

6. Effectiveness of Flood Hazard Map

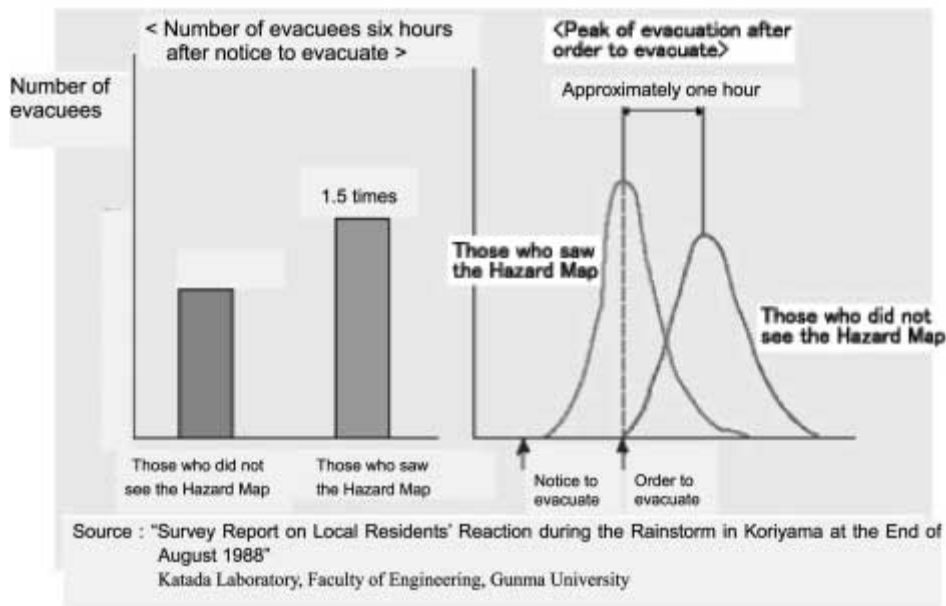
In Japan, the effectiveness of Flood Hazard Maps has already been verified in several cases. The first case was the flooding of the Abukuma River in the Tohoku district in August 1998. The city of Koriyama is located in the middle reach of the Abukuma River, and the Flood Hazard Maps had been produced and distributed among the local residents well before the occurrence of the flood.

Flooding in Koroyama City, August 1998



According to the questionnaire survey conducted immediately after the flood, the effectiveness of the Flood Hazard Maps was satisfactorily verified as stated below:

- 1) The majority of the local residents referred to the locations of the refuges on the Flood Hazard Maps, and evacuated to the proper refuges.
- 2) The number of evacuees was 1.5 times more for those who referred to the maps than for those who did not.
- 3) Residents who referred to the maps commenced evacuation one hour earlier than those who did not.



The Flood Hazard Maps of the city of Koriyama were highly effective for the risk management of the city. In the process of producing the maps, the administrative staff in charge of river management for the city were astonished that the flood-prone areas ranged so widely, and that so many residents were scattered within the areas.

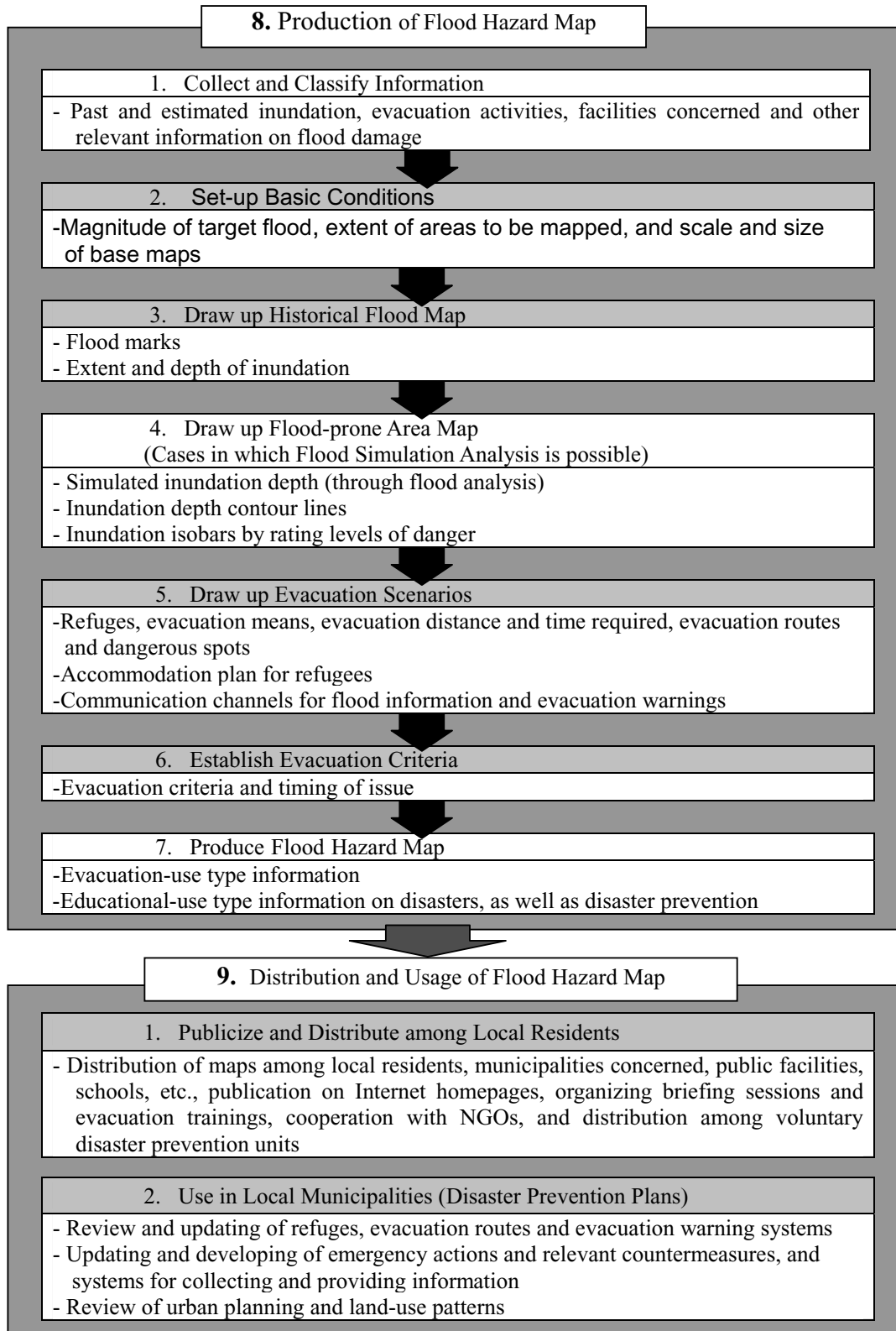
Crisis Management Effects



The necessity for establishing practical and detailed evacuation plans, such as the location of refuges and the pertinent timing of issuing advisory evacuation warnings, was fully realized, and the relevant actions were immediately put into practice and implemented. Such planning played an extremely important role in the effective and efficient evacuation of the local residents during the 1998 flooding. If the Flood Hazard Maps had not been prepared, the evacuation would not have been smooth.

7. Process of Production, Distribution and Usage of Flood Hazard Map

The chart below shows the key steps for production, distribution and usage of Flood Hazard Maps.



8. Production of Flood Hazard Map

8.1 Collection and Classification of Information

It is desirable to collect the following information for producing Flood Hazard Maps.

Table 3 Information to be Collected

Category		Description	
Base maps		-Base maps (topographic maps in scales of 1:2,500, 1:10,000 and 1:25,000) -General-purpose maps	
Information on inundation	Past inundation	-Spill overtopping and levee-break spots, inundated areas, inundated depth -Damage suffered -Hourly water level and hourly rainfall on major spots of the river	
	Estimated inundation	-Results of flood simulation analysis, such as flooded areas, inundation level, inundation depth, etc. -Flood diffusion process -Change of inundation depth with time elapsed -Flood flow velocity	
Information on evacuation	Areas to be evacuated	-Boundaries of jurisdictional districts and blocks, school districts and neighboring associations' territories	
	Number of residents to be evacuated	-Population by district -Households by district	
	Evacuation refuges	-Refuges -Public facilities (kindergartens, elementary schools, junior and senior high schools, colleges and universities, civic centers, assembly halls, gymnasiums, etc.)	
	Dangerous spots on evacuation routes	-Spots with potential steep-slope collapse, mud flows and debris torrents -Roads blocked by past inundation -Past landslide spots -Underpasses -Bridges	
	Communication channels	-Communication channels and appliances for use in emergency	
	Underground spaces	-Locations of underground spaces, and emergency communication system to users	
	Evacuation criteria	-Evacuation criteria -Past evacuation activities (issuance and communication channels of advisory and imperative evacuation warnings, refuges set up, number of refugees accommodated)	
	Facilities for those vulnerable in the event of emergency	-Number of residents to be assisted -Facilities for the vulnerable (hospitals, homes for the elderly and handicapped, and other facilities concerned)	
	Other information to be collected	Bodies and agencies concerned	-Local municipal facilities -Prefectural facilities -National facilities -Firefighting facilities -Police stations and call boxes
		Disaster prevention facilities and equipment	-Administrative wireless radio stations for disaster prevention, loudspeakers, sirens -Disaster prevention centers -First-aid stations, information-display facilities on flood damage -Water level stations and rain gauge stations
		Medical facilities	-Emergency hospitals -Public health centers -Hospitals, doctors' offices and clinics
Lifelines		-Water supply and sewerage plants, gas works, power plants and substations -Telecommunication facilities (telephone exchange offices)	
Social welfare facilities		-Homes for the elderly and handicapped	

8.2 Setting-up of Basic Conditions

The following basic conditions shall be set up beforehand, taking into consideration past inundation records and evacuation activities, as well as the existing circumstances of possible inundation areas and topographic features:

- Magnitude of target flood
- Extent of areas to be mapped
- Scale and size of base maps

(1) Magnitude of Target Flood

The target flood shall, in principle, be specified among the following floods:

- 1) Design flood
- 2) Largest flood previously recorded
- 3) Largest flood occurring once in several years

However, in the many areas where flood analysis has not been sufficiently conducted, it is admissible to select from the largest flood recorded, historically severe flood, or the largest flood occurring once in two years.

(2) Extent of Areas to be Mapped

The extent of areas to be mapped shall, in principle, be the entire areas of the local municipalities. If the potential flood areas are only a part of the municipalities, these areas and their outskirts shall be properly mapped.

The neighboring territories shall be integrally incorporated and produced in the map when the potential flood areas extend to neighboring municipalities. Evacuation to other municipalities shall be planned and incorporated accordingly.

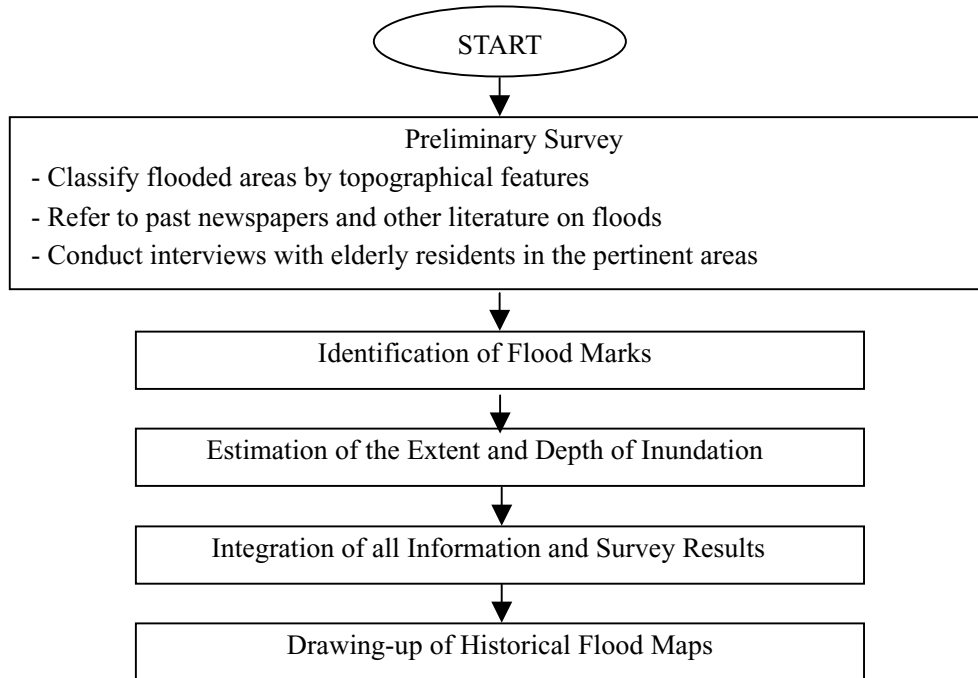
(3) Scale and Size of Base Maps

The standard scale of base maps shall be 1/10,000 to 1/15,000 in order to enable identification of not only individual houses, but also evacuation routes and extent of inundation. Topographic maps of 1/25,000 to 1/50,000 are generally undesirable because they do not allow identification of individual houses.

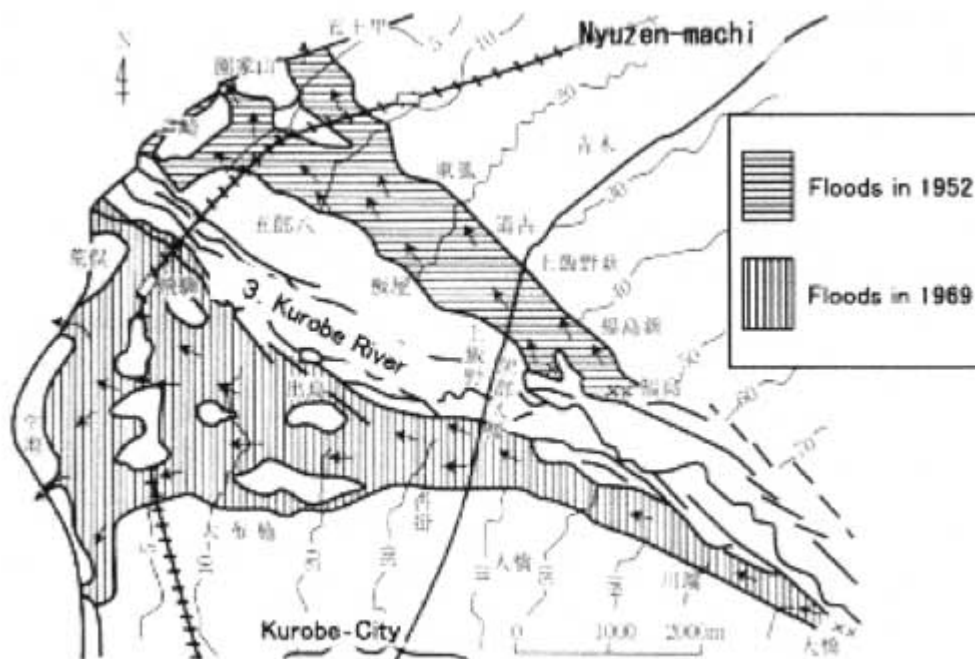
The standard size of base maps shall be A0 to A1. If these sizes are not appropriate, specify alternate appropriate sizes, taking into consideration relevant factors such as proper scale, number of subdivided maps, necessary cost, ease of use, etc.

8.3 Drawing-up of Historical Flood Map

Historical Flood Maps are to be drawn up immediately following flooding.



- Example of Historical Flood Map
The Kurobe River floods of 1952 and 1969



Source: Kurobe River Alluvial Fan Story, Institute of Kurobe River Alluvial Fans