

9. Distribution and Usage of Flood Hazard Map

9.1 Distribution among Local Residents

(1) Public Relations

Once Flood Hazard Maps have been produced and distributed, the local municipalities shall make efforts to enhance the local residents' awareness of the purpose and advantageous effects of the maps through educational activities and flood evacuation practices. Consideration shall be given to the following activities:

- 1) Providing information to local media (hometown newspapers and magazines)
- 2) Organizing briefing sessions at voluntary disaster prevention units, schools, private companies, etc.
- 3) Sending questionnaires to households, voluntary disaster prevention units, schools, private companies, etc., with the goal of stimulating interest in the maps, active use of the maps by residents, and collection of their opinions on the information contained in the maps, as well as increasing their involvement in disaster prevention activities
- 4) Distribution at various events (voluntary and administrative disaster prevention fairs, emergency evacuation practices, etc.)
- 5) Using CATV (local channels, teletext broadcasting)
- 6) Using notice boards at public or district facilities
- 7) Cooperating with mass media (TV and radio stations, newspapers, etc.)
- 8) Insertion in telephone directories (Yellow Pages)
- 9) Using Internet homepages

(2) Target Users

It is desirable to distribute Flood Hazard Maps to all local residents for the most effective use of them. However, it may be conceivable to restrictively distribute them to residents in the areas to be evacuated.

- Distribute to local residents in the entire administrative areas concerned
- Distribute only to specified districts and their town-block associations, covering the possible inundation areas
- Distribute only to households that will inevitably be evacuated
- Distribute through Internet homepages

Possible distribution to pertinent institutions, bodies and agencies other than local residents, such as:

- Community centers and other public services (pin-up notices)
- Schools (pin-up notices and teaching materials)
- Private companies (pin-up notices to employees and visitors)

9.2 Administrative Use

It is important to identify various levels of risks and specific issues to be developed in the respective areas, referring to the Flood Hazard Maps, and to successively update the emergency evacuation plan as well as disaster prevention plans.

The table below shows several issues to be fully reflected in the prevention disaster plans.

Table 5 Examples of Issues to be Reviewed in Disaster Prevention Plans

Category	Description
Evacuation routes and refuges	- Review evacuation routes and refuges currently used, taking into consideration specific risks involved in the areas
Emergency activity system	- Review and update mobilization plan, taking into consideration widely scattered dangerous areas - Review and update arrangement and assignment plans for flood-fighting materials, equipment and staff members
Communication channels for emergency information	- Establish more reliable channels for emergency evacuation activities - Provide more accurate and effective information on evacuation
Evacuation encouragement	- Review and update organization and assignment of staff for safe evacuation - Review and update assistance plans for evacuation of the vulnerable (infants, elderly, sick, and handicapped) - Review and update voluntary activities

Furthermore, Flood Hazard Maps shall be referred to in the design of flood-resistant buildings and urban planning, as well as land-use patterns.

9.3 Issues on Flood Evacuation

Much effort has recently been made on the prevention of flood disaster in Japan through the production of hazard maps and their distribution to local residents, and the establishment of communication systems for disaster information, providing timely and accurate evacuation information in the event of a flood occurrence. It can not be said, however, that the smooth evacuation of local residents in the event of a flood occurrence is ever practiced based on these systems. There are still many issues to be addressed in order to improve the current situation. Those issues are mainly related to a lack of awareness of disaster, as well as a lack of understanding of disaster information among the residents.

When the water level of a river rises and evacuation is deemed necessary, the mayor issues an advisory evacuation warning and/or an imperative evacuation warning (the residents are, however, not charged a penalty if they do not follow the warnings). Generally, the evacuation rate of residents is fairly low. In Japan, the following particulars are pointed out as reasons why the residents do not evacuate in the event of a flood occurrence.

- 1) The number of residents who have experienced the fierceness of flooding is becoming fewer due to the development of structural flood countermeasures.

- 2) From the standpoint of disaster psychology, the view called “normalcy bias” predominates in the residents’ minds, and accordingly, they feel disengaged from those who are suffering from a flood disaster, even though the adjacent river has flooded.
- 3) The opportunities for playing in a river and learning about rivers have decreased due to river pollution and the dangerous image of rivers. More and more residents do not recognize the strong power of stream flow, and believe that they can evacuate even after the onset of flooding.
- 4) Those who have had property damaged by a flood, but not to a serious extent, often mistakenly believe that the flood was not serious, and that the next flood will not be serious either. They do not care about evacuation at all.
- 5) Even when it is certain that their houses will be inundated due to flooding, residents prefer to shift their household effects to safe places rather than evacuate themselves. They hardly realize that they are in serious danger.



9.4 Issues on Residents’ Understanding of Flood Hazard Map

The issues on Flood Hazard Maps presented here are related to the local residents’ understanding of the information. These issues are of great importance in developing practical, effective Flood Hazard Maps.

- 1) Even though Flood Hazard Maps have been distributed among the residents, many of them are thrown away or lost. The number of residents who lose their Flood Hazard Maps increases as time goes by. The main reasons for losing the maps are that the residents are unconscious of the real dangers of a flood, they have little interest in the information shown on the maps, and they do not recognize the importance of the information. Once a flood evacuation is imminent, the Flood Hazard Maps serve as evacuation manuals. It is of great significance to remind the residents of their importance and to encourage them to keep the maps.
- 2) Sometimes, the information that is shown on the Flood Hazard Maps leads to the residents’ mistaken assumption that the information is correct and unchanged. Once the residents read the predicted inundation depth for their houses on the Flood Hazard Maps, they misjudge the depth on the map as being the maximum. If the depth is shallower than they expected, they

feel a sense of relief, and either completely stop evacuation or wait until the water level reaches the level in question. This is, however, a serious misunderstanding. The Flood Hazard Maps present merely one possible result obtained through a simulation based on the assumed rainfall patterns (once in a hundred years probability is commonly used in Japan), and levee-break spots in accordance with the designated scenarios. For cases in which the actual rainfall is heavier than that of the designated scenario, the inundation depth will be deeper than that shown on the Flood Hazard Map.

- 3) There is another issue: how to represent information on Flood Hazard Maps. The predicted inundation depths are usually shown in different colors on Flood Hazard Maps, while it is difficult to show the flow velocities in the same way.

In the case of flash floods, the flow velocity, which is inundating city areas, is normally high, and the inundation depth will be shallower as a result. When the flow velocity is high, it is extremely dangerous to evacuate on foot in the water, even if the water depth is shallow. Safe evacuation is not guaranteed. Even though flow velocities can be shown on Flood Hazard Maps, it is difficult for residents to understand the actual danger of high-flow velocity. The flow velocity is primarily important information for the evacuation procedures.

- 4) In some cases, a Flood Hazard Map can mistakenly be interpreted as a “safety area map in the event of a flood occurrence.” Non-colored areas on the hazard maps (non-inundation areas) are merely results from the flood simulation, based on the designated scenarios. The residents in those areas, however, believe that the areas will never be inundated during a flood occurrence.



9.5 Effective Use of Flood Hazard Map

In Japan, the reason why local residents do not evacuate in the event of a flood occurrence is, as mentioned above, that they hardly recognize the necessity for evacuation. Flood Hazard Maps are expected to play a major role in settling these issues.

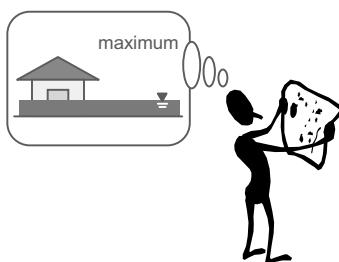
In view of the relationship between flood evacuation and Flood Hazard Maps, there are several steps of roles of the Flood Hazard Maps:

- 1) The first role of the Flood Hazard Map is to function effectively as an evacuation manual during a flood occurrence. The residents can confirm the safe refuge and safe evacuation route through the maps and attached explanation. In the cases of the floods at Koriyama City in 1998 and Tajimi City in 2000, it was reported that the Flood Hazard Maps were of great use as an evacuation manual.
- 2) The second role of the Flood Hazard Map is to provide the respective households with information on the flood danger level of their own houses. The flood danger level is usually shown as inundation depth, which is expected to increase the residents' awareness of the necessity of evacuation.
On the other hand, the information shown on the Flood Hazard Map explicitly suggests several issues to be settled concerning the residents' understanding. These issues include the risk that residents might think of the flood danger level as unchanged information and not

understand the meaning of the information, which may result in an extremely dangerous situation.

- 3) The third role of the Flood Hazard Map is to offer the residents an incentive to realize the fierceness of a flood, and how to properly protect themselves from the flood disaster. The residents are expected to fully understand that the information shown on hazard maps presents merely one result out of many possible scenarios that might occur around them. They are requested to decide themselves what actions should be taken to protect their families' lives during a flood occurrence, in correspondence with the designated scenario as well as unexpected situations beyond the scenario. The Flood Hazard Maps therefore work as preliminary instructive materials.

If Flood Hazard Maps are simply distributed among the local residents, without any educational activities, they can not fulfill their role. The residents will not be aware of the importance of Flood Hazard Maps, and will consequently throw them away. To fulfill their role, educational activities using hazard maps as teaching materials, are essential. The local residents should be encouraged to actively participate in the development of Flood Hazard Maps through discussions with the relevant local municipality staff on what actions should be taken during a flood occurrence.



Concluding Remarks

In Japan, the importance of Flood Hazard Maps has undoubtedly been recognized in recent years, and now the preparation of the maps is progressing in a positive direction. It has not been long since their preparation began, and yet various efforts are devoted to producing more advantageous and more effective maps.

The experience of producing Flood Hazard Maps in Japan is hereupon briefly introduced. The respective staffs of the local municipalities involved are highly expected to make their utmost efforts, with marked enthusiasm, in preparing reliable and effective Flood Hazard Maps.