

Flood and Sediment Disaster

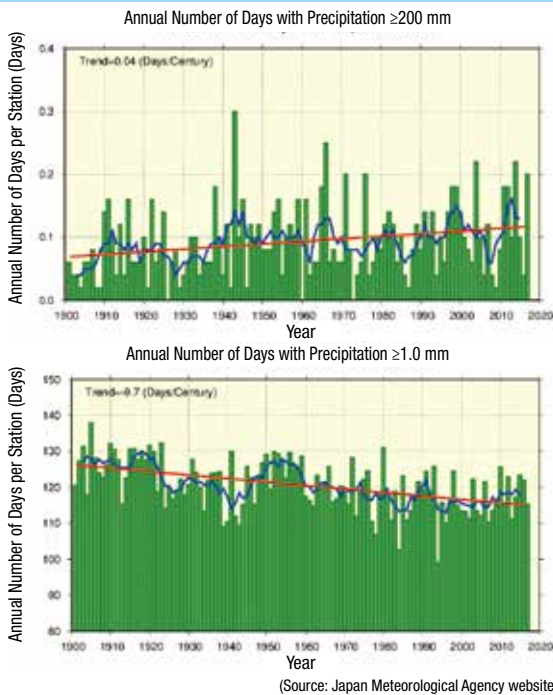
May 2018

Disaster Management Bureau, Cabinet Office

Disasters caused by flood and sediment frequently occur almost every year. Such risks would be increasing due to the climate change caused by global warming. However, the damage of flood/sediment disasters can be reduced by understanding its risk correctly, and preparing against it appropriately at home and in communities. People can protect their own lives by making actions unemotionally and properly against the danger. This brochure provides the insights for “preparedness” and “response” to flood/sediment disasters.

1. What is the risk of heavy rain?

The risk of heavy rain is increasing due to climate change.



Global warming has been ongoing. According to the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC), all scenarios, regardless of future emissions of greenhouse gases, forecast a rise of global average temperature towards the end of the 21st Century and increasing risk of the impact of climate change.

In Japan, heavy rainfall events beyond 100 mm a day or 200 mm a day has been increasing, while rainfall events beyond 1 mm a day has been decreasing. If the relatively high level of greenhouse gas emission continues in the future, it is estimated that the frequency of short-duration downpours will be increased in every region.

Recent major flood/sediment disasters

2014	July 6 - 11	Typhoon 8 in 2014
	July 30 - August 11	Typhoons 11 and 12 in 2014
	August 15 - 26	Prolonged heavy rain in 2014
	August 20	Heavy Rain in August 2014 (Hiroshima Sediment Disaster)
2015	July 16 - 18	Typhoon 11 in 2015
	August 22 - 26	Typhoon 15 in 2015
	September 9 - 11	Kanto/Tohoku Heavy Rain in September 2015
	September 27 - 28	Typhoon 21 in 2015
2016	June 20 - 21	Heavy rain in western Japan in 2016
	August 16 - 31	Typhoons 7, 9, 10 and 11 in 2016
	September 1 - 5	Typhoon 12 in 2016
	September 6 - 7	Typhoon 13 in 2016
	September 16 - 21	Typhoon 16 in 2016
	September 30 - October 5	Typhoon 18 in 2016
2017	June 30 - July 10	Seasonal rain front in 2017, Typhoon 3 in 2017 and the Northern Kyushu Torrential Rain in July 2017
	August 3 - 9	Typhoon 5 in 2017
	September 13 - 18	Typhoon 18 in 2017
	October 21 - 23	Typhoon 21 in 2017
	October 27 - 30	Typhoon 22 in 2017

* The Office for Information and Countermeasure was set up in the Cabinet Office, or fatalities/missing persons were reported.
* Descriptions in red indicate relatively significant damage.

The concentration of population and buildings, accumulation of various functions in urban areas and large scale, complicated use of underground spaces, resulting from economic growth, may increase human casualties and property damage due to flood and sediment disasters. This will require considerable cost and time for recovery and reconstruction.

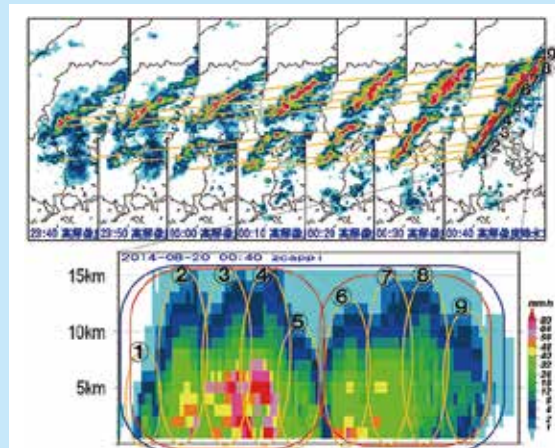
In recent years, flood/sediment disasters causing major damage have occurred successively in various regions of Japan, such as sediment disaster caused by heavy rain in Hiroshima City in August 2014, Kanto/Tohoku Torrential Rain in September 2015 and the Northern Kyushu Torrential Rain in July 2017.

Heavy rain leading to flood and sediment disasters is caused by various factors.

Linear precipitation system causing the Hiroshima Sediment Disaster

A phenomenon whereby cumulonimbus clouds occurring continuously in a windward direction move leeward in succession and trigger torrential rain is called the "back building phenomenon," because they resemble a series of buildings. The phenomenon continues unless the factors causing water vapor and rising air current are disappeared, or the wind moving the cumulonimbus clouds changes. Then, the cumulonimbus clouds line up to form a "linear precipitation system."

Back building phenomenon in the 2014 Hiroshima Sediment Disaster



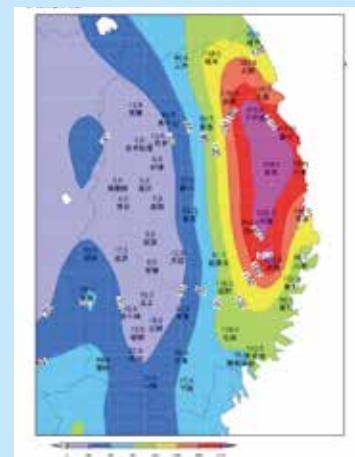
Upper figure: Time series precipitation intensity distribution by live High-Resolution Precipitation Nowcast (23:40 August 19 - 00:40 August 20)

Lower figure: Vertical cross-sections of the line segments in the upper figure (00:40 August 20)
Yellow ellipses indicate individual cumulonimbus; two red ellipses indicate cumulonimbus clusters of overlapped individual cumulonimbus clouds

Heavy rain due to typhoon

Clouds surrounding the typhoon will cause heavy rain over a wide area. Clouds hitting a mountainous area or a slow-moving typhoon are particularly likely to cause prolonged heavy rain in the same area, leading to serious damage.

Total precipitation in Iwate Prefecture caused by Typhoon 10 in 2016 (00:00 August 29 - 12:00 August 31)



Rain that triggers these meteorological disasters **cannot necessarily be forecast accurately in advance**, though forecasts have become more accurate than before. There are many cases where **there is little time from forecast to evacuation**, or **evacuation has already become difficult due to heavy rain** when residents decide to evacuate.

Once intense heavy rains occur ...

- The river may suddenly swell or flood.
- Inundation on/under the floor will occur or the roads will become flooded.
- Water which cannot be completely drained away by ditches and sewage may flow into underground shopping centers and basements.
- The ground loosens, causing debris flows and slope failures.

Inundation in Joso City, Ibaraki Prefecture (September 2015)



(Photo taken by MLIT on September 10, 2015)

- During September 9 - 11 in 2015, heavy rain hit the Kanto/Tohoku regions due to continuous inflow of moist air caused by Typhoon 17 and low atmospheric pressure transformed from Typhoon 18. In Joso City, Ibaraki Prefecture, roughly 200 meters of the Kinu River embankment was destroyed, resulting in tremendous damage such as building outflow, about 7,100 houses completely or half-destroyed, wide-ranging inundation and long-term flooding.

Around Hakata Station Chikushi Exit flooded due to overflow of Mikasa River (July 2003)



(Source: Ministry of Land, Infrastructure, Transport and Tourism website)

- Due to torrential rains at the end of the rainy season, hourly and daily rainfall amounted to 104 mm (16:50) and 315 mm respectively in Dazaifu City, located upstream of Mikasa River on July 19, 2003, both of which were record figures. Accordingly, Mikasa River flooded downstream, causing significant damage, particularly in the vicinity of Hakata Station and impacting significantly on the Japan Railway and subway network for an extended period.

- Intense heavy rains attacked Asakita, Asaminami and Nishi wards in Hiroshima City for several hours from nighttime on August 19 to dawn on August 20 in 2014. The intensive downpour triggered numerous debris flow and landslides, causing tremendous damage, including 76 fatalities and approximately 400 completely or half-destroyed houses; mainly in the residential area adjacent to the steep slope.

The sediment disaster in Hiroshima (August 2014)



(Source: White Paper on 2015 Disaster Management)

- From July 5 to 6, 2017, total precipitation peaked at over 500 mm in northern Kyushu, causing record 24-hour precipitation in Asakura City, Fukuoka Prefecture and Hita City, Oita Prefecture. This heavy rain resulted in 40 fatalities and 2 missing persons mainly in mountainous areas as well as housing damage, such as completely or half-destroyed houses and inundation above floor level.

Asakura City damaged in the Northern Kyushu Torrential Rain (July 2017)



(Source: Photo taken by Cabinet Office)

Protecting yourself from disasters requires understanding and preparedness. In particular for disaster management leaders and residents in the community, this leaflet introduces the necessary knowledge and emergency supplies as well as daily collaboration with the community, in order to protect residents from flood/sediment disasters.

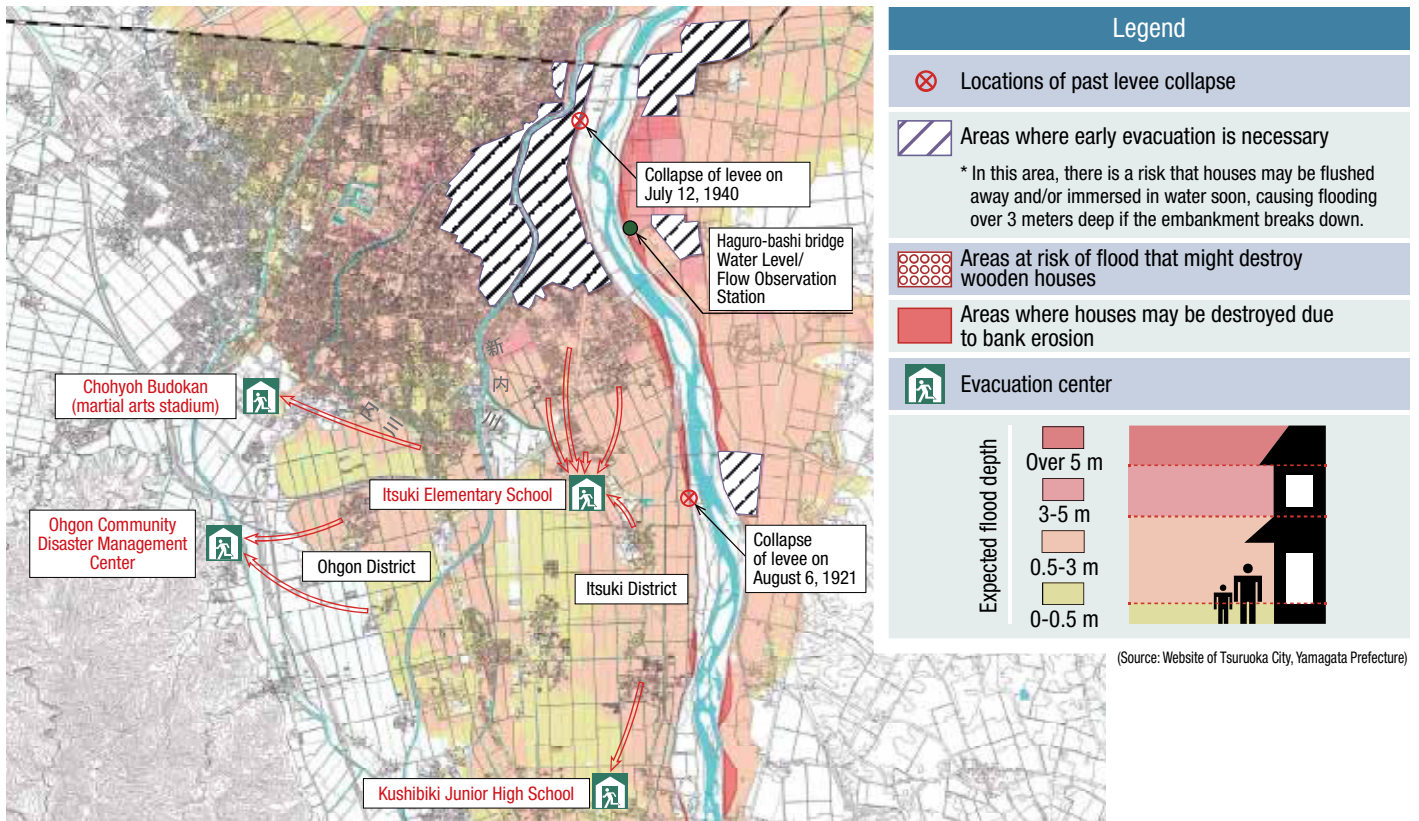
2. What are the risks?

Protecting yourself from flood and sediment disasters requires understanding the risk of these disasters in the community.

Hazard map

The hazard map shows the expected damage areas by forecasting the damage caused by flood, sediment and other natural disasters. The map shows such information as the areas at risk of damage from disaster, the extent of damage and evacuation routes/sites. Note, however, that damage may occur at places not designated as risk area on the hazard map, or at a scale larger than the information on the hazard map.

Example of a flood hazard map

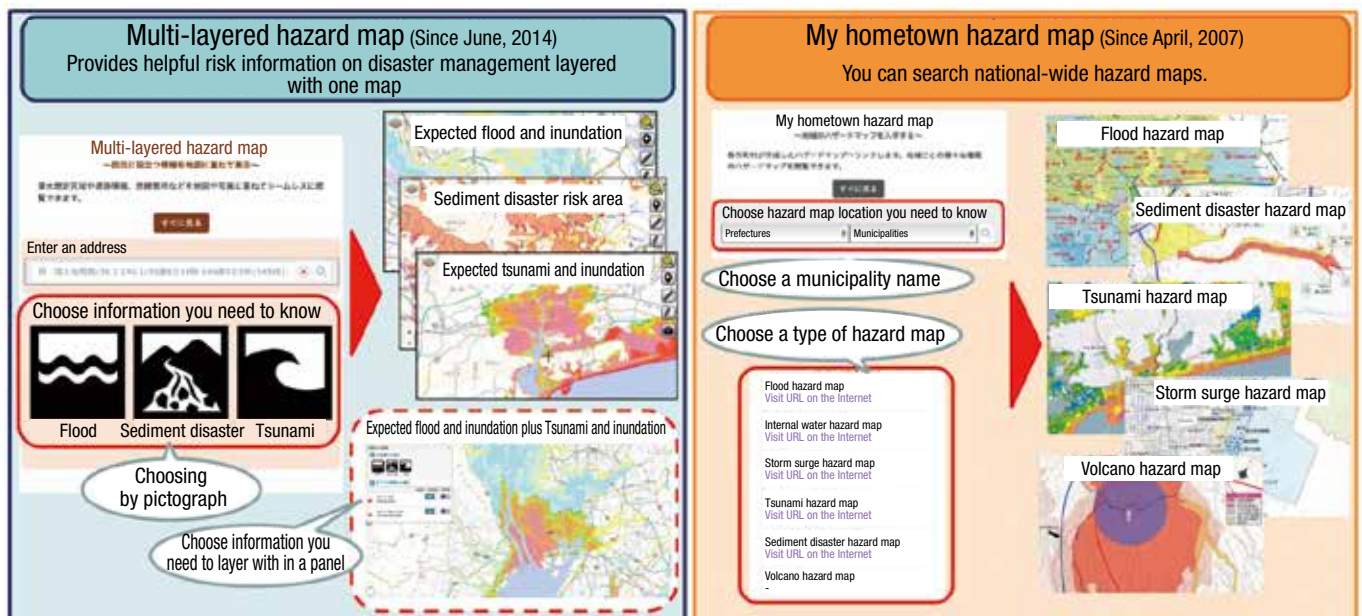


(Source: Website of Tsuruoka City, Yamagata Prefecture)

The hazard map of your city can be obtained from the disaster management bureau of the municipality. The Hazard Map Portal Site of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT)* allows all citizens to obtain the required hazard map by choosing the municipality and type of map.

* Since it may take time to update the Portal site with the latest information, please contact the municipality for the latest version of maps.

MLIT hazard map portal site (This site written in Japanese only)



<https://disaportal.gsi.go.jp/>

Sediment disaster hazard zone

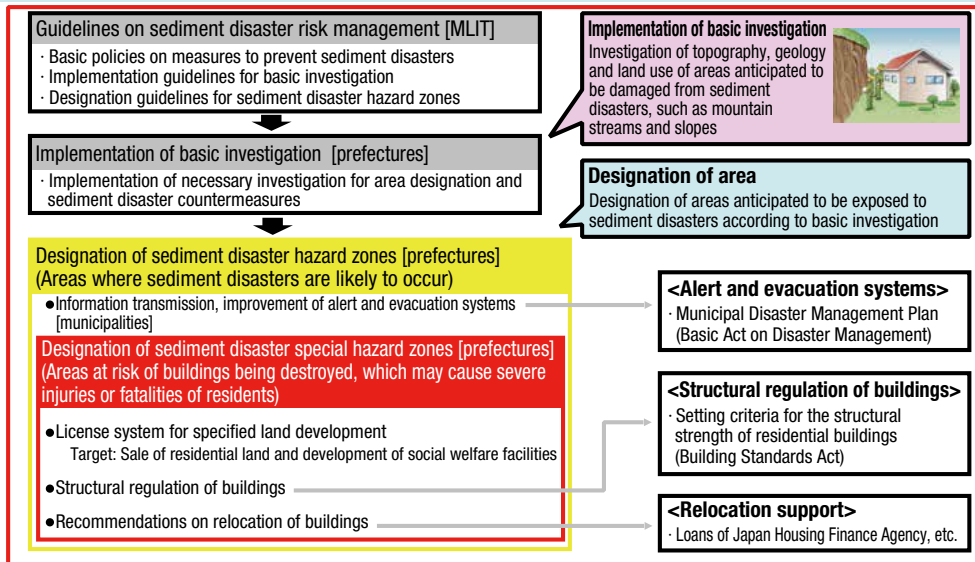
Areas where sediment disasters are likely to occur are designated as sediment disaster hazard zones by the prefectural government. According to the amendment of the Sediment Disaster Prevention Act in 2014, it is now mandatory for prefectural governments to publicize the results of basic investigation and a corresponding goal was set to complete the basic investigation by the end of FY2019.

Outline of the Sediment Disaster Prevention Act

The designation of sediment disaster hazard zones is publicized on the relevant prefecture's website.

The Sediment Disaster Prevention Act* is intended to promote non-structural measures to protect people's lives from sediment disasters, including the dissemination of information on areas potentially endangered by sediment disasters, improvement of alert and evacuation systems, restriction of new housing and land development and promotion of the relocation of existing houses.

* Official name: Act on Promotion of Sediment Disaster Countermeasures in Sediment Disaster Hazard Areas



(Source: MLIT)

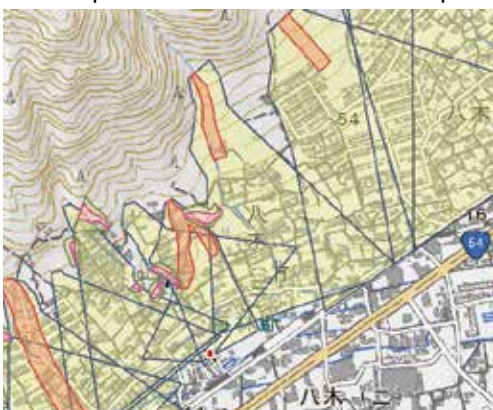
[Sediment disaster hazard zones (Yellow zones)]

Areas where injuries or fatalities among residents are anticipated to occur in the event of the concentrated steep slope failures, and the risk will be widely informed and alert and evacuation systems provided.

[Sediment disaster special hazard zones (Red zones)]

Areas where damage to buildings is anticipated causing serious injuries or fatalities among residents in the event of concentrated steep slope failures, and a permit system for specified development and structural regulations of buildings will be implemented.

Example of a sediment disaster hazard zone map



(Source: Sediment Disaster Portal Hiroshima)

Slope failure	Landslide	Debris flow
The phenomenon whereby the part right under the surface of the slope becomes loose due to the penetration of rainwater and/or earthquake, leading to a sudden slope failure. Once underway, the slope is disrupted very quickly, so if it occurs near housing areas, many people may be unable to escape, often leading to fatalities.	The phenomenon whereby all or part of a slope slowly subsides due to the influence of groundwater and gravity. Given the huge volume of soil mass involved, they cause tremendous damage.	The phenomenon whereby stones and earth/sand on a mountainside/river bed are swept away downstream at a stroke by ongoing extended rain or intense heavy rain. The debris flows at a speed of 20 to 40 km/h; destroying houses and fields instantly.
Slope failure precursors <ul style="list-style-type: none"> - Cracking in cliffs - Pebbles continuously falling - Water gushing from a cliff - Stop of spring water - Spring water becoming turbid - Ground rumbling 	Landslide precursors <ul style="list-style-type: none"> - The ground cracking or sinking - Water spewing from cliffs and slopes - Well and swampy water becoming turbid - Ground/mountain rumbling - Trees leaning - Cracks and steps being generated 	Debris flow precursors <ul style="list-style-type: none"> - Mountain rumbling - River water suddenly becoming turbid and driftwood beginning to mix - Smell of rotten soil - The river water level falling despite ongoing rain - Sounds of trees splitting and stones hitting each other

(Source: Website of Public Relations Office, Cabinet Office)

From past experiences, it is known that “precursors” can be felt just before the disaster really happens but the disaster itself has often been already happening by this time. Accordingly, it should be assumed that **there will be little time to evacuate**. Residents must take actions to evacuate immediately if sensing “something wrong.”

(About evacuation actions, see page 8)

3. What type of “information” is available?

Various forms of information on heavy rain are provided by various organizations such as the Japan Meteorological Agency.

Information for severe weather preparedness

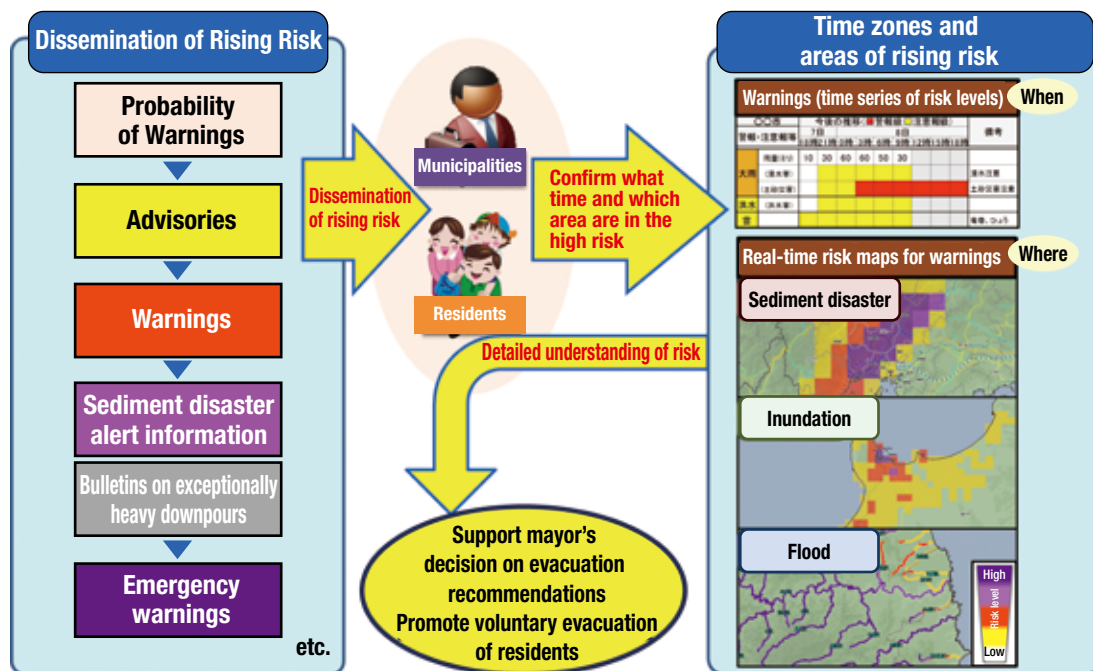
The Japan Meteorological Agency announces the information for severe weather preparedness such as weather warnings/advisories and bulletins to prevent or mitigate disasters caused by heavy rain and storms. To support the activities of disaster management related organizations and judgement of residents for ensuring their safety, JMA announces the “bulletins” a few days before such severe phenomena triggering disasters are expected to happen, then announces advisories, warnings and emergency warnings in each stage of the danger intensification.

Emergency warnings/warnings/advisories and weather bulletin are as follows:

Category of information for severe weather preparedness

Type	Category	Warning classes
Emergency warning	Heavy rain (sediment disasters, inundation), windstorms, snowstorms, heavy snow, high wave, storm surges	· Issued if there is significant likelihood that a serious disaster.
Warning	Heavy rain (landslide, inundation), flood, windstorm, snowstorm, heavy snow, high wave, storm surge	· Issued if there is a chance of a serious disaster.
Advisory	Heavy rain, flood, gale, gale and snow, heavy snow, high wave, storm surge, thunderstorm, snow melting, dense fog, dry air, avalanches, low temperature, frost, ice accretion, snow accretion	· Issued if there is potential for the development of serious adverse conditions.
Weather bulletin	<ul style="list-style-type: none"> · Real-time risk map · Weather bulletins on Heavy Rains · Typhoon Information · Hazardous wind watch · Bulletins on exceptionally heavy downpours · Probability of Warnings · Weather bulletin on long-term high temperature 	<ul style="list-style-type: none"> · Announced every 10 minutes to show where the risk of disasters is rising to supplement warnings. · Announced as required several days before a warning to attract attention, and amid ongoing warnings as necessary to explain the progress and prediction of the phenomenon and the points to be considered for disaster management. · Announced as required to show weather conditions not subject to warnings but likely to have significant impacts on society.

The key to issuing heavy rain warnings is to combine them with the relevant real-time risk maps for collective use of the two. Specifically, when a heavy rain warning or sediment disaster alert information is announced, **it is important for residents to ensure their safety by checking when and where the risk is expected to increase by the real-time risk map and being fully aware of the danger approaching the community.**



Emergency warnings/warnings/advisories

Once a warning level phenomenon occurs, there is a danger of fatalities. **A warning is to be announced approximately 3-6 hours in advance to the expected happening of warning level phenomenon which may cause serious disasters.** Also, when a warning level phenomenon is expected to occur about 6 hours later or even later, an advisory, which is likely to be replaced by a warning, is to be announced before announcing the warning. For instance, when a warning level phenomenon is expected to occur on the dawn of the following day, the advisory comes with an indication of “High possibility of becoming a ○○ warning by dawn”.

Bulletins on exceptionally heavy downpours

Bulletins on exceptionally heavy downpours is announced by the Japan Meteorological Agency after a heavy rain warning is issued, in order to inform that **the rainfall is at levels rarely observed and may cause sediment disasters, inundation and flood in small and medium rivers.** The observation points and municipalities where heavy rain was observed are specified clearly in this announcement. It is possible to check where the disaster risk is actually rising by referring to the “real-time risk map (sediment disaster, inundation, or flood).”

3. What type of "information" is available?

River Flood Information

MLIT publicizes real time water level information of major rivers on its website.



In main rivers ...

Flood Warnings and Advisories for designated rivers

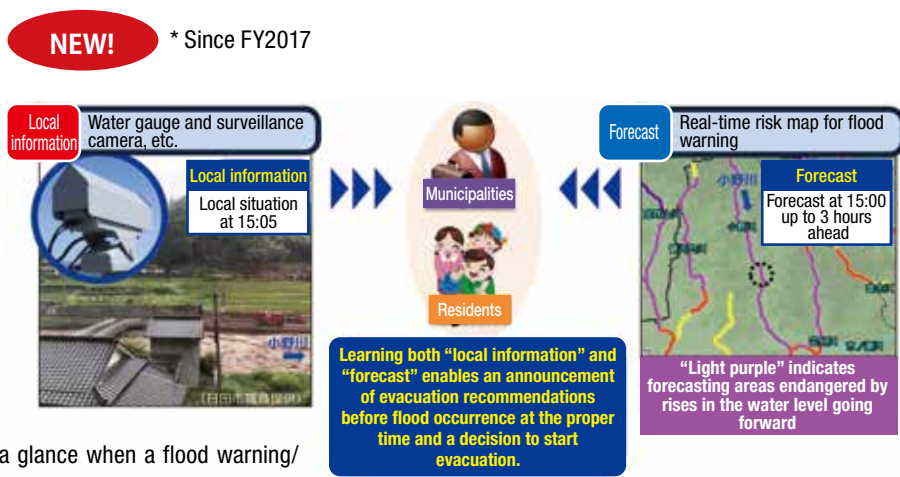
For helping residents' evacuation, the Japan Meteorological Agency, in collaboration with the MLIT and prefectural agencies, forecasts flood of specific sections of rivers while indicating water levels and flow rates. The forecast comprises four types of information: information to call attention to flooding, information to provide a warning on flooding, information on flood hazard, and information on flood occurrence. Each information is announced with the name of the river such as "information to call attention to the ○○ river flooding" or "information to provide a warning on the △△ river flooding."

Title of flood forecast (type)	Criteria for announcement	The stage that the action of municipalities and residents is requested
Information on the ○○ River flooding occurrence (Flood Warning)	Occurrence of flood (level 5) (Forecast of flood water*)	Stage requesting attention to flood.
Information on the ○○ River flood hazard (Flood Warning)	Water having risen to the hazardous water level (level 4).	Flood may occur any time soon. Take responses to the occurrence of flood such as evacuation (Evacuation recommendations)
Information to provide a warning on the ○○ River flooding (Flood Warning)	The water level is estimated to reach the hazardous water level (level 4), or reached to the evacuation warning water level (level 3) and estimated to rise further after a certain period of time.	Stage requesting attention to the occurrence of flood, including preparations for evacuation (Prepare to evacuate and start evacuating elderly and other persons requiring special care)
Information to call attention to the ○○ River flooding (Flood advisory)	The water reached the flood alert level (level 2) and is estimated to rise further	Stage of being careful about the occurrence of flood

* Flood forecast
According to the amendment of the Flood Control Act and the Meteorological Service Act in July 2005, areas at risk of flood and the water depth in the area after the adjacent river overflows are included in the forecast, in addition to the water level and flow rate of the time when there is a risk of flood. As of March 2017, flood forecast is implemented in some parts of the Tone and Abukuma Rivers. (Source: Japan Meteorological Agency website)

Real-time flood risk map

The real-time flood risk map includes information on small and medium rivers that are not the target of flood forecast (rivers for which water level information is announced and others), that indicates the flood risk level of approximately 1km section each of the river by five levels in different colors on the map. As forecasts up to 3 hours ahead are updated every 10 minutes, it is possible to check which river is exposed to increased flood risk at a glance when a flood warning/advisory is announced.



In small and medium rivers ...

When the highest risk level "extremely dangerous" (dark purple) is indicated out of the 5 risk levels, it may become difficult to evacuate because the roads may already be covered in flood water. Also, given the exceptionally rapid rise in the water level of small and medium rivers, it is important to check the latest situations of the river with a water gauge and surveillance camera and promptly decide to commence evacuation when the "very dangerous" level (light purple) implying a further rise of water level appears.

High	Extremely dangerous
Very dangerous	("evacuation recommendations" if the water exceeds the flood alert level)
Warning	("prepare to evacuate and start evacuating elderly and other persons requiring special care" if exceeding the water exceeds the flood control team stand-by level)
Watch	
Low	Note the subsequent information

3. What type of “information” is available?

Sediment disaster alert information

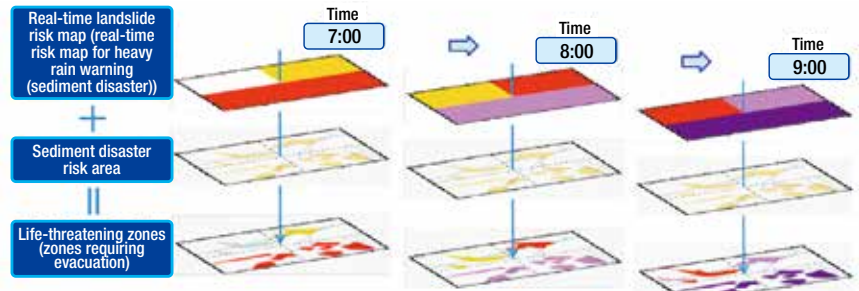
When a potentially life-threatening sediment disaster is likely to occur anytime soon, the prefectural government and weather station will jointly announce sediment disaster alert information to help municipal mayors issue evacuation recommendations and residents decide when to start evacuation. In municipalities where sediment disaster alert information was announced, it is possible to check details of rising risk areas with the real-time landslide risk maps.

Real-time landslide risk map

The real-time landslide risk map indicates the risk of sediment disaster due to heavy rain by five levels with difference colors for each 5 kilometer square area on a map. The forecast is updated every 10 minutes and it is possible to check at a glance where the risk is rising when a heavy rain warning (landslide) or sediment disaster alert information is announced.

When the highest risk level “Extremely dangerous” (dark purple) is indicated out of the 5 risk levels, the sediment disaster risk area/sediment disaster hazard zone is in an extremely dangerous situation comparable to previous cases of serious sediment disaster. This means it is no wonder that life-threatening sediment disasters have occurred by that time. Accordingly, considering the time taken for evacuation, the risk levels of “Very dangerous” (light purple) and “Warning” (red) are displayed based on forecasts up to 2 hours ahead.

People living in the sediment disaster risk area/sediment disaster hazard zone are recommended to evacuate as early as possible. Elderly people in particular are required to start evacuation when “Warning” (red) emerges at the latest, while residents in general are required to do so when “Very dangerous” (light purple) appears at the latest. Moreover, evacuation should be completed before “Extremely dangerous” (dark purple) emerges.



	Color indication	Evacuation information to be issued for sediment disaster risk areas, etc. in the Cabinet Office guideline	Examples of actions taken by residents in sediment disaster risk areas in the Cabinet Office guideline
Risk level	High	Extremely dangerous	Evacuation instruction (Emergency)
		Very dangerous	Evacuation recommendation
		Warning	Prepare to evacuate and start evacuating elderly and other persons requiring special care
		Watch	-
	Low	Note the subsequent information	-
			Complete evacuation
			Start evacuation promptly
			Start evacuating elderly and other persons requiring special care *
			Confirm real-time risk maps frequently
			Note the subsequent information

* In particular, in areas endangered by sediment disasters that occur abruptly and are difficult to forecast, residents are strongly recommended to leave for the designated emergency evacuation site against sediment disasters as soon as the evacuation preparations are completed. (Source: Japan Meteorological Agency website)

The relationship between evacuation information/actions and the information for severe weather preparedness announced in each phase is shown in the following table:

Weather conditions	JMA's Information	Municipality's responses	Resident's actions
Heavy rain is expected in a few days to 24 hours The possibility of heavy rain is strong	Possibility of warnings Bulletins on Heavy Rain	Increasing preparedness for disasters Confirming emergency contact of public officers Paying attention to subsequent weather changes	Confirming weather information and hazard maps Increasing preparedness for disasters Grasping dangerous places including sediment disaster risk areas or expected flooding zones, etc. Confirming evacuation sites and routes
12hr - 3hr before heavy rain Rain starts falling	Advisories High possibility of switching to warning Advisories Flood Warnings and Advisories for designated rivers	First disaster management system (Allocating contact personnel)	Confirming the latest information frequently
Rain becomes heavier	Warnings Flood Alert Information	Second disaster management system (Providing for issuing “Prepare to evacuate and start evacuating elderly and other persons requiring special care”)	Preparing for evacuating elderly and other persons requiring special care Elderly and persons requiring special care, living in dangerous places including sediment disaster risk areas or expected flooding zones, etc. and taking time to evacuate should prepare for evacuation
3hr - 2hr before heavy rain	Warnings Flood Warning Information	(If “Warning” appears on the real-time flood risk map, and it exceeds the Flood Control Team Stand-by water level) Prepare to evacuate and start evacuating elderly and other persons requiring special care	Starting evacuation of elderly and other persons requiring special care Elderly and other persons requiring special care, living in dangerous places including sediment disaster risk areas or expected flooding zones, etc. and taking time to evacuate should evacuate promptly to safe places outside dangerous zones including sediment disaster risk areas or expected flooding zones, etc. Residents who live in areas endangered by sediment disaster that occurs very suddenly and is difficult to forecast or areas along rivers endangered by sudden rises in the water level should evacuate as soon as preparations for evacuation are completed.
Torrential rain is falling	Landslide Alert Information Bulletins on Exceptionally Heavy Downpours Flood Risk Information	Third disaster management system (Enabling judgment to issue evacuation recommendations)	Starting evacuation promptly Start evacuation promptly to safe places as outside dangerous zones including sediment disaster risk areas or expected flooding zones, etc.
Torrential rain intensifies	Very dangerous Life-threatening disaster may occur anytime soon Flood Occurrence Information	(If “Very dangerous” appears on the real-time flood risk map and it exceeds the Flood Alert water level) Evacuation recommendations	Completion of evacuation Evacuation should be completed before falling into this situation
Heavy rain observed only once every few decades over a wide area	Emergency warning Unexceptionally abnormal situation which may be encountered only once every few decades	Fourth disaster management system (Enabling decision to issue evacuation recommendations) Evacuation instruction (Emergency) Disseminating emergency warning to residents Reconfirming areas subject to Evacuation instruction (Emergency)	Complete evacuation, in a prior stage, before the “Extremely dangerous” (deep purple) appears in real-time risk map.

(Source: Japan Meteorological Agency)

For more detailed explanation of residents' actions according to the color indications on the real-time risk map, please see the information/explanation pages below.

- Real-time landslide risk map: <https://www.jma.go.jp/jma/kishou/now/bosai/doshakeikai.html#d>
- Real-time flood risk map: https://www.jma.go.jp/jma/kishou/now/bosai/riskmap_flood.html
- Real-time inundation risk map: https://www.jma.go.jp/jma/kishou/now/bosai/riskmap_inundation.html

4. How to evacuate?

Once you notice the impending danger, you need to take appropriate evacuation actions.

When a disaster occurs or is likely to occur, the head of the municipality will issue evacuation recommendations as follows, according to the Basic Act on Disaster Management:

* Not necessarily issued step by step (in this order).

Prepare to evacuate and start evacuating elderly and other persons requiring special care

Persons requiring special care who take longer time to evacuate and their supporters are asked to leave for evacuation. Other people should prepare for evacuation, monitor subsequent information for severe weather preparedness and water levels and start evacuation voluntarily. In particular, people in the areas where sediment disaster is likely to occur abruptly and difficult to forecast, and areas along rivers endangered by sudden rises in the water level, people are strongly recommended to leave for the designated emergency evacuation site for the corresponding disaster as soon as they complete evacuation preparations.



Evacuation recommendations

Residents are asked to evacuate promptly to the designated emergency evacuation site for the expected disaster. In case residents decide that evacuation to the designated emergency evacuation site may be life-threatening, they need to evacuate to "a safe place in the neighborhood" or "secure indoor safety" as evacuation actions improving the possibility of survival.



Evacuation instruction (Emergency)

In an extremely dangerous situation where a disaster may occur any time soon, those who have yet to evacuate are asked urgently to do so to the designated emergency evacuation site corresponding to the expected disaster. In case residents decide that evacuation to the designated emergency evacuation site may be life-threatening, they need to evacuate to "a safe place in the neighborhood" or "secure indoor safety" as evacuation actions improving the possibility of survival.



When evacuation recommendations are issued, residents must take evacuation actions promptly. Note, however, that evacuation recommendations may not be issued in time in case of the sudden occurrence of a disaster. Even if no evacuation recommendations have been issued, residents should take evacuation actions if they sense danger. The important thing is to "make own decision."

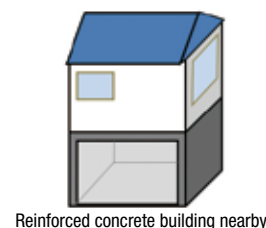
Leaving for evacuation means early evacuation to this place in principle.

- **"Designated emergency evacuation site"** (designated by municipalities)
 - Emergency evacuation site for to protect people's life from a disaster
 - Note that the site differs by hazard such as sediment disaster and flood
 - * People can evacuate not only to designated emergency evacuation sites but also to places where human casualties due to hazard are not anticipated to occur (e.g. relative's or friend's house) by making own decision.



In situations where residents cannot move due to heavy rain to the places where inundation is not anticipated to occur including designated emergency evacuation site...

- **"Safe place in the neighborhood"**
 - People may judge to take emergency evacuation to a "safe building in the neighborhood" (e.g. private apartments)
 - Therefore, it is necessary to check an appropriate evacuation site from ordinary time



In case it is dangerous to even go out ...

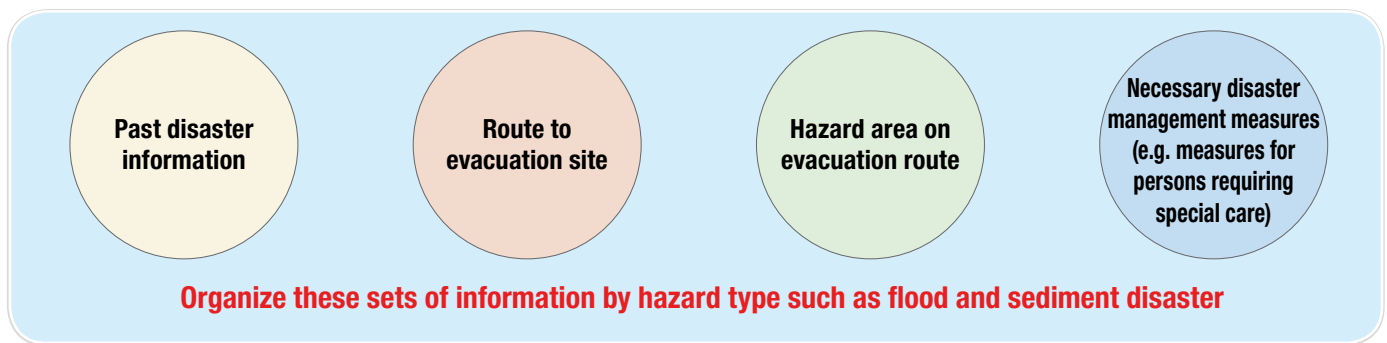
- **"Securing indoor safety"**
 - Move to a room as far away from the mountain as possible on the upper floor of the house



4. How to evacuate?

Disaster/Evacuation Card

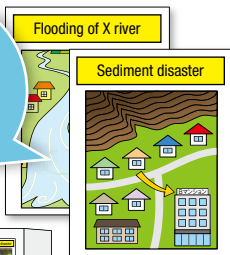
To prepare for evacuation in case of emergency, it is useful to make a “Disaster/Evacuation Card” to recognize in advance where to evacuate and other necessary information.



“Timetable” indicating the evacuation actions and alert of evacuation for each type of hazard

Disaster/Evacuation Card (●● district ××)

“My map” describing the information such as route to the evacuation site



Disaster	Evacuation center and site	Signs of evacuation
Sediment disaster	'A' elementary school ('B' apartment if it is impossible to go to the specified site)	Sediment disaster alert information
Flooding of X river	C Municipal Hall	Flood risk information

* Check what kind of information you need to pay attention to avoid being caught up in a disaster!

Source: Brochure entitled “Protect Yourself from Sediment Disasters!” (Cabinet Office (Disaster Management Bureau))

“Disaster/Evacuation Card” must be:

- * **Fixed in a prominent place such as the fridge door, or**
- * **Placed in the wallet and carried around.**

To properly evacuate ...

- Check in advance the location of the evacuation site nearby.
- Even if no evacuation recommendations are issued, pay attention to the information for severe weather preparedness to prepare for an early response.
- If evacuation is dangerous, it is also effective to stay in the upper floors of the building (vertical evacuation) instead of evacuating outdoors. (People would be easily carried away when walking in flowing water.)
- Persons requiring special care, such as the elderly people who cannot evacuate by oneself, take time to evacuate. They need to take evacuation actions at an early stage with the help of supporters. It is also necessary to care for the safety of supporters.

5. How to prepare?

No one knows when disaster may occur. Be prepared against the expected disaster by stockpiling emergency supplies, preparing items to take out, and purchasing insurance to avoid belated regret.

Importance of daily awareness and disaster preparedness

· Prepare items to take out.

In preparation for evacuation by a flood disaster, always buy a few more necessities than usually required and get ready to take them out together with valuables when heavy rain approaches.



Water and food

<Necessities>



Pocket radio

<To grasp at current situation>



Whistle

<In case of being confined>

· Confirm emergency contact points and meeting places among family members and relatives

Confirm how to check the safety of family members and relatives and where to meet them when disaster occurs among family members and relatives in ordinary times. Also, use services such as “Disaster Emergency Message Dial (171).”

Community cooperation (mutual support) is important

· For relief and evacuation in the event of large-scale disasters, the routine neighborhood relationship comes into its own.

· Residents can be familiar with disaster management initiatives in their community through events organized mainly by neighbors or self-governing associations. In participatory disaster drills, residents can also experience measures such as safety confirmation, rescue/relief, emergency feeding, evacuation actions, and livelihood at evacuation centers.

· To reduce the damage caused by disasters, the community relationship in ordinary times is important.

Utilization of insurance

In case a large scale disaster causes extensive damage to the house, it will be costly to repair and rebuild the house. Public support funds or donations from goodwill alone will not suffice for housing/living reconstruction. To smoothly rebuild housing/living, it is important to be prepared for disasters in a “self-help” manner, such as subscribing to insurance and mutual aid.

By subscribing to insurance/mutual aid compensating for the damage from storm/flood/sediment disasters, money will be paid according to the extent of damage. Note, however, that depending on the amount to be subscribed and the contents of the contract, the full cost to reconstruct the house may not be paid. The contract of insurance already taken out must be reviewed to confirm whether the insured coverage and contents suffice.

There are different types of insurance/mutual aid for disasters such as those which add compensation for disaster to the fire insurance (mutual aid) or include it in basic compensation. Ensure the compensation required by fully recognizing the disaster risk to the house.

Furthermore, regardless of the extent of building damage, household goods may be considerably damaged and need to be repurchased. House owners are recommended to prepare both for building compensation and for household property compensation.

In addition, the car owners are recommended to purchase a vehicle insurance that compensates for hydrological disasters.

Number/proportion of homeowner households enrolling in insurance/mutual aid (buildings only) (Cabinet Office tentative calculation)

With compensation for fire:

28.8 million cases (82%)

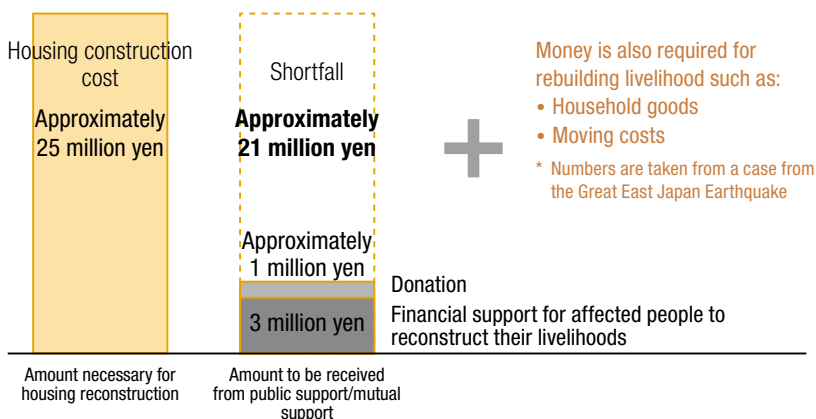
With compensation for flood disaster:

23.07 million cases (66%)

Compared to fire compensation, the rate of subscription for flood disaster compensation is still relatively low.

* Estimated by the Cabinet Office tentatively, based on data compiled by the General Insurance Rating Organization of Japan (aggregation of fire insurance contracts covering buildings (houses) of all insurance companies as of the end of FY2015) and data compiled by the Japan Cooperative Insurance Association Incorporated (aggregation of mutual aid contracts covering buildings (houses) of the National Mutual Insurance Federation of Agricultural Cooperatives, National Mutual Insurance Federation of Fisheries Cooperatives, National Federation of Workers and Consumers Insurance Cooperatives and Japan Life Co-operation League as of the end of FY2015, excluding contracts for which it is difficult to disaggregate data for houses only).

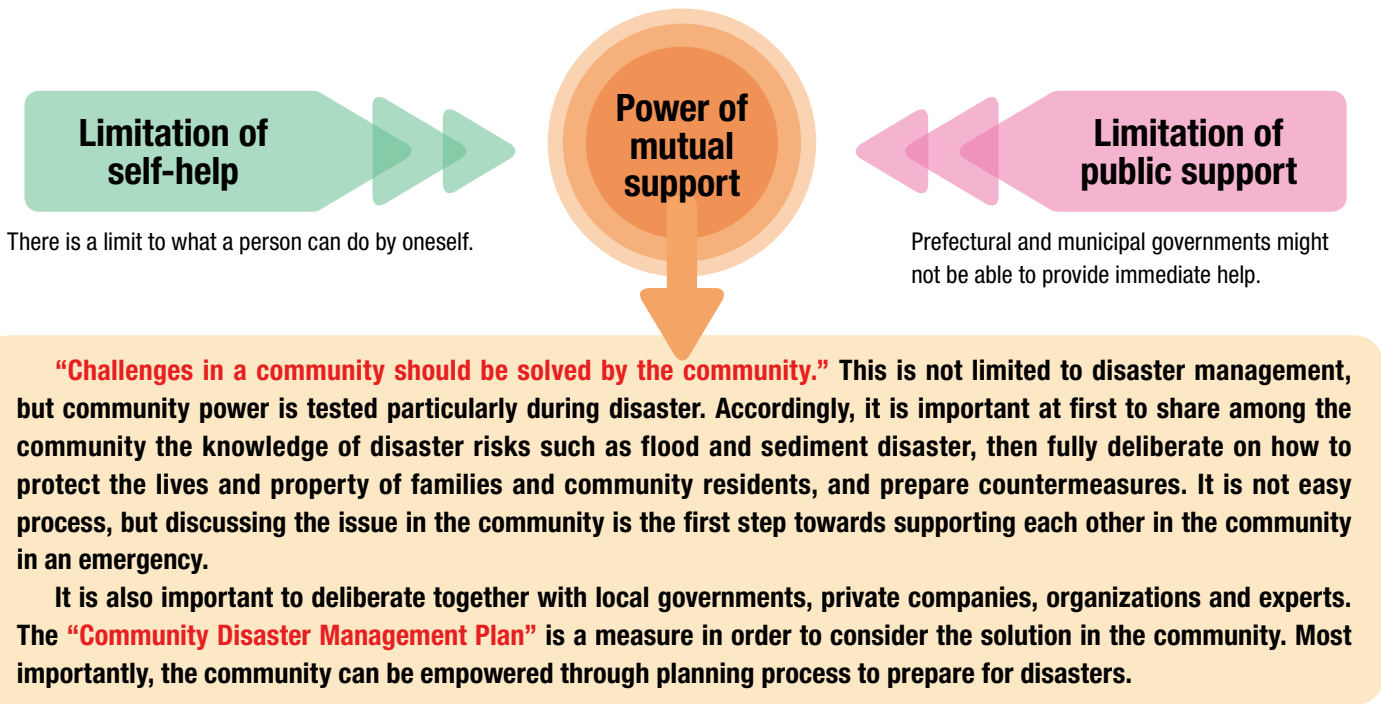
The reconstruction cost of completely destroyed house by the Great East Japan Earthquake amounted to about 25 million yen on average, while the cost covered by public funds was amounted only to about 4 million yen, even including goodwill donations.



According to the Disaster Relief Act, the municipality is responsible for emergency repairs of “half-destroyed” houses until an upper limit of 584,000 yen (as of April 1, 2018). Low interest loans based on the Finance System for Disaster Recovery Housing are also available for “partially destroyed” houses.

6. How to develop a community plan?

It is important to discuss and plan among community in advance over how to protect your family and neighbors from sudden flood and sediment disaster.



The Great East Japan Earthquake had people recognize how crucial it would be to link up self-help, mutual support and public support as countermeasures for large-scale region-wide disasters. Subsequently, the “Community Disaster Management Planning” System was newly established to promote mutual support in the community, subject to the amendment of the Basic Act on Disaster Management in 2013. The “Community Disaster Management Plan” is a plan concerning disaster management activities voluntarily implemented by local residents to improve mutual support of the community (implemented from April 1, 2014).

1. Local community based bottom-up plan

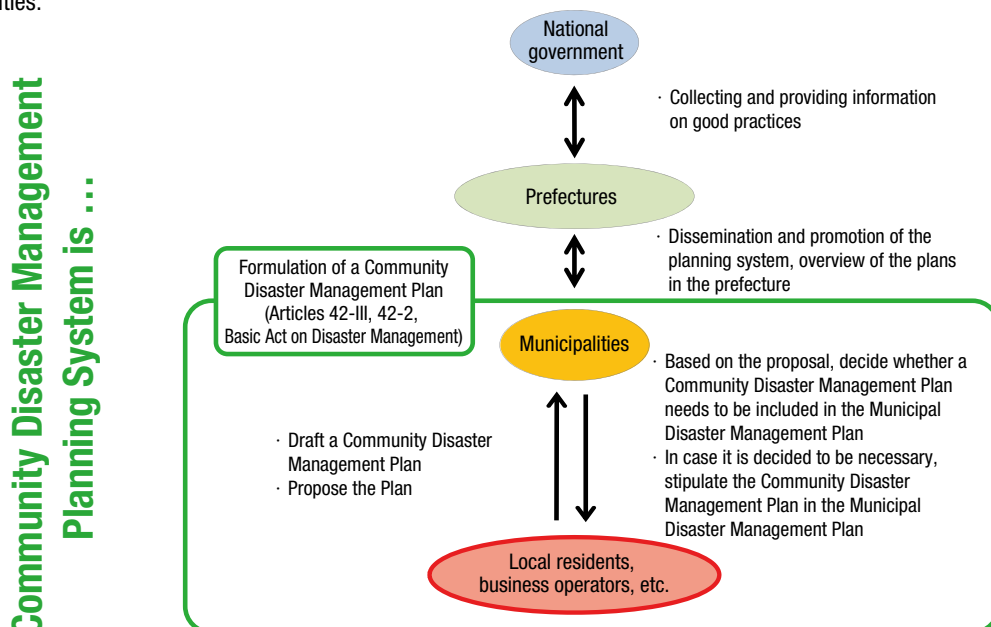
The “Community Disaster Management Plan” is a bottom-up plan on disaster management activities voluntarily performed by local residents. Furthermore, the plan (draft) formulated in this way can be proposed as part of the Local Plans for Disaster Risk Reduction.

2. Plan according to district features

The Community Disaster Management Plan can be designed according to the features of each district and the expected disasters. For instance, the formulating body of the plan, the organization responsible for disaster management activities, the extent of community (district) and the contents of the plan can be decided freely according to the features of the district, such as.

3. Plan to continuously improve community disaster management capability

It is important for local residents in a community to not only formulate a Community Disaster Management Plan, but also implement disaster management activities from ordinary times according to the plan, and continue such activities while periodically evaluating and reviewing the disaster management activities.



Naganuma District, Nagano City, Nagano Prefecture (model project in FY2014)

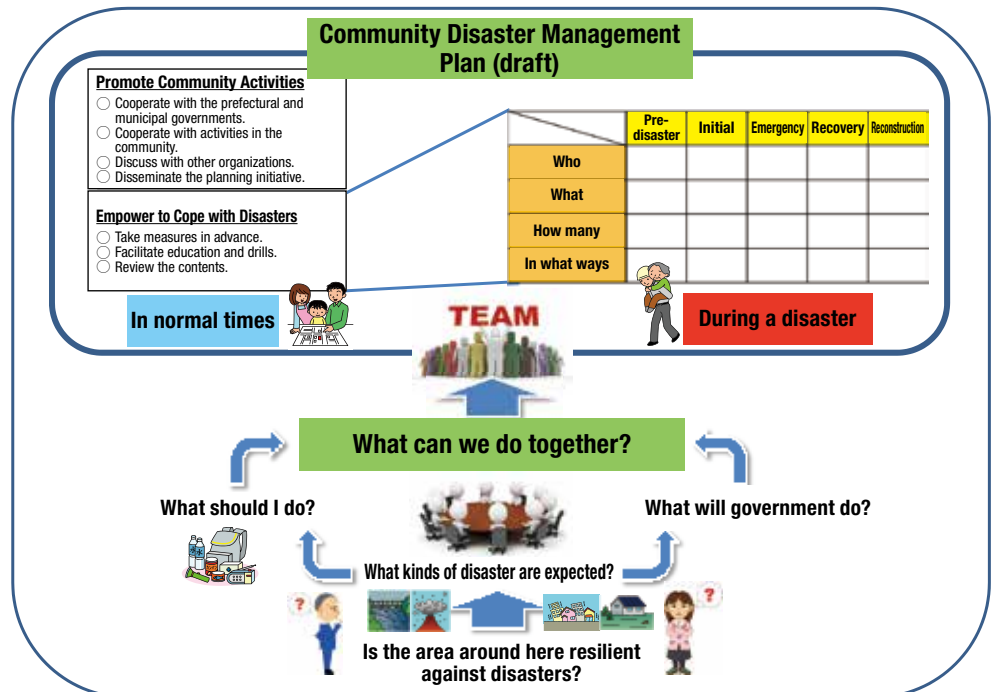
This district is in a flat, low-altitude zone located between Chikuma and Asa rivers, which are frequently affected by heavy rain disasters.

The local residents, in cooperation with the City government and River Office (national government), discussed among them and **set its own evacuation standards** based on the water level of the Chikuma River. Through the formulation of the Community Disaster Management Plan, the residents themselves agreed with the City government about their evacuation standards.



Significance of the Community Disaster Management Plan

- Resident enhance awareness on self-help and mutual support by deciding and sharing the rules of the district and conducting practical drills.
- The plan contributes to good relationships in community and more locally tailored urban development in the district through participatory planning process.



The Disaster Management Bureau of the Cabinet Office introduces guidelines for the community disaster management plan and model district projects on the website entitled a "Community Disaster Management Plan Formulated by Everybody."

<http://www.bousai.go.jp/kyoiku/chikubousai/index.html>

6. How to develop a community plan?

[Examples of community initiatives in the July 2017 the Northern Kyushu Torrential Rain]

In the July 2017 the Northern Kyushu Torrential Rain, evacuation recommendations were issued in Asakura City, Toho Village and Hita City based on the information for severe weather preparedness and the local situation in rapidly worsening weather conditions. Each of the local governments had also addressed disaster management in advance, in cooperation with residents' associations, taking advantage of the existence of local communities. The residents in the areas affected by this disaster had experienced the Northern Kyushu Torrential Rain in July 2012 and thus were highly aware of disaster management. They had formulated a voluntarily disaster management map in each district, prepared a list of persons requiring special support for evacuation as well as their supporters, and carried out evacuation drills. Accordingly, it is recognized that communication among the neighbors contributed to reduce the damage.

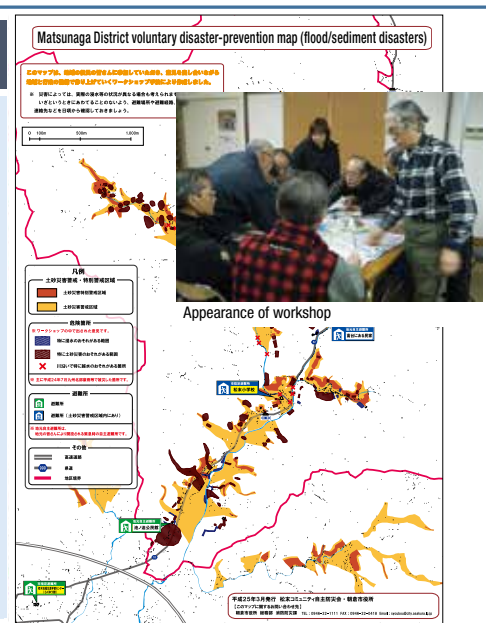
Affected Asakura City (July 2017)



<Initiatives in the community>

Asakura City (voluntary disaster management map)

- In Asakura City, work began in FY2011 to formulate a **“Voluntary Disaster Management Map”** for each district, and all districts completed formulation of the map by FY2014.
- **The map was formulated by the workshop method**, whereby board members of the community participated in the formulation process under **collaboration between the community and the prefectural and municipal governments**. The map was distributed to all households in the district.
- The map is utilized for disaster management at home and in the community, for example, to **confirm the evacuation site and route as well as contact information of families and neighbors** from ordinary times in order to avoid panic in case of emergency.

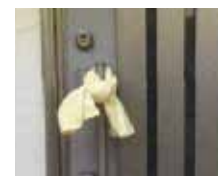


Toho Village (evacuation drills, assistance for persons requiring special care)

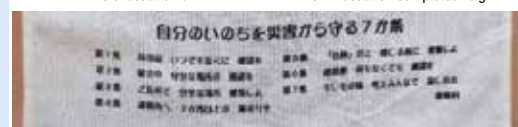
- An evacuation drill for villagers is conducted once a year in June to prepare for sediment disasters. Approximately 1,000 people, **about half of the villagers, participate in the drill.**
- Public support (what the village government does), mutual support (what the community does) and self-help (what individuals can do) were separately considered in advance. As soon as the “evacuation recommendations” were issued from the village government, they drilled supporters' assistance for **evacuation of persons requiring special care and confirmed evacuation routes and hazard area by through actual evacuation activities.**
- **Various ideas were devised for the drill**, including showing the “Evacuation completed” sign (yellow towel) on the house entrance to smoothly confirm that the evacuation of the residents had been completed.



The evacuation drill



The “Evacuation completed” sign



Distributed to each household “Evacuation towel” in which “7 Clauses for Evacuation” are written

避難行動要支援者支援計画 Evacuation Action Plan for Persons Requiring Special Support			
避難行動要支援者氏名	おんがけの義務者	緊急時の連絡先	備考
氏名	電話番号	住所	

“Persons requiring special care” and “Supporters” are listed up in advance

<Initiatives in cooperation with prefectural and municipal governments>

Example of initiatives to strengthen the system allowing evacuation recommendations to be issued without hesitation


- Publication of initiatives by Asakura City and Fukuoka Prefecture

- Role-play type drills were conducted jointly by Fukuoka Prefecture and Asakura City to issue and deliver evacuation recommendations and judge the start of evacuation for assumed sediment disasters caused by rain.
 - Local governments (officers)


Improvement of their capacities to judge and deliver information based on a wide range of information received, such as the capacity to decide the announcement timings of evacuation information to residents.
 - Local residents

Improvement of their capacities to gather information and make evacuation decisions enabling them to take appropriate evacuation actions in hazardous situations where sediment disasters are likely to occur.

Establishment of a system of issuing evacuation recommendations without hesitation



(Local government) Decision of whether to provide additional information to the residents based on the information displayed on the monitor



(Local residents) Decision of whether to evacuate based on the information displayed on the screen

In Hita City, Oita Prefecture, a river surveillance camera is set up, which presents the real time situation of rivers on its website.



Lessons learned from the Northern Kyushu Torrential Rain in the July 2017

- Residents need to confirm a **designated emergency evacuation site** in the neighborhood (or, if difficult, a voluntary evacuation site as a second-best solution) and grasp at **the evacuation site and route**.
- It is important for residents to **evacuate early by making own decision**, while taking into account the state of evacuation sites/routes through utilizing hazard maps or other means, in order to prepare for a possible lack of information from the prefectural and municipal governments.
- Because the situation of persons requiring support for evacuation differs depending on the timing – daytime on weekdays, nighttime on weekdays or weekends/holidays, **the methods to support the evacuation of these persons need to be decided in advance according to differing situations**. (This will reduce the risk of supporters themselves and consequently strengthen supporting capacity across the entire community.)
- Accordingly, residents are recommended to **discuss among community over a community plan in advance**. The plan should be made together with the prefectural and municipal governments and tailored to the actual circumstances of the community by taking into account the advice of experts*. With regard to small and medium rivers in mountainous areas in particular, little information is available and thus residents are recommended to consider how to gather information in cooperation with prefectural and municipal governments.
 - * Cooperation of specialists with technical knowledge about rivers and earth/sand is also important.
- It is important for **both residents and local government officers to jointly carry out evacuation drills** before the rainy season starts.
- For all that, DON'T forget that **unexpected disasters may also occur**.

[Information for emergency]

Weather warning/advisory (JMA)
<https://www.jma.go.jp/en/warn/>

Risk of sediment disaster (real-time landslide risk map) (JMA)
<https://www.jma.go.jp/en/doshamesh/>

Disaster prevention information on rivers (MLIT)
<https://www.river.go.jp/kwabou/ipTopGaikyo.do>

Real-time flood risk map (JMA)
<https://www.jma.go.jp/en/suigaimesh/flood.html>

Weather warning



Real-time Landslide Risk Map



Disaster prevention on rivers



Real-time flood risk map



[Information for ex-ante preparation]

MLIT Hazard Map Portal Site (MLIT)
<https://disaportal.gsi.go.jp/>

Sediment Disaster Prevention Act (MLIT)
<http://www.mlit.go.jp/river/sabo/linksinpou.htm>

Decision and dissemination of evacuation recommendation (Cabinet Office)
<http://www.bousai.go.jp/oukyu/hinankankoku/index.html>

Guide for Municipalities' Response to Flood Damage (Cabinet Office)
<http://www.bousai.go.jp/taisaku/chihogyomukeizoku/index.html>

Collection of cases on Disaster/Evacuation Card (Cabinet Office)
http://www.bousai.go.jp/oukyu/hinankankoku/saigai_jireisyu.html

Protect Our House from Flood Disaster and Earthquake
 Recommendation for taking out an insurance or mutual aid (Cabinet Office)
<http://www.bousai.go.jp/kyoiku/hokenkyousai/index.html>

Community Disaster Management Plan Formulated by Everybody (Cabinet Office)
<http://www.bousai.go.jp/kyoiku/chikubousai/index.html>

Countermeasures for storm and flood disasters (Cabinet Office)
<http://www.bousai.go.jp/fusuigai/index.html>

Enhancement of preparedness for disaster management during rainy and typhoon seasons (Cabinet Office)
http://www.bousai.go.jp/kohou/oshirase/pdf/20170531_01kisyu.pdf

Disaster management and risk management e-college (Fire and Disaster Management Agency)
<http://open.fdma.go.jp/e-college/>

Hazard map



Sediment Disaster Prevention Act



Evacuation recommendations



Flood disaster (guide)



Evacuation card



Insurance (Cabinet Office)



Community disaster management



Countermeasures for storm and flood disasters



Other portal sites are also available



Production: Office in Charge of Disaster Preparedness, Public Relations and International Cooperation, Cabinet Office (Disaster Management Bureau)
 03-3502-6984



<https://bosaijapan.jp/>

The focused readers of those who is developing plans to prepare for flood and sediment disasters in the community as well as those taking the community's initiative in supporting the evacuation of local residents when a disaster is anticipated to occur or has actually occurred. It is recommended to use this brochure as a trigger to prepare for disasters in community.