

Sediment-related Disaster Warning and Evacuation Guidelines

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**Sabo (Erosion and Sediment Control) Department
Ministry of Land, Infrastructure, Transport and Tourism**

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For effective use of the Guidelines

1. Background

In recent years, approximately 1,000 sediment-related disasters have occurred every year in different parts of Japan due to typhoons and localized torrential downpours, which have claimed many human lives.

Problems with the warning and evacuation system concerning these sediment-related disasters include: (1) Evacuation advice is not issued frequently before disasters occur, (2) Not many residents evacuate even if evacuation advice is issued, (3) Shelters are struck by sediment-related disasters and (4) People requiring assistance during a disaster are more likely to be affected by disasters.

The Law for Promotion of Sediment-related Disaster Prevention in Sediment-related Disaster Hazard Areas (Law No. 57 of May 8, 2000; hereafter "Sediment-related Disaster Prevention Law") was enforced in April 2001, which stipulates that municipalities should provide for in the municipal plan for disaster prevention major issues of the warning and evacuation system required to prevent sediment-related disasters for areas designated as sediment-related disaster hazard areas.

In addition, in September 2006, the Minister of Land, Infrastructure, Transport and Tourism changed the basic guidelines for preventing sediment-related disasters to further address the problems concerning sediment-related disasters of recent years for the enhancement of the warning and evacuations system.

2. Purpose

For the purpose of helping municipalities with the establishment of a warning and evacuation system, the Ministry of Land, Infrastructure, Transport and Tourism has created the Sediment-related Disaster Warning and Evacuation Guidelines, which outlines the concepts of collection and communication of information, issuance of evacuation advice, establishment and operation of shelters, support for people requiring assistance during a disaster, prevention of secondary disasters, improved awareness of disaster prevention, etc. as issues of special note concerning sediment-related disasters.

These Guidelines have been prepared based on the discussion in the "Exploratory Committee on the Sediment-related Disaster Warning and Evacuation Guidelines" consisting of experts.

3. Use of the Guidelines

These Guidelines are offered for extensive use by voluntary disaster prevention organizations, residents, etc. in addition to people in charge of disaster prevention of municipalities as a guide to the establishment of a warning and evacuation system.

For areas not designated as sediment-related disaster hazard areas, etc., a warning and evacuation system should also be put in place with these Guidelines as a reference.

The Guidelines have been made in view of the problems concerning warning and evacuation in recent sediment-related disasters and the information contained will be reviewed and revised as required. Regarding the use of these Guidelines, to provide the regional plan for disaster prevention, etc. with the regional characteristics of a given municipality and needs of the residents taken into account, efforts should be made for the improvement of a warning and evacuation system through continuous review of the content. These Guidelines mainly discuss debris flows and slope failures caused by heavy rains and do not mention landslides in principle, which require separate considerations.

Chapter 1: For Protection against Sediment-related Disasters

1. Fundamentals

(1) Characteristics of sediment-related disasters and responses

- Sediment-related disasters, which occur suddenly and have strong destructive forces, affect people's lives.
- Sediment-related disasters are phenomena that pose difficulty in the accurate prediction of time and place of occurrence.
- The reason is that sediment-related disasters are mainly caused by large supplies of water due to rain and the conditions of instability of slopes or mountain streams (geology, ease of failure, groundwater level, etc.) vary depending on the place, which makes changes in those conditions difficult to follow up.
- While the construction of sabo facilities is important, it requires time and cost and larger sediment-related disasters than assumed may occur. For this reason, the establishment of a warning and evacuation system is required and carrying out evacuation is essential.

(2) Division of roles between the government and the residents

The government and the residents must have shared awareness of the characteristics of sediment-related disasters and their respective roles and cooperate with each other to build a warning and evacuation system against sediment-related disasters.

[1] Roles of the government

The government must make efforts to provide residents with information on the state of rain, sediment-related disaster warning, etc.

Under storm conditions

- Provision of rainfall information, sediment-related disaster warning information, information about the establishment of shelters, etc.
- Issuance of evacuation advice, etc. based on the sediment-related disaster warning information, precursor information from residents, etc.
- Cooperation with relevant departments.

Under normal conditions

- Provision of hazard maps.
- Holding of emergency drills, study sessions, etc.
- Promotion of PR activities.

[2] Roles of the residents

When the danger of a sediment-related disaster has increased, the best way for the residents to take is to evacuate.

Under storm conditions

- Evacuation following evacuation advice.
- Evacuation on own judgment based on precursors found, etc.

Under normal conditions

- Deepening of knowledge of sediment-related disasters.
- Awareness of the task of "protecting own area with own hands."

(3) For improved disaster prevention capabilities of the area

- For enhancing the residents' awareness of disaster prevention, the government must make good use of opportunities including briefing sessions at the time of the designation of sediment-related disaster hazard areas based on the Sediment-related Disaster Prevention Law and emergency drills to actively interact with the residents.
- The resident must seek to strengthen mutual ties as a community by discussing measures for sediment-related disasters, etc. through activities such as residents' or neighborhood associations on a regular basis for disaster prevention in emergency situations.
- On the basis of shared awareness of sediment-related disasters, information sharing must be achieved by the government's "effort to make known" and the residents' "effort to know" for improving the disaster prevention capabilities of the area.

2. Points of the Guidelines

○ Collection and communication of information

- Provision of rainfall information, sediment-related disaster warning information, information about the status of the establishment of shelters, etc. for residents under storm conditions.
- Provision of information about sediment-related disaster hazard locations via hazard maps, etc. for residents on a regular basis.
- Multiplication of means of communication by distribution of information via satellite and mobile phones, etc. in addition to the establishment of the disaster management radio system.
- Collection of information from residents about precursors and the occurrence of disasters in neighboring areas for making decisions on evacuation advice, etc.

○ Issuance of evacuation advice, etc.

- Appropriate issuance of information on evacuation preparations, evacuation advice and evacuation directive.
- For home-bound people requiring assistance during a disaster, etc. issuance of evacuation advice to such people so that evacuation can be completed before sunset when evacuation is likely to take place at night.
- Effective use of expert advice regarding sediment-related disasters for appropriate issuance of evacuation advice, etc.

○ Establishment and operation of shelters

- Having municipal staff members residing locally work for the establishment and operation and ensuring a system of operation in collaboration with voluntary disaster prevention organizations, etc.
- Consideration to designate as shelters familiar facilities where information is gathered on a routine basis.
- Securing of shelters such as accessible community centers with safety confirmed in preparation for early evacuation of home-bound people requiring assistance during a disaster, etc.
- Selection of other public or private facilities as temporary shelters when safe shelters are difficult to secure.
- Construction of sabo facilities for safeguarding shelters.

- **Support for people who need assistance during a disaster**
 - Mutual confirmation with the facility managers of the means of communication to facilities relevant to people requiring assistance during a disaster.
 - Establishment of a system to assist evacuation by cooperation between disaster prevention and welfare departments for home-bound people requiring assistance during a disaster.
 - Construction of sabo facilities for safeguarding facilities relevant to people requiring assistance during a disaster.

- **Improved awareness of disaster prevention**
 - Implementation of PR activities and emergency drills in the Sediment Disaster Prevention Month.
 - Assistance to encourage active involvement of residents by preparing hazard maps with a focus on the residents, etc.
 - Education and training of district disaster prevention leaders by holding study sessions, etc.

Chapter 2: Collection and Communication of Information

1. Information on sediment-related disasters

- Provide information on sediment-related disaster hazard locations, shelters, etc. for the residents on a regular basis.
- Collect and communicate information concerning sediment-related disasters including weather/rainfall information, sediment-related disaster warning information, information about precursors and occurrence of disasters, evacuation advice, status of the establishment of shelters etc.
- Inform the residents of the types of information concerning sediment-related disasters and how to obtain and use such information

[Description]

[1] Information sharing on a regular basis

It is essential for the government to make known to the residents in advance the sediment-related disaster hazard locations and shelters and the information to be communicated when any disaster is likely through hazard maps and other means and the content and where to obtain them at briefing sessions, etc.

To allow the residents to make a decision on evacuation on their own judgment in case of rainfall, the residents must be informed of their task to understand and share the information about surrounding circumstances for themselves in addition to the information provided by the government.

Comment of the head of a disaster-hit municipality

- "Detailed information must be provided to the residents on a regular basis."

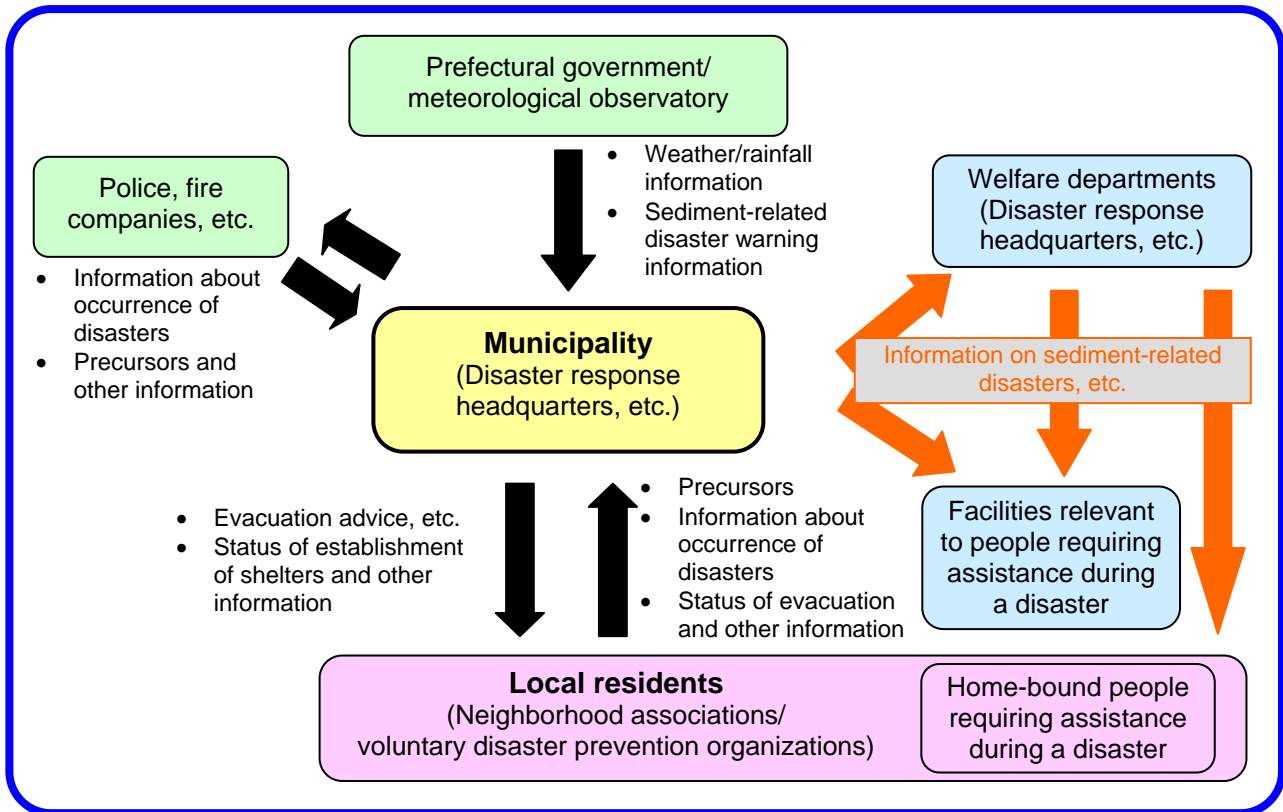
[2] Collection and communication of information on sediment-related disasters

The government must collect from the relevant organizations or residents and analyze the information required for predicting the risk of sediment-related disasters and reliably inform the residents of the risk.

For that purpose, municipalities must collect weather/rainfall information, sediment-related disaster warning information, etc. from the prefectural governments and meteorological observatories and about precursors and occurrence of disasters from the residents, police departments, fire companies, etc., based on which to communicate the risk of sediment-related disasters, evacuation advice, status of the establishment of shelters, etc. to the residents. Information must be provided so as to communicate the risk in phases to the residents and give them enough time to make preparations for evacuation. For this reason, it is important to patrol the sediment-related disaster hazard locations, sabo facilities, etc. on a regular basis.

Regarding the facilities relevant to people requiring assistance during a disaster, the facility managers must be provided with information on sediment-related disasters to allow smooth warning and evacuation of users of the facilities. At the same time, the information must be communicated to welfare departments for helping home-bound people requiring assistance during a disaster with evacuation.

Flow of information on sediment-related disasters



[3] Types of information on sediment-related disasters

○ Weather/rainfall information

Most sediment-related disasters are caused by rains. For the determination of risk of sediment-related disasters based on rainfall information and putting a system in place including securing of personnel for quick response to increased risk of such disasters, collection of weather/rainfall information is necessary.

Regarding rainfall information, the AMeDAS (Automated Meteorological Data Acquisition System) rainfall information and precipitation distribution for up to six hours ahead are available from the website of the Meteorological Agency. Surface rainfall data can also be collected from the Disaster Management Information Center, a website run by the MLIT, and the disaster prevention systems and websites of prefectural governments.

For districts with locally specific rainfall conditions such as mountain areas, municipalities must independently install rain gauges to collect rainfall information for determining the risk of disasters.

Comments of the heads of disaster-hit municipalities

- "Weather information is obtained independently as a city separately from the information provided by the Meteorological Agency and the prefectural government."
- "We have increased the number of telemetering rain gauges installed to allow monitoring at the municipal office."

○ **Sediment-related disaster warning information**

Sediment-related disaster warning information is the information published jointly by the sabo department of a prefectural government and the Meteorological Agency to assist the heads of municipalities with timely and appropriate response including disaster prevention activities and evacuation advice to the residents and to provide reference to the residents' own decision making on evacuation when the risk of sediment-related disasters due to heavy rain has increased. Sediment-related disaster warning information is communicated by the disaster prevention systems, fax, etc. from prefectural governments (*).

In addition to sediment-related disaster warning information, initiatives are in process for the provision of supplementary information by prefectural governments that indicates the regional differences in the imminence and the degree of risk of sediment-related disasters. Specific criteria of the issuance of evacuation advice must be determined in advance by making use of such information including the sediment-related disaster warning information.

- * As of the end of March 2007, the publication has been started in 12 prefectures.
By the flood season of 2007, the publication will be started in 31 prefectures.
The publication is scheduled to start nationwide by the end of FY 2007.

Comment of the head of a disaster-hit municipality

- "In addition to wide-area warning for individual cities, for example, more precise information is necessary."

○ **Precursors**

Precursors are signs observed on slopes and mountain streams before the occurrence of sediment-related disasters such as debris flows and slope failures. Phenomena such as shingles rolling down a slope, spring water turning cloudy, mountain streams suddenly turning muddy and water level decreasing while raining indicate that some events are already occurring inside the slope or upper mountain stream. When such precursors have been confirmed, evacuation must be started immediately.

To use information provided by the residents, police, fire companies, etc. as the basis of decisions on the issuance of evacuation advice to the district concerned and the surrounding districts, municipalities are required to always ensure that the residents, police, fire companies and other parties concerned are well informed of precursors and the information addressees.

Getting close to slopes and mountain streams in heavy rain situations is dangerous and caution must be used.

○ **Information about occurrence of disasters**

Information about the situations on site including the occurrence of any sediment-related disaster, flood, submerged or closed road in the neighboring areas must be widely collected from the residents, prefectural civil engineering branch offices, police, fire companies, etc., on which to base decisions on the issuance of evacuation advice. It is important to widely communicate the collected information to the residents and governments in the neighboring areas as well as within the municipalities to share it among them.

Comments of the heads of disaster-hit municipalities

- **"Mutual exchange of information between the government and residents is necessary."**
- **"Information from the area such as that provided by fire companies is necessary."**

○ **Issuance of evacuation advice, etc., establishment of shelters and status of evacuation**

Evacuation advice, etc. must be communicated reliably to the residents for the start of their evacuation. Means such as telephone, fax, TV and radio in addition to the disaster management radio system and loudspeaker vans must be used to communicate the advice to the residents without fail. It is also imperative to promptly communicate to the residents the status of the establishment of shelters. Remaining constantly updated with the status of evacuation of the residents is also important.

2. Development of means of collection and communication of information

- Establish the disaster management radio system for reliable collection and communication of information concerning sediment-related disasters.
- Multiply means of collection and communication of information and countermeasures for power failure.
- Establish means of collection and communication of information best suited for the characteristics of the areas in municipalities.

[Description]

[1] Means of collection and communication of information

Approximately 75 percent of all municipalities are equipped with a broadcast disaster management radio system that simultaneously communicates information from municipalities to the residents. Disaster management radio systems including mobile disaster radio systems that allow communication with the staff on site must be established to achieve reliable communication of information to the residents in danger of sediment-related disasters.

In addition, cooperation with TV and radio stations must be sought for broadcasting the information about sediment-related disaster warning and other types of information such as evacuation advice. It is also important to communicate detailed information by using such means of communication as terrestrial digital broadcasting, websites and CATV.

[2] Multiplication of means of collection and communication of information and countermeasures for power failure

In storm situations, lifelines may be significantly affected by disasters. In past cases, the occurrence of sediment-related disasters caused power failure and disconnection of landline phones over wide areas. In addition, wide area power failure disrupts the operation of mobile phone relay stations, which renders mobile phones useless, and ordinary means of communication may also become unavailable.

Accordingly, to ensure reliable collection and communication of information, the multiplication of means of communication by using satellite communication systems (satellite phones), etc. is required.

Because power failure renders many communication devices unusable, independent power generators must be installed at government buildings, shelters, etc. to ensure normal functioning of means of communication.

Comment of the head of a disaster-hit municipality

- "Local information could not be obtained because of the interruption of power and landline and mobile phone communications.

[3] **Establishment of means of collection and communication of information best suited for the characteristics of the areas**

For reliable collection and communication of information, the volume of communication, speed, accuracy, range, reliability, etc. must be taken into account to put in place means suited for the characteristics of the individual areas in municipalities.

Outdoor loudspeakers of disaster management radio systems have problems including poor audibility during heavy rains. It is also necessary to consider measures for reliable communication of the risk of sediment-related disasters by using distribution with disaster radio receivers for individual households, fax, mobile phones, etc.

Based on the high penetration rate of the Internet at approximately 67 percent (according to 2008 WHITE PAPER Information and Communications in Japan), websites can be said to be an effective means to communicate various types of information concerning sediment-related disasters under normal conditions in particular.

On websites of municipalities, information including points of concern for warning and evacuation such as sediment-related disaster hazard locations, shelters, precursors, information about occurrence of disasters, the status of the establishment of shelters and evacuation advice must be published. It is also important to publish rainfall information, sediment-related disaster warning information and other information obtained from prefectural governments, etc. in an easy-to-understand way for the residents of municipalities.

Furthermore, the fact that disaster management information is published on websites must be vigorously communicated via PR magazines, etc.

Comments of the heads of disaster-hit municipalities

- **"The disaster radio system and loudspeaker vans were used to communicate information to the residents but the sounds were not heard by those inside the houses because of the strong wind and heavy rain."**

3. Establishment of a system for information sharing

- Improve municipal staffing in relation to the collection and communication of information. Establish a system for information sharing by equipping branches and local offices with communication devices and staffing them especially for municipalities with large areas.
- Establish of a system for information sharing in cooperation with local residents.
- Establish a system for information sharing among staff members and with fire companies, etc.

[Description]

[1] Establishment of a system for information sharing among municipality staff members

For reliably collecting and communicating information about sediment-related disasters and making good use of it for warning and evacuation, staffing in relation to the collection and communication of information is required as well as putting necessary communication devices in place. On the basis of such system established, a system for sharing knowledge and experience is necessary. In municipalities with large areas including plains and mountains, in particular, a system for sharing information on individual districts must be secured.

Because a large volume of information is likely to be jumbled together in emergency situations, a contact that aggregates the information and full-time staff in charge of sediment-related disaster management must be put in place for analyzing many pieces of useful information without omission and any sediment-related disaster warning information or information concerning decision on the issuance of evacuation advice such as precursors must be reported to the heads of municipalities immediately.

[2] Information sharing in cooperation with local residents

For information to be communicated to all residents with certainty, a system of information communication based on residents' or neighborhood associations as base units must be established.

To ensure reliable collection of information from the residents, cooperation with local residents is essential and the residents must be educated on precursory phenomena, etc. on a regular basis.

A flood of calls coming in from residents is expected in disaster situations and public relations contacts, etc. must be established. In areas where use of the Internet is popular, use of bulletin boards of websites, etc. for collecting various types of local information from an unspecified large number of residents and informing the residents of the government's response is also effective.

Comments of the heads of disaster-hit municipalities

- "Warning and evacuation information is communicated through neighborhood associations."
- "A means to centrally process information such as a call center should be in place."

[3] Information sharing among staff members and with fire companies, etc.

Staff and fire companies are likely to be working outdoors during rains, etc. and sufficient information may not be obtained. Efforts must be made to facilitate information sharing among people in charge of disaster management by securing in advance radio sets and emergency priority lines of cell phones, etc.

Chapter 3: Issuance of Evacuation Advice, etc.

1. Making known of sediment-related disaster hazard locations, etc.

- Municipalities must inform the residents, relevant organizations, etc. of sediment-related disaster hazard locations.
- Prepare hazard maps containing information including shelters/evacuation routes, facilities relevant to people requiring assistance during a disaster, characteristics and precursors of sediment-related disasters, etc. for the awareness of sediment-related disaster hazard locations to facilitate smooth evacuation of residents, etc.

[Description]

[1] Informing the residents, etc. of sediment-related disaster hazard locations

Municipalities are required to mention the sediment-related disaster hazard locations (mountain streams at risk of debris flow, places at risk of steep slope failure and places at risk of landslide) in the regional plan for disaster prevention based on the sediment-related disaster hazard locations diagrams, etc. provided by prefectural governments and make it known to the residents, facilities relevant to people requiring assistance during a disaster, relevant organizations, etc.

To communicate the information, sediment-related disaster hazard location diagrams should be published not only by offering for perusal at municipal offices but also by approaches such as the distribution or circulation to individual residents' households and publishing in PR magazines, websites of municipalities, etc. for sufficient awareness raising.

[2] Informing by hazard maps

To make use of information concerning sediment-related disaster hazard locations for facilitating smooth evacuation of residents, municipalities are required to prepare hazard maps containing information including shelters/evacuation routes, facilities relevant to people requiring assistance during a disaster, disaster management-related organizations such as municipal offices and fire and police departments, emergency contacts, characteristics and precursors of sediment-related disasters, what residents should do in preparation for evacuation, etc. based on the sediment-related disaster hazard locations diagrams to ensure that the residents and relevant organizations are informed.

For areas designated as sediment-related disaster hazard areas, etc. based on the Sediment-related Disaster Prevention Law, a sediment-related disaster hazard map indicating the sediment-related disaster hazard areas and the types of natural phenomena that may cause sediment-related disasters in the areas, methods of communication of information concerning sediment-related disasters, etc. must be prepared to ensure that the residents and relevant organizations are informed.

Sediment-related disaster hazard map under the Sediment-related Disaster Prevention Law

Article 7 Paragraph 3 of the Sediment-related Disaster Prevention Law stipulates that "the head of a municipality shall, for ensuring that the residents are informed of the methods of communication of information concerning sediment-related disasters and matters necessary for smooth warning and evacuation in hazard areas, distribute printed literature containing such information and take any other measures required."

Based on this provision, it is important for municipalities to promptly prepare sediment-related disaster hazard maps for areas designated as sediment-related disaster hazard areas, etc. and inform the residents.

2. Issuance of evacuation advice/instruction

- When the danger of a sediment-related disaster has increased due to a typhoon, localized torrential downpour, etc., identify the locations with the risk of sediment-related disasters (locations with the danger of sediment-related disasters increased by rain, etc.) based on sediment-related disaster warning information, supplementary information indicating the imminence or changes in the degree of the risk of sediment-related disasters and precursors. Issue appropriate evacuation preparation information, evacuation advice and evacuation instruction to the units of evacuation that applies to the locations (see "5. Specification of the unit of evacuation").
- Make effective use of expert advice regarding sediment-related disasters for appropriate issuance of evacuation advice, etc.
- For units of evacuation with home-bound people requiring assistance during a disaster in the locations with the risk of sediment-related disasters, issue evacuation advice to such people so that evacuation can be completed before sunset when evacuation is likely to take place at night in view of the difficulty of the evacuation. Communicate similar information to managers of facilities relevant to people requiring assistance during a disaster.

[Description]

[1] Prompt and appropriate issuance of evacuation advice

When the degree of the risk of sediment-related disaster has reached the evacuation advice issuance criteria specified in the regional plan for disaster prevention, necessary measures must be taken regarding issues including the following and evacuation advice must be issued without delay.

Concerning the issuance of evacuation advice to areas prone to isolation or located far from shelters, special considerations such as issuance in good time are required.

- ◆ Identification of locations with the risk of sediment-related disasters
- ◆ Confirmation of the units of evacuation that apply to the locations
- ◆ Communication and coordination with voluntary disaster prevention organizations, fire companies, police, etc. in relation to evacuation guidance and support
- ◆ Timing of the issuance of evacuation advice (based on the issuance criteria in the regional plan for disaster prevention)
- ◆ Establishment of shelters and safety of evacuation routes

[2] Effective use of expert advice

For the issuance of evacuation advice, etc., it is useful to seek views and advice from experts on sediment-related disasters (staff of prefectural civil engineering offices, sabo volunteers, fire company chiefs, etc.) as required.

Comments of the heads of disaster-hit municipalities

- "Organizations and personnel such as experts in charge of disaster crisis management and crisis management administrators capable of recommending evacuation orders to the heads of municipalities are necessary."
- "Since the disaster of the last year, people have come to feel less uncomfortable with the issuance of evacuation advice or instruction by the heads of municipalities."
- "Decisions should be made in good time because missing a chance ruins everything."
- "Evacuation was issued, which proved needless, but there was no criticism from the media."
- "The government's strong will to issue advice when certain criteria have been met should be established."

[3] **Early evacuation issuance to home-bound people requiring assistance during a disaster**

More than half of the victims in recent years are people requiring assistance during a disaster. To prevent people requiring assistance during a disaster from falling victim to disasters, evacuation must be completed promptly in view of the travel time, means of evacuation, etc. to shelters.

For evacuation in safe conditions, it is important to take measures such as issuance of evacuation advice to people requiring assistance during a disaster when evacuation is estimated to take place at night so that evacuation can be completed before sunset. If evacuation takes place early, support from staff of municipalities may be available.

3. Communication of evacuation advice, etc.

- Ensure reliable communication of information including evacuation advice, etc. to the residents via mobile phones, CATV, FM broadcast, tickers on TV, etc. in addition to the disaster management radio system. Make doubly sure of communication by also encouraging direct mutual alerting between the voluntary disaster prevention organizations and residents in the neighborhood and sending messages from the heads of the municipalities themselves.
- Verify the status of evacuation after the issuance of evacuation advice to analyze anybody who refuses to evacuate and consider future measures.

[Description]

[1] **Reliable communication of evacuation advice information**

When evacuation advice, etc. is issued, the information must reach all of the relevant residents without fail. Circumstances under which evacuation advice is issued include storm situations and nighttime and the communication of information by outdoor loudspeakers and loudspeaker vans alone may be insufficient.

For this reason, every possible effort must be made for the communication of information by using cell phones, CATV or FM broadcast, requesting for ticker broadcast on TV, etc. in addition to the disaster management radio system used as the basis.

Smooth communication of information through TV, etc. may be achieved by concluding agreements with news organizations in advance regarding emergency broadcast under the issuance of evacuation advice.

[2] **Encouragement of evacuation by mutual assistance**

In many cases, the issuance of evacuation advice, etc. only leads to the evacuation of a small number of residents. While approaches to improved awareness of disaster prevention must be taken on a regular basis, measures to encourage the residents to evacuate are important in emergency.

Approaches that lead to the residents' evacuation such as inducement between neighbors with everyday contacts with each other or by fire companies or messages from the heads of municipalities themselves are important.

Comments of the heads of disaster-hit municipalities

- "Those who evacuate in response to evacuation advice evacuate 'because he says so.'"
- "We made phone calls to those who were reluctant to evacuate to ask them to evacuate. They agreed to evacuate 'to save the village head's face.'"
- "I would like the residents to accept evacuation advice even if it proves needless later because human life is more important."

[3] Understanding of the importance of evacuation advice, etc.

To facilitate smooth evacuation of the residents, opportunities such as sediment-related disaster prevention study sessions and briefing sessions to explain the Sediment-related Disaster Prevention Law must be used to make the nature and importance of evacuation advice, instruction, etc. known to the residents.

[4] Verification of the status of evacuation

After the issuance of evacuation advice, it is important to explain to the residents at shelters, etc. the circumstances that led to the issuance of the advice (weather conditions, whether or not any sediment-related disaster occurred, etc.) for a better understanding of the next evacuation action.

It is also important to analyze the reasons for non-evacuation of those who did not evacuate based on the list of evacuees at the individual shelters and consider future measures. For studying the measures, one useful method is to conduct a survey, etc. to clarify the name of the area, age, past disaster experience, awareness of sediment-related disasters, response to evacuation advice, etc.

4. Specification of the criteria of the issuance of evacuation advice, etc.

- Specify objective criteria of the issuance based on the sediment-related disaster information, precursors, etc. and publish it in the regional plan for disaster prevention and ensure the residents are informed of the criteria.

[Description]

To allow the heads of municipalities to issue appropriate evacuation advice, etc. objective issuance criteria must be specified in advance. Possible objective criteria include the following.

It is important to ensure that the residents are informed of these criteria by means of publishing in the sediment-related disaster hazard maps, PR magazines, etc. or posting at meeting places, etc. used for shelters.

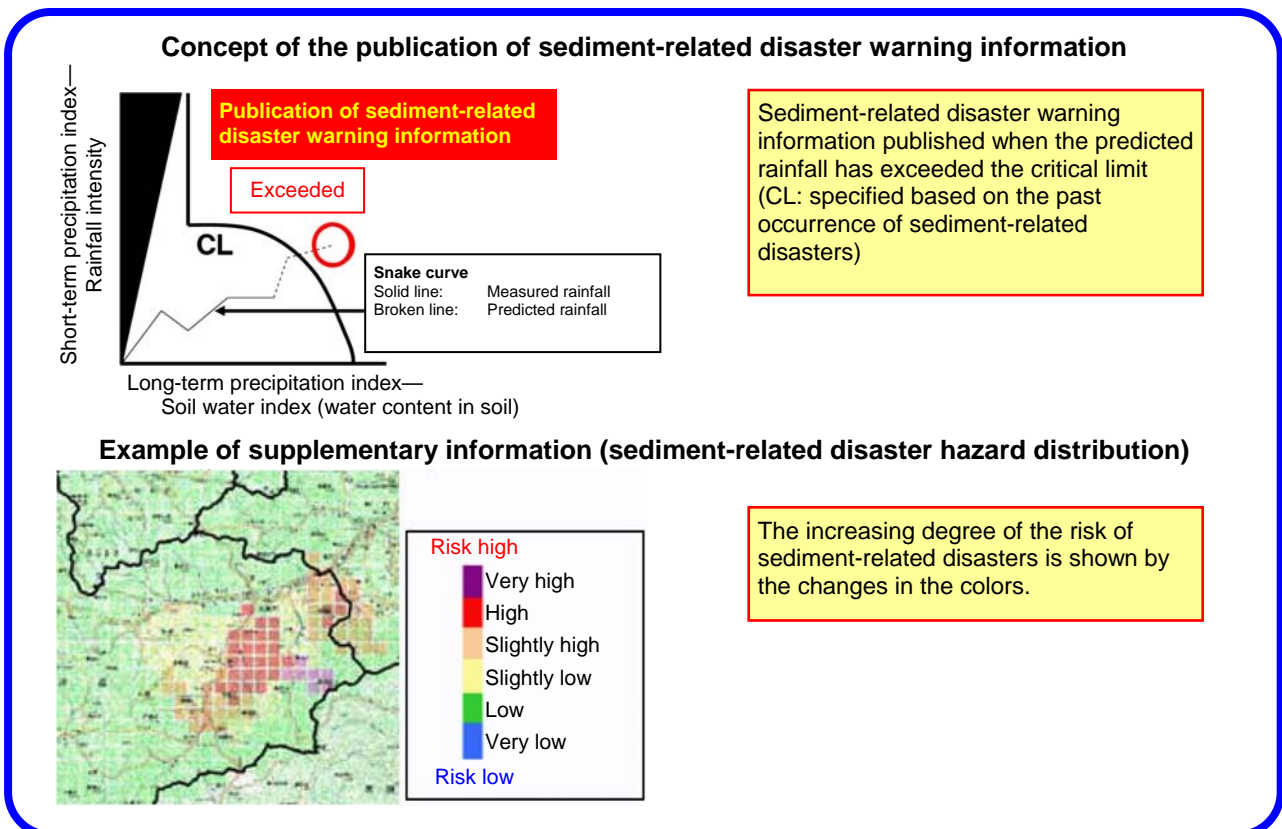
[1] Use of sediment-related disaster warning information

Sediment-related disaster warning information is published jointly by a prefectural government and the Meteorological Agency to assist the heads of municipalities with timely and appropriate response including disaster prevention activities and evacuation advice to the residents when the risk of sediment-related disasters due to heavy rain has increased.

In parallel with the publication of sediment-related disaster warning information, approaches are being taken by prefectural governments to the provision of supplementary information indicating more detailed temporal imminence.

Such publication of sediment-related disaster warning information, etc. may be used as the criteria of the issuance of evacuation advice.

Use of sediment-related disaster warning information



[2] Use of the critical rainfall for sediment-related disaster warning and evacuation

For prefectures in which sediment-related disaster warning information is not used, the critical rainfall for sediment-related disaster warning and evacuation, which has been traditionally provided by the sabo departments, may be specified as the issuance criterion.

[3] Use of rainfall measured with rain gauges

Rainfall per hour, the total amount of continuous rain, etc. measured with rain gauges installed by prefectural sabo departments, etc. may be specified as the issuance criteria.

[4] Use of precursors or information about disasters in the surrounding areas

Issuance may be based on the precursors confirmed on site or information about disasters in the surrounding areas.

5. Specification of the unit of evacuation

- For safe and efficient evacuation of the residents to shelters, specify a district the residents of which should take the same evacuation action such as a residents' or neighborhood association, voluntary disaster prevention organization, etc.
(Specification of a district covered by the issuance of evacuation advice, etc.)
- See if there are any home-bound people requiring assistance during a disaster in the individual units of evacuation specified. If there are many such people, revise the unit as required in view of the system to assist evacuation.

[Description]

[1] Concept of a unit of evacuation

Regarding the issuance of evacuation advice, etc., districts in which the residents should take the same evacuation action (evacuation to the same shelters at the same timing) must be specified in advance as the units of evacuation for defining the districts covered by the issuance of evacuation advice, etc.

Units of evacuation specified based on residents' or neighborhood associations, etc. may have differing scales or numbers of residents according to the regional characteristics of plains, mountains, etc. and the units must be specified in consideration of the distances to and capacities of shelters. Sufficient deliberations are necessary by taking into account the opinions of fire companies, voluntary disaster prevention organizations, etc.

[2] Unit of evacuation in view of home-bound people requiring assistance during a disaster

It is difficult for people requiring assistance during a disaster to take the same evacuation action as the ordinary residents and longer travel times may be required.

For this reason, it is important to team up with welfare departments to see if there are any home-bound people requiring assistance during a disaster in the individual units of evacuation and ensure that the specification of the units of evacuation is appropriate from the viewpoint of the support for people requiring assistance during a disaster.

If giving support for smooth evacuation is estimated to be difficult because of the large number of people requiring assistance during a disaster, the units of evacuation should be revised as required.

6. Lifting of evacuation advice, etc.

- Use the lifting of heavy rain warning or sediment-related disaster warning information as a reference and thoroughly check the weather conditions and the situations on site to lift the evacuation advice, etc.
- Regarding the situations on site, have fire companies, etc., patrol and inspect the site to make sure that no precursors of sediment-related disasters are observed in the hazard locations concerned and ensure safety of the evacuation routes for the residents to go home from the shelters.
- Conduct on-site inspection, etc. of any location hit by a sediment-related disaster and ensure that there is no risk of secondary disasters and confirm safety. In this case, seeking expert opinions concerning sediment-related disasters as a reference is useful.

[Description]

[1] Points to note for the lifting of evacuation advice, etc.

Sediment-related disasters may occur sometime after rain has stopped and any decision on the lifting of evacuation advice, etc. must be made carefully.

It is necessary to confirm the unlikelihood of further heavy rain and the lifting of sediment-related disaster warning information based on the weather information provided by the meteorological observatories, etc. In addition, patrol and inspection must be conducted to check the situations on site (for any collapse or new crack, etc.) to make sure that no precursors of sediment-related disasters are observed.

[2] Patrol and inspection of the site

For patrol and inspection of the site, sufficient attention must be paid to ensure safety of the patrol personnel and considerations such as postponing any nighttime inspection to the next morning are necessary.

[3] Confirmation of safety of locations hit by sediment-related disasters

For any location hit by a sediment-related disaster, on-site inspection must be conducted to confirm that there is no risk of subsequent disasters. The conditions of roads used for evacuees to go home from shelters must also be checked to confirm safety before the evacuation advice, etc. can be lifted.

To ensure safety of the residents during rains before the facilities for preventing recurrence of disasters are put in place, measures must be taken such as the revision of the critical rainfall for sediment-related disaster warning and evacuation and installation of sensors for detecting sediment-related disasters.

Criteria of the lifting of sediment-related disaster warning information

At present, the following criteria are often used for the lifting of sediment-related disaster warning information.

- When the rainfall has decreased below the critical limit for publishing warning information,
- and is estimated not to exceed the limit again in a short time.
- If the rainfall does not decrease below the critical limit regardless of the continued state of no rain, the decision should be made based on the condition of the second tank storage decrease of the soil water index, etc. (second tank storage of the soil water index: amount of water contained in the surface layer).

Chapter 4: Establishment and Operation of Shelters

1. Establishment and operation of shelters

- For the establishment of shelters, confirm safety of the shelters.
- For the establishment and operation of shelters, take measures such as assigning municipal staff who reside locally to the extent possible.
- For operation, ensure a system of operation in collaboration with the residents, voluntary disaster prevention organizations, etc.
- In preparation for early evacuation of home-bound people requiring assistance during a disaster, etc., secure shelters such as accessible community centers with safety confirmed and establish a system required for prompt establishment and operation of the shelters.
- Inform the residents of the status of the establishment of shelters, etc. without delay.

[Description]

[1] Establishment and operation of shelters in collaboration with voluntary disaster prevention organizations, etc.

Before shelters can be established, the shelters and the surrounding areas must be checked for any abnormality. Some residents may start evacuating as early as when evacuation preparation information is issued and shelters must be established in an appropriate way to be in time for the start of evacuation of residents.

For this reason, municipal staff residing locally must be assigned to the closest shelters to the extent possible for taking charge of the establishment and operation. It is also important to consider measures for assistance regarding the establishment and operation of shelters by voluntary disaster prevention organizations, residents, etc. to build a system with the government in collaboration with the residents.

Comment of the head of a disaster-hit municipality

- "Taking care of shelters is not much trouble. Rather, it is difficult to give sufficient support to the residents in disaster situations."

[2] Support for the evacuation of home-bound people requiring assistance during a disaster

People requiring assistance during a disaster evacuate to shelters sooner by early evacuation advice. Accordingly, it is important to select, as shelters for home-bound people requiring assistance during a disaster, etc., accessible facilities with community functions such as community centers where the elderly, etc. assemble on a regular basis. These considerations must be given to make evacuation less uncomfortable to people requiring assistance during a disaster, etc.

In addition, cooperation with nearby hospitals, doctors, etc. is required to establish a system for acceptance including physical condition check and medical care for evacuated people requiring assistance during a disaster, etc. and to put welfare shelters in place.

[3] Communication of information on the status of the establishment of shelters

When shelters have been established, the names of the shelters, what the residents should bring for evacuation, other points to consider, etc. must be promptly communicated to the residents.

2. Functions desired of shelters

- Shelters should preferably be familiar facilities provided with functions and equipment in consideration of the convenience of evacuation life where disaster-related information can be obtained and information is gathered on a routine basis.

[Description]

[1] Administrative system

Shelters are required to be facilities with resident managers and equipment maintained on a regular basis under normal conditions to allow use anytime in disaster situations.

[2] Means of collection and communication of information

Even if the safety of a shelter is confirmed, residents cannot lead an evacuation life without anxiety in an environment with no incoming information about the circumstances of the surrounding area. For this reason, facilities should preferably be provided with means of collection and communication of information for providing information concerning the circumstances of the surrounding area to evacuees. At least TVs are required.

At shelters, it is important to provide residents who have evacuated with information concerning sediment-related disasters such as the current weather information, information about occurrence of sediment-related disasters in neighboring areas, sediment-related disaster warning information, etc. The content of such information must be discussed in advance.

[3] Ensuring privacy

Unlike ordinary everyday life, evacuation life imposes various restrictions and forces living among many other people, which may subject the residents to heavy stress. For this reason, facilities with sufficient capacity capable of ensuring privacy of the residents should be selected to alleviate the stress on the residents.

[4] Considerations for people requiring assistance during a disaster

Compared with ordinary residents, people requiring assistance during a disaster are not able to move freely and may develop even heavier stress. Accordingly, considerations for people requiring assistance during a disaster through securing private rooms for those who require assistance, work in collaboration with hospitals, etc. are important.

[5] Community functions

While shelters are intended for protecting the residents' lives from sediment-related disasters, facilities to which the residents hesitate to evacuate may increase the possibility that they do not evacuate.

For this reason, familiar facilities (with Japanese-style rooms, TVs, etc. in place) to which the residents can evacuate casually and provided with community functions are desired.

[6] Emergency power supply

Sediment-related disaster may cause power failure, which renders communication devices such as telephones unusable and generate anxiety among the residents.

Accordingly, shelters are required to have emergency power supply installed to maintain means of communication during power failure and regular maintenance must be conducted to keep them in usable state.

[7] Storing of provisions, etc.

In areas prone to isolation, provisions, blankets, etc. must be stored at shelters to allow the residents to live evacuation life for a certain period without anxiety even if aid from outside is not easily deliverable in disaster situations.

Comment of the head of a disaster-hit municipality

- "Readiness to receive evacuees must be established. For people requiring assistance during a disaster, in particular."

3. Confirmation of safety of shelters and evacuation routes

- Joint inspection of shelters and evacuation routes involving municipalities, fire and police departments, voluntary disaster prevention organizations, residents, etc. must be conducted regularly to confirm safety of shelters against sediment-related disasters.
- For shelters of which safety against sediment-related disasters is deemed difficult to confirm due to conditions of location, etc, measures must be taken such as on-site inspection by experts on sediment-related disasters.
- When safe shelters are difficult to secure, select private facilities, etc. as temporary shelters and consider use of other public facilities, etc.

[Description]

[1] Regular safety inspection

The conditions of shelters must be checked to see if they provide safety against sediment-related or other natural disasters based on sediment-related disaster hazard maps, etc. The actual site must be inspected for the knowledge of the sediment-related disaster hazard locations around the shelters and the evacuation times and routes, conditions of the structures of shelters, etc. taken into consideration.

Conducting regular safety inspection involving fire and police departments, voluntary disaster prevention organizations, residents expected to evacuate to given shelters, etc. in addition to the government is important.

These activities contributes to the residents' and organization staff's improved awareness of disaster prevention and allows actual check of the shelter locations and evacuation routes, which may facilitate smooth evacuation of the residents and evacuation guidance by the fire companies, police department, voluntary disaster prevention organizations, etc. in emergency situations.

[2] On-site inspection by experts

When safety against sediment-related disasters is difficult to confirm (when establishment of a shelter in a sediment-related disaster hazard area based on the Sediment-related Disaster Prevention Law, etc. is unavoidable), on-site inspection must be conducted in cooperation with experts on sediment-related disasters (staff of prefectural civil engineering offices, sabo volunteers, etc.).

[3] Securing of safe shelters and evacuation routes

Shelters to which the residents to evacuate without anxiety are facilities with safety against sediment-related disasters confirmed that are equipped with functions required of shelters.

If a given shelter has proved unsafe as a result of inspection, a safe shelter must be secured in the area by the use of private facilities or houses as temporary shelters in agreement with the private sector, use of other public facilities, structural reinforcement or construction of shelters, etc.

In unexpected situations, evacuation to places that are deemed safe such as the second floor or higher of own homes or adjacent reinforced concrete structures must be considered.

4. Construction of sabo facilities for safeguarding shelters

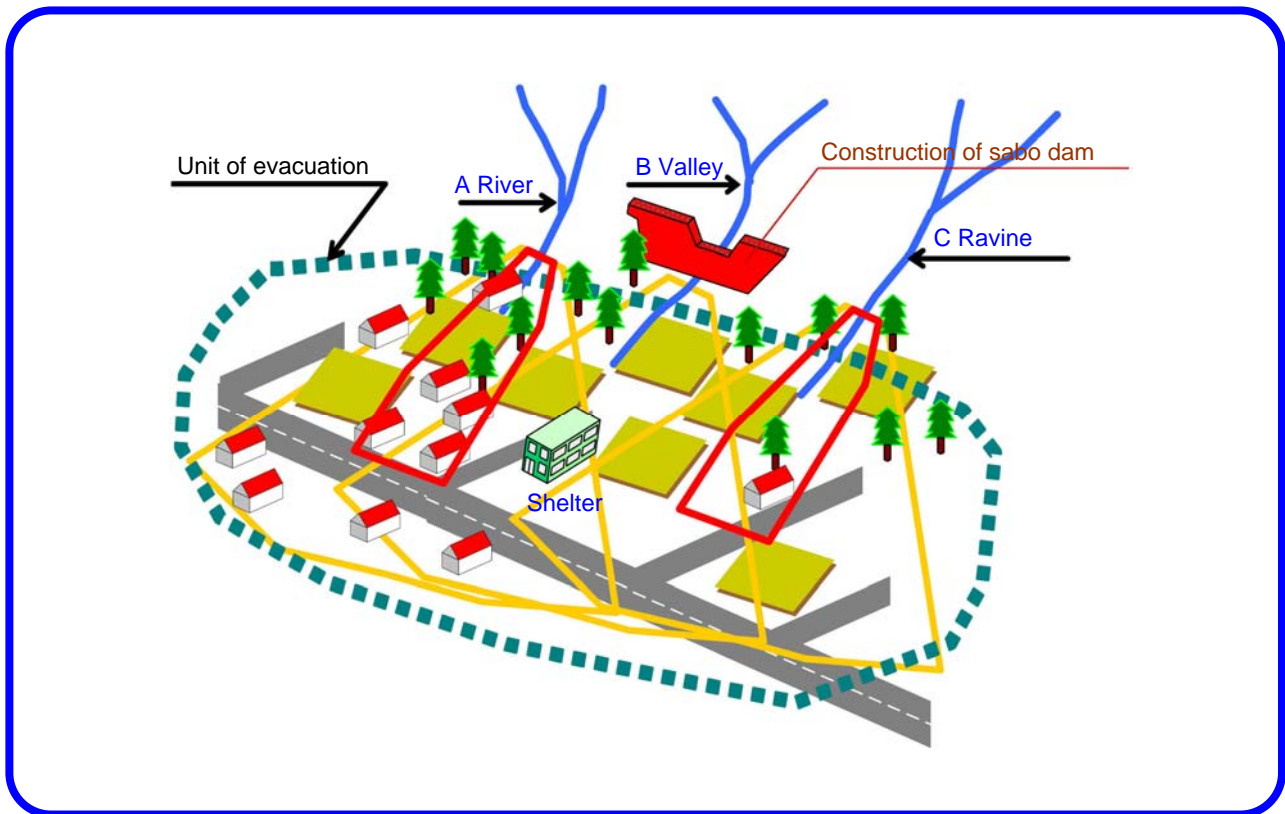
- Build sabo facilities that safeguards areas in which shelters that are safe against sediment-related disaster cannot be secured.

[Description]

While it is a duty of the facility managers of shelters to secure shelters that are safe against sediment-related disasters, when safe shelters cannot be secured within the areas, the construction of sabo facilities for safeguarding shelters is a priority subject.

Efforts must be made to improve the degree of safety of the entire area by putting sabo facilities in place based on sufficient cooperation and coordination with relevant organizations to realize measures integrated with the warning and evacuation system.

Measures for sediment-related disasters integrated with warning and evacuation system (construction of sabo facilities for safeguarding shelter)



Chapter 5: Support for People Requiring Assistance during a Disaster

1. Evacuation support for facilities relevant to people requiring assistance during a disaster

- Concerning facilities relevant to people requiring assistance during a disaster, determine the methods of communication of information including the information on sediment-related disasters, forecast, warning, evacuation advice, etc. and assist the managers of the facilities with the establishment of a warning and evacuation system.
- Hold briefing sessions, etc. for the managers and people in charge of disaster prevention of facilities relevant to people requiring assistance during a disaster, etc.

[Description]

[1] Evacuation support for facilities relevant to people requiring assistance during a disaster

It is important for municipalities to support the warning and evacuation system of facilities relevant to people requiring assistance during a disaster by determining the methods of communication for providing the facilities with rainfall information, information about shelters and evacuation routes, sediment-related disaster warning information, evacuation preparation information, evacuation advice, etc., and seeking cooperation in advance with hospitals, etc. to allow early evacuation of those requiring assistance during a disaster at the facilities in case of evacuation.

[2] Holding briefing sessions for the managers of facilities, etc.

It is important for disaster prevention and welfare departments, etc. to coordinate and cooperate for holding briefing sessions for the managers of facilities relevant to people requiring assistance during a disaster for improving knowledge about sediment-related disasters and raising awareness of disaster prevention.

Definition of people requiring assistance during a disaster and facilities relevant to people requiring assistance during a disaster

- **People requiring assistance during a disaster**

Refers to people who require assistance for taking a series of actions in disaster situations such as prompt and accurate acquisition of necessary information and evacuation to safe places for self-protection from disasters and generally includes the elderly, disabled, foreigners, infants, pregnant women, etc.

(Guidelines for Evacuation Support of People Requiring Assistance during a Disaster—Study Commission on the Measures for Evacuation of People Requiring Assistance during a Disaster, March 2006)

- **Facilities relevant to people requiring assistance during a disaster**

Refers to social welfare facilities, schools and medical facilities used by the elderly, disabled, infants or other people who require special considerations in terms of disaster prevention and generally includes the following facilities.

(Article 9 Paragraph 2 of the Sediment-related Disaster Prevention Law and Article 6 of the Enforcement Ordinance of the Law)

- Welfare institutions for the aged (excluding elderly care support centers), fee-charging old people's homes, social welfare and rehabilitation institutions for physically handicapped persons, welfare facilities for mentally retarded, social rehabilitation institutions for mentally disordered persons, institutions for public aid recipients (excluding medical care centers and facilities providing accommodations), child welfare facilities (excluding homes for juvenile training education), maternal and child welfare institutions, maternal and child health centers and other similar facilities
- Special needs schools and kindergartens
- Hospitals, clinics and maternity homes

Establishment of the methods of communication to facilities relevant to people requiring assistance during a disaster under the Sediment-related Disaster Prevention Law

Concerning municipal disaster prevention councils, the Sediment-related Disaster Prevention Law stipulates as follows.

A municipal disaster prevention council shall, when any hazard area has facilities used chiefly by the elderly, disabled, infants or other people who require special considerations in terms of disaster prevention, determine the methods of communication of the information about sediment-related disasters, forecast and warning to allow smooth warning to and evacuation of the users of the relevant facilities.

(Article 7 Paragraph 2 of the Sediment-related Disaster Prevention Law)

2. Evacuation support for home-bound people requiring assistance during a disaster

- Disaster prevention and welfare departments should cooperate to establish a system to assist evacuation of home-bound people requiring assistance during a disaster. Make efforts to raise the awareness of sediment-related disasters so that home-bound people requiring assistance during a disaster who have difficulty with evacuating on their own will be encouraged to communicate on their own initiative the need for assistance in evacuation to evacuation supporters or municipalities in advance.
- Seek the sharing of information about home-bound people requiring assistance during a disaster by cooperating with welfare departments while giving sufficient consideration to personal information protection.
- Communicate with certainty the evacuation advice to people requiring assistance during a disaster and evacuation supporters through fire companies, voluntary disaster prevention organizations, welfare staff, etc.
- Hold briefing sessions intended for care workers, welfare commissioners, etc. on evacuation support for home-bound people requiring assistance during a disaster.

[Description]

[1] Evacuation support for home-bound people requiring assistance during a disaster

Sixty-three percent of the dead or missing in sediment-related disasters between 2004 and 2006 are people requiring assistance during a disaster including the elderly.

This indicates that disaster prevention and welfare departments need to cooperate to establish a system for assisting evacuation of home-bound people requiring assistance during a disaster who have difficulty with evacuating on their own.

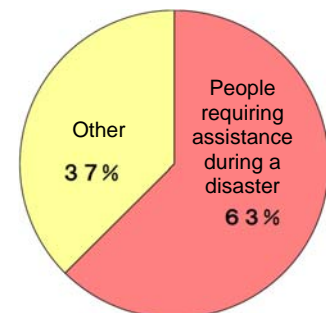
It must be ensured that evacuation supporters such as the families and voluntary disaster prevention organizations have the knowledge of shelters and evacuation routes used in emergency situations and information about sediment-related disasters (evacuation preparation information, evacuation advice, etc.) is reliably communicated. For evacuation, efforts must be made for safe and prompt evacuation of home-bound people requiring assistance during a disaster including securing means of transportation by emergency vehicles, etc.

Direct mutual alerting between voluntary disaster prevention organizations, local welfare commissioners, residents in the neighborhoods, etc. is also important.

[2] Sharing of information about home-bound people requiring assistance during a disaster

Welfare and disaster prevention departments need to work in cooperation for sharing of information about home-bound people requiring assistance during a disaster while giving sufficient consideration to personal information protection. Disaster prevention departments should create lists of home-bound people requiring assistance during a disaster who need assistance with evacuation and distribute the information to the leaders of voluntary disaster prevention organizations, etc., for smoothly providing evacuation support in emergency situations.

Home-bound people requiring assistance during a disaster accounting for many of the victims



Percentage accounted for by home-bound people requiring assistance during a disaster of all victims of sediment-related disasters that occurred between 2004 and 2006 (survey by Sabo Dept., MLIT)

* For 2005, victims of Typhoon No. 14 only

Comment of the head of a disaster-hit municipality

- "Welfare commissioners can persuade the elderly to evacuate and ensure they evacuate."

[3] **Issuance and communication of evacuation advice to people requiring assistance during a disaster**

For allowing people requiring assistance during a disaster to evacuate in safe conditions, it is important to take measures such as issuance of evacuation advice to people requiring assistance during a disaster when evacuation is estimated to take place at night so that evacuation can be completed before sunset. Municipalities must ensure that evacuation advice is communicated to people requiring assistance during a disaster through fire departments, voluntary disaster prevention organizations, welfare staff, etc. Facilities relevant to people requiring assistance during a disaster must also be informed of the issuance of evacuation advice to people requiring assistance during a disaster, etc.

[4] **Briefing sessions for care workers, welfare commissioners, etc.**

It is important to hold briefing sessions intended for care workers, welfare commissioners, etc. who are regularly in contact with home-bound people requiring assistance during a disaster on the evacuation support to be given to those people requiring assistance when evacuation advice has been issued and on sediment-related disasters for the improvement of knowledge and raising of the awareness of disaster prevention.

Comment of the head of a disaster-hit municipality

- "We hold sabo study sessions for welfare commissioners and welfare office staff."

3. Construction of sabo facilities for safeguarding facilities relevant to people requiring assistance during a disaster

- After the safety against sediment-related disasters of facilities relevant to people requiring assistance during a disaster has been confirmed, construct sabo facilities to safeguard facilities located in any area vulnerable to sediment-related disasters. Also consider the ensuring of safety of shelters by shelter managers' own efforts to put countermeasure facilities in place.

[Description]

It is facility managers' duty to ensure safety of facilities relevant to people requiring assistance during a disaster against sediment-related disasters. If facilities relevant to people requiring assistance during a disaster are located in any area vulnerable to sediment-related disasters, measures integrated with the warning and evacuation system must be taken such as the construction of sabo facilities for safeguarding facilities relevant to people requiring assistance during a disaster based on sufficient cooperation and coordination with relevant organizations.

Chapter 6: Prevention of Secondary Disasters

1. Points to consider in disaster prevention activities

- For disaster prevention activities after any disaster has occurred, take measures including stationing of observers, installation of sensors, etc. in view of the risk of secondary disasters for ensuring thorough safety.
- Send in experts on sediment-related disasters as required.
- Attention must be paid to the characteristics of sediment-related disasters because disasters have often struck during disaster prevention activities such as patrol to check the situations on site.

[Description]

In past cases, fire company members, etc. were involved in and fell victim to sediment-related disasters during disaster prevention activities after the occurrence of disasters. Sediment-related disasters often occur unexpectedly and may occur after rain has peaked and subsided.

For the prevention of secondary disasters caused by sediment-related disasters during disaster prevention activities, a system to confirm safety must be set up by installing sensors for detecting sediment-related disasters, etc. in addition to stationing of observers to check for the occurrence of any disaster or precursor.

Appropriate responses must also be taken by sending in experts on sediment-related disasters, etc. as required.

Chapter 7: Improvement of the Awareness of Disaster Prevention

1. Establishment of a disaster prevention system led by the residents

- Work in cooperation with prefectural governments and relevant organizations on a regular basis including during the Sediment Disaster Prevention Month for promoting public relations activities and raising awareness of disaster prevention.
- Make good use of opportunities including briefing sessions at the time of the designation of sediment-related disaster hazard areas based on the Sediment-related Disaster Prevention Law and emergency drills to actively interact with the residents.
- Residents must seek to strengthen mutual ties as a community by discussing measures for sediment-related disasters, etc. through activities such as residents' or neighborhood associations on a regular basis for disaster prevention in emergency situations.

[Description]

When the danger of a sediment-related disaster has increased, the best way for the residents to take is to evacuate on their own initiative based on the understanding of precursors as well as evacuation by following evacuation advice.

To this end, constant efforts to develop the understanding of sediment-related disasters and the awareness of the task of "protecting own area with own hands" are important.

In addition, information sharing must be achieved by the government's "effort to make known" and the residents' "effort to know" on the basis of shared awareness of sediment-related disasters for improving the disaster prevention capabilities of the area.

[1] Promotion of PR activities during the Sediment Disaster Prevention Month, etc.

As activities for the Sediment Disaster prevention Month (June 1 - 30), study sessions and tours, joint inspection of the sediment-related disaster hazard locations, shelters, evacuation routes etc. based on the coordination between prefectural governments and relevant organizations can be conducted for raising the residents' awareness of the prevention of sediment-related disasters.

Websites provide a means of communication that allows the residents to acquire information at anytime. Making good use of disaster-related webpages of municipalities realizes effective means to provide information about the basic knowledge regarding sediment-related disasters and shelters, etc. Public relations activities by taking advantage of the space of municipal PR magazines are also useful.

[2] Interaction between the government and the residents

At the opportunities including briefing sessions at the time of the designation of sediment-related disaster hazard areas based on the Sediment-related Disaster Prevention Law and emergency drills, it is important for the government and the residents to actively interact with each other, rather than the government's one-way provision of information to the residents, for shared awareness of sediment-related disasters

Based on this understanding, the government and the residents must be involved in the establishment of the warning and evacuation system according to their respective roles.

[3] Promotion of the building of voluntary disaster prevention organizations

As the preparations for sediment-related disasters, active exchanges between residents on a regular basis through activities of residents' or neighborhood associations, etc. for the building of organizations that function in emergency situations are very important.

To facilitate effective activities by voluntary disaster prevention organizations, municipalities need to provide support with the establishment of organizations, their operations and overall activities.

Comment of the head of a disaster-hit municipality

- "Cooperation in a local areas is important. Mutual collaboration between immediate neighbors is very useful."

[4] Education and training of disaster prevention leaders

For more enhanced and continued activities of voluntary disaster prevention organizations, continuous cultivation of human resources to be the leaders of the given districts (voluntary disaster prevention organizations), or education and training of disaster prevention leaders, is important. Disaster prevention leaders of districts are expected to play the central role in the self- and mutual help for leading voluntary disaster prevention organizations. Effective ways to develop disaster prevention leaders include making use of systems such as the "sabo volunteer," "disaster prevention expert" and "disaster relief specialist" systems in addition to study sessions with experts invited as lecturers.

2. Emergency drills and disaster education

- Conduct regular emergency drills and support emergency drills led by the residents for improved awareness of disaster prevention and check the methods and systems relevant to warning and evacuation.
- Positively promote disaster education intended for elementary and junior high school students.
- People in charge of disaster prevention, etc. must actively take part in disaster prevention-related training and study sessions, etc. for improving their own knowledge about disaster prevention.

[Description]

[1] Holding of emergency drills with a clear sense of purpose

For conducting emergency drills, plan drill menus for checking the methods and systems relevant to warning and evacuation in view of the local disaster experiences and actual disaster conditions. In response to any problem identified by the drill, take measures immediately. It is important to conduct such drills before the flood season every year and to continue with the effort.

The content of the drills must be based on the participation of the residents including people requiring assistance during a disaster and cooperation must be achieved with voluntary disaster prevention organizations, fire companies, the police department, Self Defense Forces, prefectural and national governments and other relevant organizations. It must also be ensured that effective drills take place by conducting at night or on holidays. For the drills, it is important to assume the actual occurrence of sediment-related disasters and include in the drills such details as the communication of information about sediment-related disasters, issuance of evacuation advice, establishment of shelters, evacuation of the residents and evacuation support for people requiring assistance during a disaster.

Comments of the heads of disaster-hit municipalities

- "Drills are necessary for smooth evacuation. It is important for people to be trained with drills even if evacuation turns out unnecessary afterwards."
- "Continuation is important for raising the consciousness of the residents."

[2] Disaster education for pupils/students

It is important to provide disaster education from early stages for pupils/students, who will be the driving disaster prevention of the regions in the following generations. Approaches to the development of a sense of self- and mutual help such as conducting disaster drills as part of integrated study in cooperation with elementary and junior high schools and boards of education and incorporating "disaster prevention" into the education programs are also necessary.

Comment of the head of a disaster-hit municipality

- "Disaster education for elementary and junior high school students must be spread nationwide."

[3] Disaster prevention training for people in charge of disaster prevention

For the issuance of evacuation advice, etc. based on appropriate decisions, municipal staff in charge of disaster prevention, fire company members, etc. are required to take part in training and study sessions for increasing the awareness and knowledge of disaster prevention. It is also important for the heads of municipalities to raise the awareness of disaster prevention on their own initiative.

Furthermore, the acquisition of communication abilities is also important for the establishment of a warning and evacuation system on the basis of the collaboration between the residents and government because direct interaction between municipal staff in charge of disaster prevention and local residents is significant.

Comment of the head of a municipality

- **"Efforts to discuss disaster prevention with the residents under normal conditions are important."**

3. Preparation of hazard maps with the focus on the residents

- Seek to improve the residents' awareness of disaster prevention by giving active support for the preparation of hazard maps with the focus on the residents as well as providing information about sediment-related disaster hazard locations, shelters, etc.

[Description]

The disaster awareness of residents who have not experienced disasters is likely to be low. Efforts must be made to improve the residents' awareness of disaster prevention by using disaster traditions handed down locally and disaster experiences in other municipalities as educational materials.

For this purpose, assistance must be given to the residents with the discovery and sorting out of the sediment-related disasters and precursors that occurred locally in the past and traditions in relation to sediment-related disasters. Using the results to create hazard maps with the leadership of the residents is effective.

Easy-to-understand handmade hazard maps from the viewpoint of the residents can be created by having the residents add the local traditions of sediment-related disasters, precursors, etc. to drawings indicating the sediment-related disaster hazard locations, locations of shelters, evacuation routes, facilities relevant to people requiring assistance during a disaster, etc. This can further deepen the residents' knowledge and awareness of sediment-related disasters.

It is important for municipalities to give support for the preparation of hazard maps with the focus on the residents while seeking the participation and advice of experts on sediment-related disasters.

Comment of the head of a municipality

- "It is our wish to integrate disaster-related traditions, life stories, folktales, records of past disasters, stories told by old people, etc. and hand them down to posterity"

References

Reference 1: Learning Lessons from Municipalities with Sediment-related Disaster Experiences

Are you fully prepared for sediment-related disasters?

Municipalities that have experienced actual sediment-related disasters are renewing their awareness of sediment-related disasters as common calamities and taking measures to address various challenges they faced when they were hit by disasters.

Places vulnerable to sediment-related disasters are all over the country and such disasters may occur anytime, anywhere and at any scale. It is important to study the problems of the municipalities that have undergone sediment-related disasters as the problems of one's own town to set up a sufficient warning and evacuation system.

1. Challenges and responses regarding the collection and communication of information

- **The conditions of rain differ between mountains and lowlands. Because the town government building is on the low-level ground, the information on the rainfall in the mountains can only be acquired after the rain. (Hakone Town, Kanagawa)**
- **Rainfall may vary within the city depending on the area. (Niihama City, Ehime)**

Measures taken/considered after the disaster

- Staff are stationed at public facilities when heavy rain warning was announced for the collection of information. (Hakone Town, Kanagawa)
- To acquire rainfall information for the respective area, the town was divided into districts, where rain gauges were installed. (Hinokage Town, Miyazaki)
- Additional rain gauges were installed in the disaster-hit districts. (Niihama City, Ehime).

[Reference in the main text: Chapter 2 Section 1]

- **The disaster management radio system and loudspeaker vans were used to communicate information to the residents but the sounds were not heard by those inside the houses because of the strong wind and heavy rain. (Miyazu City, Kyoto)**
- **The public-address system of the residents' associations was not adequate to be heard in heavy rain and the communication of evacuation information, etc. was hampered. (Niihama City, Ehime)**

Measures taken/considered after the disaster

- For communicating disaster information to the residents with certainty, broadcasting by means of the disaster management radio system, loudspeaker vans or cable has been put in place and the presidents of residents' associations have been requested to communicate information to the individual households. (Miyazu City, Kyoto)
- For an improved disaster management radio system covering the entire city (outdoor public address system slave stations and home receivers), the improvement project has been carried out according to a plan. (Same as above)
- Official vehicles with loudspeakers have been added to use as loudspeaker vans until the environment is prepared. (Same as above)

- At the time of disaster, municipal staff and members of voluntary disaster prevention organizations went from house to house for giving information and evacuation guidance. (Niihama City, Ehime)
- Efforts are being made to enhance the communication system with the networks of the residents' associations in especially dangerous districts. (Same as above)
- Additional means of communication were set up by posting disaster and rainfall information on websites, giving the information about evacuation advice and road closure to CATV, mobile networks, websites, mass media, etc. (Same as above)

[Reference in the main text: Chapter 2 Section 2]

- **Regional information could not be obtained because of the interruption of power, telephone service and mobile phone communication. (Shiiba Village, Miyazaki)**
- **Satellite phones have been introduced after the disaster experience but to an insufficient extent. (Same as above)**

Measures taken/considered after the disaster

- Communication checks via the satellite phones and disaster management radio system were conducted at the emergency drill. (Shiiba Village, Miyazaki)
- Satellite phones will be introduced to the individual community centers in addition to the 12 districts with fire companies. (Same as above)

[Reference in the main text: Chapter 2 Section 2]

- **Information about disaster forecast, weather conditions, etc. is generally communicated one-way from the government to the residents and regional information from the residents is difficult to obtain. (Tarumizu City, Kagoshima)**
- **While some residents may be provided with information by phone, there is a limit to the government's telephone line capacity, etc. and the overall situation is difficult to understand. (Same as above)**
- **Information communication systems such as telephone do not function and accurate on-site information cannot be communicated. (Nishigo Village, Fukushima)**

Measures taken/considered after the disaster

- The establishment of a bi-directional communication system (disaster management radio system and mutual notification system, etc.), rather than one-way communication from the government to the residents, is necessary. (Municipalities)

[Reference in the main text: Chapter 2 Section 2]

- **Although the system of collection and communication of information is in the regional plan for disaster prevention, many were new to the situation and in a state of panic at early stages. (Nishigo Village, Fukushima)**
- **Initial action by fire companies and staff in charge of regional information communication was delayed by road interruptions, etc. (Same as above)**
- **Road interruptions caused by flooding made the site unreachable by car. (Same as above)**
- **The town office (disaster response headquarters) was flooded. (Hinokage Town, Miyazaki)**

Measures taken/considered after the disaster

- The system of on-site information communication of the local fire companies has been improved. (Nishigo Village, Fukushima)
- Use of amateur radio should be considered. (Same as above)
- Substations with functions equivalent to those of the disaster response headquarters should be established in the individual districts. (Hinokage Town, Miyazaki)
- Staff should be stationed at the "disaster response headquarters" of the districts to enable independent responses even if the town office headquarters cannot be contacted. (Shiiba Village, Miyazaki)

[Reference in the main text: Chapter 2 Section 3]

- **Disaster prevention organizations were preoccupied with disaster responses while the power supply was cut of and telephone lines were interrupted and smooth cooperation was not achieved because the acquisition of the information about the conditions of damage took time and communication of information between disaster prevention organizations was delayed. (Miyazu City, Kyoto)**
- **The flood of conflicting information required large amounts of time for confirmation and sorting, the responses to which were time consuming. (Same as above)**

Measures taken/considered after the disaster

- The "Response Manual for the Staff" of the individual functions of the municipal office has been created to define the sharing of responsibility of the entire office and establish a support system. (Miyazu City, Kyoto)
- For the system of communication between relevant organizations, the need has been confirmed for taking advantage of the existing means of communication to exchange information. (Same as above)

[Reference in the main text: Chapter 2 Section 3]

2. Challenges and responses regarding the issuance of evacuation advice, etc.

Many residents who have experienced sediment-related disasters say that they never thought that they were living in such dangerous places. (Hiroshima City, Hiroshima)

Measures taken/considered after the disaster

- Specific explanations are given at briefing sessions for the residents at the time of the designation of hazard areas based on the Sediment-related Disaster Prevention Law, etc. about the risk of sediment-related disasters and the extent of their impact for a better understanding of sediment-related disasters. (Hiroshima City)
- For a better understanding of the responses to sediment-related disasters, the residents have been encouraged to lead the preparation of the warning and evacuation manual and the implementation of drills for its validation. (Same as above)

[Reference in the main text: Chapter 3 Section 1, Chapter 7 Section 3]

The awareness is increased of the ward heads and fire company members who participated in the local briefing sessions at the time of the designation of hazard areas based on the Sediment-related Disaster Prevention Law but the risk awareness of ordinary residents is low. (Suwa City, Nagano)

Measures taken/considered after the disaster

- Based on the designation of sediment-related disaster hazard areas and the results of survey of the flood assumed areas, a hazard map should be prepared and distributed to all households for the development of risk awareness. (Suwa City, Nagano)

[Reference in the main text: Chapter 3 Section 1, Chapter 7 Section 3]

While the overall awareness of the village has been increased through the disaster experience, there is a gap in the awareness between the disaster-hit areas and other areas. (Shiiba Village, Miyazaki)

Measures taken/considered after the disaster

- Efforts are made for ensuring that the residents are informed of hazard locations (watch the neighborhood regularly on own initiative). (Shiiba Village, Miyazaki)
- The idea that "disasters can hit anytime" should be firmly communicated. (Same as above)

[Reference in the main text: Chapter 3 Section 1, Chapter 7 Section 2]

- **Because of the lack of major disaster experiences in the past, most of the citizens and municipal staff members did not expect a disaster as serious as the 2004 disaster. (Niihama City, Ehime)**
- **Some areas have showed low evacuation rates despite that they are at the foot of the mountains. (Same as above)**

Measures taken/considered after the disaster

- Disaster prevention was featured at municipal informal gatherings (with the mayor visiting local areas for discussion) in FY 2005. (Niihama City, Ehime)

- Disaster prevention maps indicating the sediment-related disaster hazard locations and shelters have been distributed to all households for the residents to be informed. (Same as above)
- For raising awareness of the risk of disasters, briefing sessions for warning areas based on the Sediment-related Disaster Prevention Law are held for subdistricts. (Same as above)

[Reference in the main text: Chapter 3 Section 1, Chapter 7 Sections 2 and 3]

- **Any municipal head would feel under pressure when issuing evacuation advice, etc. (Tarumizu City, Kagoshima)**
- **There is a concern that evacuation advice proving to be unnecessary too often might make the residents think of it as "crying wolf." (Same as above)**

Measures taken/considered after the disaster

- The resident should be informed that advice may be issued at anytime. (Tarumizu City, Kagoshima)
- An environment should be built in which the residents feel glad about non-occurrence of disasters even if warning turns out to be unnecessary. (Same as above)

[Reference in the main text: Chapter 3 Section 2]

- **Many tourists visit the town and simultaneous evacuation of all residents is impossible. (Hakone Town, Kanagawa)**
- **Defining of the areas to be evacuated is difficult. (Same as above)**
- **There are challenges with the timing of switching from "voluntary evacuation" to "evacuation advice" and the identification of the areas to be evacuated. (Miyazu City, Kyoto)**

Measures taken/considered after the disaster

- Sediment-related disaster warning information can be used. (Hakone Town, Kanagawa)
- The timing of issuing "evacuation advice" has been determined based on the criteria of the sediment-related disaster monitoring system of Kyoto Prefecture. (Miyazu City, Kyoto)

[Reference in the main text: Chapter 3 Section 2]

- **Evacuation advice could not be issued or was issued after the occurrence of debris flows, etc. (Niihama City, Ehime)**
- **The residents who responded to sediment-related disasters had only a limited amount of time to evacuate. (Hiroshima City, Hiroshima)**
- **The criteria of the issuance of evacuation advice, etc. are unclear. (Shiiba Village, Miyazaki)**
- **Decisions on evacuation advice in response to sediment-related disasters are difficult to make. (Hinokage Town, Miyazaki)**
- **Signs of sediment-related disasters are difficult to identify and decisions cannot be made. (Nishigo Village, Fukushima)**
- **The village suffered flood disasters in the past but no sediment-related disasters. (Nishigo Village, Fukushima)**

Measures taken/considered after the disaster

- It has been made a rule to issue evacuation preparation information roughly one hour before evacuation advice. (Same as above)
- The criteria of the issuance should be determined with the specific geographical characteristics of the individual areas understood rather than depending only on weather forecast or warning. (Nishigo Village, Fukushima)
- The city area has been subdivided in view of the local characteristics and the evacuation criteria rainfall (working rainfall), etc. have been determined based on the rainfall information provided by the pluviometric stations of the subdivided districts to use as the basis of decisions on the appropriate issuance of evacuation advice., etc. in accordance with the actual situations of the areas. (Hiroshima City, Hiroshima)
- For prompt issuance of evacuation advice, etc., some districts hit by disasters in the past have been designated as evacuation advice key districts and the zones and the number of houses to be evacuated have been defined in advance as part of the preparations. (Same as above)
- The criteria of issuance should be revised based on the conventional notification from the communities and rain gauge data. (Shiiba Village, Miyazaki)
- The criteria of the issuance of voluntary evacuation, evacuation advice and evacuation directive must be clearly defined. (Hakone Town, Kanagawa)
- Holding of training sessions, etc. on sediment-related disasters for the heads of administrative districts must be considered. (Nishigo Village, Fukushima)
- The criteria of the issuance of evacuation advice, etc. based on rainfall have been established for the individual communities. (Niihama City, Ehime)

Criteria of evacuation for sediment-related disasters

(districts at the foot of the mountains other than Tatsukawa and Besshiyama districts)

	Evacuation preparation information	Evacuation advice	Evacuation directive
Continuous rainfall up to the previous day measured 100 mm or more	Daily rainfall of the day exceeding 50 mm	Rainfall of the day exceeding 50 mm and heavy rain of at least 30 mm in the hourly rainfall expected	Precursor of a sediment-related disaster observed Sediment-related disaster occurred
Continuous rainfall up to the previous day measured between 40 and 100 mm	Daily rainfall of the day exceeding 80 mm	Rainfall of the day exceeding 80 mm and heavy rain of at least 30 mm in the hourly rainfall expected	Precursor of a sediment-related disaster observed Sediment-related disaster occurred
No rainfall up to the previous day	Daily rainfall of the day exceeding 100 mm	Rainfall of the day exceeding 100 mm and heavy rain of at least 30 mm in the hourly rainfall expected	Precursor of a sediment-related disaster observed Sediment-related disaster occurred

[Reference in the main text: Chapter 3 Section 2, Chapter 3 Section 4]

- **The organization members and residents do not have a sufficient understanding of the meaning of evacuation advice/directive. (Miyazu City, Kyoto)**

Measures taken/considered after the disaster

- The "Evacuation Manual" to assist the residents with safe evacuation has been prepared and distributed to all households. (Miyazu City, Kyoto)

- Awareness is raised through "Evacuation Manual" on the specific concept of voluntary evacuation and the residents' own responsibility for taking action. (Same as above)
- Evacuation is difficult in midnight and consideration must be given to the hour of the issuance of evacuation advice, etc. (Hiroshima City, Hiroshima)
- For the communication of disaster prevention information including evacuation advice, siren signals of motor sirens (with a predefined pattern of siren sounds for evacuation advice) are used and information about disaster prevention is provided by taking advantage of mobile phones (distribution of disaster prevention messages (Kyoto Prefecture disaster/crime prevention message distribution system)), the municipal website, etc. (Miyazu City, Kyoto)

[Reference in the main text: Chapter 3 Section 2, Chapter 3 Section 3]

- **Not many engineering staff members capable of judging the risk of sediment-related disasters are available on site. (Suwa City, Nagano)**
- **The on-site risk criteria such as earth falls and cracks are difficult to define. (Same as above)**

Measures taken/considered after the disaster

- A manual containing consistent risk criteria together with case examples should be prepared and the means of notification put in place. (Suwa City, Nagano)

[Reference in the main text: Chapter 3 Section 4]

3. Challenges and responses regarding the establishment and operation of shelters

- Regarding the operation of shelters, some problems were found in the identification of people to be accepted in shelters, management of admission to and leaving from shelters, communication of information to evacuees, consultation, etc. (Miyazu City, Kyoto)

Measures taken/considered after the disaster

- For smooth preparation for the establishment and operation of shelters, creation of the "Manual for the Establishment and Operation of Shelters" has been considered. (Miyazu City, Kyoto)

[Reference in the main text: Chapter 4 Section 1]

- The convention center to which the residents had voluntarily evacuated rather than shelters designated by the government was hit by a disaster. (Shiiba Village, Miyazaki)
- In some cases where shelters were far from home, nearby assembly facilities of the residents' associations, homes of acquaintances, etc. were used for temporary evacuation, which made it difficult to understand the actual conditions. (Miyazu City, Kyoto)

Measures taken/considered after the disaster

- Discussion should be held for achieving closer contact between the residents' association and the municipal government in the future. (Miyazu City, Kyoto)

[Reference in the main text: Chapter 4 Section 1]

- At the time of the establishment of shelters, disaster reserves (daily living necessities such as blankets) and cooking devices (gas rice cookers, pots and pans, etc.) were not prepared. (Miyazu City, Kyoto)
- The functions of shelters are not sufficient. (Nishigo Village, Fukushima)

Measures taken/considered after the disaster

- Shelters are furnished with heating apparatus (kerosene stoves) and blankets in advance. (Miyazu City, Kyoto)
- While food service at shelters should basically be via emergency kitchens, boxed meal catering services may be used depending on the situations of disasters. (Same as above)
- The environment of the shelters should be improved to create an atmosphere that makes people feel comfortable with going to shelters. (Tarumizu City, Kagoshima)

[Reference in the main text: Chapter 4 Section 2]

- Because of mountainous terrain, shelters are unavoidably inside the sediment-related disaster hazard areas. (Hakone Town, Kanagawa)
- Shelters are located on rough terrain and unsafe. (Hinokage Town, Miyazaki)
- Many evacuation routes run in the valleys and are unsafe. (Hinokage Town, Miyazaki)
- Meeting places and schools are often specified as shelters for no special reason and safe selection criteria have not been established. (Nishigo Village, Fukushima)
- In semi-mountainous areas, routes to shelters often get interrupted. (Nishigo Village, Fukushima)

Measures taken/considered after the disaster

- Shelters, evacuation routes, etc. should be immediately reviewed based on the designation of sediment-related disaster hazard areas, etc. for guiding to safe shelters. (Hakone Town, Kanagawa and Hinokage Town, Miyazaki)
- Measures such as the use of private facilities outside the areas must be considered (Hakone Town, Kanagawa)
- Evacuation should take place at early stages in view of the risk of road interruptions. (Shiiba Village, Miyazaki)
- The "hardware" of shelters should be improved. (Same as above)

[Reference in the main text: Chapter 4 Section 3, Chapter 4 Section 4]

Some shelters were rendered unavailable for evacuation because of the flooding of roads in front of them. And the shelters themselves were flooded. (Niihama City, Ehime)

Measures taken/considered after the disaster

- Additional facilities not prone to flooding have been designated as shelters. (Niihama City, Ehime)
- Because evacuation may be dangerous after roads have been flooded, early evacuation action is encouraged at every opportunity of explanation to the residents. (Same as above)

[Reference in the main text: Chapter 4 Section 3]

Shelters are distantly located. (Tarumizu City, Kagoshima)

Measures taken/considered after the disaster

- The "evacuation transportation management department" should be set up in the disaster response headquarters to evacuate citizens without transportation. (Tarumizu City, Kagoshima)

[Reference in the main text: Chapter 4 Section 3]

The existing shelters are not enough to accommodate all the citizens. (Tarumizu City, Kagoshima)

Measures taken/considered after the disaster

- Safe private facilities should be designated as shelters. (Tarumizu City, Kagoshima)
- Because the capacity of shelters set up by the government is limited, the establishment of "temporary shelters" managed by the communities (residents' associations) themselves according to the actual conditions of the communities have been encouraged. (Miyazu City, Kyoto)

[Reference in the main text: Chapter 4 Section 3]

4. Challenges and responses regarding the support given to people requiring assistance during a disaster

An old people's home and nursery school are located on steep terrain along a river. (Hinokage Town, Miyazaki)

Measures taken/considered after the disaster

- Early evacuation should be encouraged and staffing revised. (Hinokage Town, Miyazaki)
- For social welfare facilities, assistance manuals have been prepared and evacuation drills are conducted every year. (Nishigo Village, Fukushima)

[Reference in the main text: Chapter 5 Section 1]

- **No specific assistance measures are in place for home-bound people requiring assistance. (Nishigo Village, Fukushima)**
- **Data on people requiring assistance during a disaster are personal information, which cannot be offered to voluntary disaster prevention organizations and residents' associations. (Hakone Town, Kanagawa)**

Measures taken/considered after the disaster

- Cooperation should be achieved with administrative districts to seek the establishment of a system to provide assistance as soon as possible. (Nishigo Village, Fukushima)
- Maps containing information about people requiring assistance during a disaster should be prepared. (Same as above)
- The "Miyazu City Disaster Mutual Aid Network" system has been set up to assist the elderly and disabled (people requiring assistance during a disaster) with evacuation and the system is being established in the individual residents' associations. (Miyazu City, Kyoto)

[Reference in the main text: Chapter 5 Section 2]

- **Great pains were taken to transportation and acceptance at shelters of bedridden elderly people, etc. when the disaster struck. (Tarumizu City, Kagoshima)**
- **Some people requiring assistance were laid down on long desks at ordinary designated shelters. (Same as above)**
- **Accommodating elderly people requiring nursing care in evacuation centers is very difficult. (Suwa City, Nagano)**

Measures taken/considered after the disaster

- Agreement should be made with welfare facilities concerning acceptance. (Tarumizu City, Kagoshima)
- Transportation vehicles that allow use of stretchers, etc. should be introduced. (Same as above)
- Doctors and nurses should be stationed at shelters and use of geriatric healthcare facilities should be considered. (Suwa City, Nagano)

[Reference in the main text: Chapter 5 Section 2]

People requiring assistance during a disasters were notified of the evacuation information by municipal staff via telephone but some of them had no evacuation supporters, which obliged staff members to visit them to provide evacuation assistance. Because support for some people requiring assistance during a disaster was delayed, they had to evacuate with assistance while being soaked in water.

In addition, gymnasiums and community centers not accessible to people requiring assistance during a disaster are designated as shelters. (Niihama City, Ehime)

Measures taken/considered after the disaster

- To secure evacuation places for people requiring assistance during a disaster, agreement has been made with the manager of social welfare facilities in the city. (Niihama City, Ehime)
- A plan for supporting people requiring assistance during disaster is under development for particularly dangerous areas and a system is being set up to allow the communities to have the information about evacuation supporters and give evacuation support in disaster situations. (Same as above)

[Reference in the main text: Chapter 5 Section 2]

5. Challenges and responses regarding the raising of disaster prevention awareness

- The rate of organized voluntary disaster prevention groups was low at the time of the disaster. The communities with the organizations did not suffer human damage. (Tarumizu City, Kagoshima)
- Before the disaster in 2004, the rate of formation of voluntary disaster prevention organizations was low (15.6 percent as of FY 2003) and the residents had little interest. (Niihama City, Ehime)
- Not many people in the age groups capable of leading the activities of voluntary disaster prevention organization take part in the activities. (Hiroshima City)

Measures taken/considered after the disaster

- The reinforcement of local voluntary disaster prevention organizations and local communities is necessary. The rate of organized voluntary disaster prevention groups dramatically increased after the disaster experience. (Tarumizu City, Kagoshima)
- The increase of the rate of formation of voluntary disaster prevention organizations was promoted and the rate improved rapidly (96.3 percent at present). (Niihama City, Ehime)
- Urban areas with a low rate of formation of voluntary disaster prevention organizations are being approached by the municipal government to encourage the organization starting in FY 2007. (Miyazu City, Kyoto)
- Because active leaders are essential to the activities of voluntary disaster prevention organizations, leader training sessions and informal gatherings are held to develop the leaders of voluntary disaster prevention organizations. (Hiroshima City, Hiroshima)

[Reference in the main text: Chapter 7 Section 1]

Comprehensive emergency drills are led by the government and not held voluntarily, which has resulted in an insufficient understanding of the division of roles. (Hakone Town, Kanagawa)

Measures taken/considered after the disaster

- Voluntary emergency drills should be conducted by the individual communities and districts defined by the residents themselves. (Hakone Town, Kanagawa)

[Reference in the main text: Chapter 7 Section 2]

Twenty-three years have already passed since the last sediment-related disaster experience and the number of residents and staff members who have experienced disasters is decreasing. (Suwa City, Nagano)

Measures taken/considered after the disaster

- Past cases of disasters should be handed down and disaster management seminars and emergency drills involving the staff and residents should be held. (Suwa City, Nagano)

[Reference in the main text: Chapter 7 Section 2]

Even now, after a disaster has been experienced, middle-aged and older people are the main participants in disaster prevention activities and the participation of younger generations is low. (Niihama City, Ehime)

Measures taken/considered after the disaster

- Disaster management lectures have been given in different communities with the cooperation of Ehime University. (Niihama City, Ehime)
- The establishment of Ehime Disaster Expert Education Council (tentative name) is scheduled with the collaboration of Ehime University. The project is intended for educating children who value the lives of their own and others. Disaster education with up to ten school hours at six elementary and junior high schools in the city is planned. (Niihama City, Ehime)

[Reference in the main text: Chapter 7 Section 2]

The city has suffered many sediment-related disasters. Still, easygoing ideas about sediment-related disasters ("no rain has ever caused disasters so far, no matter how heavy") and overconfidence without any grounds ("we are in a safe place, if not others") have led to suffering from disasters. (Tarumizu City, Kagoshima)

Measures taken/considered after the disaster

- "Disaster management seminars" with the cooperation of the university that are intended for the citizens are held and will continued to be held regularly. (Tarumizu City, Kagoshima)

[Reference in the main text: Chapter 7 Section 2]

Disaster maps indicating sediment-related disaster hazard locations were distributed to all households a few months before the disaster hit but the residents' level of understanding was not sufficient. (Miyazu City, Kyoto)

Measures taken/considered after the disaster

- Public relations activities were carried out before the flood season for raising awareness of disaster prevention. (Miyazu City, Kyoto)
- On the first Sunday of September before the typhoon season, a siren sounding drill (with the siren sounded in the pattern indicating evacuation advice) is conducted and voluntary evacuation drills by local residents' associations are encouraged at the same time, which can raise awareness to prompt them to "think what they can do and carry it out" as a community. (Same as above)

[Reference in the main text: Chapter 7 Section 2]

- **Nobody imagined that the back mountain where they resided would collapse. (Nishigo Village, Fukushima)**
- **With no knowledge or experience of sediment-related disasters, everybody was simply stunned. (Same as above)**
- **Where and when sediment-related disasters can occur is difficult for the residents to understand. (Hiroshima City, Hiroshima)**

Measures taken/considered after the disaster

- Based on the disaster experience, "The Family Handbook of Disasters" has been distributed to the households. (Nishigo Village, Fukushima)
- Emergency drills have been improved and awareness raising initiative has been taken by using the disaster management radio system. (Same as above)
- Diagrams indicating the sediment-related disaster hazard locations have been posted at ward offices and community centers. In addition, the Disaster Map containing the information about the causes and precursors of sediment-related disasters, sediment-related disaster hazard locations, etc. has been distributed to all households by inserting in newspapers for enhancing the awareness of sediment-related disasters. (Hiroshima City, Hiroshima)
- For mitigating damage caused by disasters, positive encouragement is given to the preparation of "our town disaster map" by voluntary disaster prevention organizations to increase the residents' awareness of disaster prevention. (Same as above)

[Reference in the main text: Chapter 7 Section 2 Chapter 7 Section 3]

6. Case examples of disasters

Case in Nishigo Village, Fukushima:

localized torrential downpour in 1997

The localized torrential downpour at the end of August 1998 (total rainfall 1,267 mm, maximum rainfall per hour 90 mm) caused sediment-related disasters in different parts of Fukushima and Tochigi Prefectures and overtopping and washout of small to medium sized rivers. In Nishigo Village, Fukushima Prefecture, earth and sand flowed into a social welfare facility called Taiyo no Kuni, which claimed the lives of five people.



Damage to Taiyo no Kuni Karamatsu So

Source: MIT website

Case in Hakone Town, Kanagawa:

Typhoon No. 21 in 2002

Typhoon No. 21 that struck in October 2002 brought about a record-breaking heavy rain with rainfall per hour of 98 mm, which caused damage including debris flows at five locations, roads rendered impassable, part of the women's dormitory of a golf course engulfed and a tourist home downstream subjected to a debris flow. Fortunately, no human damage was caused.

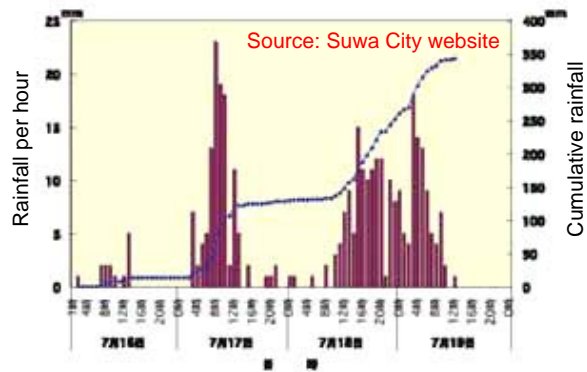


Case in Suwa and Okaya Cities, Nagano:

Typhoon No. 21 in 2006

The rain front became stationary since around July 15 and caused intermittent heavy rain. Between 18 and 19, human damage and destruction of houses were caused by sediment-related disasters. The human damage included 11 people dead or missing mainly in Okaya City, Suwa City and Tatsuno Town.

Data provided by Suwa Observatory



Case in Miyazu City, Kyoto:

Typhoon No. 32 in 2004

As Typhoon No. 23 was approaching, intermittent rain continued between October 19 and 20. The wind and rain became stronger around 1:00 p.m. of 20 and a rapid increase of the water level was confirmed in Otegawa River in the city. By around 5:00 p.m., debris flows occurred in two mountain streams in Takiba district, which resulted in two deaths, four houses totally destroyed, one house half-destroyed and 13 houses partially damaged.



Case in Hiroshima City, Hiroshima:

Localized torrential downpour in 1999

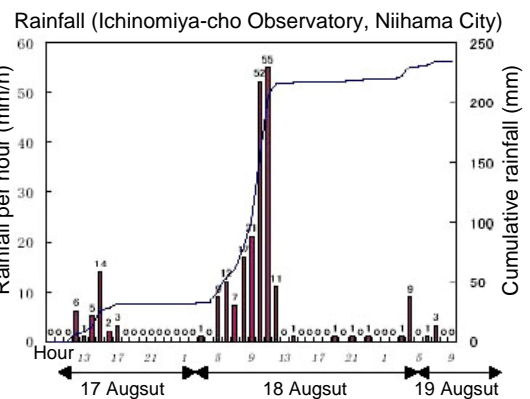
The rain that started around 0:00 a.m. of June 29 grew stronger and heavy rain was observed between 1:00 and 4:00 p.m. all over Saeki and Asakita Wards, Hiroshima City. Between 3:00 and 5:00 p.m., heavy rain was observed in an area extending from Ogaki Town to Higashihiroshima City, mainly in Kure City. The total amount of continuous rain between June 28 and 29 reached 199.5 mm at Ono Interchange, 271 mm at Toyama and 184 mm in Kure City. The record-breaking short-time rainfall caused local rainfall per hour of 81 mm at Yahatagawa Bridge, 63 mm at Toyama and 73 mm at Kure City. The number of disaster-hit locations include 139 by debris flows and 186 by slope failures and the large-scale sediment-related disasters not experienced in recent years left 31 people dead, one person missing and 154 houses completely destroyed. The damage was concentrated in new residential areas in the suburbs and the disasters are positioned as urban sediment-related disasters.



Case in Niihama City, Ehime:

Typhoon No. 15 in 2004

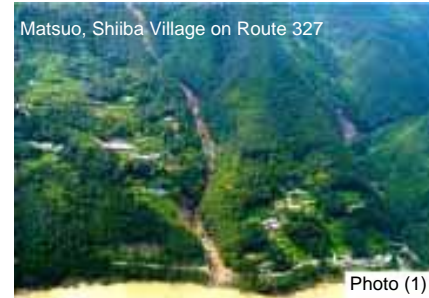
Around 10:00 am of August 18, localized rain with the maximum rainfall per hour of 55.5 mm was observed in Niihama City and the urban district in the east part of the city suffered concentrated flooding of rivers and sediment-related disasters. Typhoon No. 15 caused four deaths (of which three by sediment-related disasters), 34 houses completely or half-destroyed, etc. in Ehime Prefecture, mainly in Niihama City.



Case in Shiiba Village, Miyazaki:

Typhoon No. 14 in 2005

Earth fall and flood damage occurred in different parts of the village. With the lifelines including power, telephone and national and prefectural roads seriously destroyed, the village remained isolated for a few days. From the experience of the disaster in 2004, the village had prepared 13 satellite phones (one for each district), which proved very useful at the time of the typhoon in 2005. However, access was interrupted just by one valley between areas even within a community and connection was severed.



Case in Hinokage Town, Miyazaki:

Typhoon 14 in 2005

During the two days between September 5 and 6, a storm continued for a long time mainly in the eastern part of Kyushu. In Miyazaki Prefecture, the 48-hour precipitation exceeded 1,000 mm. At Nakagoya, Hinokage Town, rainfall per hour of 51 mm and 48-hour precipitation of 847 mm were observed.

A debris flow struck eight houses but the residents evacuated on their own initiative based on the encouragement of voluntary evacuation given by the town and no human damage was caused.



Local storm with the rainfall of over 100 mm continued since the evening of July 5 mainly in the Osumi region. In Tarumizu City, rainfall of 109 mm was recorded at 10:00 p.m.. The city set up the disaster response headquarters at 10:00 p.m., issued evacuation advice intended for 19,101 people of all of the 8,334 households of the city and established 16 shelters in the city.

In the Kamiichiki district of the city, a debris flow occurred around 11:00 p.m., which caused damage including complete destruction of four houses. But some of the local residents had started to evacuate voluntarily around 6:00 p.m. and no human damage was caused.

The city had experienced a disaster that claimed the lives of three people due to a debris flow when Typhoon No. 14 hit in 2005.



Reference 2: For Improved Disaster Prevention Capabilities of the Area

For the government and the residents to have shared awareness of sediment-related disasters and build a warning and evacuation system against sediment-related disasters in cooperation with each other based on their respective roles, the government and the residents must have direct interaction on a regular basis to discuss the measures and take action for improving the disaster prevention capabilities of the area.

1. Interaction between the government and the residents

The government should take advantage of opportunities including briefing sessions at the time of the designation of sediment-related disaster hazard areas based on the Sediment-related Disaster Prevention Law and emergency drills to actively interact with the residents.

[Description]

Briefing sessions for the residents should be considered as opportunities for mutual interaction rather than providing information one-way from the government to the residents and efforts should be made for achieving good communication.

Discussing the impact and seriousness of sediment-related disasters, how the government can respond, what action the residents should take, etc. for raising awareness of the task of "protecting own area with own hands" leads to the improvement of the disaster prevention capabilities of the area.

Briefing session to the residents



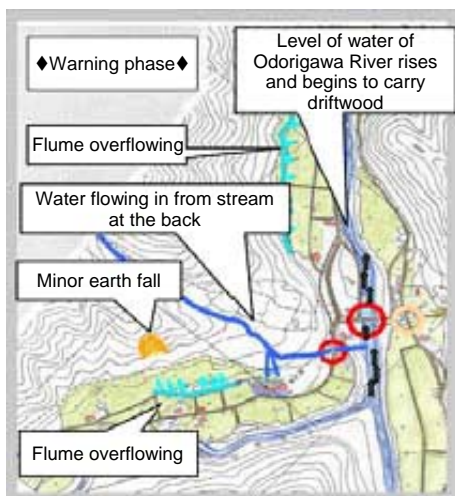
(Example of Tosa City, Kochi)

Emergency drill



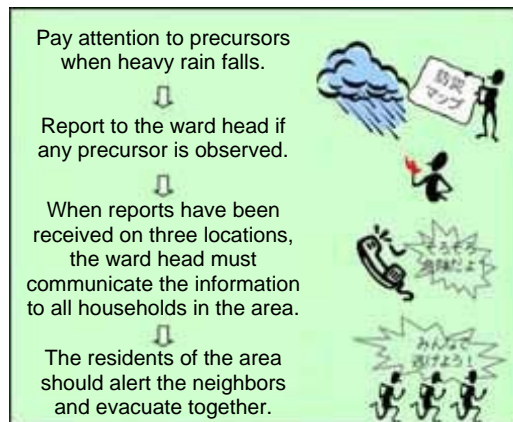
(Example of Tarumizu City, Kagoshima)

Preparation of hazard map (disaster prevention map) with a focus on the residents



(Example of Takayama City, Gifu)

Establishment of rules of voluntary evacuation



(Example of Awazawa district, Minakami Town, Gunma)

(Examples of communication)

In cooperation with mediators (disaster prevention leaders), the government must:
Provide any information that can be offered to the residents (explain at the same time that there are limitations) and bring awareness that the residents need to "protect their lives for themselves."

Information that can be offered include:

- Status of the occurrence of disasters in the surrounding areas
- Status of hazard locations (types of disasters and extent of impact)
- Information concerning the risk of disasters (weather information, sediment-related disaster warning information, etc.)
- Means of provision of information (disaster radio, loudspeaker vans, etc.)
- Issuance of evacuation preparation information, evacuation advice and evacuation directive
- Establishment and operation of safe shelters
- Status of sabo facilities of the area



Neighborhood associations (voluntary disaster prevention organizations) must:

- Sort out precursors and disaster traditions and prepare disaster maps.
- Check the shelters and evacuation routes based on disaster maps., etc. If appropriate shelters are not readily available, secure temporary shelters. Discuss the operation of shelters.
- Determine the evacuation rules to follow when there is any risk of sediment-related disasters.
- Acquire the information about people requiring assistance and discuss evacuation support.



Neighborhood associations (voluntary disaster prevention organizations) must:

Conduct disaster drills and study sessions on an ongoing basis and verify their effect.

The government must give as much support as possible to facilitate these activities of the voluntary disaster prevention organizations, etc. by:

- Holding training sessions for disaster leaders., etc.
- Taking part in disaster drills to communicate information.
- Securing safe and familiar shelters.
- Discussing the operation of shelters.
- Providing lists of people requiring assistance.

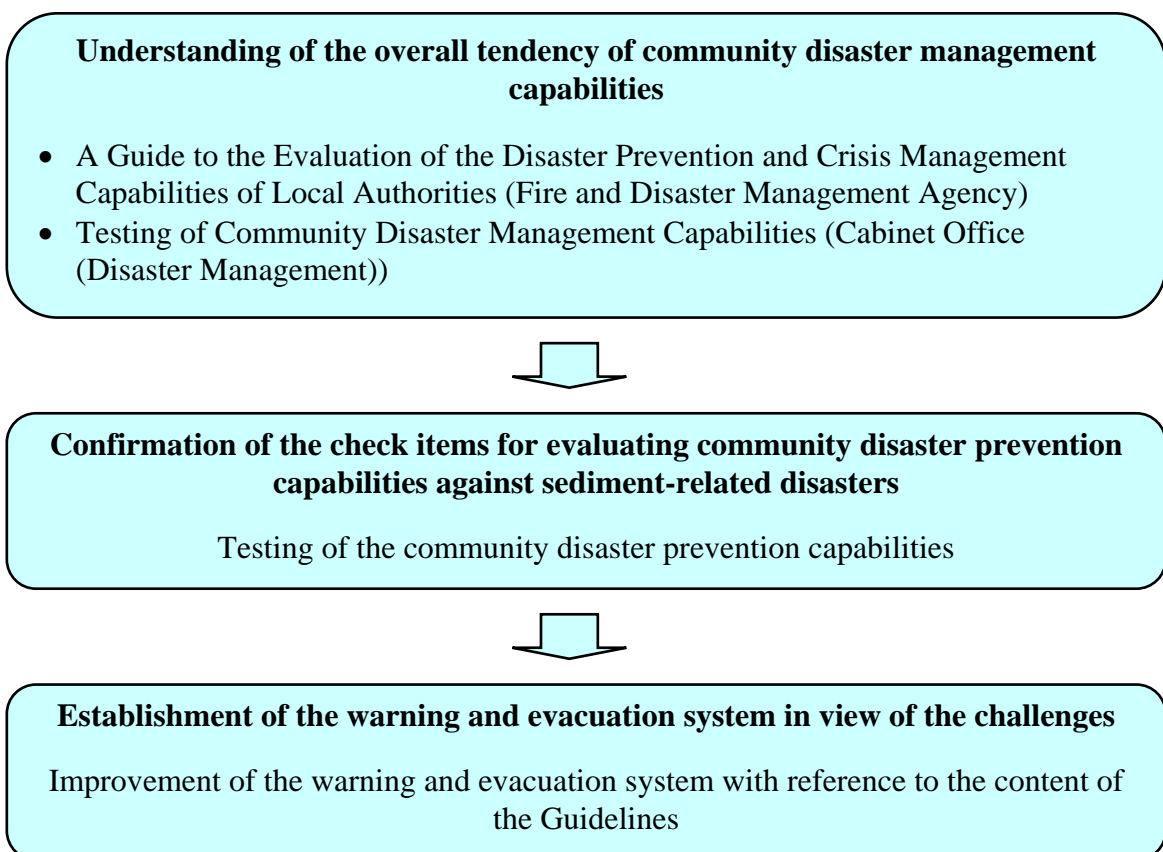
2. Test of disaster capabilities of the area

It is important to identify any flaw in the warning and evacuation system, real-life challenges facing the area, characteristics advantageous to the establishment of a warning and evacuation system, etc., based on which measures suitable for a given community must be devised.

To this end, the current overall disaster prevention capabilities of the communities must be tested to clarify the challenges for the establishment of the warning and evacuation system of the individual community.

[Description]

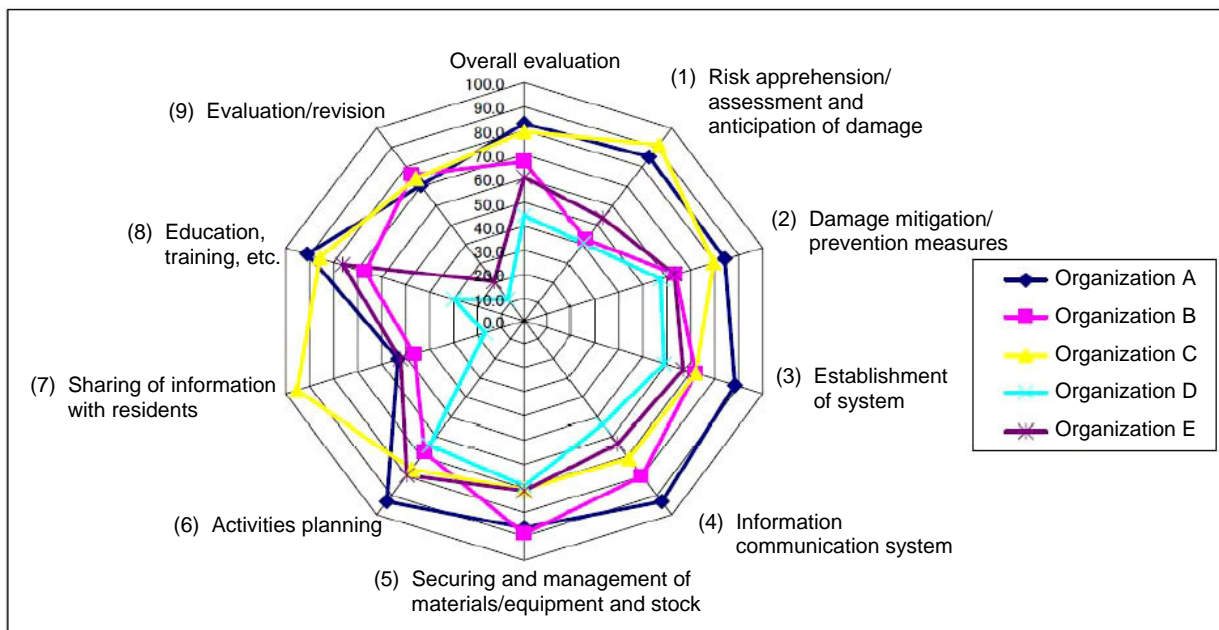
Methods to evaluate the community disaster prevention capabilities include "A Guide to the Evaluation of the Disaster Prevention and Crisis Management Capabilities of Local Authorities (Fire and Disaster Management Agency)" and "Testing of Community Disaster Management Capabilities (Cabinet Office (Disaster Management))." These methods can be used for gaining an understanding of overall tendency of disaster prevention capabilities of prefectural governments and municipalities. While evaluation of overall disaster prevention capabilities by these methods is important, specific disaster prevention capabilities of the communities against sediment-related disasters must be tested. The warning and evacuation system should be improved to address the challenges identified by the results of the tests with reference to the content of the Guidelines.



(1) A Guide to the Evaluation of the Disaster Prevention and Crisis Management Capabilities of Local Authorities (October 2003, Fire and Disaster Management Agency)

- Intended for: prefectural governments and municipalities
- Description: The Guide uses a method in which a checklist of questions is created, the responses given by municipalities are quantified as scores and represented as a multisided graph, based on which evaluation and analysis can be conducted.
- Indices: Evaluation scores for nine indices are represented in a radar chart, which allows evaluation of the current disaster prevention capabilities.
- * URL: http://www.fdma.go.jp/html/new/pdf/031110_1_02.pdf

(I) Evaluation in terms of 9 indices



Radar chart

(2) **Testing of Community Disaster Management Capabilities (Cabinet Office (Disaster Management))**

- Intended for: districts in municipalities (community residents)
- Description: Questions about response to sediment-related and flood disasters are listed on the website, to which answers are be given. The results are represented as a multisided graph, based on which evaluation and analysis can be conducted.
- Indices: Evaluation scores for seven indices are represented in a radar chart, which allows evaluation of the tendency of the current disaster prevention capabilities.
- * URL: <http://www.bousai.go.jp/bousairyoku/>

Questions on website

Self-test of community disaster management capabilities against sediment-related disasters

* An option in **blue** is exclusive and checking an option in blue renders other options in the section unselectable. To change the response, click the choice in **blue** again. "Residents'/neighborhood association," which appears often in questions, may be replaced by "the town where you reside," "neighborhood," etc.

Q1

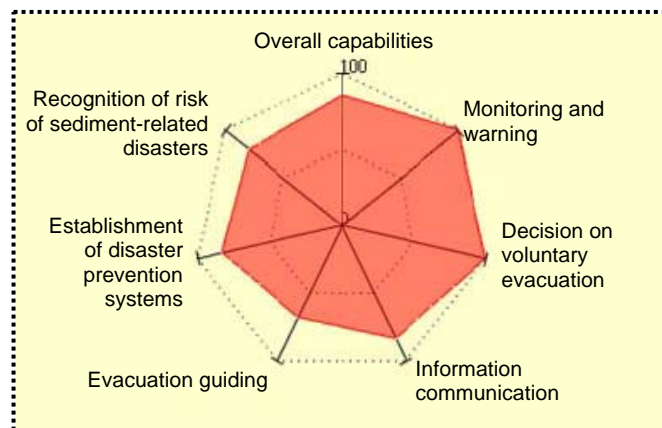
How high is the interest in disasters of people living in the residents'/neighborhood association?
Check **one** that applies.

- | | |
|-------------------------------------|------------------------------------|
| <input type="radio"/> Very high | <input type="radio"/> Slightly low |
| <input type="radio"/> Slightly high | <input type="radio"/> Very low |

Q2

Does the community where you reside have any leader enthusiastic about disaster prevention activities?
Of the options below, check **all** people/organization that apply.

- | | |
|--|---|
| <input type="checkbox"/> President of the residents'/neighborhood association | <input type="checkbox"/> Leader of disaster volunteers |
| <input type="checkbox"/> Board member of the residents'/neighborhood | <input type="checkbox"/> Leader of a female group such as a women's association and women's fire control club |
| <input type="checkbox"/> Board member of the fire company | <input type="checkbox"/> Welfare commissioner |
| <input type="checkbox"/> Organization such as a private company and neighborhood store association | <input type="checkbox"/> Other |
| <input type="checkbox"/> No community leader is enthusiastic about disaster | |



Radar chart showing the result of evaluation with 7 indices

(3) Understanding of community disaster prevention capabilities

To understand the current disaster prevention capabilities of the community, check the following items. For any item that cannot be answered with "yes" (cannot be checked), make efforts to put it in place with reference to the chapters in the Guidelines.

From Chapter 2 of the Guidelines

1. Are systems for the collection and communication of information in place?

<p>Can necessary information be acquired and communicated with certainty?</p> <ul style="list-style-type: none"><input type="checkbox"/> Can weather and rainfall information be acquired?<input type="checkbox"/> Is the sediment-related disaster warning information used effectively?<input type="checkbox"/> Are systems in place that allow the acquisition of information about precursors of sediment-related disasters and occurrence of disasters?<input type="checkbox"/> Is a procedure established to ensure that the issuance of evacuation advice, status of the establishment of shelters, etc. are reliably communicated to the residents?
<p>Are multiple means of communication available?</p> <ul style="list-style-type: none"><input type="checkbox"/> Are multiple means of communication in place such as a disaster management radio system and e-mail?<input type="checkbox"/> Have all means of communication such as TV and radio stations and CATV been made available?<input type="checkbox"/> Do the areas with the risk of isolation have means of communication such as satellite phones in place?
<p>Are efforts being made for staffing for the collection and communication of information?</p> <ul style="list-style-type: none"><input type="checkbox"/> Have on-site staff for the collection and communication of information such as community contact people been assigned?<input type="checkbox"/> Do the areas with the risk of isolation have means of communication such as satellite phones in place?<input type="checkbox"/> Is the information relevant to the decision on the issuance of evacuation advice such as sediment-related disaster warning and precursor information promptly communicated to the head of the municipality?

From Chapter 3 of the Guidelines

2. Can evacuation advice, etc. be issued?

<p>Do you have the knowledge of the locations vulnerable to sediment-related disasters?</p> <ul style="list-style-type: none"><input type="checkbox"/> Do you also have the knowledge of the sediment-related disaster hazard locations without the designation as sediment-related disaster hazard areas?<input type="checkbox"/> Are the residents informed of the sediment-related disaster hazard maps in the areas designated as sediment-related disaster hazard areas?
<p>Can prompt and appropriate evacuation advice, etc. be issued?</p> <ul style="list-style-type: none"><input type="checkbox"/> Has the procedure been determined for issuing evacuation advice without delay based on the sediment-related disaster warning and supplementary information, etc.?<input type="checkbox"/> Can evacuation advice be issued earlier to home-bound people requiring assistance during a disaster?

<p>Can evacuation advice, etc. be reliably communicated?</p> <p><input type="checkbox"/> Are multiple means of communication put in place for communicating evacuation advice, etc.?</p> <p><input type="checkbox"/> Are systems that allow initiatives such as mutual alerting between community residents in place?</p>
<p>Have the criteria of the issuance of evacuation advice been established?</p> <p><input type="checkbox"/> Have specific criteria of the issuance of evacuation advice based on sediment-related disaster warning information, etc. been established?</p>
<p>Have the units of evacuation been established?</p> <p><input type="checkbox"/> Have the units of evacuation for defining the districts covered by the issuance of evacuation advice, etc. been established?</p>
<p>Has the procedure for lifting evacuation advice, etc. been determined?</p> <p><input type="checkbox"/> Have specific criteria been established for lifting evacuation advice, etc.?</p> <p><input type="checkbox"/> Have the methods of patrol and inspection to check the situations on site been determined?</p>

From Chapter 4 of the Guidelines

3. Are systems for the establishment and operation of shelters in place?

<p>Have the methods of establishment and operation of shelters been determined?</p> <p><input type="checkbox"/> Is a system of operation of shelters in collaboration with voluntary disaster prevention organizations, etc. in place?</p> <p><input type="checkbox"/> Have the methods of evacuation of home-bound people requiring assistance during a disaster been discussed?</p>
<p>Have the functions required of shelters been considered?</p> <p><input type="checkbox"/> Are the systems of operation, information communication, community functions and privacy protection appropriate?</p>
<p>Is safety inspection of shelters conducted?</p> <p><input type="checkbox"/> Is the safety of shelters against sediment-related disasters, etc. assessed?</p>
<p>Are flexible measures taken concerning the selection and operation of shelters?</p> <p><input type="checkbox"/> Is agreement with private facilities, etc. considered for the selection of safe shelters?</p>
<p>Is the construction of sabo facilities considered?</p> <p><input type="checkbox"/> Is the construction of sabo facilities considered for ensuring safety of shelters?</p>

From Chapter 5 of the Guidelines

4. Are measures for supporting people requiring assistance during a disaster in place?

Can information be reliably communicated to facilities relevant to people requiring assistance during a disaster?

- Regarding facilities relevant to people requiring assistance during a disaster, have evacuation plans including information communication been made?

Have systems been established to give evacuation support to facilities relevant to people requiring assistance during a disaster?

- Are measures for supporting people with difficulty in evacuation discussed in cooperation with welfare facilities, etc.?

Is the construction of sabo facilities considered?

- Is the construction of sabo facilities considered for ensuring safety of facilities relevant to people requiring assistance?

From Chapter 6 of the Guidelines

5. Have sufficient consideration been given to disaster prevention activities against sediment-related disasters?

Is safety ensured in disaster prevention activities against sediment-related disasters?

- Have sufficient consideration been given to the dispatch of experts, monitoring systems, etc. for preventing secondary disasters?

From Chapter 7 of the Guidelines

6. Are efforts being made for the improvement of awareness of disaster prevention?

Is the establishment of a disaster prevention system with the focus on the residents in process?

- Is the formation of voluntary disaster prevention organizations in process?
- Are disaster prevention leaders being developed through seminars, etc.?
- Has a system for the registration of sabo volunteers, disaster experts and disaster relief specialists been established?

Are emergency drills and disaster education given?

- Are emergency drills with a clear sense of purpose conducted?
- Is disaster education given with disaster traditions handed down locally and disaster experiences used as educational materials?
- Is disaster education given that is intended for elementary and junior high school students?
- Is disaster education regarding sediment-related disasters given that is intended for people in charge of disaster prevention, fire companies, flood fighting companies, etc.?

Are hazard maps with the focus on the residents prepared?

- Is sufficient support given for the preparation of hazard maps with the focus on the residents?