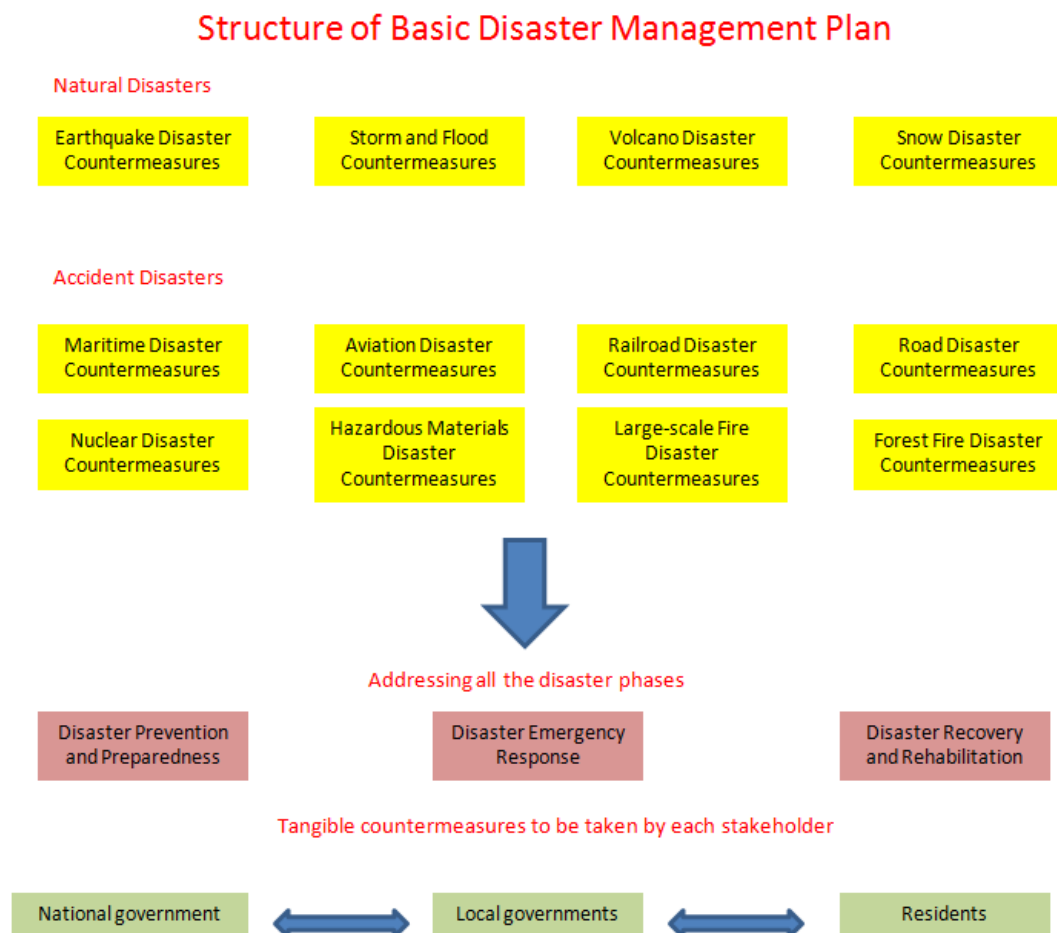


Image 5 structure of basic disaster management plan

A) Nation Disaster management planning

Specified by the Central Disaster Management Council, clearly establish the basic guidelines for disaster mitigation organizations and systems to promote disaster prevention program, and timely and correct conduct disaster recovery and reconstruction, specified mitigation scientific research programs, as well as specify the priority of disaster management, business plans and local plans terms, based on the experience of the 1995 Great Hanshin-Awaji earthquake, disaster prevention and basic plan is a comprehensive amendment, plans to clear the central government, public agencies, local governments to implement the functions of the disaster Prevention and Countermeasures plan also describes the disaster countermeasures in accordance with the different types of disaster preparedness disaster preparedness, emergency response and post-disaster recovery and reconstruction process of the basic procedures.

B) Disaster management mechanism Plan

According to the disaster management plan, specified by the designated government agencies and public institutions. To determine agencies should bear mitigation countermeasures, such as the Ministry of Land, Infrastructure and Transport, the Meteorological Agency and so developed a disaster preparedness plan within the scope of its business.

C) Local disaster management Plan

By prefectures, Municipal disaster management council Chief Executive in accordance with the disaster plan and local disaster management is responsible for designating determined by the local mitigation agencies should bear mitigation countermeasures in general, all regions are in accordance with the hazard to develop earthquake disaster prevention plan and flooding Hazards disaster Plan (including snowstorms, fires, hazardous materials incidents, unexpected major incidents). salient features of the natural disasters that may occur in the region has a very specific predictions, including personnel killed (death, serious injury, minor injuries), building damage (full destroyed, half destroyed), the fire situation, the number of in need of asylum, the various quantities are estimates to bits, in this case, effectively develop all kinds of local disaster prevention measures.

3.2. Disaster information system and risk assessment

3.2.1. Disaster information system

Disaster information play important role in the disaster rescue. There is no accurate, timely and comprehensive disaster information, the government disaster control work will not be able to effectively carry out. Disasters governance requires the government must build the relevant aspects of information involving emergency incident management information network, the information from different processing systems into the same agencies and emergency command center and interact with each other, so that the agency can directly from the database and user access to data collected from the environment. Only authoritative information first-hand for the first time, the government was likely to be successful disaster relief. Japan is a model in this regard, its core institutions developed network management and modern information technology makes efficient information transmission channels in disaster management, China should learn and draw lessons from the Japanese disaster information management has several characteristics.

A) The authority of unified information management agencies

Japan believes that the information can come from many different grassroots organizations, all information should go into a core of information management agency, and the agency is able to achieve a peacetime disasters quick disaster information acquisition, analysis, processing, and effective use of effective coordination of specific management department, disaster control. To this end, Japan has established in the Cabinet the Cabinet Intelligence survey room as the core information management agencies responsible for intelligence gathering, aggregation, analysis and comprehensive utilization of working to strengthen national disaster information centralized control.

The institution in the information management has a commanding height, the major responsibilities of the commander of the global: 1. Responsible for intelligence on the situation at home and abroad, the domestic and foreign media rhetoric, scholars have suggested that the collection, analysis, important content on a regular basis, or feel free to report to the Prime Minister and Chief Cabinet Secretary. 2. Coordination meeting regularly with relevant ministries and agencies held a joint intelligence collection, analysis.3. Responsible for the transmission of intelligence between the relevant ministries and agencies, with the prime minister's residence in the event of a large-scale disasters or emergencies, and collect relevant information from the public institutions of civil society needed.

The institutions set up Cabinet Intelligence summary center, multi-purpose satellite broadcast system is equipped with the latest technology, to prevent information leaks and outsiders sneak into the security of information systems, multimedia summary of national crises management

information through multiple channels of information and communication systems to information and intelligence to strengthen the agency to collect, aggregate analysis capabilities. Through this agency, Japan paradigm to achieve unified management of disaster-related information on the different levels of government and relevant departments, departments cooperate with each other, the accuracy of the science of efficient communication of disaster information as well as relief decisions.

B) Advanced information management organization

The reason why Japan disaster information system effective, advanced information management organization is another important factor, in addition to the authority and unified information management agencies contributed. In Japan, information management institutions to assist the authority to do disaster information collection, aggregation, analysis and comprehensive utilization, the establishment of advanced information management organizations from the central to local levels.

In the central government, the establishment of the Ministry of Land, Infrastructure and Transport Province and its outside, the Japan Meteorological Agency, fire agencies, the Joint Chiefs of Staff under the intelligence department and other information management organizations. As major disaster information management organizations, the Ministry of Land, Infrastructure and Transport, the Japan Meteorological Agency responsible for collecting, publishing and management of disaster information in disaster forecasting and disaster.

In addition to the central ministries and agencies have a set of intelligence information transmission system, the relevant government agencies and organizations, and the relevant departments of the local governments at all levels have set up their own disaster information transmission system. Tokyo Prefecture Disaster Countermeasures such as in the event of a disaster, the Tokyo Metropolitan Police Department, Fire Department, Department of Construction, Department of Education and other relevant departments through their own intelligence transmission system will collect disaster intelligence is directly transferred to the Tokyo Metropolitan Disaster Prevention Center the headquarters, disaster Response Headquarters then disaster intelligence analysis collate, draw the entire Tokyo Metropolitan affected.

C) Advanced information technology systems

Information technology support system is another strong pillar of Japan disaster information system with remarkable results, but also to achieve the protection of the emergency response linkage.

On the one hand, Japan has the world famous Phoenix Disaster Management System, including information network system, the release of environmental information phone system, disaster assessment systems, maps, information systems, disaster information systems, visual information systems, communications support system of disaster management, disaster response countermeasures support system functions software emergency system after receiving the alarm of the incident through a variety of systems to understand the incident had occurred, the type, level, the consequences need emergency information such as the type and quantity of the resource, and then quickly effective response.

On the other hand, digital, information, networking, and other high-tech features, the highly developed communications systems used in disaster management, disaster information system has a state-of-the-art technical support. For example, after the Great Hanshin Earthquake, Japan, has established a national disaster information network.

In addition to the country to establish a meteorological disaster prevention and intelligence, regional meteorological observations intelligence, river basin intelligence, road disaster intelligence system, flexible use of map information as well as GPS, GIS and CAD, RS and other technologies, these information systems to achieve fast and accurate reach to collect disaster information.

3.2.1. Disaster risk assessment

The scientific management of the disaster information cannot be separated from the hazard assessment. Leave the hazard assessment, the Government will not be screening the genuineness of the disaster information, the government disaster prevention, disaster relief, disaster reduction decision-making cannot guarantee the accuracy of the science. Disaster information and efficient operation, the protection of the government decision-making accuracy, timeliness, Japan established a disaster assessment mechanism.

1. Japan has a set of comprehensive disaster assessment background database. Japan disaster has occurred in the history of historical disaster statistics, historical disaster records document major historical disaster cases in the form established a complete historical background database, a

detailed collection of Japan's history of previous disasters, disaster, disaster situation disaster losses, the government disaster relief decision data, to help the government to determine the specific hazards in different regions of the disaster law and absorb the lessons of previous decision-making by the Government. Japan disaster prevention, disaster relief, mitigation spared prepared for the extensive collection of various regions in Japan terrain, socio-economic background, hydrological and meteorological characteristics of homes background and specific disaster-prone region specific background information, establish a thorough background disaster assessment database, and provide reference for the government to assess the situation.

2. Establishment of a rapid and effective disaster assessment model. With this model, the government is able to analyze and grasp of the extent of disasters, scope, size and loss mitigation to ensure timeliness and accuracy.

3. Establishment Disaster assessment expert system. Responsible for the disaster and major natural disasters trend in consultation with, and rushed to the disaster site disaster assessment. Such as towns, buildings and other infrastructure seismic experts responsible for the disaster-stricken town buildings and infrastructure damage assessment; disaster management and relief experts is responsible for property damage to the victims, the local Government disaster response capacity and disaster emergency management effectiveness, victims living conditions, relief needs for evaluation.

Similarly, the risk assessment is also the basis of the disaster warning. Disaster risk assessment has become an important basis for Japan to develop the urban disaster prevention plan and countermeasures, play an important role in the work of urban disaster prevention and mitigation. According to the Japan disaster prevention and mitigation planning requirements of the system, the main purpose of disaster risk assessment analysis of representative areas, disaster research and to determine disaster prevention urban plan representative areas and key areas of disaster prevention plan implementation of the recovery plan.

As required by law, at all levels of administrative regions in Japan through the various types of risk assessment methods to determine the degree of hazard. For doing the work of disaster risk assessment, the assessment and a local risk map identifies the earthquake, tsunami, volcanic eruptions, floods, landslides and other disaster-prone area, and indicate the appropriate emergency evacuation routes throughout Japan.

Geographical Survey Institute of Japan through various surveys, provide basic information to draw different types of major Japanese plains and surrounding areas and active volcanoes risk maps. Some communities often organize community-based risk map design activities proposed countermeasures to cope with various disasters threatened to raise public awareness on the risk map.

For example, since 1975, the Tokyo local municipal assessment object classification assessment every five years by the risk of the building, the fire risk and the emergency shelter risk, draw around risk, as a the basis for the preparation of disaster prevention and mitigation plans and contingency plans. In February 2008, Tokyo released the 6th comprehensive risk assessment results including Tokyo 5099 municipal.

Case research 2: the hazard map in Japan

Japanese municipalities generally create and distribute hazard maps that show the area most vulnerable to earthquakes, tsunamis, volcanic eruptions, floods, and landslides, as well as evacuation information. The Geographical Survey Institute (GSI) conducts surveys that provide basic information for the creation of various types of hazard maps for the major Japanese plains and surrounding areas, and for active volcanoes. It creates thematic maps, such as topographical maps showing geographical information relevant for disaster reduction, and compiles statistical data.

Flood Hazard Map

To ensure that residents know the flood risk in advance and can take prompt and appropriate evacuation measures in the case of a disaster, the MLIT and prefectural governments (which are responsible for managing rivers) identify flood hazard areas along rivers designated for flood forecasting and water level reporting activities, based on flood simulations

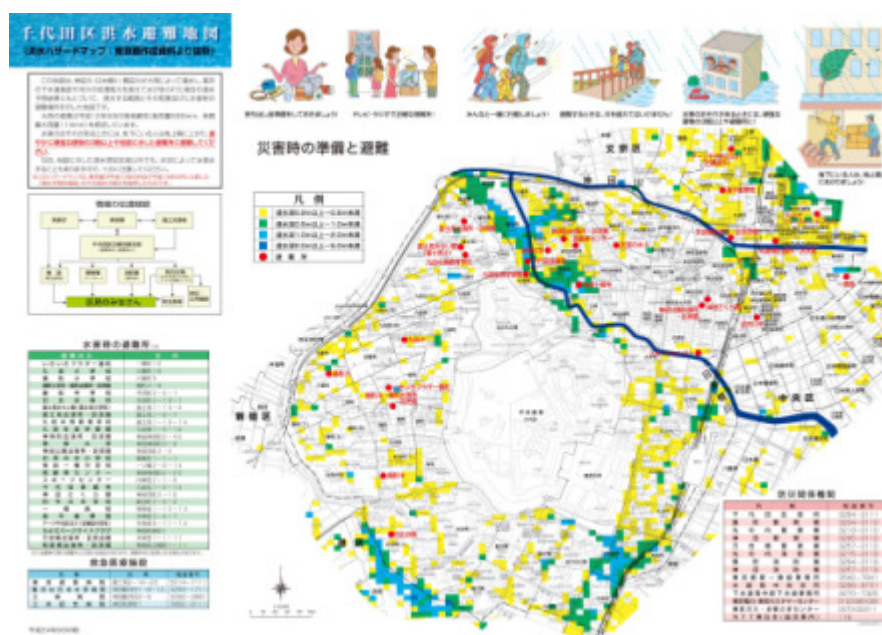


Image 6 Flood Hazard Map in Chiyo

using the planned rainfall for those rivers. Municipalities that contain areas where flooding from rivers is expected to occur are creating flood hazard maps that include such information as flood hazard areas and probable water depths (provided by river managers), evacuation sites, and flood forecast communication methods. Municipalities are working to distribute their flood

hazard maps by displaying and distributing them at government offices, distributing them to individual homes, displaying them at civic halls and hospitals, publishing them in newsletters, on websites, and in phone directories, conducting evacuation drills using the hazard maps, using them as teaching materials in elementary and junior high schools, and holding community meetings about them.

Tsunami Hazard Map

In the event of a massive trench earthquake such as those which are feared to be imminent in the Tokai region and the Tonankai/Nankai regions, the national government estimates that enormous damage will be sustained from the resulting local tsunami. To mitigate such tsunami damage, efforts must be made to develop technologies for even more rapidly issuing

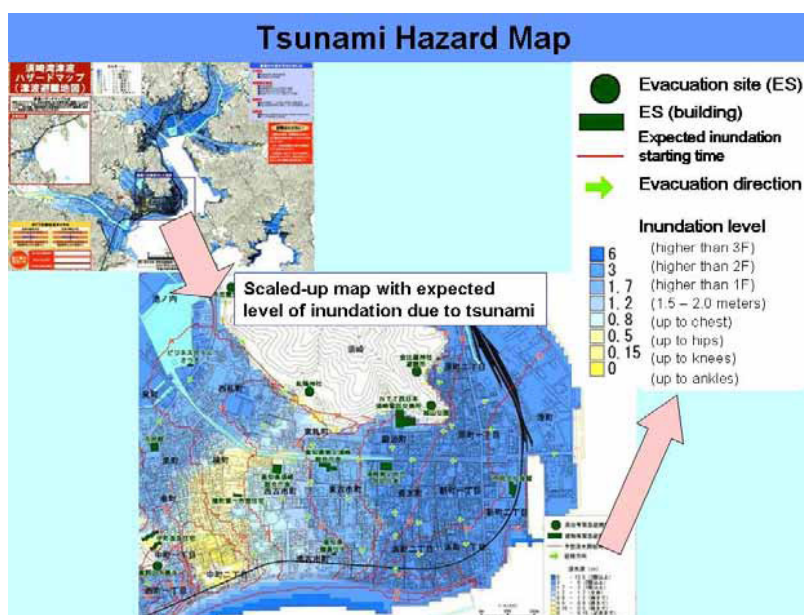


Image 7 Tsunami Hazard Map

tsunami early warning information, and to raise awareness of the tsunami damage risks at the individual and community level so that warning information will be used appropriately by residents for evacuation. The national government has set a goal of having tsunami hazard maps created for all municipalities that need to implement tsunami disaster reduction measures. To this end, it investigated several issues with regard to supporting the creation and use of hazard maps by local government bodies, and created a tsunami hazard map manual in 2004. Also, to mitigate tsunami damage along the coast, the Japan Coast Guard is performing calculations for the tsunamis that would likely be generated by the kind of massive earthquakes believed to be imminent, and is working on developing tsunami disaster reduction information diagrams that map those results.

Earthquake Hazard Map

Japanese government also created Earthquake Hazard Map, in case of Chiyoda-ku, Tokyo seismic hazard map, clearly marked above 7,6 6 weak earthquake affected area housing collapse of the region's risk, the risk of fire, emergency transportation roads, shelter and other information clearly marked, the local people can clearly understand the risk of the region where, where security. This greatly increases the chance of survival of the people after disasters.

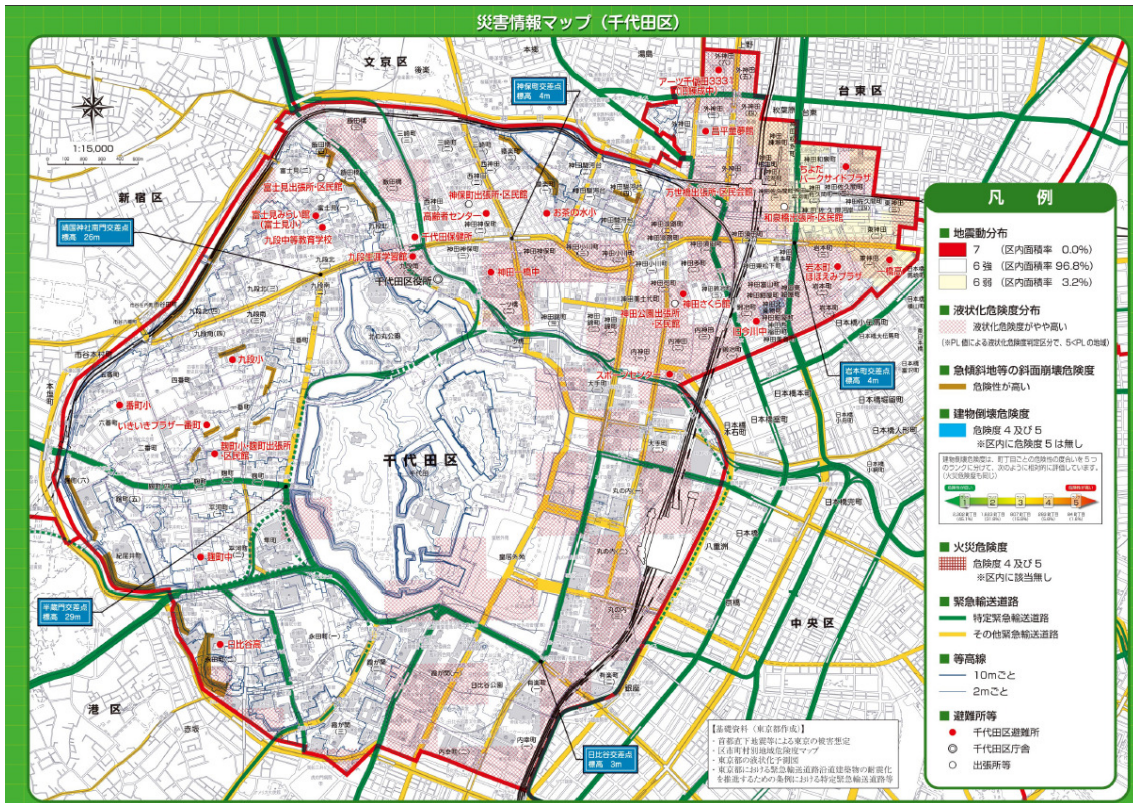


Image 8 earthquake Hazard Map in Chiyo

Volcano Hazard Map

Creating volcano hazard maps that take into account the activity patterns of each volcano and the particular disaster hazards of a specific location is an effective way to ensure that residents are prepared to take prompt and appropriate evacuation actions based on volcano early warning information. Volcano hazard maps are useful for raising the disaster reduction awareness of people who live near volcanoes, facilitating the formulation of suitable disaster reduction plans by local government bodies, and encouraging appropriate land use. The creation of these maps is being promoted primarily by relevant local government bodies, with the technical support and cooperation of the national government, and they are currently available for 37 volcanoes.

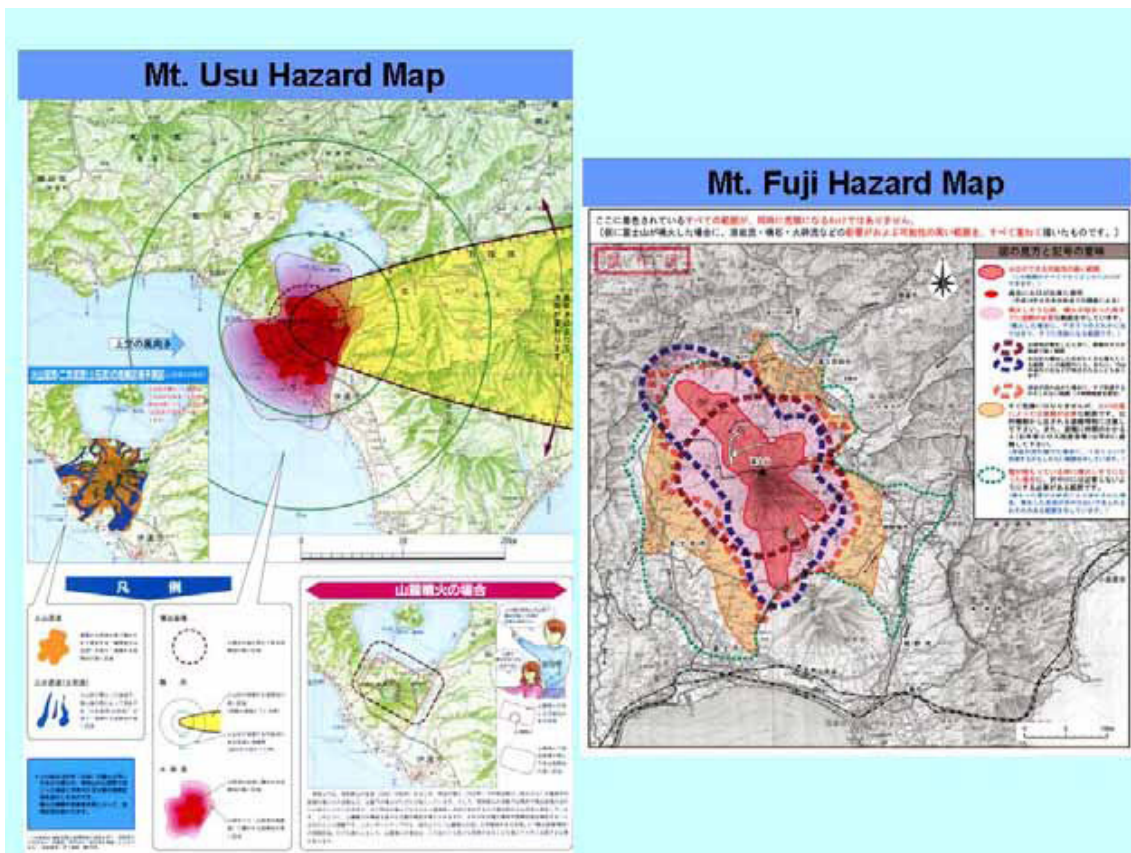


Image 8 Volcano Hazard Map

3.3. Disaster early warning

3.3.1. Disaster early warning profile

Monitoring and early warning process and the behavior of the government to effectively prevent and respond to emergencies, identification, analysis and assessment of various risks, timely posted to the relevant personnel and regional hazard warning.

The goal of the monitoring and early warning is to strengthen the study of the occurrence and development of all types of emergencies and derivative law, to improve the information network, to improve monitoring and early warning level, and to ensure that the potential risks early discovery, early reporting, early.

Early warning including monitoring and warning.

Monitoring is the scientific method to collect major hazard, hazardous area, the spatial distribution of the critical infrastructure and important protection goals, information about the health and social security situation, and close monitoring of the various factors that may cause emergencies, to collect information about risks, grasp the changes first-hand information of the risks and emergencies, and to provide important information on the basis of scientific early warning and take timely and effective measures.

The warning is based on unexpected events past and present data, information and materials, use logical reasoning and scientific forecasting methods and techniques, the risk factors that may arise in the future, the development trend and evolution to make estimates and inference. Issued the exact warning information, the government and the public to understand the trend of developments in advance, in order to take timely coping strategies to prevent or eliminate the adverse consequences of a series of activities.

Fundamentally speaking, the monitoring and early warning is based on historical data and real data to predict the future, the management department of timely, accurate grasp of the current situation and the future, be aware, and to make early arrangements. Monitoring for early warning service, is the basis and premise of the warning. The monitoring focus more on the long-term, continuous primary data collection process, is a normal behavior. The warning is monitoring based on advance warning prior forecast danger that may occur in the future, through a variety of warning channels, drew the attention of the relevant parties.

3.3.2. Disaster early warning system

Japan is a country prone to earthquakes, tsunamis, volcanoes and other natural disasters. On the basis of previous disasters, the lessons learned, the Japanese gradually establish and improve a set of strict disaster warning mechanism.

A) Meticulous Structure for monitoring to Various Disasters

To issue early warning information regarding earthquakes, tsunamis, volcanic eruptions, and severe weather disasters that is useful to the disaster reduction activities of residents and disaster management organizations, and to thereby mitigate disaster-related damage, it is essential that efforts be made to develop and strengthen the monitoring systems that provide accurate, real-time information about these phenomena, and that those systems be maintained and managed appropriately. In Japan, organizations involved in disaster reduction, especially the Japan Meteorological Agency (JMA), use 24-hour systems to carefully monitor various natural phenomena and weather conditions.

The JMA has developed a system called the Computer System for Meteorological Services (COSMETS). It uses a telephone-line-based weather information transmission system to collect observation data and disseminate information, and a super computer system to conduct analyses and make predictions. The JMA serves as the telecommunications hub for the Global Telecommunication System (GTS) that is being operated cooperatively by weather organizations worldwide, and thus is also exchanging observation data with other relevant nations.

B) Earthquakes and Tsunamis monitoring

The national government, local governments, and research organizations have installed seismometers, seismic intensity meters, and tsunami monitoring facilities throughout the country, and the JMA collects this observation data to monitor seismic activity and tsunamis.

C) Volcanic monitoring

The JMA has installed seismometers and other volcano observation equipment at 30 of the most active of Japan's 108 volcanoes. It also has a 24-hour system for collecting and monitoring data, including the data from observation equipment installed by other relevant organizations, at its four Volcano Observations and Information Centers. The JMA routinely patrols other active volcanoes to check their activity status. If any abnormalities are detected, observations of the site are stepped up through the installation of observation equipment that can be monitored in real time. University and other research institutions are promoting volcanic eruption research

through everyday observations of 36 active volcanoes.

3.3.3 Flood early warning

A) Flood Monitoring

The MLIT and prefectural governments observe the rainfall and water level in the rivers that they manage for disaster reduction monitoring purposes. The MLIT assesses the rainfall situation (distribution and strength) throughout Japan for the rivers managed by the national government from 26 radar rainfall observation stations nationwide. It also conducts observations at about 2,500 rainfall observation stations and about 2,000 water level observation stations all over Japan using visual observation methods, mechanical observation equipment, and a wireless telemeter system that transmits automatically observed data from remote locations.

B) Flood early warning

Hazard zones have been designated for those rivers deemed important to disaster reduction, and the MLIT or prefectural government, whichever manages each river, works with the JMA to issue forecasts regarding flooding. The JMA handles the water conditions (rainfall, snow melt) while the MLIT or prefectural government handles the water situation (river water levels and flow volumes). By working closely together, they can issue flood forecasts that include predictions of future rainfall, water levels, and flow volumes. This information is communicated to residents via the municipal flood prevention management entities that conduct flood prevention activities (flood prevention corps), and via the media.

C) Flood Prevention Warnings

Flood prevention warnings are issued for the purpose of enabling river managers to provide guidelines for activity preparations and deployment to municipal flood prevention management entities and other organizations involved in flood prevention. When serious flood damage is expected to occur along a river, the MLIT or prefectural government responsible for that river designates hazard zones and issues flood prevention warnings when the water level rises to the pre-designated water level (preparations for flood prevention activities) or the warning water level (implementation of flood prevention activities).

3.3.4 Earthquake early warning

A) Earthquake Observations

To quickly locate the hypocenter and estimate the magnitude of an earthquake after it occurs and to promptly issue tsunami forecasts, the JMA has installed seismometers at about 180 sites nationwide (approximately every 60 km). It also constantly monitors seismic activity by

collecting observation data from online data sources, including high-sensitivity seismometers used by research institutions. The JMA issues seismic intensity information for a total of approximately 3,900 locations nationwide. To do this, it uses data from its own seismic intensity meters, installed at about 600 sites nationwide (approximately every 20 km) to measure the intensity of ground motion, as well as data from seismic intensity meters installed by local governments at about 2,800 sites, and data from strong-motion seismographs installed by the National Research Institute for Earth Science and Natural Disaster Prevention (NIED) at about 470 of its approximately 1,000 strong-motion seismic observation (K-NET) facilities.

In addition, to gain a more thorough understanding of earthquakes and crustal activities and to provide basic observations for survey research, earthquake observations are conducted using high-sensitivity seismometers and broadband seismometers through partnerships with relevant research institutions such as the NIED, in accordance with the guidelines of the national government's Headquarters for Earthquake Research Promotion. The Geographical Survey Institute (GSI) has set up about 1,200 GPS stations all over Japan to form the GPS Earth Observation NET work, which it uses to monitor and analyze crustal movements based on regular field measurement data. These observation data are shared with relevant organizations.

B) Issuance of Earthquake Information

As soon as an earthquake occurs in or around Japan, the JMA analyzes the data from various seismometers and seismic intensity meters. Within about two minutes, it issues a "seismic intensity information" report for earthquakes of intensity 3 or greater, and within five minutes issues an "earthquake information" report indicating the hypocenter and magnitude of the earthquake, and the seismic intensity in the municipalities where strong shaking was observed.

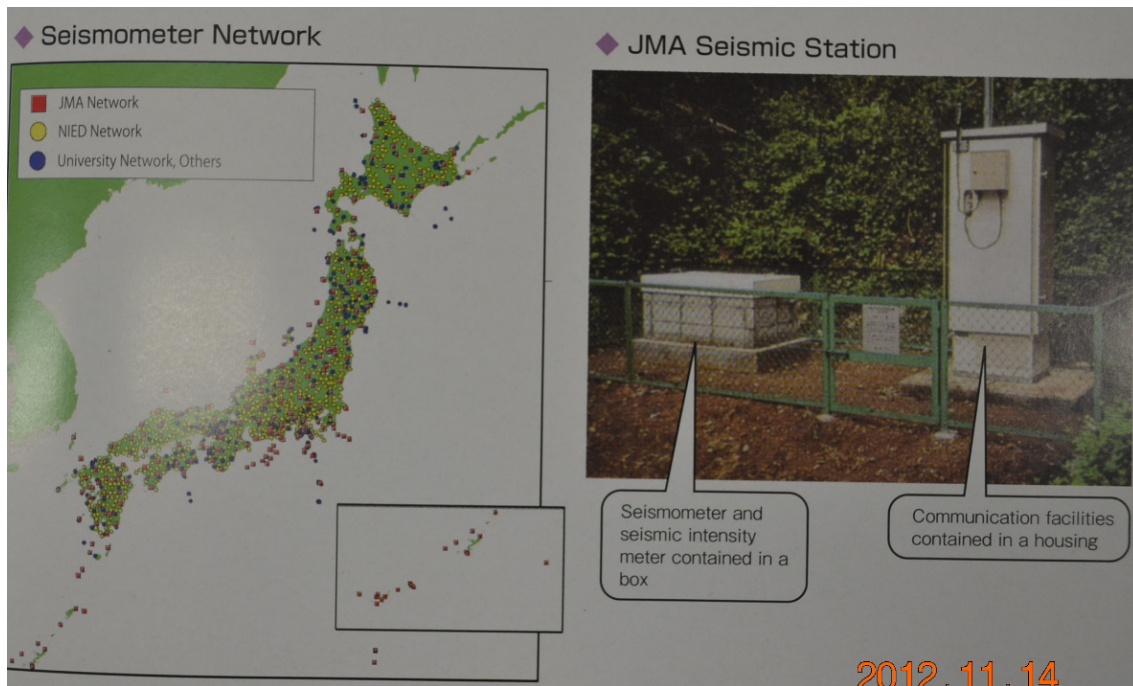


Image 9 JMA Seismic Station

3.3.5. Tsunami early warning

Most of the tsunami damage in Japan has been caused by "local tsunamis" which were generated by earthquakes near the coast and made landfall within only several minutes to several tens of minutes after the earthquake. Because of this, tsunami early warnings require the development of data analysis and transmission systems that can operate in extremely short periods of time.

The JMA conducts tsunami observations at 100 sites nationwide, including about 70 of its own facilities as well as observation facilities installed by such organizations as the Japan Coast Guard and local government bodies. The Port and Airport Research Institute and the University of Tokyo Earthquake Research Institute have jointly installed GPS tide gauges 13 km off the Cape of Muroto and are conducting demonstration experiments using those gauges. After an earthquake generated along the Pacific coast in September 2004, a tsunami with a height of 10 cm was observed.

When a large earthquake with the potential to cause a tsunami occurs, the JMA selects a corresponding scenario from the "tsunami database," which stores estimates of the tsunami height along the coast and the time it will take to reach shore. Tsunami forecasts can then be made based on this information. When a tsunami is expected to cause coastal damage, the JMA

issues a tsunami warning or advisory within about three minutes after the earthquake and then follows up with announcements about the estimated height and arrival time of the tsunami. Tsunami advisories are issued when estimates indicate a tsunami wave height of about 0.5 m, while tsunami warnings are issued for wave heights of 2 m. Major tsunami warnings are issued for wave heights of 3 m or higher. The tsunami warnings are transmitted immediately to disaster management organizations and media outlets using the Information Network for Disaster Prevention and satellite systems. The warnings are then forwarded to residents.

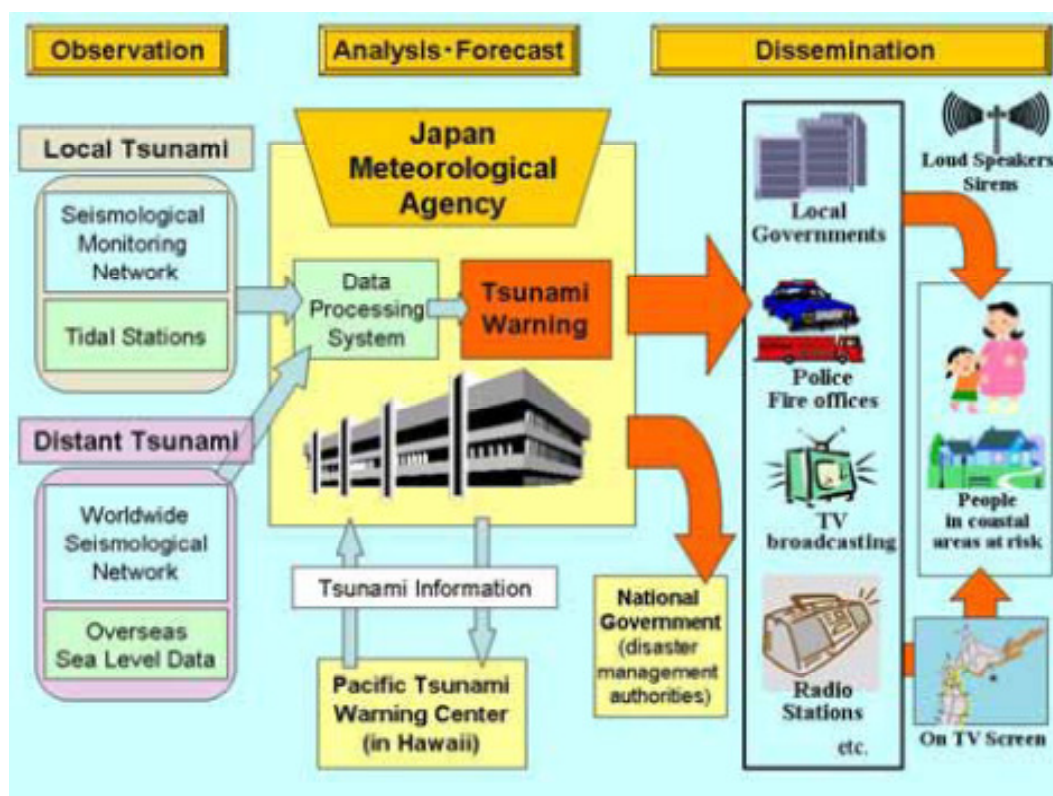


Image 10 Tsunami early warning

Case research 3: Utilization of Earthquake Early Warnings An earthquake early warning (EEW)

Utilization of Earthquake Early Warnings An earthquake early warning (EEW) announces the estimated arrival time of the S-wave of the earthquake and seismic intensity in each region. This information is based on the estimated hypocenter and magnitude of the earthquake quickly calculated from the P-wave data obtained at seismic stations near the epicenter. (The P-wave is a longitudinal wave that propagates 6-7 km/s through the earth's crust, while the S-wave is a transverse wave that propagates 3.5-4 km/s through the earth's crust, arriving later and causing the more severely destructive phenomena.) The time lag between the P-wave and the S-wave can make it possible to mitigate earthquake damage by enabling disaster prevention actions to

be taken before the major shaking begins (when the S-wave arrives).

Currently the JMA provisionally provides EEWs to a limited number of organizations, such as railroad companies, construction companies, and local governments using data from its own seismometers specially designed for the EEW throughout Japan and from the high-sensitivity earthquake observation network (Hi-net) stations installed by the NIED in 700 locations nationwide. The elapsed time between the issuance of the EEW and the start of major shaking will differ significantly depending on a location's distance from the epicenter. EEWs may not be issued in time to areas located just above the hypocenter of an inland earthquake. However, when a large earthquake occurs near an ocean trench, there may be a time lag, albeit a very short one (ten seconds to several tens of seconds), between the issuance of the EEW and the start of severe shaking. This may be just enough time to mitigate damage by triggering emergency stops on trains, plant operations, and elevators, or even just by allowing people to take basic risk-reduction actions, such as extinguishing flames or taking cover under a desk.

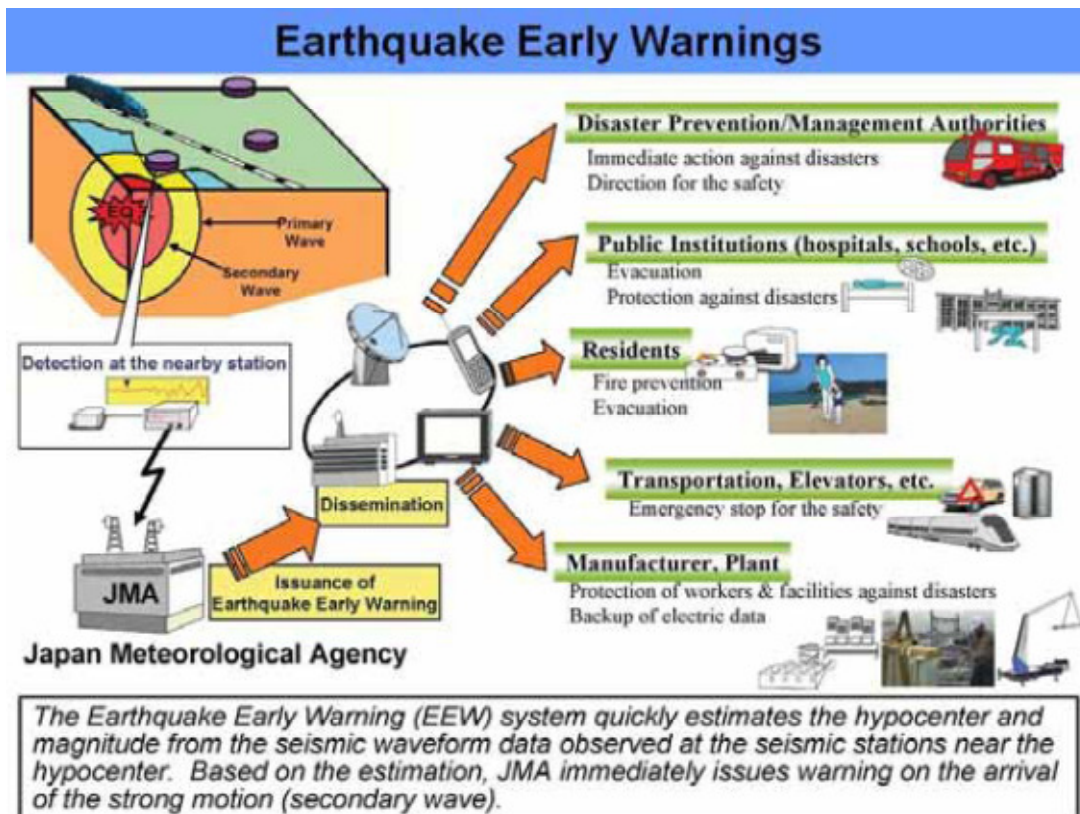


Image 11 earthquake early warning

3.4. Disaster reduction and prevention project

3.4.1 Improvement of disaster prevention facilities

Disaster management activities quickly and efficiently and the continue improvement of disaster prevention measures and equipment that including the observation equipment, materials and equipment needed in the emergency response, the emergency intelligence liaison and communication systems, transportation facilities, shelter and the path of the facilities, the facilities of the disaster countermeasures headquarters.

Japan most of the area are built or under construction, disaster prevention base this disaster prevention facilities in peacetime as parks, stadiums, disaster prevention and education base, as well as material reserves base can be immediately converted to refuge in emergency disasters the place can be used as an emergency command center, material deployment center, medical security center has become important disaster preparedness base.

In addition, for this type of high-risk urban area, Japan is promoting preparedness such as the establishment of green space, implementation of seismic inspection and reinforcement of existing buildings, improvement and inspection of public facilities and earthquake disaster prevention measures lifeline facilities, in order to try to reduce the population and threats to wealth was concentrated in the urban areas.

3.4.2 Construction of disaster prevention projects

Improve the ecological environment, intensify the construction of disaster prevention projects is an important foundation for the work of disaster prevention and mitigation.

Japan has promoted Homeland preservation carried out a long time a large-scale survey activities, and developed such as watershed conservation, flood cause of coastal engineering steep collapse Countermeasures career, sewer system transformation, land improvements, such as medium-term or long-term plans, and proposed and is propulsion more land preservation advancing the project.

Case research 4: soil erosion control dam (prevent debris flow)

Part of soil, stone and gravel making up a hillside and river bed is intermingled with water from long-continuing or localized rainfall, becomes slushy like porridge and is carried downstream at a dash. The flow is called a “debris flow”.

A Sabo dam stops the flow of a lot of mud and rocks that may cause a disaster, and then carries them downstream slowly and safely.

Sabo dam as preventive measures against debris flows Sabo dams built in the upstream areas of mountain streams accumulate sediment and suppress production and flow of sediment. Those built at the exits of valleys work as a direct barrier to a debris flow which has occurred. A sabo dam with slits is particularly effective in capturing a debris flow because it has a larger capacity of sand pool under normal conditions. In case that there is a fear of flow-down of driftwood, a slit sabo dam is built as a preventive measure.



Image 12 Sabo dam

the dam allows sediment to flow down-stream under normal conditions. when a large scale debris flow occurs, sediment is captured and temporarily held here to prevent disasters in downstream areas.

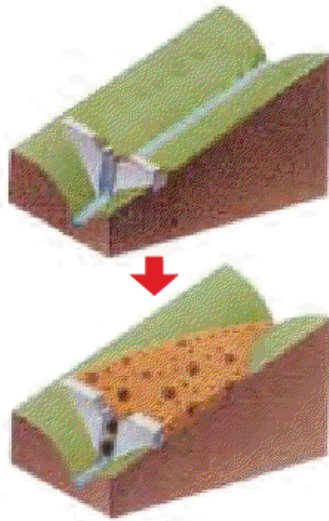


Image 13 Sabo dam Principle of operation

Case research 5: seawall in Japan (prevent tsunami and typhoon)

Japan have at least 43 per cent of Japan's 35,500 kilometres coastline is lined with concrete seawalls or other structures designed to protect the country against typhoons and tsunamis.

The design and type of a seawall varies depending on unique aspects specific to each location, and the erosional processes and environment which they are placed in. There are three main types of seawalls: vertical; curved or stepped; and mounds.

A) Vertical seawalls are built in particularly exposed situations. These reflect wave energy and, under storm conditions, standing waves (clapotis) will develop. In some cases piles are placed in front of the wall to lessen wave energy slightly.

B) Curved seawalls are designed to enable waves to break to dissipate wave energy and to repel waves back to the sea. The curve can also prevent the wave overtopping the wall and provides additional protection for the toe of the wall.

C) Mound-type structures are used in less demanding settings where lower energy erosional

processes operate. The least exposed sites involve the lowest-cost bulkheads and revetments of sand bags or geotextiles. These serve to armour the shore and minimise erosion and may be either watertight or porous, which allows water to filter through after the wave energy has been dissipated



Image 14 Seawall in Wakayama

Case research 6: Miki Earthquake Disaster Memorial Park

The park is ordinarily used for sports and recreation as well as for disaster prevention education and training of personnel. In the event of a major disaster, it will support afflicted areas in the prefecture as a core facility of the regional emergency management base network for the entire prefecture.

In the event of a disaster, this will become a base for collecting relief supplies. The approximately 5,000 square meters of space below the stands are used for storage.

Different facilities have different functions in event of disaster. For example, athletics stadium responsible for supply base, baseball stadium responsible for temporary heliport, gymnasium responsible for supply base, tennis courts responsible for assembly and accommodation of emergency relief workers.



Image 15 Miki Earthquake Disaster Memorial Park

3.5. Disaster reduction activity

In order to promote disaster reduction activities, need the cooperation of every citizen, the citizen should understand the importance of disaster reduction, therefore, through a variety of disaster reduction activities, citizens mitigation concerns.

Japan Disaster Prevention Day on September 1, Disaster Prevention Week from August 30 to September 5, the central and local governments are usually a series of activities, such as disaster prevention and exhibitions, disaster prevention seminars and disaster drills race.

In addition, the Disaster Management and Volunteer Day January 17, and disaster management volunteers Week, January 15-21, to carry out a series of promotion of volunteer activities and local disaster management promotion activities.

3.5.1. Disaster drill

In order to make sure that every department of disaster management system in disasters quickly and effectively carry out a variety of activities established, as well as the public have the right disaster the corresponding consciousness and knowledge. Japan has carried out wide-ranging and in-depth disaster prevention training and exercises. Disaster prevention training and drill has become an important part of Japan's disaster preparedness. Public through participation in disaster management training or on TV-related activities, there are more opportunities to reach out and think about disaster management.

In recent years, some of the actual disaster prevention training methods were introduced, such as role-playing exercises, prior to any relevant information to the participants in such drills, participants must make a judgment based on the information in the training process and the response. September 1 Disaster Prevention Day, the government and related institutions co-organize large-scale disaster prevention drills throughout Japan. In addition, throughout the whole year on regular basis will be held on the basis of historical disasters disaster prevention drill.

Disaster prevention training and drills in Japan can be said to be a regular activity, whether it is for disaster management professionals, or the general public, the business sector, etc. are a regular or occasional disaster preparedness training and drills, the disaster prevention training and drills has become an important way to one of ordinary Japanese disaster prevention knowledge and education in Japan.

3.5.2. Disaster Volunteer Training

Japan's disaster volunteer training has become one of the important aspects of disaster reduction activities in Japan. When disaster occurs, local residents take the initiative to take action, fire fighting, flood fighting, search and rescue, refuge effectively is very important to help the disaster management activities. Therefore, the establishment of voluntary organization of the local disaster management aware of the residents of the importance of community solidarity, these organizations are generally equipped with appropriate materials and equipment, disaster management training on a regular basis.

According to statistics, more than 50% of Japanese households to participate in the local disaster management volunteer organization involved in disaster relief volunteers around \$ 130 million in the 1995 Hanshin earthquake. These groups, the central government and local

governments are encouraged to disseminate relevant information through public relations and education to create a good learning environment, and its base of preparatory activities to promote the development of support organizations and volunteer activities.

Case research 7: Himeji city disaster drill

Practical drills are carried out with the participation of local residents such as voluntary disaster response organizations, with the aim of enhancing the awareness of citizens regarding disaster prevention, improving voluntary disaster response capabilities and strengthening cooperation.

September 1st, I was fortunate to site to watch the Himeji city disaster drill. I was very shocking this drill.

Organizations participated in the training of more than about 40 and more than 2,000 people. In addition to the army, police, fire, and other specialized rescue teams, as well as electricity, telecommunications, gas, water, health care, water, and other relevant professional rescue teams. Public mainly from social groups, college students, this drill lasted 2 hours, motor vehicles and helicopters deployed to build multiple analog ruins of earthquake. The disaster drills show the entire contents of the post-earthquake rescue. For example Self-help and mutual aid, emergency evacuation, rescue teams search and rescue, fire fighting, helicopter flight rescue, medical assistance, and so on.

Most lament is the Japanese public and Rescue volunteers into the exercise a high degree of awareness of disaster prevention and social responsibility. In the drill site, the drill personnel obey the command of the shock rescue the disposal of the wounded, to accept a variety of drills training students also saw in the drill field, such as: the use of fire extinguishers, ropes knotted, bandaging the wounded.



Image 16 disaster drill site

3.6. Disaster education and research

3.6.1. Disaster education

Japan gave me the most impressive is Japan's disaster prevention education has been deeply integrated into the daily life of the Japanese people. Of course, this because high-frequency earthquakes, typhoons and other disasters, but also shows that the Japanese government and people to the positive attitude towards learning how to respond to natural disasters.

Japan's disaster management work is very important aspect to the lives of ordinary people through a variety of ways to enter into the unusual social life.

A) Variety of disaster Museum

In Japan, on the one hand, due to too many losses of natural disasters, on the one hand, but also conform to the needs of disaster management. Japan has established a large number of disaster museums.

Asian Disaster Reduction Center located in Japan's Hyogo Prefecture, the area is the 1995 Great Hanshin-Awaji earthquake affected areas, the Asian Disaster Reduction Center where the office building of the Great Hanshin-Awaji Earthquake Memorial neighbors, exhibited a lot of kind data. There will be a lot of visitors in Museum opening hours, including students and the elderly

by organization and school.

Many disaster Museum are established to commemorate the earthquake and disaster prevention projects built after the 1995 Great Hanshin-Awaji earthquake, not only as a memorial stadium, has also become important disaster prevention publicity and education base.



Image 17 Variety of disaster Museum

B) Variety of disaster prevention and education publicity materials

In Japan, whether visiting the disaster prevention facilities, or visit some of the disaster management agency, to participate in a number of disaster prevention activities can be exposed to a lot of disaster prevention and publicity materials.

Public disaster manual is a very typical example, the manual describes the common local disaster and its victims in disaster prevention and self-help method, generally have several languages such as Japanese, English, Chinese and Korean. Many disaster management agencies have own characteristics promotional materials, such as newspapers, magazines, and manuals.

Japan's disaster prevention publicity materials a great feature is the use of cartoon image to explain the instructions, in such a lively, user-friendly form of disaster prevention knowledge to the general public popularity, especially for primary and secondary students, more quickly

accept this kind of disaster risk reduction education.



Image 18 Public disaster manual

C) Education and promotion of universal Internet Disaster Reduction

Powerful resources of the Internet in today's information age, the Internet is widely used in all walks of life, that the areas of disaster prevention in Japan is no exception. Japan disaster management department and relevant departments have established a dedicated website or web page as the propaganda disaster prevention knowledge and dissemination of disaster information platform. Disaster preparedness is an important topic in the official website of the central government and local governments in Japan and around the disaster plan, disaster prevention and disaster map information can be found on such sites. Professional departments also have their own disaster plan on its website is very easy to access.

Japan weather forecast page is a comprehensive disaster information publishing platform, contains meteorological information to the earthquake, volcanic eruption, marine disasters, disaster information and early warning information. The general public can be very convenient inspection, as an essential reference for daily life.

3.6.2. Disaster research

Japan attaches great importance to disaster prevention and research and development, the government and some public bodies are specialized research institutions, the focus of its research and development include the following aspects:

1. Mechanism of abnormal phenomena of natural disasters as well as forecast technology.
2. Earthquake rapid response system, such as the earthquake management information systems, emergency medical, life-saving systems.
3. High degree of concentration in urban areas to reduce catastrophic losses Countermeasures.
4. Hub functions, cultural facilities, science and technology and research facilities protection system.
5. Disaster management support system.
6. Advanced road traffic system.
7. Road, sea, air traffic safety countermeasures.
8. Social infrastructure aging countermeasures.
9. The harmful hazardous material security countermeasures and social crime.

Case research 8: Nojima Fault Museum in Hyogo Prefecture

Nojima Fault Preservation Museum is located in Awaji city in Awaji Island. It is near the northwest coast of the island, and is located about 10 km southwest of the north end of the island.

The Great Hanshin Earthquake occurred at 5:46 a.m. on January 17th, 1995. It caused considerable damage mainly in the south part of Hyogo Prefecture. The earthquake caused 6,434 deaths and injured 43,792 people. And about 640 thousand houses was destroyed. The number of deaths was the highest since in the postwar period. It was centered at the north end of Awaji Island, at a depth of 16 kilometers. It had the magnitude of 7.3 (Japan Meteorological Agency scale). An active fault runs from the northwest coast, through Kobe city, to Itami city at the north of Osaka city. Because the fault shifted, this great earthquake was occurred. When the earthquake occurred, the real fault appeared on the surface of the ground at Nojima district in Awaji city. Two parts of the ground slipped about 1-2 meters each other, and one part raised 0.5-1.2 meters. Then this fault was designated as a natural monument. And the museum has been built on a part of the fault.

In the museum, we can see the real fault about 140 meters long. And many photos and restored models about the earthquake are displayed. Additionally, we can experience the same quake as the Great Hanshin Earthquake in a model room.



Image 18 Nojima Fault Museum in Hyogo Prefecture

Case research 9: Community-Based Disaster Reduction Activities (use Hazard map)



Image 19 Hazard map Activities

Community-Based Disaster Reduction education is very important. Hazard maps are designed to ensure that the residents who use them better understand the hazards in their area and will take the appropriate actions when a disaster strikes. The maps are useless, however, if people do not know they are available. Some communities therefore organize activities designed to increase public understanding of hazard maps and activities to create community-based disaster reduction maps. These include "town watching" activities in which people actually go around the town they live in and identify its disaster risks, and workshops on disaster reduction. Such activities raise

local residents' awareness of disasters and disaster reduction, lead to suggestions for improving the community's vulnerabilities, and contribute significantly to improving the disaster reduction capabilities of the community.

Conclusion and Lesson learning

China is the one of the larger losses countries by natural disaster. For nearly 50 years, the average annual natural and man-made disasters caused about 10 million deaths and direct economic losses of up to state revenue 1/6 to 1/10. With the enhancement of economic and social development and human activities, the loss of the natural disasters in order to faster growth. At present, China has made in disaster information management a series of progress, but there are still many shortcomings, especially in the face of the catastrophe of inadequate preparation, China can learn a lot of experience in Japan.

A. Authoritative and unified disaster information management to achieve efficient cooperation between the disaster information management departments.

By the impact of the planned economic system, China has been the sub-sector, sub-hazard, a single system of disaster relief and disaster management mode, the objective properties of the disaster as the standard to determine the appropriate government responsibility, china has yet authoritative disaster information management agencies to co-ordinate disaster management, especially in the face of catastrophe relief headquarters, each are formed on an ad hoc basis, and the lack of preparation. China should learn from the experience of Japan set up a disaster the core management agencies, and unified management of different levels of government and relevant departments of disaster information, promote efficient communication departments cooperate with each other and Disaster Information.

B. Streamline disaster information transmission level to construct a smooth and complete disaster information transmission mechanism.

In China, the disaster was inverted V-shaped flow information. After the disaster, all kinds of information in accordance with the Town - County - City - Province - Central 5 levels, eventually reaching the central government, wasting too much time to relief, the practice can learn from Japan: adjusted by modifying the relevant laws and regulations, in the past layers reported mechanism sub-sector, sub sector to the in functional paralysis cases, direct report of the central Government.

C. Full use of modern information technology, to build a well-developed information technology support system.

Advanced information technology and information system in disaster emergency management is very important. Japan a few minutes, the earthquake situation and disaster statistics can achieve quick report of China's earthquake situation it takes 15 to 30 minutes the disaster the quick report should take 5 to 10 hours, access to information and the transmission speed is seriously lagging behind. Therefore, this should be the full development of modern information technology, to establish nationwide efficient and effective the disaster information technology systems. Japan's experience, the use of map information as well as the global satellite positioning (GPS) technology the space integrated management (GIS) and computer-aided design (CAD), remote sensing (RS), multimedia, virtual reality technology, the Internet combined, building operations strong intelligence collection system (such as geographic information systems, information resources such as databases) and so on. IT support system will greatly improve the disaster information collection and transmission of accurate, efficient, timely and comprehensive goals to achieve.

D. Quickly and accurately assess the information system to ensure true and reliable disaster information.

Information analysis and evaluation system are in blank state in China disaster management. Learn from the experience of the Japanese disaster management, in order to ensure that the decision-making and information communication correctly, you must set the scientific analysis and evaluation system: First, it is necessary to improve the overall quality of the information analysts to grasp the scientific method of analysis. Second, we need to introduce professional analysis tools, to ensure that the conclusion is as accurate as possible. analysis Third, we must establish a system of disaster assessment system, such as a complete disaster assessment background database, rapid and effective disaster assessment model, authoritative experts of disaster assessment system. Thus objectively reflect the actual scope of the disaster, the extent, size and loss and to ensure the timeliness, in order to facilitate the timely development of relief decisions. Fourth, we must design natural disaster risk maps in each city, the entire society and the people in the disaster prevention ability and consciousness.

E. Strengthen disaster information publicity, education, drills, training, socialization mechanisms construct disaster information.

How informed the extent of the disaster-related information, as well as the actual ability to respond to disasters, public awareness of disaster crisis directly affects the level of the government to respond to disasters. Public disaster awareness in our country is very weak, and obviously cannot keep the frequency and extent of the outbreak by the disaster. We want to learn from the advanced experience of Japan, First, we must instill risk awareness to the public

through the mass media and various forms of propaganda, to develop their disaster prevention and awareness, to enrich their knowledge and skills to cope with; public two recurring disaster prevention rescue skills education and training, to absorb the public and social organizations involved in disaster relief exercises, enhanced with governmental disaster awareness, improve their endurance, and disaster response capacity, educate the community and the normalization of the disaster prevention and relief.

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