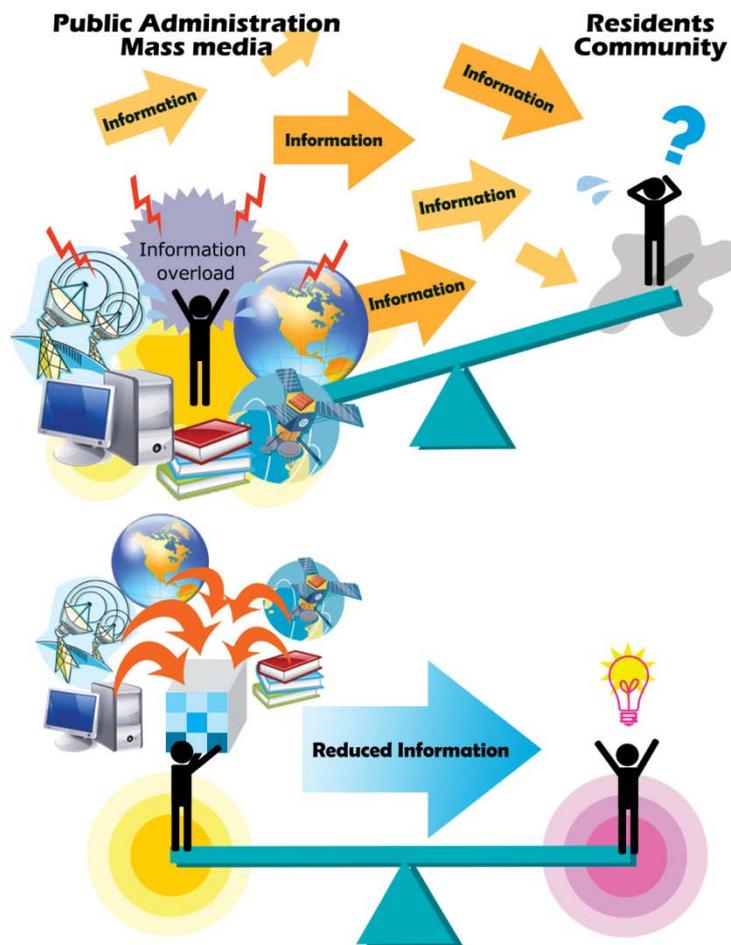


# LOCAL DISASTER MANAGEMENT AND HAZARD MAPPING



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# 1. Outline of FHM

## 1.1 What is Flood Hazard Map?

In Japan, in the sense of legislation, Flood Hazard Map(FHM) is defined as a map

- 1) with anticipated inundation area
- 2) with information for safe evacuation
- 3) made by municipality.

However, a map of past inundation with/without information for safe evacuation can also be called “FHM”. It can be considered that the essence of FHM is “hazard” of floods. Then, so-called “flood risk map” can also be included in FHM.

The web page of “Terminology of disaster risk reduction” in ISDR(UN/International Strategy for Disaster Reduction) does not have “(Flood) Hazard Map” or “(Flood) Risk Map”. See the following site.

<http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm>

In EU, Directive 2007/60/EC on the assessment and management of flood risks entered into force on 26 November 2007. The Directive includes “flood hazard maps” or “flood risk maps”. See the following site.

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:288:0027:0034:EN:PDF>

It is written in Chapter III, that Flood hazard maps shall cover the geographical areas which could be flooded according to the following scenarios:

- (a) floods with a low probability, or extreme event scenarios;
- (b) floods with a medium probability (likely return period  $\geq$  100 years);
- (c) floods with a high probability, where appropriate.

For each scenario the following elements shall be shown:

- (a) the flood extent;
- (b) water depths or water level, as appropriate;
- (c) where appropriate, the flow velocity or the relevant water flow.

Flood risk maps shall show the potential adverse consequences associated with flood scenarios referred to in paragraph 3 and expressed in terms of the following:

- (a) the indicative number of inhabitants potentially affected;
- (b) type of economic activity of the area potentially affected;
- (c) installations as referred to in Annex I to Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (1) which might cause accidental pollution in case of flooding and potentially affected protected areas identified in Annex IV(1)(i), (iii) and (v) to Directive 2000/60/EC;
- (d) other information which the Member State considers useful such as the indication of areas where floods with a high content of transported sediments and debris

floods can occur and information on other significant sources of pollution.

In UK, the Environment Agency shows how to get information on flood risk. See the following site. <http://www.environment-agency.gov.uk/subjects/flood/?lang=e> They use “Flood Map” in it.

The Japanese FHM is mainly focused in this text hereafter.

## 1.2 Objectives of FHM

The goal of the flood management is to minimize the damage of life and property and to maximize the benefit from floods. Since the flood is a natural phenomenon that usually triggered by severe rainfall, it is difficult to get full control over it. History shows that the human being used to live away from natural hazards. While the society develops, city expands and land becomes scarce commodity, then, people tend to live in unsafe zones while pursuing comfortable way of living. Although some levels of countermeasures have been adopted to mitigate the disaster risk, these are not enough and not a complete solution by any means.

The natural runoff process has been much affected by human activities. One of directly influencing activities includes the construction of flood control facilities such as dams, embankment. On the other hand, human activities such as urban development, deforestation etc are equally crucial to influence the natural runoff process. Further, the effect of climate change may worsen the situation of flood risk management since countermeasures for flooding are insufficient in general.

We have to know well what kind of phenomena will be brought by a flood in the situation of flood risk management in the above mentioned contexts. Floods are classified into “flash flood”, “continental flood”, “inundation behind levees” and so on and they have individual characteristics in relation with rainfall patterns. Some of them change very gradually and the others quickly. In case of quick flood, one cannot evacuate after noticing the phenomenon. Even in the gradually sweeping flood, for people such as the disabled and infant, it takes longer time to evacuate. In addition, safe evacuation needs a safer evacuation route and safe evacuation places therefore it is important for flood managers to be well prepared for appropriate evacuation.

In order to deal with above mentioned issues adequately, FHM is usually developed in such a manner that it displays clearly the inundation area(with water depth), dangerous spots at floods, information on smooth and quick evacuation such as the location of shelter, evacuation route, access point to flood information.

From this point of view, it becomes important not only to make easy-to-understand FHM but also it must be familiarized broadly among the residents and to develop their resilience to manage evacuation by themselves.

### 1.3 Role of flood hazard map in IFRM

The Integrated Flood Risk Management(IFRM) will provide ample knowledge on the importance of flood risk management to maintain natural harmony and promote sustainable use of the resources of the river basin.

The role of FHM is to let the residents recognize the risk of floods as well as ensure smooth and quick evacuation at floods.

The information about inundation characteristics is important for recognizing the flood risk and it has to contain the inundation area at the least. It might be helpful if it has the information such as inundation depth, flow direction of flood, flow velocity and so on. With these information, one can know whether his house is located in safe zone against floods or not. In the case of unsafe, one can know how to evacuate safely. It is very difficult to know how miserable flood disaster is as broadcasted by TVs or newspapers. The work to recover an ordinary life after flooding is very harder than mere cleaning after receding flood water. In case of breach of embankment, it must be recognized that houses near to the breach might be destroyed by the strong current of floodwater.

Once the threat to a community or a city is recognized, countermeasures to mitigate them are sought. Establishment of some extent of flood control facilities such as embankments will certainly reduces the frequency of flood disaster, however, many people might have misunderstood that their community or city is/has become completely safe so will forget any possible disaster thereby will lose adequate judgment of flood disaster prevention. This leads to accumulation of asset and higher flood disaster potential in the case of breach of structures and consequent flood. In this situation, the annual mean disaster damage may become larger than in the case without structural countermeasures.

In order to prevent from falling into and repeating such foolish and illogical situation, it is important that politicians, administrators, residents have to realize the flood risk of their city and endeavor to achieve a wise and sustainable use of the river basin.

Generally speaking, development needs some extent of investment which is brought by accumulation of surplus. It means no surplus yields no development. On the contrary, if one has some asset, he needs a security system such as safe or lock. Similarly, a city which has achieved some development have to install a security system, otherwise a devastating disaster will deprive the city of most property including infrastructures and force to be back to its initial stage. Most people of large cities in developing countries are poor and living in flood prone areas without effective countermeasure. This situation may cause issues to be solved while the administrators implement appropriate countermeasures corresponding its level of urbanization. Even similar problems can be seen in Japan. Though the degree of security or disaster prevention of a city must be raised

according to its development or urbanization, it is very difficult to move people who once settled even in high inundation risk area unless they are completely destroyed.

### 1.4 How to make FHM

The process preparing FHM is as follows;

- 1) The administrator of the river provides information on anticipated inundation area with depth
- 2) Show the anticipated inundation area and depth on the topographical map and discuss necessary information for safe evacuation (by municipal office)
- 3) Stack above three kinds of information in a map (by municipal office)

See Fig. 1-1.

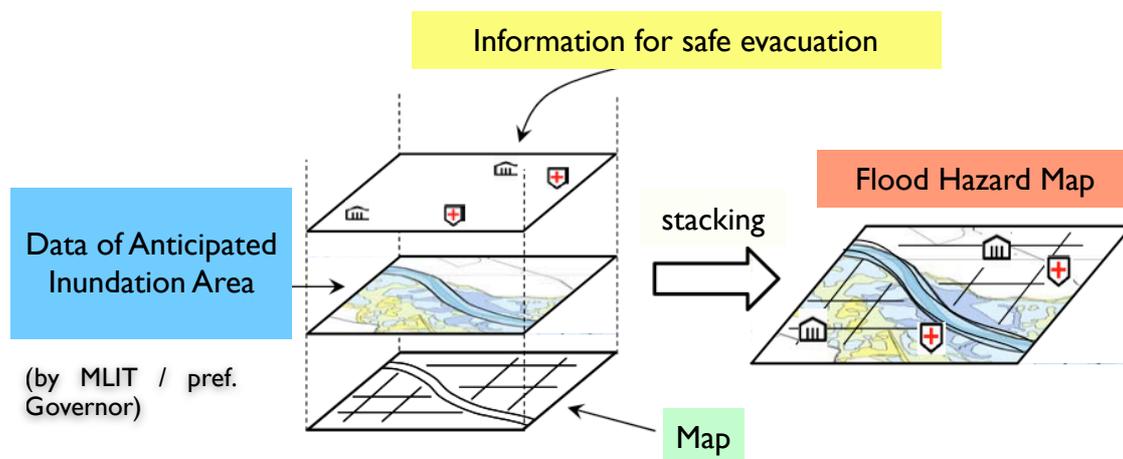


Fig. 1-1 Process of preparation of FHM

In Japan, administrators of the river are classified into three patterns, i.e., Class A river, Class B river and others. Rivers subject to the River Law are classified into Class A and Class B rivers, depending on the importance of their roles. The Class A rivers are more important than Class B rivers because the basin spreads over several prefectures and due to other reasons. The administrator of Class A rivers is the Minister of Land, Infrastructure, Transport and Tourism (MLIT). On the other hand, the governors of prefectures administrate Class B rivers. Most of the substantial works for Class A rivers are carried out by the work office of MLIT. Several work offices are responsible for big and long rivers, however, it is common for a work office to manage several smaller Class A rivers. See Fig. 1-2.

The return period of the design flood in Class A river depends on the importance of the flood affecting area such as population and asset in it. It varies 200, 150 and 100 years. Each work office calculates anticipated inundation area for its responsible flood affecting area. The Class A and B rivers have installed levees on both sides in their flood affecting area generally. At this moment, the current altitude of levee is generally higher than the design high water level, therefore, no one knows where will breach by design flood or larger flood. To cope with this issue, it is assumed that breach will occur every 1 km on both sides. This means several tens of inundation calculations are necessary. After

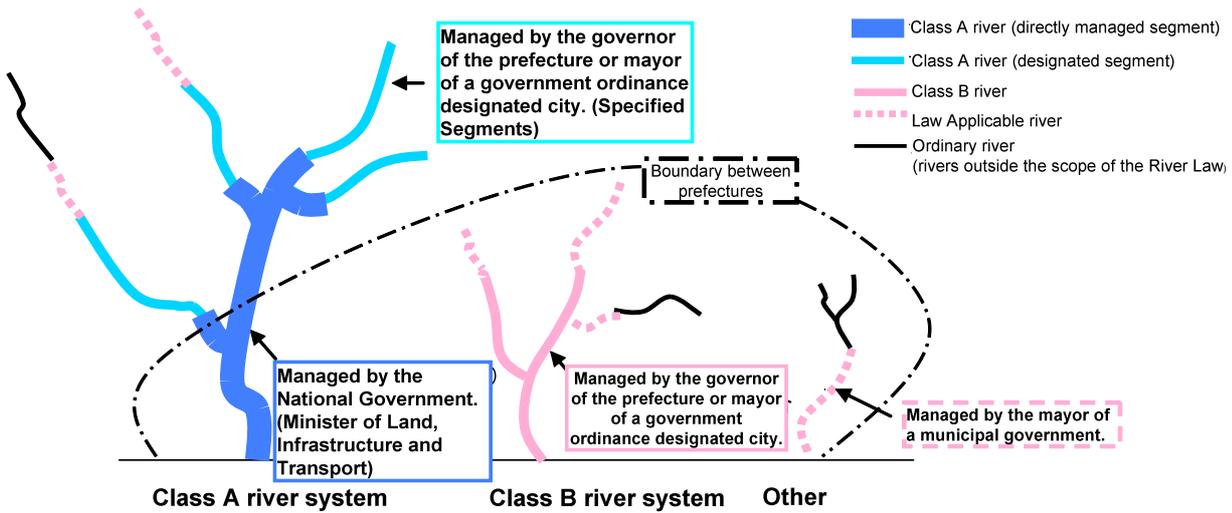


Fig. 1-2 Classification of river administrators.

these calculations, the envelope of the peak inundation water levels is obtained and inundation depths for celles in flood affecting area are obtained. So, the inundation area due to a breach does not coincide with the anticipated inundation map. In order to give more detailed information to the residents, the work office often shows every chronological inundation change of every breach. This information will help residents to understand how the inundation area will spread in near future in case of actual breach. See the following site as an example of movie(sorry in Japanese).

[http://www.ktr.mlit.go.jp/tonejo/bousai/hanran/tone\\_1260\\_r\\_movie.htm](http://www.ktr.mlit.go.jp/tonejo/bousai/hanran/tone_1260_r_movie.htm)

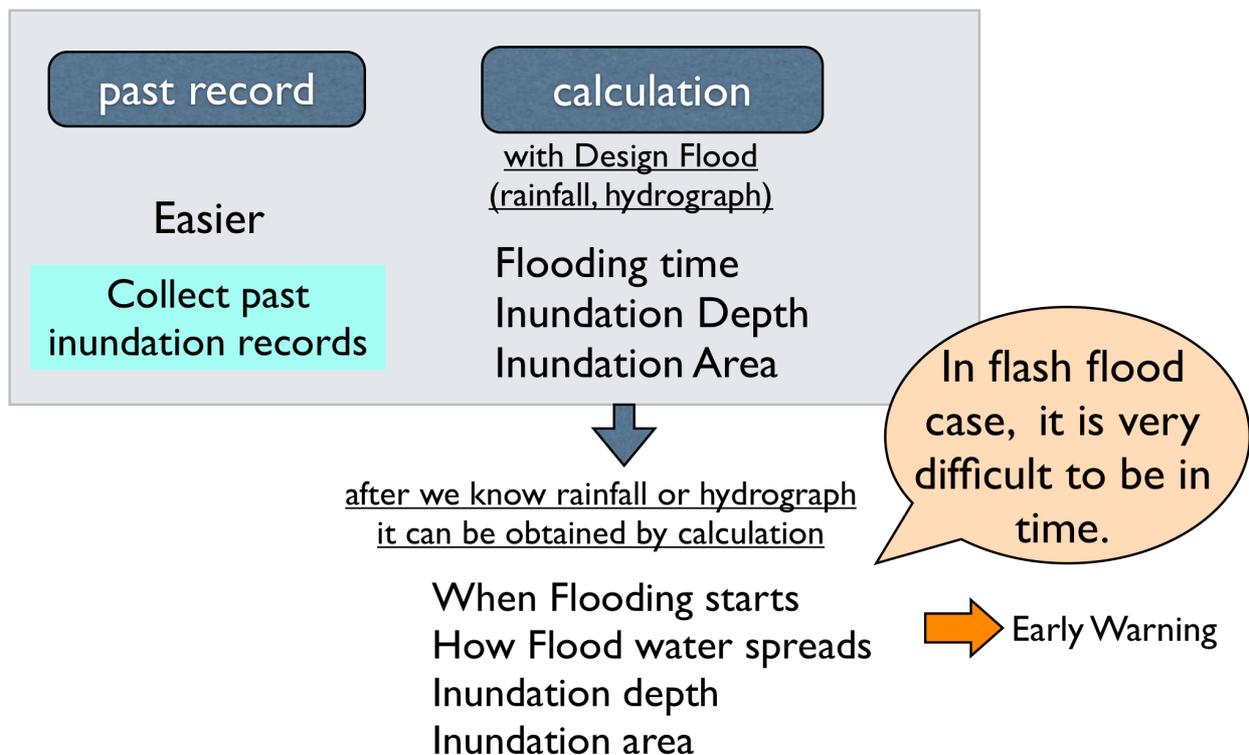


Fig. 1-3 Difference between inundation map using historical record and calculation

## 1.5 Differences between anticipated inundation map and historical inundation map

In case that the flood affected area does not have levees for design flood and almost same area is inundated by the floods of similar magnitude, historical inundation record or map can be used. The largest historical inundation area is very helpful for residents until continuous levees constructed. On the other hand, after construction of continuous levees corresponding to design flood, the envelope type of anticipated inundation map will be needed. Even in the case without sufficient continuous levees, the result of calculation of anticipated inundation area can provide useful information for emergency operation. If you can know rainfall forecast, you can obtain very useful inundation information from the runoff and inundation calculation such as when flooding starts, how flood spreads and so on. Usually, inundation analysis takes longer time, so it should be calculated beforehand. This information will help disaster weak to evacuate safely. See Fig. 1-3.

## 1.6 Importance of correct recognition of hazard

We must fear natural hazard correctly. A lot of people recorded tsunami attacking scene in videos at the saddest Indian Ocean Tsunami. This tsunami was the first tsunami of which hitting phenomena were recorded in so many videos. The videos have been shared across the world through mass media so that many people became to know what Tsunami is and how Tsunami attack coastal area. If you watch this movie, you will find how difficult to survive from a tsunami. However, we don't have sufficient information to know what flood is and how flood sweeps. We can find considerable photos of flooded situation in books and on internet but they do not necessarily show us fear of flooding realistically.

Torahiko Terada, who is an eminent physicist in Japan, once wrote "it is easy to fear a thing too much or little but it is difficult to fear it appropriately." This is true for floods or natural disasters. A FHM does not tell the fear of floods. You can find just whether you are at inundation risk area or not. If you are at risk area you have to imagine what kind of phenomena will happen on you by another source and know how to avoid being a victim of flood. We should understand what flood is with FHM and keep the knowledge until flood comes.

WYSIWYG

[What You See Is What You Get]

denoting the representation of text on screen in a form exactly corresponding to its appearance on a printout.

If we have a time in an emergency, we should do somethings for the others such as helping disaster weak people. However, generally, it is very difficult. In order to do such activities, we need drills until we can do it unconsciously or automatically. We are trained to behave a good manner in a society such as greeting, not throwing away a

piece of litter and picking it up. Like this, we have to train ourselves so that we can work and evacuate without manual in emergency case. To do so, it can be considered that the correct recognition of hazard is most important.

### 1.7 Self help, Mutual support and Public assistance

On January 17th in 1995, The Great Hanshin-Awaji Earthquake devastated Kobe area. At the disaster, 70 percent of rescued people rescued by them selves, 20 percent by mutual support and 10 percent by public assistance. In case of large disaster, fire fighting rescue team or public assistance can not help many people.

In Japan, generally, the disaster management department of local municipality has just around or less than 5 people. In case of disaster, they can do just information collection and reporting. So, we cannot expect that they would help residents in emergent case. As a result, Self help and Mutual support become very important. See Fig. 1-4.

While the magnitude of disaster is small and few people need support, we can manage, however, the magnitude become larger, more people need support and less people can work for the others, we cannot manage in that emergency. After all, we must prepare for the probable disasters. If a city has some extent of lives and asset in flood prone area, the city should protect it at considerable level or move them into safer place and reduce the probable damage within manageable level.

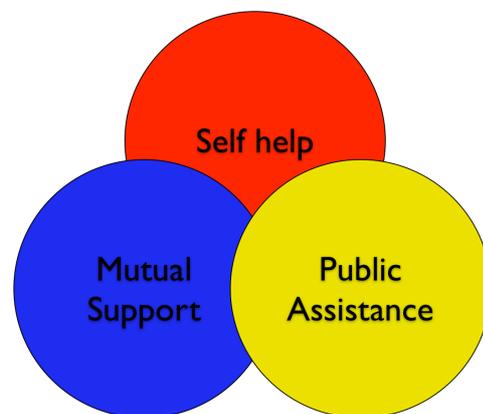


Fig. 1-4 Three components in disaster management

## 2. Flood Hazard Mapping Manual

### 2.1 Background of FHM and its development

Japanese natural conditions, such as its topography and climate, are severe. Besides, about 50 % of its total population and about 75% of its assets are concentrated in flood vulnerable areas in the alluvial plains, which account for only 10% of its total land area. Furthermore, as a result of the recent trend of the nuclear family and the increasing urban population, more people, even those who live in a flood-prone area, have no past experience of floods. As the people's memories of floods fade over time, the awareness to the potential flood risks is also fading away.

Consequently, there now is a higher risk that, once a levee breaks during a massive flood, not only many lives and assets will be lost but also an unimaginable scale of social and economical confusion will occur. In recent years, torrential rainfall frequently causes flood disasters, and a quite a few of them cause tremendous damage to the areas, such as inundation in a large urban area and in underground facilities.

In order to mitigate those flood disasters, it is important to promote structural measures by constructing flood control facilities such as levees. It is also important, however, to prepare non-structural measures by improving ways to communicate disaster information and better evacuation as well as by enhancing public awareness towards disaster prevention, since there is always a possibility that a levee can breach if a flood exceeds its design capacity.

For these reasons, flood records were disclosed as a part of the comprehensive flood control measures, which has been carried out since 1980. In 1991, the river council issued a report entitled "Future Vision of River Development". In this report, the council argued the need for promoting non-structural measures including enlightening the public on the possible disaster risks caused by floods, tidal waves, tsunami, mudslide, volcanic eruption and others, in order to minimize the damage at the occurrence of a disaster. As a result of this report, the map of flood risk areas along the major rivers throughout Japan was created based on flood simulations and disclosed from 1993 to 1994.

As these measures for warning possible flood risks have progressed, public demands for measures to alleviate flood damages grew. Against the backdrop of such situation, "Promotion of Flood Hazard Mapping" and "Guidelines for Flood Hazard Mapping" (Manager of Flood Control Division, River Bureau, the Ministry of Construction) were notified to municipal governments in 1994 to encourage preparation of flood hazard maps. The preparation has been underway in the municipal governments with the support of the Regional Development Bureaus and prefectural governments.

Figure 2-1 shows significant effect of FHM. An extensive survey was carried out by Prof. Katada of Gunma University after 1998 flood in Koriyama in Fukushima prefecture. This

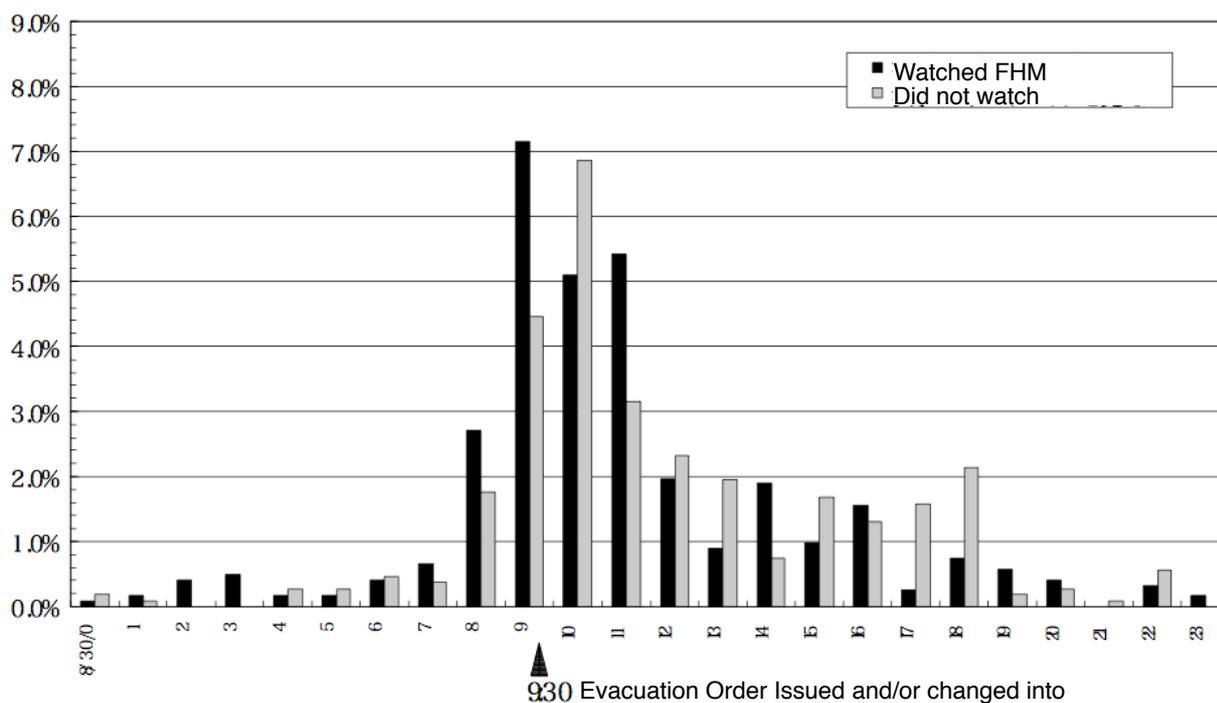


Fig. 2-1 Difference in evacuation between those who watched FHM and did not. (from Prof. Toshitaka Katada, Gunma University)

figure shows that the evacuation rate was 10% higher than those have not watched. Further, the peak time of those who watched FHM evacuated one hour earlier than those have not watched. And, the variance in time of those who watched (blue curve) is narrower than did not (red curve). Since this figure shows effectiveness of FHM well, it has become famous and outstanding in Japan after its publication.

In 2000, just after the downpour in the Tokai area, the river council positioned flood hazard mapping as very effective measures for disaster prevention and presented a report entitled “Future Role of Flood Prevention”, which underlined the need for active preparation and disclosure of flood hazard maps. Based on this report, the Flood Fighting Act was partly amended in June 2001, and the inundation risk area system was established. By this amendment, rivers under the control of prefectural governments were also included in the scope of designation as a flood forecasting river. Besides, designation of inundation risk area and its disclosure became mandatory for the flood forecasting rivers. In addition, municipal disaster prevention plans are now required to include information for helping residents to evacuate quickly and safely, such as means of delivering flood forecast information and evacuation sites, by each inundation risk area. Municipal governments are also required to keep their residents informed of such information. For these reasons, flood hazard maps were positioned as a means to inform residents of information on flood risks and evacuation. Along with the partial amendment of the Flood Fighting Act, “Flood Hazard Mapping Manual” was also amended, and consequently flood hazard maps have been prepared and disclosed by 301 municipalities across Japan as of the end of fiscal year 2003. However, the progress is not necessarily satisfactory.

In 2004, a series of downpour that occurred in many places across Japan revealed several problems to be solved. To address such issues, it was decided to amend the Flood Fighting Act so that the local capability of preventing disasters will be improved. The amendment was promulgated in May 2, 2005, and went into effect in July 1 of the same year. By this amendment, municipal governments are now required to designate inundation risk areas not only along large rivers for which flood forecasting is conducted but along also major small- and medium-sized rivers. In addition, the municipal governments are required to keep their residents informed of means of delivering information on flood forecasts and evacuation sites by distributing flood hazard maps that contain such information. The purpose here is to provide residents with sufficient information on disaster prevention so as to help them act appropriately at the occurrence of disaster. To this end, flood hazard mapping is now considered to be even more important than ever.

“Flood Hazard Mapping Manual” was prepared as a technical reference to provide practical guidelines in flood hazard mapping, based on the amended Flood Fighting Act. The manual is helpful for all concerned to successfully prepare and disclose flood hazard maps.

Table 2-1 Development History of FHM in Japan

year	incident
323	The first levee was constructed in Mamuta, Japan.
1950s	Landform classification map of flood; Just after the tragic disaster due to the Ise Bay Typhoon, a newspaper reported “A map has shown a nightmare”. This was about the landform classification map of flood. After this lesson, the Geographical Survey Institute(GSI) began to make the Landform classification map extensively.
1976-1978	Landform classification map for flood control; The GSI made 861 peaces of these maps on a scale of 1:25000 for mainly flood control use. The target area is flood plain of A-class (National Government administrated) river in Japan. After using as basic information for flood countermeasure, it has been opened to the public since 26 August 2005.
1980	Flood inundation records were disclosed as a part of comprehensive flood control measures.
1993	Maps of flood risk areas along major rivers in Japan were disclosed.
1994	Municipal governments started to prepare their own FHM based on the technical manual provided by MOC.
1998	Extensive flood in Koriyama, Fukushima Pref. occurred. FHM discriminated evacuation activities between those who watched FHM and did not.
2000	Tokai torrential rainfall disaster
2001	The Flood Fighting Act (Enacted in 1949) was partly amended.
	- Designation and disclosure of inundation risk areas became mandatory.
	- Municipal governments were strongly encouraged to inform residents about evacuation sites and means of providing flood forecast information.
	- FHM was introduced as a tool to inform residents on flood risks and evacuation.
2003	FHM were prepared and disclosed by 301 municipalities across Japan.
2004	Serious flood damages due to 10 typhoons landfall
2005	The Flood Fighting Act was partly amended
	- From this amendment onward, Municipal governments are required to distribute Flood Hazard Maps to every household in the municipality.
	- The Flood Hazard Mapping Manual was also updated.
	- In addition to major rivers, FHM was expanded to local rivers in Japan.

Table 2-1 shows development history of FHM in Japan. After the first levee construction, levees have been constructed almost all rivers in Japan. At the first stage, they built small levees and discontinuous levees, but later, they have repeated damage and

Table 2-2 Usage of Flood Hazard Maps

Situation	Public sector	Residents
Normal time	<ul style="list-style-type: none"> <li>-Implementation of flood hazard maps into local disaster prevention plans and flood prevention plans</li> <li>-Promotion of building a flood-resistant community</li> <li>-Revision of evacuation sites/routes</li> <li>-Review of evacuation/rescue methods for disaster vulnerable people including bedridden elderly people and physically challenged people</li> <li>-Development of communication methods/systems for evacuation information</li> <li>-Dissemination of knowledge about disaster prevention</li> <li>-Promotion of public awareness toward disaster prevention</li> <li>-Nurture of voluntary disaster prevention groups</li> <li>-Information provision, advice, and guidance to flood fighting groups</li> <li>-Organization of flood fighting corps and fire fighting corps</li> <li>-Promotion of disaster education and evacuation drills</li> </ul>	<ul style="list-style-type: none"> <li>-Residents should try to:</li> <li>-Have a better understanding about past inundation and inundation risk in their living areas.</li> <li>-Minimize damage by preparing emergency goods in case of flooding.</li> <li>-Provide disaster education and conduct evacuation drills for themselves.</li> <li>-Choose land use and building styles after considering possible flood risk in their living areas.</li> </ul>
Before/After evacuation recommendation	<ul style="list-style-type: none"> <li>- Information provision (weather information, flood forecasting, etc.)</li> <li>- Consideration for disaster-vulnerable people</li> <li>- Confirmation of inundation areas/depths and evacuation sites/routes in case of flooding</li> </ul>	<ul style="list-style-type: none"> <li>- Confirm evacuation sites/routes and emergency goods.</li> <li>- Decide voluntarily to evacuate based on weather information and flood forecasting.</li> </ul>
	Issuing of evacuation recommendation	
	<ul style="list-style-type: none"> <li>- Provision of evacuation information</li> <li>- Opening of evacuation sites</li> <li>- Evacuation guidance</li> </ul>	<p>Evacuate to a best possible evacuation site by a safest possible route based on evacuation recommendation/order. If not evacuating, residents are expected to take whatever measures available for them to protect their own lives.</p>

rehabilitation. As a result of the repetition, it is very common nowadays to see continuous levees along the both side of a river.

Table 2-2 shows usage of FHM in both public sector and residents for normal time, before an event, on the event and after the event.

Figure 2-2 shows the relationship among articles concerning to FHM of Flood Control Act.

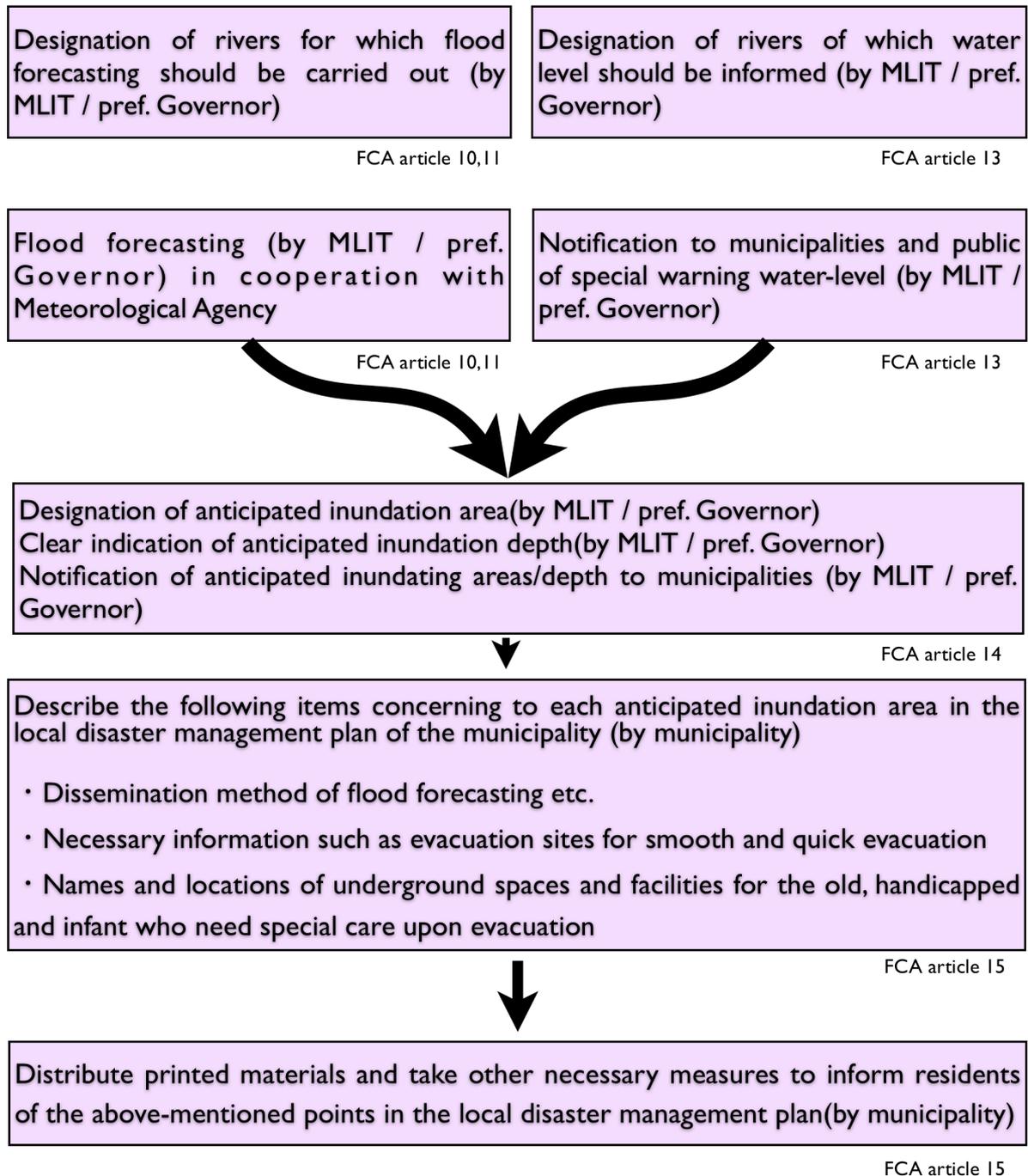


Fig. 2-2 relationship among articles concerning to FHM of Flood Control Act.

## 1) Flood forecasting rivers

According to **Article 10** of Flood Control Act, a flood forecasting river is a river that meets the following:

- Runs across two or more prefectures or has a wide basin area.
- Designated by MLIT as a river that may cause a serious damage to the national economy if it floods.
- When the risk of flooding is recognized, MLIT must, with the cooperation of the Meteorological Agency chief, identify and notify the water level, flow rate and other conditions of the river to the governors concerned.
- Once the river floods, MLIT must, with the cooperation of the Meteorological Agency chief, identify and notify the water level, flow rate and other conditions of the river, as well as inundation risk areas and their inundation depth, to the governors concerned.
- MLIT must notify the public of such information on the river by calling for the cooperation of mass media, when necessary.

According to **Article 11** of Flood Control Act, a flood forecasting river is a river that meets the following:

- Not designated as a flood forecasting river in the above by MLIT, but has a wide basin area.
- Designated by the governor concerned as a river that may cause a serious damage if it floods
- When the risk of floods is recognized, the governor must, with the cooperation of the Meteorological Agency chief, identify and notify the water level, flow rate and other conditions of the river to the flood control/watermark administrator specified in the prefectural flood prevention plan.
- The governor must notify the public of such information on the river by calling for the cooperation of mass media, when necessary.

## 2) Water level information communication rivers

According to **Article 13** of Flood Control Act, a water level information communication river is a river that meets the following:

- Not designated as a flood forecasting river, but is a class-A river that runs outside the zone designated by the River Act.
- Designated by MLIT as a river that may cause a serious damage to the national economy if it floods.
- When the water level of the river reaches a specified special warning water-level, MLIT must notify it along with the water level, flow rate and other conditions of the river to the governors concerned.

- MLIT must notify the public of such information on the river by calling for the cooperation of mass media, when necessary.

Also:

- Not designated as a water level information communication river in the above by MLIT, but is a class-A or class-B river that runs in the zone designated by the River Act.
- Designated by the governor concerned as a river that may cause a serious damage if it floods
- When the water level of the river reaches a specified special warning water-level, the governor must notify it along with the water level, flow rate and other conditions of the river to the flood control/watermark administrator specified in the prefectural flood prevention plan.
- The governor must notify the public of such information on the river by calling for the cooperation of mass media, when necessary.

### 3. Legislation and Institution of FHM

#### 3.1 Development of disaster management in Japan

In Japan, laws for water-related disaster countermeasure began to be established in 1896. See Table 3-1. Major laws before the World War II are River Act and Erosion control Act. Just before the establishments of these legislations there occurred many severe disasters due to flood and debris flow.

Table 3-1 History of water-related laws

Year	Enacted Law
1896	River Act (1964,1997 major amendment)
1897	Erosion Control Act
1947	Disaster Relief Act
1949	Flood Control Act
1950	Building Standard Law
1951	Act on National Treasury Share of Expenses for Recovery Projects for Public Civil Engineering Facilities Damaged Due to Disasters
1952	Meteorological Services Act
1956	Seashore Act
1958	Land slide Control Act
1960	Disaster Countermeasures Basic Act

Torahiko Terada, an eminent physicist in Japan, wrote an essay titled “Natural disasters and National Securities” just after the devastating typhoon disaster in 1934. He meant “Disasters will come after we have forgotten. Further, disasters will evolve with society.” As he mentioned, Japanese history of disaster evolved disaster by disaster, then Japanese Government and society have dealt with each disaster with upgrading the river design.

See “**Disaster Management in Japan**” and “**Natural disasters and National Securities**” in Annex.

#### **[River Act](1896)**

The purpose of this law is to clearly define the responsibilities of the national and local governments and other public organizations to take necessary measures for comprehensive river management, through which disasters due to floods and storm surges will

be prevented, rivers will be in proper use, the regular functions of river water will be maintained, and river environment will be improved and conserved, which will contribute to the conservation and development of the national land, and thus ultimately to enhance public welfare.

This law specifies the administration of rivers including classification of administrator.

### **[Erosion Control Act](1897)**

[There is no statement of the purpose in the Act.]

The purpose of this law is to clearly define the responsibilities of the national and local governments and other public organizations to take necessary measures for preventing sediment-related disasters from the generation and discharge of unstable sediment due to natural events, such as heavy-rain induced landslides and river-bed erosion, to ensure a sound environment and maintain the functions of rivers in flood control and water use, and thus to contribute to the conservation of the national land and the stability of the people's livelihood.

### **[Disaster Relief Act](1947)**

The purpose of this law is to allow the national government to take necessary emergency relief measures in case of disaster in cooperation with local municipal governments, the Japan Red Cross, other relevant organizations, and the people of Japan to protect disaster victims and maintain social order.

Article 22 in Chapter of relief, the responsibility of the prefectural governor as follows; The prefectural governor shall constantly endeavor to formulate required plans, establish powerful relief organizations, and provide for labor, facilities, equipment, supplies and funding to ensure fully effective Relief Activities.

The types of Relief Activities provided are as follows:

- 1) Provision of accommodations (including emergency temporary housing)
- 2) Distribution of cooked rice and other foods, supplies of drinking water;
- 3) Distribution and/or loan of clothing, bedding, and other basic necessities;
- 4) Medical and natal care;
- 5) Rescue of disaster victims;
- 6) Emergency repairs of housing subject to disaster;
- 7) Distribution and/or loan of funding, equipment, and materials required to maintain livelihoods;
- 8) Distribution of school supplies
- 9) Interment;
- 10) Other matters in addition to those in the preceding sub-paragraphs as specified by government ordinance.

## **[Flood Control Act](1949)**

**This law has been translated as “Flood Fighting Act”, too.**

This law expects national and local governments and other public organizations to take necessary countermeasures for floods and storm surges in terms of preparedness, prevention and mitigation, and thus to maintain public safety.

Article 14 The MLIT (Ministry of Land, Infrastructure, Transport and Tourism) and prefectural governors designate flood risk areas, which are located around specified rivers and are likely to be flooded by design rainfall, in order to promote quick evacuation and mitigate flood damage in time of flooding.

2. When designating flood risk areas, the MLIT and prefectural governors need to clearly specify areas and their predicted inundation depths.

3. When designating flood risk areas, the MLIT and prefectural governors inform heads of local municipalities of the areas designated as such and their predicted inundation depths. according to relevant MLIT ordinances.

Article 15 Local municipal disaster prevention organizations specify the following, when their municipal areas include flood risk areas designated by article 14.

i) How to disseminate flood forecasting/warnings.

ii) Necessary procedures to promote quick evacuation in time of flooding, including evacuation routes/sites.

iii) Names and locations of underground facilities, such as shopping malls, as well as facilities frequently used by those who need special help when evacuating, such as the elderly, handicapped, and infant.

2. How to disseminate flood forecasting/warnings to those facilities specified by item iii) of article 15 to promote quick evacuation.

4. Heads of local municipalities distribute printed materials to inform residents of necessary information listed in the first paragraph of article 15 according to relevant MLIT ordinances, when their municipalities contain flood risk areas.

## **[Building Standard Law](1950)**

The purpose of this law is to specify the minimum standard of basement, structure, facilities and usage of buildings to protect life, health and property of the people of Japan,, and thus to contribute promoting public welfare.

In Article 39 of the law, the municipal government is allowed to designate the area with considerable risk due to tsunami, storm surge, flood and so on as “disaster prone area” by its local ordinance. And it shall be determined in the above ordinance that necessary

items for disaster prevention in the disaster prone area such as prohibition against building a residence or restriction concerning to build a building.

**[Act on National Treasury Share of Expenses for Recovery Projects for Public Civil Engineering Facilities Damaged Due to Disasters](1951)**

The purpose of this law is to lay down a set of ground rules to specify the national government’s share of the expense for a post-disaster recovery project based on the financial situation of a local municipal government to promote prompt post-disaster recovery, and thus to secure public welfare.

This law defines “disasters” as ones that can be caused due to extreme natural events, such as wind storms, floods, storm surges, and earthquakes and so on.

This law defines “post-disaster recovery projects” as ones that become necessary due to disasters and aim to build back damaged facilities to an original state (including ones that aim to build facilities which can ensure people the same benefits as the previous facilities did, if it is impossible to build back the damaged facilities to an original state. The same will be applied hereinafter.)

This law will be equally applied to projects which aim to build alternative facilities, as long as the projects have become necessary due to disasters and if it is extremely difficult or unreasonable to build back the damaged facilities to an original state.

**[Meteorological Service Act](1952)**

The purpose of this Act is to establish an underlying system concerning meteorological services to promote the sound development of the services, contribute to progress in public welfare, such as disaster management, traffic safety control, and industrial prosperity, and provide the services to the international community.

(Forecasting and warning)

Article 13 The Japan Meteorological Agency, pursuant to the provision of cabinet orders, is responsible for providing the general public with forecasts and warnings relating to meteorological phenomena, terrestrial phenomena (limited to earthquake motions in terms of earthquake: hereinafter the same will apply in this chapter except article 16), tsunamis, storm surges, wind waves, and floods.

2 The Agency, in addition to the forecasts and warnings prescribed in the preceding paragraph, pursuant to the provision of cabinet orders, may provide the general public with forecasts and warnings relating to hydrological phenomena other than tsunamis, storm surges, wind waves, and floods.

3 The Agency, when providing the forecasts and warnings prescribed in the preceding two paragraphs, is responsible for voluntarily taking necessary measures, as well as requesting cooperation from the media, to inform the public of those forecasts and warnings.

Article 14 The Japan Meteorological Agency, pursuant to the provision of cabinet orders, is responsible for providing forecasts and warnings relating to meteorological and terrestrial phenomena, tsunamis, storm surges, and wind waves for aerial, riverine and marine navigation.

Article 14-2 The Japan Meteorological Agency, pursuant to the provision of cabinet orders, is responsible for providing forecasts and warnings relating to meteorological phenomena, storm surges, and floods for flood fighting activities.

2 The Japan Meteorological Agency, in cooperation with the Minister of Land, Infrastructure, Transport and Tourism, who is in charge of the management of flood fighting activities, is responsible for issuing forecasts and warnings for flood fighting activities by providing the water levels and discharges of the rivers designated pursuant to paragraph 2 of article 10 of the Flood Fighting Act (Law No. 193: enacted in 1949). Assumed inundation areas and their inundation depths also need to be provided in case of flooding in addition to the water levels and discharges.

3 The Japan Meteorological Agency, in cooperation with prefectural governors, is responsible for issuing forecasts and warnings for flood fighting activities by providing the water levels and discharges of the rivers designated pursuant to paragraph 1 of article 11 of the Flood Fighting Act.

4 Paragraph 3 of article 13 is also applied to cases where forecasts and warnings are issued pursuant to the provision of paragraphs 1, 2 and 3 of article 14-2. When it is applied, it needs to be done in cooperation with the Minister of Land, Infrastructure, Transport and Tourism or prefectural governors, respectively.

Article 15 The Japan Meteorological Agency, pursuant to the provision of cabinet orders, is responsible for informing the National Police Agency, the Ministry of Land, Infrastructure, Transport and Tourism, the Japan Coast Guard, prefectural offices, the Nippon Telegraph and Telephone West Corporation, the Nippon Telegraph and Telephone East Corporation, and the Japan Broadcasting Corporation of warnings as soon as issuing them relating to meteorological and terrestrial phenomena, tsunamis, storm surges, wind waves and floods pursuant to the provision of paragraph 1 of article 13, paragraph 1 of article 14, or paragraphs 1, 2 and 3 of article 14-2. The Agency also needs inform those organizations when the warnings issued are no longer in effect except cases of earthquake motions.

2 The National Police Agency, prefectural offices, the Nippon Telegraph and Telephone West Corporation, the Nippon Telegraph and Telephone East Corporation need endeavor to promptly inform mayors of concerned local municipalities of the warnings issued pursuant to the preceding paragraph.

3 The mayors of local municipalities need endeavor to promptly inform the public and local public offices of the warnings that have been relayed to them pursuant to the preceding paragraph.

6 The offices of the Japan Broadcasting Corporation need endeavor to promptly broadcast the warnings that have been sent to them pursuant to paragraph 1 of this article.

### **[Seashore Act](1956)**

The purpose of this law is to clearly define the responsibilities of the national and local governments and other public organizations to take necessary measures for protecting seashores from extreme oceanic or geological events, including tsunamis, storm surges, and high waves, and promoting the improvement and conservation of seashore environment and the proper use of seashores, and thus to contribute to the conservation of the national land.

### **[Land slide Control Act](1958)**

The purpose of this law is to clearly define the responsibilities of the national and local governments and other public organizations to take necessary measures for preventing landslides or slag heap collapses to avoid or mitigate damage from those hazards, and thus to contribute to the conservation of the national land and the stability of the people's livelihood.

### **[Disaster Countermeasure Basic Act](1960)**

The purpose of this law is to improve and promote disaster management that is comprehensive and systematic to protect the national land, the lives and limbs of the people of Japan, and their property from disasters, and thus to maintain social order and ensure public welfare. To this end, the law aims to establish necessary systems to cope with disasters in national and local governments and other public organizations and clearly state corresponding responsibilities of those organizations. The law also aims to provide fundamental frameworks for each essential aspect of disaster management, including disaster management planning, disaster preparedness, disaster emergency response, and financial measures for recovery and preparedness.

While this law is basic one and it has a role for the basis of disaster management, it was established after all water-related laws enacted. The name of this law is "Disaster Countermeasure Basic Act", however, it also includes important articles for disaster management and it is the most important and **comprehensive** law for disaster prevention and mitigation in Japan.

The cornerstone of legislation on disaster risk reduction is the Disaster Countermeasures Basic Act, enacted in 1961, which set out the basis for measures to reduce disaster risk in Japan. There are also organizations involved in disaster risk reduction, legis-

lation on disaster risk reduction and emergency response to disasters, post-disaster recovery and reconstruction, and all-round legislative provision regarding specific disaster risk reduction activities. Disaster countermeasures and risk reduction are comprehensively covered.

Under the Disaster Countermeasures Basic Act, the Basic Plan for Disaster Management has been drafted, setting out comprehensive and long-term plans for disaster risk reduction in Japan: based on this Plan, a comprehensive disaster-management planning system has been established. See National Report of Japan on Disaster Reduction for the World Conference on Disaster Reduction (Kobe-Hyogo, Japan, 18-22, Jan 2005)

<http://www.unisdr.org/eng/mdgs-drr/national-reports/Japan-report.pdf>

### 3.2 Contents & Structure of Disaster Countermeasure Basic Act

Disaster Countermeasure Basic Act consists of following chapters.

1. Definition of responsibilities for disaster management (General Provisions)
2. Disaster management organizations
3. Disaster management planning system
4. Disaster prevention and preparedness
5. Disaster emergency response (including evacuation)
6. Disaster recovery and rehabilitation
7. Financial measures
8. State of Disaster Emergency

Disaster Countermeasure Basic Act specifies **Disaster Management Planning System** including following three plans.

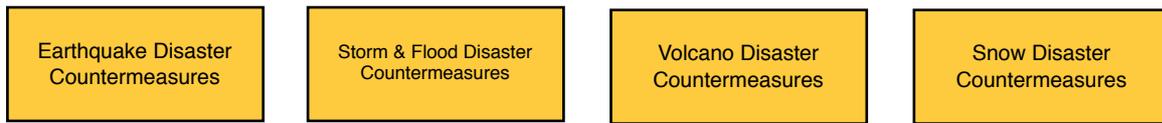
- (1)**Basic Disaster Management Plan**: This plan is a basis for disaster reduction activities and is prepared by the Central Disaster Management Council based on the Disaster Countermeasures Basic Act.
- (2)**Disaster Management Operation Plan**: This is a plan made by each designated government organization and designated public corporation based on the Basic Disaster Management Plan.
- (3)**Local Disaster Management Plan**: This is a plan made by each prefectural and municipal disaster management council, subject to local circumstances and based on the Basic Disaster Management Plan.

The structure of **Basic Disaster Management Plan** is shown in Fig. 3-1. For each disaster of four natural disasters and eight accident disasters, preparation before disastrous events, emergency response and rehabilitation stages are described respectively. As a result, **Basic Disaster Management Plan** has 15 volumes including general volumes.

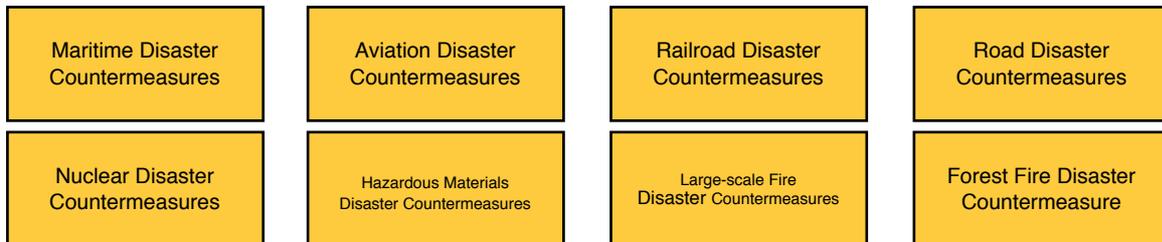
Each prefectural governments and municipal governments shall establish **Local Disaster Management Plan** according to Basic Disaster Management Plan. The local disaster management plan includes volumes related to disasters anticipated in the municipality. For example, in case of municipalities which do not have volcanoes, the volume for volcano disaster countermeasures will not be included.

Disaster Countermeasure Basic Act specifies the disaster management system as shown in Fig. 3-2.

Natural Disasters



Accident Disasters



(Addressing all the disaster phases)



(Tangible countermeasures to be taken by each stakeholder)

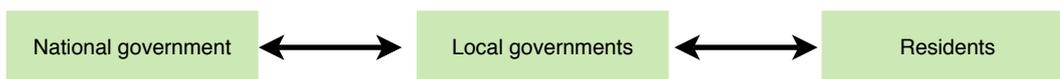


Fig. 3-1 Structure of Basic Disaster Management Plan

The national government is responsible for establishment and execution of the basic disaster management plan and supports prefectures and local municipalities with relevant management to protect the national territory and the citizens' lives and property (Article 3). The prefectural governments are responsible for establishment and execution of local disaster management plans and support local municipalities with relevant management to protect prefectural territories and the citizens' lives and property (Article 4) The municipal offices are responsible for establishment and execution of local disaster management plans to protect municipal territories and the citizens' lives and property as fundamental governing units.

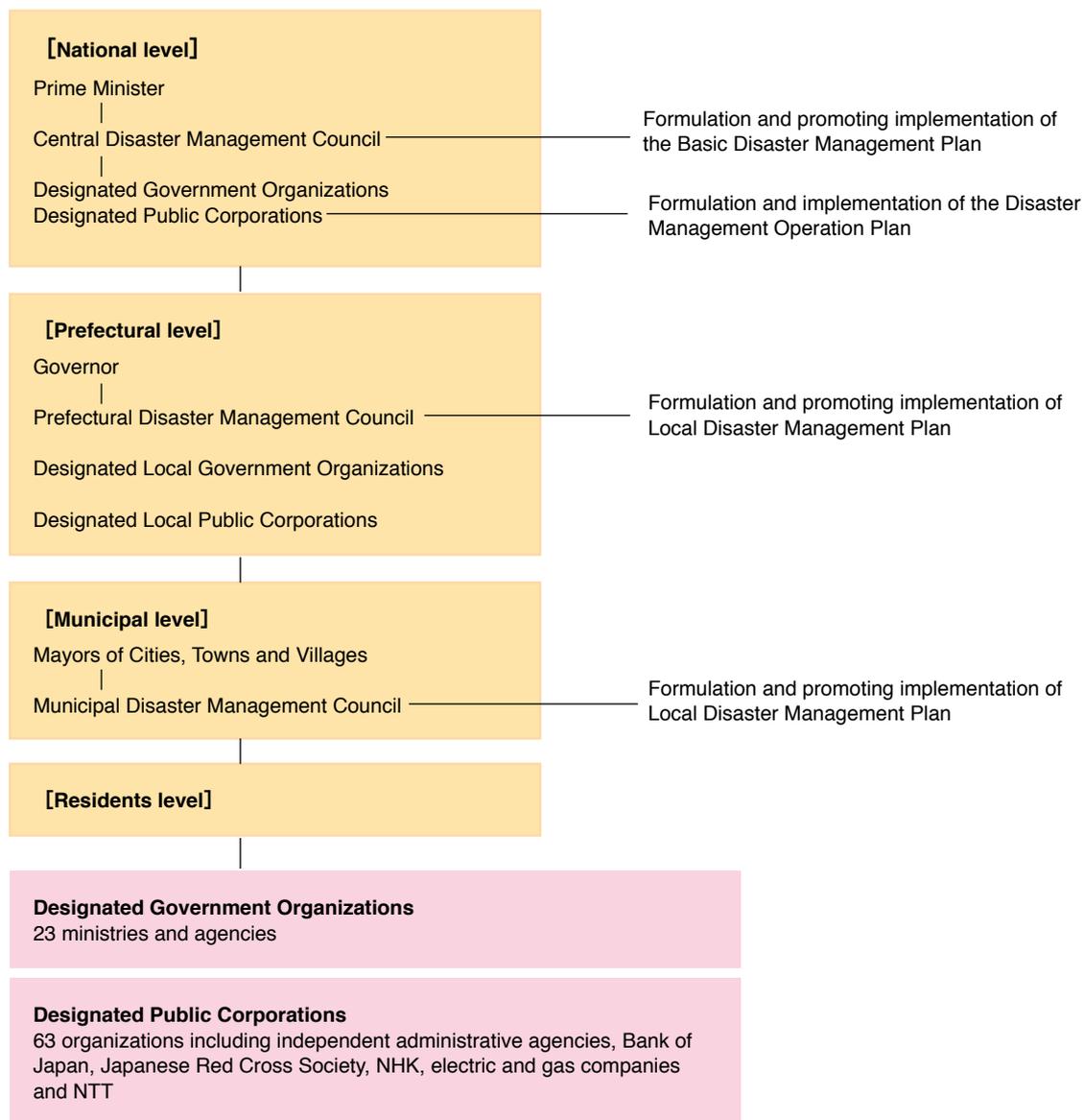


Fig. 3-2 Structure of Disaster Management System in Japan

You can see also that residents of the area under local government are obligated to contribute toward the cause of disaster prevention by taking their own measures to prepare for disaster and by participating in voluntary disaster prevention organization etc.

Table 3-2 shows an example of storm and flood countermeasure volume of a Local Disaster Management Plan. In this example, the parts relating flood fighting and evacuation are described in detail while the other parts rough.

Table 3-2 Example of Contents of Local Disaster Management Plan

**第1節 基本方針**

**第2節 迅速な災害応急活動体制の確立**

第1款 組織の設置

第2款 配備、動員

第3款 情報の収集・伝達及び報告

第1 情報収集・伝達手段の確保

第2 警報等の収集・伝達

第3 災害情報の収集・報告

第4 情報共有

第5 被災情報の収集・伝達

第6 被害調査

第7 支援要請

第4款 防災関係機関等との連携

第1 自衛隊への派遣要請

第2 関係機関との連携

第5款 災害救助法の適用

**第3節 円滑な災害応急活動の展開**

第1款 水防活動

施設の監視、

水防活動の段階、決壊の通知

通知後の処置、

情報連絡

第2款 救助・救急・医療対策

第1 人命救出活動

第2 救急医療活動

第3 医療・助産対策

第3款 交通・輸送対策

第1 交通確保対策

第2 緊急輸送対策

第3 ヘリコプターの運航

第4款 避難対策

第1 避難準備情報、勧告・指示

避難準備情報、勧告・指示、実施基準、

避難情報の伝達、避難誘導

警戒区域の設定

区、自主防災組織および住民等の協力

**1. Basic Policy**

**2. Quick establishment of Emergency Operating System**

1. Setting emergency operation organization

2. Mobilization

3. Collection and dissemination of disaster information, report

3.1.secure the route of information collecting and dissemination

3.2.collecting alert information and dissemination

3.3.collecting disaster information and report

3.4.information sharing

3.5.collecting damage information and report

3.6.investigation of damage

3.7.demand for support

4. Collaboration with disaster related organization

5. Application of Disaster Relief Act

**3. Development of Smooth disaster emergency operation**

1. Flood fighting

1.1.patrolling flood control facilities

1.2.stage of flood fighting

stand by, get ready, go into action

1.3.notification of breach and measures to mitigate flood damage

1.4.information transfer

2. rescue, relief, medical assistance

3. traffic and transportation

4. Evacuation

4.1.standby, recommendation and order of evacuation

related organization, authorization and condition of issuance , criterion of issuance, dissemination of evacuation recommendation and order, evacuation guiding, designation of limit off area and its authorization, cooperation of voluntarily disaster management organization and residents

- |   |   |
|---|---|
| <p>第2 避難所の開設・運営<br/>             避難所の開設、運営、保健活動、衛生活動<br/>             大災害時の措置</p> <p>第5 款 住宅の確保</p> <p>第6 款 食料・飲料水及び物資の供給<br/>             第1 食料の供給<br/>             第2 応急給水<br/>             第3 物資の供給</p> <p>第7 款 保健衛生、感染症対策、遺体の火葬等<br/>             第1 精神医療<br/>             第2 健康対策<br/>             第3 食品衛生対策<br/>             第4 感染症対策<br/>             第5 遺体の火葬等</p> <p>第8 款 生活救援対策<br/>             第1 救援物資の受入れ等</p> <p>第9 款 災害時要援護者支援対策<br/>             第1 高齢者、障害者等の支援<br/>             第2 外国人への情報伝達等</p> <p>第10 款 愛玩動物の収容対策</p> <p>第11 款 災害情報等の提供と相談活動<br/>             第1 災害広報<br/>             第2 市の広報<br/>             第3 災害相談</p> <p>第12 款 廃棄物対策<br/>             第1 ガレキ対策<br/>             第2 ごみ処理対策<br/>             第3 海岸漂着ごみ処理対策<br/>             第4 し尿処理対策<br/>             第5 廃自動車対策</p> <p>第13 款 環境対策</p> <p>第14 款 災害ボランティアの要請・受入れ</p> <p>第15 款 海外からの支援の受入れ</p> <p>第16 款 交通・輸送施設の応急対策<br/>             第1 鉄道施設における応急対策<br/>             第2 港湾施設における応急対策<br/>             第3 空港施設における応急対策</p> <p>第17 款 ライフラインの応急対策<br/>             第1 電力の確保<br/>             第2 ガスの確保<br/>             第3 電気通信の確保<br/>             第4 水道の確保<br/>             第5 下水道の確保</p> | <p>4.2 Setting up and operation of evacuation shelter<br/>             set up, operation, sanitation, health guidance, measures in case of large disaster</p> <p>5. Securing House</p> <p>6. Supplying Food, Drinking water and Necessities of life</p> <p>7. Sanitation, infection countermeasure and cremation</p> <p>8. Acceptance of relief</p> <p>9. Relief of disaster weak</p> <p>10. accommodation of pets</p> <p>11. Dissemination of disaster information and consultation for disaster victims</p> <p>12. countermeasure for disaster waste</p> <p>13. Environmental issues</p> <p>14. Demand and Acceptance of volunteers' applications</p> <p>15. Acceptance of oversea relief applications</p> <p>16. Emergency countermeasure for traffic and transportation facilities</p> <p>17. Emergency countermeasure for lifelines<br/>             17.1. Securing electric power<br/>             17.1. Securing municipal gas<br/>             17.1. Securing telecommunications<br/>             17.1. Securing water supply<br/>             17.1. Securing sewage system</p> |
|---|---|

第18款 教育対策	18.education
第19款 警備対策	19.Guard
第20款 旅客・帰宅困難者対策	20.Support for travelers and those who can not come back to their home
第21款 農林水産関係対策	21.Support for agricultural or fishery is- sues
第22款 公共土木施設等の応急復旧	22.Emergency rehabilitation of infrastruc- ture
第1 土砂災害	22.1.Debris flow disaster
第2 道路	22.1.Road
第3 河川	22.1.River
第4 ダム	22.1.Dam
第5 港湾、漁港、海岸	22.1.Harbor, Fishery Port, Seacoast
第6 ため池	22.1.Reservoir
第7 森林	22.1.Forest
第8 農業土木施設	22.1.Agricultural infrastructure
第9 宅地防災対策	22.2.Disaster countermeasure for residential area

## [References]

### Disaster Management in Japan

<http://www.bousai.go.jp/1info/pdf/saigaipanf.pdf>

### Disaster Countermeasure Basic Act

[http://www.adrc.or.jp/manage.php?URL=./management/JPN/Japan\\_dcba.html&Lang=en&NationCode=392](http://www.adrc.or.jp/manage.php?URL=./management/JPN/Japan_dcba.html&Lang=en&NationCode=392)

# 4. Disaster management in administration and organization

## 4.1 Roles of each administration and organization in Disaster Management

As previously shown, the Disaster Countermeasure Basic Act specifies that the national government, prefectural governments and municipal governments have their roles in disaster management. Table 4-1 shows each role for the national government, prefectural governments and municipal governments.

Table 4-1 Roles of each stakeholder in Disaster Countermeasure Basic Act

Outline of the Disaster Countermeasures Basic Act			
	(organized from each stakeholder's role)		
	National Government	Prefectures	Local municipalities
1. General Provisions	Recommendations, supervision, advice to local municipalities.	Consistent area management and coordination among local municipalities.	
	Establishment and execution of basic plans and supports prefectures and local municipalities with relevant management to protect the national territory and the citizens' lives and property (Art. 3).	Establishment and execution of local disaster prevention plans and support local municipalities with relevant management to protect prefectural territories and the citizens' lives and property (Art. 4).	Maintenance of the municipal order and secure the safety, health and welfare of the citizens and visitors.
			Execution of necessary measures to prevent crimes and disasters, to rescue and help disaster victims, and to retain traffic safety.
			Establishment and execution of local disaster prevention plans to protect municipal territories and the citizens' lives and property as fundamental governing units.
2. Disaster Prevention Organization	Central Disaster Management Council (Art. 11, etc.) Chair: Prime Minister Member: Designated from among ministers and people of experience or academic standing	Prefectural Disaster Management Councils (Art. 14, etc.) Chair: Governor Member: Heads of designated prefectural administrative organizations, Ground Self-Defense Forces, prefectural police, fire department headquarters, etc.	Local Municipal Disaster Management Councils (Art. 16) Chair and members are designated under municipal regulations.
	Major Disaster Management Headquarters (Art. 24, etc.) (in time of a large-scale disaster) Chief: Minister Purpose: Coordination of disaster emergency responses taken by heads of local municipalities	Disaster Management Headquarters (Art. 23) (When a disaster occurs or is about to occur) Chief: Governors Purpose: Disaster prevention, execution of disaster emergency responses	Disaster Management Headquarters (Art. 23) (When a disaster occurs or is about to occur) Chair: Heads of local municipalities Purpose: Disaster prevention, execution of disaster emergency responses

	The chief gives necessary orders to heads of designated local administrative organs and local municipalities.	The chief gives necessary orders to the prefectural police and other relevant organizations.	The chief gives necessary orders to the municipal board of education.
	The chief also sets up on-sight management headquarters for large-scale disasters.	The chief also set up on-sight disaster management headquarters.	
		Requests to heads of designated administrative organs for staff dispatch (Art. 29)	Requests to heads of designated administrative organs for staff dispatch (Art. 29)
	Urgent Disaster Management Headquarters (Art. 28-2, etc.) (in time of disaster of extraordinary severity) Chief: Prime Minister Secretary: Head of a designated administrative agency Purpose: Coordination of disaster emergency responses taken by heads of local municipalities		
	The chief gives necessary orders to heads of designated administrative agencies and local municipalities.		
3. Disaster Management Planning	Basic disaster management plan (Art. 34, etc.) formulated by Central Disaster Management Council	Prefectural disaster management plans (Art. 40, etc.) formulated by prefectural disaster management councils	Municipal disaster management plans (Art. 42, etc.) formulated by municipal disaster management councils
	Disaster management plan is formulated from a comprehensive and long-term standpoint	Prefectural disaster management plans are general principles for operation and clerical work to be conducted by prefectures or local municipalities within designated areas.	Municipal disaster management plans are general principles for operation and clerical work to be conducted by local municipalities
	The plan sets priorities for disaster management operation plans and local disaster management plans	The plans consist of individual plans for disaster prevention, disaster emergency response, and disaster recovery in specific local areas	The plans consist of individual plans for disaster prevention, disaster emergency response, and disaster recovery in local municipalities
	Disaster management operation plan (Art. 36)		
4. Disaster Prevention	Execution of disaster prevention based on regulations (Art. 46)	Execution of disaster prevention based on regulations (Art. 46)	Execution of disaster prevention based on regulations (Art. 46)
5. Disaster Emergency Response	Execution of emergency responses based on regulations (Art. 77-1)	Issuance of evacuation recommendations/orders on behalf of the local municipalities (Art. 60)	Discoverer's responsibility to report an unusual event which may lead to a disaster (Art. 54)
	Issuance of orders to governors and heads of local municipality for emergency measures (Art. 77-2)	Execution of emergency measures based on regulations (Art. 70)	Issuance of warnings and dissemination of received warnings to local residents (Art. 56)
	Issuance of orders for businesses in the production, sales and transportation sectors to store materials necessary for emergency measures; or requisition of such materials by designated administrative agencies (Art. 78)	Issuance of orders with respect to health and hygiene, emergency transportation, etc.	Issuance of mobilization orders to fire departments and requests for police dispatch (Art. 58)
		Issuance of orders for those in medicine, civil engineering and transportation to join rescue efforts	Issuance of orders to remove buildings or materials likely to spread a disaster
		Issuance of orders for residents to cooperate for rescue efforts	Issuance of evacuation recommendations/orders (Art. 60)

		Issuance of orders for businesses in the production, sales and transportation sectors to store materials necessary for emergency measures; or requisition of such materials by designated administrative agencies	Execution of emergency responses in fire fighting, flood control, rescue efforts, etc. based on regulations
		Issuance of orders for heads of local municipalities to execute emergency responses (Art. 72)	Establishment of restricted areas (including evacuation); Execution of such duties by police or self-defense force on behalf of heads of local municipalities
		Traffic restriction or prohibition by public safety commissions (Art. 76)	Temporary use of land, buildings and other structures (Art. 64)
			Request to governors for support (Art. 68)
			Request to governors for a disaster dispatch of self-defense forces (Art. 68-2)
6. Disaster Recovery	Execution of disaster recovery based on regulations (Art. 87)	Execution of disaster recovery based on regulations (Art. 87)	Execution of disaster recovery based on regulations (Art. 87)
7. Financial measures	Financial responsibilities for disaster-related projects (Art. 91)	Financial responsibilities for disaster-related projects (Art. 91)	Financial responsibilities for disaster-related projects (Art. 91)
	Financial responsibilities based on regulations (Art. 94)	Financial responsibilities for municipal spendings based on Art. 72 (Art. 93) or Art. 28 (Art. 95)	
	Financial responsibilities for municipal spendings based on Art. 28 (Art. 95)		
8. State of Emergency	Declaration of state of emergency (Cabinet Conference) (Art. 105)		
	(In time of an extraordinary disaster whose repercussions on the national economy and public welfare are serious and far-reaching)		
	Installation of headquarters for urgent disaster management (Art. 107)		
	Issuance of ordinances concerning urgent measures (Art. 109) (when the Diet is not in session or the House of Representatives has been dissolved, and further, when the situation does not allow time to call the Diet in session or request an emergency session of the House of Counselors for action)		
	Distribution of daily necessities, setting of the highest consumer prices, postponement of payment of financial debts		

The municipal government has fundamental roles in disaster management because it has direct relationship with residents. For example, it is responsible for establishing local(municipal) disaster management plan(Article 42), emergency operation such as dissemination of flood related alerts(Article 56), issuance of evacuation recommendation and/or order(Article 60) and execution of flood fighting or relief activities(Article 62). In case that a municipality happens to be devastated so widely and severely that it can not carry out most of its primary roles, prefectural government shall issue evacuation rec-

ommendation and/or order instead of the municipality. Look into Chapter 5 of Disaster Countermeasure Basic Act.

The followings are more detailed explanations of organizations relating to FHM and emergency operation.

## 4.2 Preparing FHM

### [river administrator]

As shown in Fig. 2-2, the river administrator is responsible for designating anticipated inundation area, clear indication of inundation risk areas and predicted depth and Notifying inundation risk areas/depth to municipalities.

### [municipal office]

On the other hand, the municipal office is responsible for describing the following items concerning to each anticipated inundation area in the local disaster management plan of the municipality (by municipality)

- Dissemination method of flood forecasting etc.
- Dissemination of necessary information such as evacuation sites for smooth and quick evacuation
- Names and locations of underground spaces and facilities for the old, handicapped and infant who need special care upon evacuation

These information should be informed to residents by any means such as FHM

## 4.3 Emergency Operation

Chapter 5 of Disaster Countermeasure Basic Act specifies emergency response of national government, prefectural government and municipal office. Article 62 specifies the responsibility for emergency response of municipal governor implementing necessary response according to local disaster management plan. Table 4-2 shows an example of roles of city, district, voluntary disaster management group, business company, residents and employees of private companies. Most of the activities are prescribed by Flood Control Act.

Figure 4-1 shows the Communication System and flow of Weather Information of the city of which local disaster management plan shown in Table 3-2 as an example. Fig. 4-2 shows Communication System and flow of Flood Forecast and Water Level Information. Fig. 4-3 also shows Communication system and flow of Prefectural Flood Fighting Order. You can see

Table 4-2 activities in municipality in each stage of emergency response

Metrological conditions, etc.	Municipal offices	Districts, voluntary disaster management groups, businesses	Residents, employees
○Appearance of Typhoon, activation of rain front, etc.	<ul style="list-style-type: none"> <li>■Preparation</li> <li>○Checking the stock of emergency supplies and equipment</li> <li>○Monitoring conditions of typhoon, other meteorological events, and rivers.</li> <li>○Checking chain of communication</li> </ul>	<ul style="list-style-type: none"> <li>○Checking the stock of emergency supplies and equipment</li> <li>○Collecting meteorological information, checking radio communications systems</li> </ul>	<ul style="list-style-type: none"> <li>○Checking emergency items to take</li> <li>○Collecting meteorological information, checking radio communication systems</li> </ul>
○Watch for heavy rain, flood, or storm surge	<ul style="list-style-type: none"> <li>■Level-0 Emergency deployment</li> </ul>	<ul style="list-style-type: none"> <li>○Checking evacuation sites and routes</li> </ul>	<ul style="list-style-type: none"> <li>○Checking evacuation sites and routes</li> </ul>
<ul style="list-style-type: none"> <li>○Alert for heavy rain, flood, or storm surge</li> <li>○Flood fighting order No. 1</li> </ul>	<ul style="list-style-type: none"> <li>■Level-1 Emergency deployment</li> <li>■Setting up a disaster warning headquarters (if necessary)</li> <li>○Informing the public and administrators of districts and important facilities about warnings, etc.</li> <li>○Checking districts and facilities for potential dangers</li> <li>○Taking traffic control measures</li> <li>○Informing the public about damage status and countermeasures for the damage</li> <li>○Getting evacuation sites ready to open for evacuees, and open them if necessary</li> <li>○Starting flood fighting activities</li> </ul>	<ul style="list-style-type: none"> <li>○Monitoring flood status and precursors of landslides, etc.</li> <li>○Checking district residents who need help for evacuation</li> <li>○Helping flood fighting activities</li> </ul>	<ul style="list-style-type: none"> <li>○Monitoring flood status and precursors of landslides, etc. in the neighborhood</li> <li>○Checking neighbors who need help for evacuation</li> </ul>
<ul style="list-style-type: none"> <li>○Flood fighting order No. 2</li> <li>○Flood forecasting (advisory)</li> </ul>	<ul style="list-style-type: none"> <li>■Level-2 Emergency deployment</li> <li>■Setting up a disaster management headquarters (if necessary)</li> <li>○Advising the public and administrators of districts and major facilities to prepare for evacuation</li> <li>○Helping people who need help for evacuation</li> <li>○Starting rescue and relief efforts</li> </ul>	<ul style="list-style-type: none"> <li>○Advising residents and those using the district's facilities to prepare for evacuation</li> <li>○Helping evacuation of those who need help (district residents and those using the districts' facilities)</li> </ul>	<ul style="list-style-type: none"> <li>○Helping evacuation of those who need help (family members and neighbors)</li> </ul>
<ul style="list-style-type: none"> <li>○Flood fighting order No. 3</li> <li>○Flood forecasting (warning)</li> <li>*Major damage is likely to occur at this stage.</li> </ul>	<ul style="list-style-type: none"> <li>■Level-3 Emergency deployment</li> <li>○Issuing an evacuation recommendation or order</li> <li>○Requesting dispatch of Self-Defense Forces</li> </ul>	<ul style="list-style-type: none"> <li>○Leading evacuation of residents and those using the district's facilities</li> </ul>	<ul style="list-style-type: none"> <li>○Communicating among evacuees, including neighbors</li> <li>○Completing evacuation</li> </ul>

<ul style="list-style-type: none"> <li>○Removal of warnings, etc.</li> </ul>	<ul style="list-style-type: none"> <li>○Preventing secondary disasters</li> <li>○Conducting Damage assessment</li> <li>○Starting post-disaster relief efforts for disaster victims</li> <li>○Coping with disaster wastes</li> <li>○Starting health care efforts</li> <li>○Accepting disaster-aid groups and volunteers</li> <li>○Starting temporary restoration of municipal facilities</li> </ul>	<ul style="list-style-type: none"> <li>○Monitoring precursors of landslides, etc. in the district</li> <li>○Helping damage assessment</li> <li>○Helping distribution of emergency supplies in the district</li> <li>○Starting an evacuees's association in each evacuation site for proper site management</li> <li>○Cooperating for proper management of garbage collection stations</li> </ul>	<ul style="list-style-type: none"> <li>○Monitoring precursors of landslides, etc. in the neighborhood</li> <li>○Helping damage assessment</li> <li>○Helping distribution of emergency supplies in the neighborhood</li> <li>○Participating in an evacuees's association to cooperate for proper site management</li> <li>○Separating garbage properly</li> </ul>
	<ul style="list-style-type: none"> <li>■Setting up a disaster recovery and rehabilitation headquarters</li> <li>○Assisting recovery of livelihood</li> <li>○Starting full restoration of municipal facilities</li> </ul>		

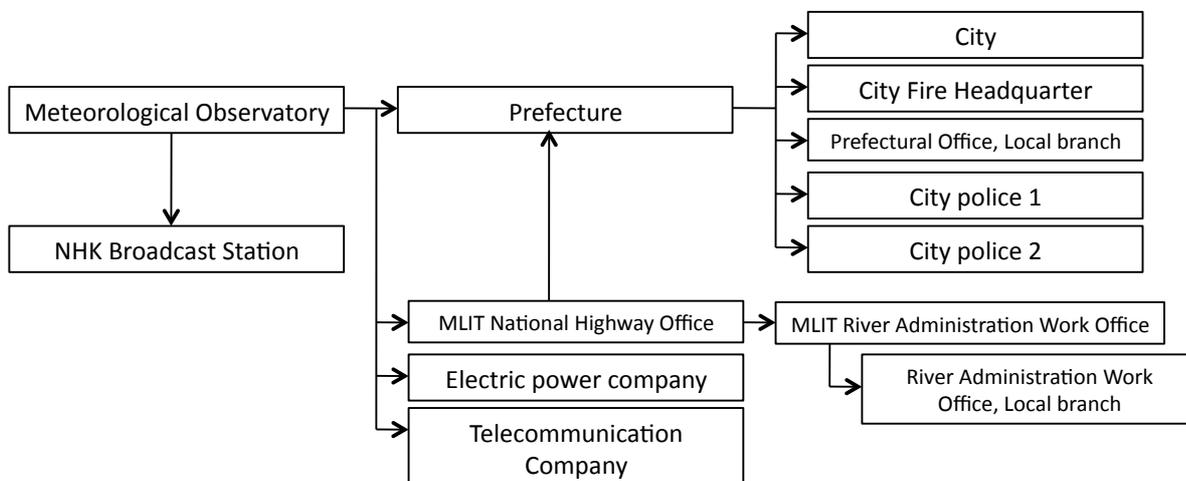


Fig. 4-1 Communication System and flow of Weather Information

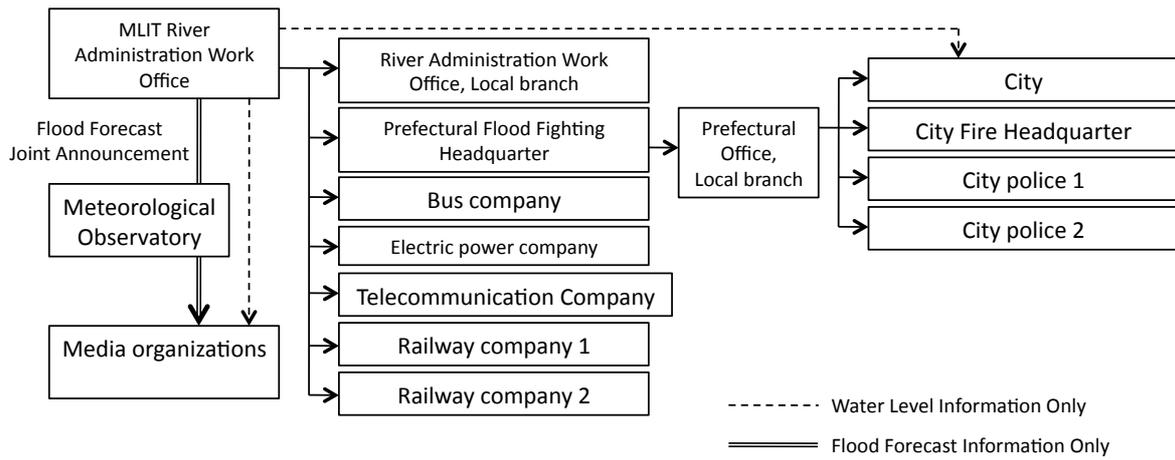


Fig. 4-2 Communication System of Flood Forecast and Water Level Information

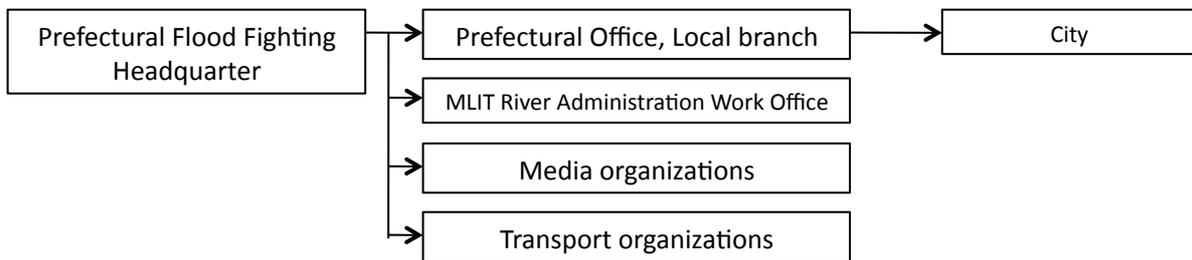


Fig. 4-3 Communication system and flow of Prefectural Flood Fighting Order

# 5. Evacuation planning

## 5.1 Objective

The objective of the evacuation planning is to secure the residents' lives etc. against floods.

The Fig. 5-1 shows the hydrograph of the water level of Miya River at the flood on 29 September 2004. You can see the water level rose very quickly. Cities along this kind of river need accurate flood forecasting. It can be said that "Evacuation(planning) is a fight against time". In order that residents can evacuate safely, the evacuation plan should be established considering the behavior of anticipated hazard and necessary time for evacuation.

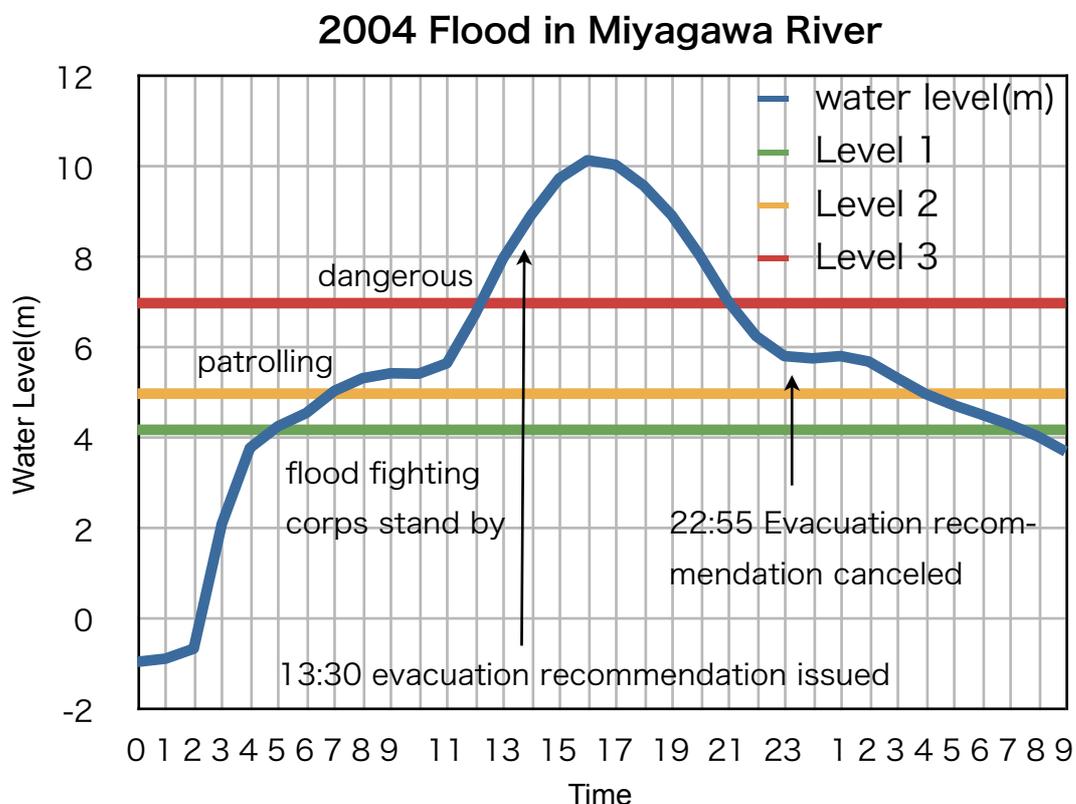


Fig. 5-1 Hydrograph of the water level of Miya River at the flood on 29 September 2004

## 5.2 Evacuation Plan in legislation

In Japan, the Disaster Countermeasure Basic Act specifies that prefectural and municipal government have to establish each local disaster management plan which includes evacuation plan in article 40 and 42, respectively. And article 60 specifies the responsibility of municipal governor to issue a recommendation and order of evacuation to the concerning residents.

## **[Disaster Countermeasure Basic Act]**

*(Prefectural local disaster management plan)*

**Article 40** A prefectural disaster management council shall formulate an local disaster management plan involving the area of the prefecture, based on the basic disaster management plan, and shall review the area plan every year, and revise it when deemed necessary. In such cases, the prefectural local disaster management plan may not be in conflict with any appropriate operational disaster management plan.

2 A prefectural local disaster management plan shall provide for the matters listed below:

(1) general outline of business or operations relating to disaster management involving the area of the prefecture and falling under the purview of a designated local administrative organ having jurisdiction over the area of the prefecture, in whole or in part, the prefecture, and the cities, towns and villages within the area of the prefecture, a designated national or local public corporation, and administrators of public organizations or establishments within the area of the prefecture concerned.

(2) plans by category of operations within the area of the prefecture: creation or improvement of disaster management establishments, investigation and research, education, drills and other preventive measures, collection and transmission of information, issuance and transmission of forecasts and alarms evacuation, fire fighting, flood prevention, rescue, sanitation, other emergency measures and rehabilitation efforts.

(3) plans for coordination, stockpiling, procurement, distribution, shipment, communication with reference to labor, establishments, equipment, materials, funds etc. required for measures relating to disaster management involving the area of the prefecture, as provided under the preceding item.

(4) in addition to what is listed in the preceding items, matters which the prefectural disaster management council may deem necessary for disaster management involving the prefectural area.

3 When the prefectural disaster management council wishes to formulate a prefectural local disaster management plan or revise it provided under paragraph 1, the council is required to consult in advance with the Prime Minister, who in turn shall consult the Central Disaster Management Council.

4 When the prefectural disaster management council has formulated or revised its prefectural local disaster management plan provided under paragraph 1, the council is required to release a summary of said plan or revision.

*(City, town or village local disaster management plan)*

**Article 42** A city, town or village disaster management council (for a city, town or village without a disaster management council, the mayor of the city or town, or the head of the village; applicable herein under) shall formulate an local disaster management plan involving the area of the city, town or village, based on the basic disaster management plan, and shall review the area plan every year, and shall revise it when deemed necessary. In so doing, the city, town or village local disaster management plan may not conflict with any appropriate operational disaster management plan or any prefectural local disaster management plan of the prefecture comprising said city, town or village.

2 A city, town or village local disaster management plan shall provide for the matters listed below:

(1) general outline of business or operations relating to disaster management involving the area of the city, town or village and falling under the purview of the city, town or village concerned and of the administrators of public organizations or important establishments for disaster management within the area.

(2) plans by category of operations within the area of the city, town or village: creation or improvement of disaster management establishments, investigation and research, education, drills and other preventive measures, collection and transmission of information, issuance and transmission of forecasts and alarms, evacuation, fire fighting, flood prevention, rescue, sanitation and other emergency measures and rehabilitation efforts.

(3) plans for coordination, stockpiling, procurement, distribution, shipment, communication with reference to labor, establishments, equipment, materials, funds etc. required for measures relating to disaster management involving the area of the city, town or village, as provided under the preceding item.

(4) in addition to what is listed in the preceding items, matters which the city, town village disaster management council may deem necessary for disaster management involving the area of the city, town or village.

3 When the city, town or village disaster management council intends to formulate or revise its local disaster management plan provided under paragraph 1, the council is required to consult in advance with the governor of the prefecture, who shall in turn consult with the prefectural disaster management council.

4 When the city, town or village disaster management council has formulated or revised its local disaster management plan provided under paragraph 1, the council is required to release a summary of said plan or revision.

5 The provisions of art. 21 shall apply, where and as necessary, to the formulation or revision of a city, town or village disaster management plan by the mayor of the city or town or the head of the village, as provided under paragraph one.

*(Mayor's orders for evacuation)*

**Article 60** In the interest of protecting life and limb from disaster or of preventing the spread of a disaster when it has occurred or is believed imminent, the mayor of the city or town or the head of the village may, when deemed necessary, make recommendations to the local residents, temporary residents and others of an area concerned to evacuate, or may, when deemed urgent, give instructions to these persons to evacuate for safety.

2 When the mayor of a city or town or the head of a village makes recommendations or give instructions for evacuation under the provisions of the preceding paragraph, he may, if deemed necessary, specify a point to which evacuees will proceed.

3 When the mayor of a city or town, or the head of a village has recommended or instructed evacuation for safety under the paragraph 1, or when he has specified the point to which the evacuees will proceed, he shall report promptly to the governor of the prefecture.

4 When there is no longer the need for evacuation, the mayor of the city or town or the head of the village shall immediately make public the fact. The provisions of the preceding paragraph shall apply to this case, where and as necessary.

5 When a disaster occurs in the territory of the prefecture and a city, town, or village is unable to perform all or the majority of its duties because of the disaster, the governor of the prefecture shall implement on behalf of the mayor of the city or town or head of the village all or a part of the measures to be implemented by the mayor of the city or town or head of the village in accordance with the provisions of para. 1, para. 2, and para. 4 above.

6 The governor of the prefecture must make it public when he begins and ceases to perform the duties of the mayor of the city or town or head of the village under the provisions of the preceding paragraph.

7 Necessary matters related to the performance by the governor of the prefecture of duties on behalf of the mayor of the city or town or head of the village under the provisions of para. 5 above shall be set forth in government ordinance.

*(Orders for evacuation by police and others)*

**Article 61** In cases provided for under the first paragraph of the preceding article, when the mayor of the city or town or the head of the village is found unable to order evacuation for safety under said paragraph, or when there has been a request from the mayor or the head, the police or maritime safety officials may order the evacuation for the safety of the residents, temporary residents or other persons in an area for which evacuation is deemed necessary. The provisions of para. 2 of the preceding article applies to this case, where and as necessary.

2 When the police or maritime safety officials have ordered evacuation for safety under the provisions of the preceding paragraph, they shall report this fact immediately to the mayor of the city or town or the head of the village.

3 The provisions of paras. 3 and 4 of the preceding article shall apply to the mayor of a city or town or the head of the village who has received a report under the preceding paragraph, where and as necessary.

### 5.3 Relation between evacuation planning and hazard map

As shown in the outline of the Flood Hazard Map (FHM), FHM is usually developed in such a manner that it displays clearly the inundation area(with water depth), dangerous spots at floods, information on smooth and quick evacuation such as the location of shelter, evacuation route, access point to flood information. Consequently, the essence of the evacuation plan should be shown on the FHM. On the contrary, the evacuation plan should be established so that residents can know necessary information from FHM. (Fig. 5-2)

It must be noticed that residents generally have slight idea of flood event or how to evacuate safely while experts on FHM or flood risk management have a common knowledge of flood. This cause different understanding of FHM. And it happens often that residents in the flood prone area complain that the FHM has not sufficient information or uneasy to understand. (Fig. 5-3)

Information of evacuation as well as flood characteristics should be put on

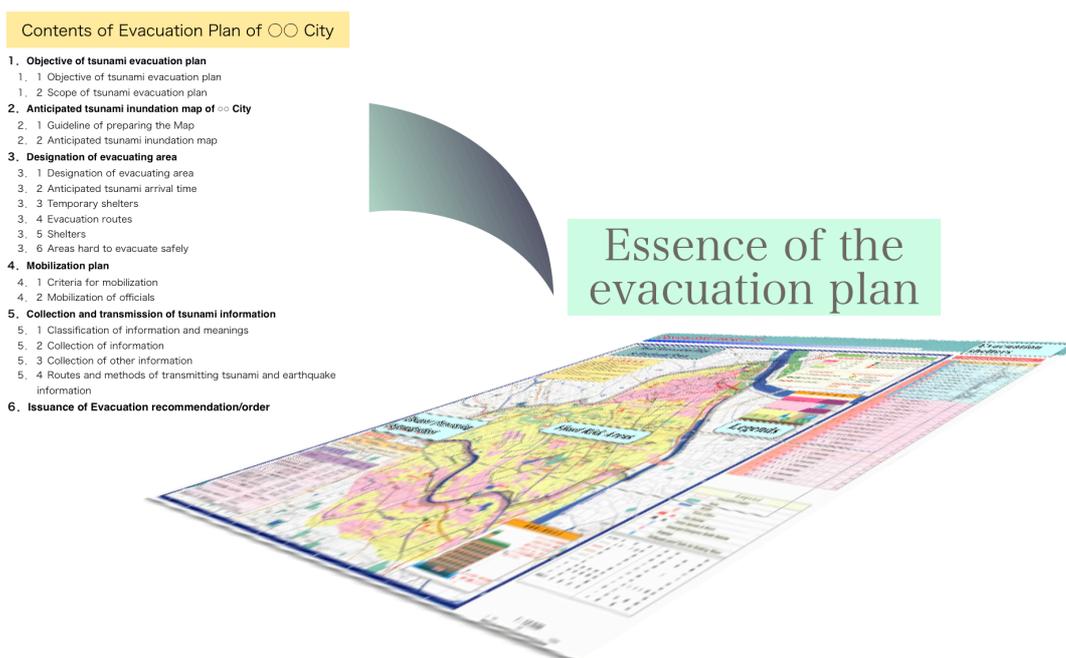


Fig. 5-2 Essence of the evacuation plan should be included in FHM understandably

## Relation between the evacuation plan and the FHM

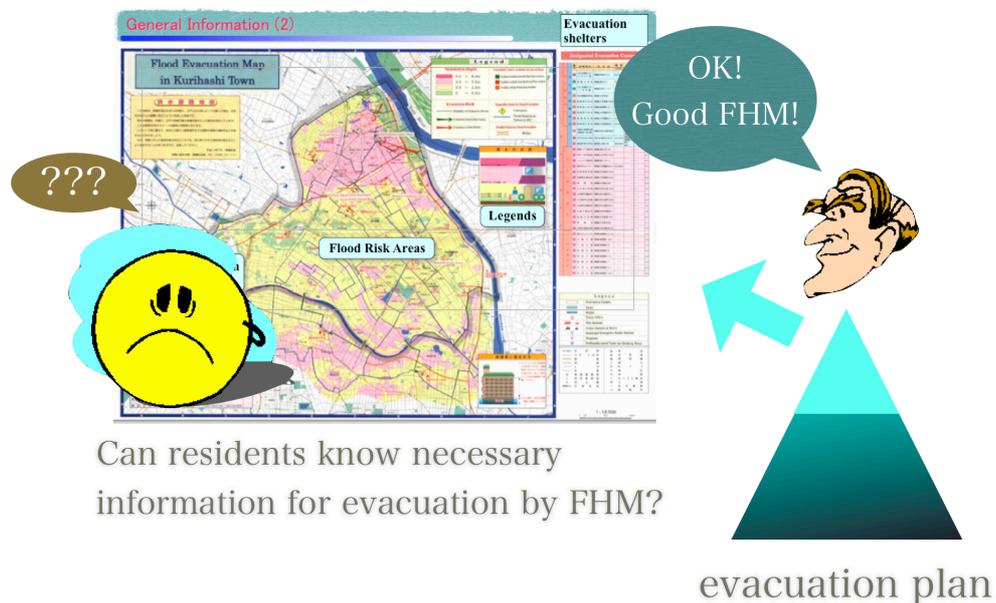


Fig. 5-3 Difference between residents and experts or officials

### 5.4 Evacuation area

The evacuation area or evacuation needed area is designated based on the anticipated inundation area or the record inundation area with information of past inundation records, witness and so on. The residents and other people such as visitors and tourists in that area should evacuate when flooding or possible flooding. The evacuation area is usually wider than the anticipated inundation area. One of the reasons is the uncertainty of calculation of inundation area and the other is relation to the area of issuance of evacuation recommendation and order, wider areas than anticipated areas are basically designated. Also the condition of public support after evacuation should be considered.

For example, if there is a spot with a few houses surrounded inundation area, it is difficult to distinguish them from others at the issuance of evacuation recommendation and to save them or serve public help in an emergency. Further, usually, inundation analysis does not have sufficient accuracy to judge safe or not against so small area because of the accuracy of topographic data and assumption of modelling of inundation and so on.

### 5.5 Evacuation places(shelters) and routes

Evacuation places shall be designated as to secure the evacuees in an emergency. They must be also installed with functions for evacuation life of evacuees. Evacuation routes shall be safe and easy to understand and shown with signs. It must be noticed that they are sufficiently safe and broad and have detours in case. In the case of tsunami anticipated area, bridges shall be earthquake-resistant and roads along coast and

rivers shall not be designated. In the case of debris flow anticipated area, it should be noticed that bridges with insufficient clearance might be flown away.

Because it depends on residents which route is safest for evacuation, major evacuation route for each evacuation area is shown on FHM.

Since we have, in general, several kinds of hazards, it is desirable that evacuation places can be used for any kind of hazard. However, in practice, public facilities were often built with little consideration of several kinds of disasters and it is common that there are evacuation places for a specific hazard and disaster. For example, if a evacuation place for fire or earthquake is located in the anticipated inundation area of river flood, it cannot be designated as a evacuation place for flood. In this situation, the other facilities in flood proof area have to be designated. Further, since it may occur that traffic jams may happen if people use cars in evacuation and even the evacuees on foot may not be able evacuate in a limited time, evacuation on foot is a basic rule generally.

You must remember that an extreme flood will be caused by intense and wide abnormal weather which bring complex hazards. For example, because typhoons and cyclones cause intense rain and strong wind simultaneously, it becomes more difficult to evacuate safely. Further, it may bother people to evacuate soon.

**[Ref.: Tsunami Hazard Map Manual]**

*Evacuation sites and routes shall be quickly constructed in coastal areas by appropriately utilizing projects of various kinds and giving priority to areas of the greatest need. Also, facilities for quick evacuation, such as evacuation signs, shall be quickly installed. In areas where evacuation sites are difficult to construct, evacuation sites shall be quickly ensured by utilizing private buildings and other structures that have enough resistance to predicted tsunamis.*

**5.6 Mobilization plan**

In an emergency, since time is very short, it is necessary to establish a mobilization plan beforehand which describes mobilization of officials, criteria for mobilization. In mobilization plan, when, who and what to do should be specified for each level of disaster or disaster forecasting respectively. In addition, telephone contact chain should also be determined and updated always and contain alternatives in case of accident on someone in order to function appropriately.

Because disaster management officials in a municipal office and other relating organizations are key persons in an emergency, they should be standby sufficiently beforehand. To secure the smooth and quick evacuation, disaster management office have to disseminate necessary information to residents as well as related organizations in time. In rainy season, successive strong rainfall often hit a river basin, then it becomes difficult to allocate appropriate officials. When a very huge typhoon approached our country,

telecommunication system failed since a lot of call concentrated in a short time. Hence, these lessons should be taken into account in the mobilization plan. Further, it is better to have redundancy in communication system.

## 5.7 Dissemination of information

The level and scope of disaster-related information and the following activities depend on the kind of hazards. How to collect the information and to whom and in what way the information should be transmitted shall be determined and shared to public as well as among officials. The information on evacuation should be disseminated as soon as possible after its issuance.

In Japan, the meteorological information such as intense rainfall warning or forecast and predicted path of typhoon are issued by the Japan Meteorological Agency(JMA). Concerning to water level in an A-class river, Ministry of Land, Infrastructure and Transport(MLIT) and JMA cooperate to forecast it and are responsible to issue the flood warning. These information are transmitted to the local government by own route via prefectural government as well as to the residents through mass media. After these information arriving at the municipal government, officials responsible for dissemination will inform them to whom in the chain list, organizations and residents. Fig. 4-1,2,3 show information tree of warnings.

See Table in Annex which shows Reference water level of rivers which run through Toyooka city. Toyooka city was devastated by the breach due to the flood in 2004.

## 5.8 Evacuation recommendations/orders

In Japan, the Disaster Countermeasure Basic Act specifies that the mayor of local municipality is primarily responsible for issuing the evacuation recommendation/order in article 60. And it is also specified, the prefectural governor shall issue them in case that the mayor of local municipality become difficult to issue them due to the disaster.

The general criteria of issuance of evacuation recommendations/orders are as follows.

- 1)when the meteorological observatory issues warning of disaster and it is judged that evacuation is necessary
- 2)when disaster related warning or information is issued by the disaster management organizations and it is judged that evacuation is necessary
- 3) when it is anticipated that the water level in rivers will exceed the warning level and be about to flood,
- 4) when the upstream area is flooded and the downstream area become danger, and so on.

The evacuation recommendations/orders shall be disseminated to the residents through disaster management radio communication network, public announcement vehicle, mass media and community networks and so on. In an emergency, it is important to disseminate through several methods in order to secure that the disseminated information reach residents certainly. In the cancellation, it must be done in the same way. And for

the aged people and disabled people who are difficult to hear the announces or dissemination in night time it is necessary to pay attention. The dissemination route should be determined beforehand.

When an evacuation recommendation/order is issued, the people in the evacuation area shall be guided to evacuate with collaboration of police station, fire department, fire fighting corps and community based disaster management team in order to secure peoples lives primarily,

## 5.9 Education and drills

The most important thing in disaster management is the awareness and preparedness of the people. And it is necessary for people to have basic knowledge in an emergency because persons in charge of disaster management are usually very few in local municipalities and cannot help people evacuate quickly and safely in an emergency. Especially, in tsunami case in which we have very short time to evacuate, it is important that one has to save one's life by oneself and it is a general rule for each one to evacuate without any consideration of others if he feel the strong earthquake along the coast.

In this point of view, it is important to enlighten people about what happens in flood and what one should do. It is considered that utilization of mass media, pamphlets, videos, internet or training at community center and "Town watching" are useful. The items of enlightenment are preparedness, records of disaster, success and failure stories, characteristics of flood events and contents of evacuation plan such as classification of forecast and warning, evacuation recommendation/order, evacuation site and routes.

In order to ensure the evacuation, it is also very useful to implement the evacuation drills. The drills should be carried out periodically by organizations relating to the area. In an emergency, visitors cannot evacuate properly and it is necessary for the residents to help visitors evacuate smoothly. Therefore, it is desirable to implement drills with wider participation including visitors. It should be also included the evacuation of the aged people, infants and people who need support in an emergency.

### Tsunami TenDenko

Sanriku coast in Touhoku area of Japan has a lot of tsunami lessons. Most of the tsunami along Sanriku coast hit the coastal villages about 30 minutes after the earthquake. However, half an hour is not sufficient for residents to evacuate with their belongings and families. In the past tsunami, many people killed when they got back to search or take members of their families and friends. In huge tsunami, it was not few families lost all of the members.

Nowadays, they have an oral lesson "Tsunami TenDenko" which means "Evacuate by yourself without thinking the others in case of Tsunami". It tells you not to care even your family.

The contents of the drills should consist of information collection, issuance and dissemination of evacuation recommendation/order, confirmation of evacuation routes, sites and necessary time and the way to check whether all people evacuate safely.

At the tsunami prone area in Japan, they usually carry out tsunami evacuation drill at least once a year. It is not so seldom that voluntary disaster management group conducts an evacuation drill in night or several drills in a year.

On the other hand, these kind of activities are not so common for the river flood in Japan.

## 5.10 Example of Evacuation Plan

The following shows an example of evacuation plan. It is the one for tsunami of Hachinohe city which is located along Sanriku coast.

<p><b>1. Objective of tsunami evacuation plan</b></p> <p>1.1 Objective of tsunami evacuation plan 1.2 Scope of tsunami evacuation plan</p> <p><b>2. Anticipated tsunami inundation map of Hachinohe City</b></p> <p>2.1 Guideline of preparing the Map 2.2 Anticipated tsunami inundation map</p> <p><b>3. Designation of evacuating area</b></p> <p>3.1 Designation of evacuating area 3.2 Anticipated tsunami arrival time 3.3 Temporary shelters 3.4 Evacuation routes 3.5 Shelters 3.6 Areas hard to evacuate safely</p> <p><b>4. Mobilization plan</b></p> <p>4.1 Criteria for mobilization 4.2 Mobilization of officials</p> <p><b>5. Collection and transmission of tsunami information</b></p> <p>5.1 Classification of information and meanings 5.2 Collection of information 5.3 Collection of other information 5.4 Routes and methods of transmitting tsunami and earthquake information</p>	<p><b>6. Issuance of Evacuation recommendation/order</b></p> <p>6.1 Person in charge for issuance 6.2 Criteria for Evacuation recommendation/order 6.3 Dissemination of Evacuation recommendation/order 6.4 How to evacuate and evacuation guide</p> <p><b>7. Education and enlightenment of tsunami disaster prevention</b></p> <p>7.1 Preparedness for tsunami 7.2 Media of enlightenment of tsunami disaster prevention 7.3 Contents of enlightenment of tsunami disaster prevention 7.4 Opportunities of enlightenment of tsunami disaster prevention</p> <p><b>8. Evacuation Drill</b></p> <p>8.1 Organizations and participants of Drill 8.2 Items of Drill</p> <p><b>9. Matters that require attention</b></p> <p>9.1 Matters for establishing visitors' evacuation 9.2 Care for who needs help in an emergency</p>
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## Points to be discussed !

We had a bad experience that some people were killed on the way to evacuation site while they would survive if they stayed their home during the flood in Niigata prefecture in 2004. On the contrary, in the case of Enza area of Ise city at 2004 flood, taking roll of the residents triggered the rescue of 4 person who were about to be killed by inundation.

What should we do in an emergency of flood? It is not necessary to evacuate all the people from evacuation area, isn't it? Or is it still necessary in order to check number of evacuees easily?

How do you think according to your country's situation?

居安思危 Be aware of risk while you are safe

思則有備 Awareness leads you preparedness

有備無患 Preparedness leaves you no worry

Source : Zuo Qiuming "Zuoshi Commentary"  
in Confucius ed. "Spring and Autumn", 480BC

### Important things in time of peace

Countermeasure for Normalcy bias

Develop a sense of unity in the community

Practice judging and acting by oneself

Acquire correct knowledge on what "Flood" is

拾う人は捨てない

A person picks up garbage will not throw it away.

### Power of a person

by Satoshi Tani

A person picks up a piece of garbage.  
That doesn't seem to make any difference.

A person throws away a piece of garbage.  
That doesn't seem to make any difference.

A person who picks up garbage will not throw it away.  
A person who throws away garbage will not pick it up.  
There emerges a huge difference between the two.

This verse makes one think about the ownership of  
society and a sense of belonging to society.

## Annex

Reference water level of rivers (MLIT, Hyogo Prefecture)							
River	Gauging Station	Watching level	Warning water level	Special warning water level	Dangerous water level	Design high water level	Assigned area
Upper Izushi River	Yane	2.20	2.80	2.80			Nakagawa Weir -Kado Bridge
Lower Izushi River	Hirohara	0.60	2.40		4.30	5.27	
Inaba River	Ibu	1.70	2.30	2.30			Dojo Weir - Arakawa Bridge
Yashiro River	Fujii	1.10	1.60				
Lower Ma-ruyama River	Akasaki	2.00				8.62	
	Fuichiba	2.00				6.91	
	Tateno	2.50	4.50		7.10	8.16	
Roppou River	Dasaka	1.90	2.80				
Upper Nasa River	Nogaki	1.80	2.60	2.60			Nasazaka Bridge - Direct management terminal line
Lower Nasa River	Miyai	2.10	3.20	4.10		5.09	
Lower Ma-ruyama River	Kinosaki	1.00				3.64	
Takeno River	Morimoto	1.30	2.20	2.38			Todoroi Weir - Sansyo River confluence
	Tateno	1.30	2.00				

\*Lower Maruyama River and Lower Nasa River are managed by MLIT. Hyogo Prefecture manages the rest.