

**Essential Tsunami Preparedness:  
Tsunami Evacuation Maps, Plans, and Procedures (TEMPP)  
Training Course Materials**

*The following is an English translation by the UNESCO/IOC-NOAA International Tsunami Information Center. Assistance was provided by technical experts from the UNESCO IOC, USA, and Japan, and the translation done with the permission of the Japan Fire and Disaster Management Agency.*

*The document is available at  
[http://www.fdma.go.jp/neuter/about/shingi\\_kento/h24/tsunami\\_hinan/index.html](http://www.fdma.go.jp/neuter/about/shingi_kento/h24/tsunami_hinan/index.html)*

*This document represents a best practice example on how to make practical and reliable tsunami evacuation maps. The practice focuses on the importance of community input as the most effective way in which to build awareness and response capability in residents who may have to act immediately to save their lives from tsunami.*

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津波避難対策推進マニュアル検討会  
報告書

平成 25 年 3 月

消防庁国民保護・防災部防災課

**Report from Study Group for  
Promoting Guidelines for Tsunami Evacuation Countermeasures**

**Fire and Disaster Management Agency (FDMA) Civil Protection and Disaster  
Management Department  
March 2013**

**Introduction**

The Great East Japan Earthquake, and ensuing tsunami, on March 11, 2011 resulted in 20,000 dead or missing people. Surrounded by the sea, our country, Japan, has experienced many tsunami disasters and will continue to be attacked by tsunamis in the future. As tsunami countermeasures, it is necessary to build structural measures such as seawalls, develop non-structural measures such as evacuation plans, and implement human measures such as awareness activities and evacuation drills.

Learning from the 2011 Report on lessons from the Great East Japan Earthquake, it is considered that voluntary tsunami evacuation by each resident is fundamental and necessary for saving lives from tsunamis. However, what, where, and how the evacuation should be will differ according to the situation in each region. This Study Group Report recommends that each prefecture and municipality, and its residents, understand the nature and extent of the tsunami disaster, prepare for it, and then train for it according to the guidance provided in this document.

Chapter 1: Objectives of the Study

Chapter 2: Guideline for the Municipality to Make Tsunami Evacuation Plan

Chapter 3: Tsunami Evacuation Planning Manual for each Region

Chapter 4: Appendix

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第 2 章 市町村における津波避難計画策定指針

**Chapter 2.  
Guideline for Municipality to Make Tsunami Evacuation Plan**

**2.1 Outline**

**1. Purpose**

To save lives from a tsunami, the voluntary evacuation of each resident is fundamental.

For tsunami evacuation, it is necessary

- To make the voluntary evacuation thoroughgoing
- To have reliable dissemination of information urging residents to evacuate
- To have safe evacuation sites
- To develop safe evacuation plans
- To promote disaster preparedness education encouraging residents to take voluntary action

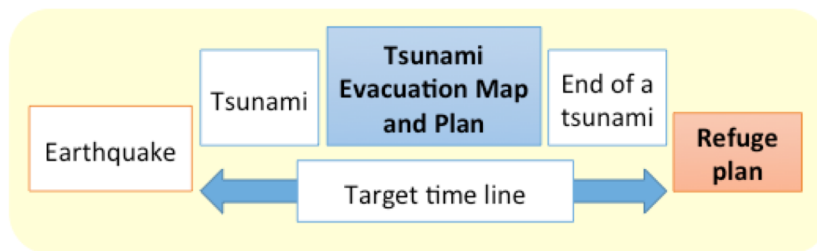
In reference to this guideline, Prefectures provide guidelines to the Municipalities for making the Tsunami Evacuation Plan.

**2 Target municipalities that need to have tsunami evacuation plan**

All municipalities having coastlines, including rivers or channels where the tsunami may travel upstream.

### 3. Target time period for tsunami evacuation plan

The plan should ensure the safe and smooth evacuation of residents covering the time from earthquake or tsunami occurrence to the end of tsunami (e.g., few to over ten hours).



### 4. Regular and continuous review of tsunami evacuation plan

Each municipality or region needs to conduct regular and continuous reviews of its tsunami evacuation plan, correcting problems identified by tsunami evacuation drills, reflecting the implementation of tsunami disaster countermeasures, and considering the changes in social environment.

### 5. Target tsunami scenarios used for tsunami evacuation plan

As necessary, the target scenarios used to develop the tsunami evacuation plan should not be limited to the maximum possible tsunami of the region, but may also be selected based on factors such as the location of (critical) facilities and regional characteristics such as topography.

## **6. Promote measures in close cooperation among stakeholders in the region**

When deciding on countermeasures for each region, it is important to take into account the wishes of residents and to consider the community's development plans, in addition to the characteristics of the region such as its topography, environment, the estimated tsunami inundation and arrival time, and the built environment of each city or village. Measures should be carried out in close cooperation with stakeholders of the region.

## **7. The requirements for tsunami evacuation plan**

The requirements for the tsunami evacuation plan are as follows. The work flow for Tsunami Evacuation Planning is illustrated in "Tsunami Evacuation Planning – flow chart", and the concept given in "Tsunami evacuation concept". This guideline explains important points to consider for each item based on this workflow.

## **8. Definition of Terms**

Definitions of terms used in Chapter 2 and 3 are as follows:

1. Tsunami inundation zone map	1 Setting the maximum possible tsunami 2 Setting calculation conditions (Setting a fault model) 3 Implementing Tsunami inundation simulation 4 Setting Tsunami inundation expectation (Inundation zone and inundation depth) 5 Estimating the tsunami arrival time
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2. Evacuation area	Designate evacuation areas whose residents need to evacuate in case of a tsunami, based on Tsunami inundation zone map.
3. Difficult to evacuate areas	Extract areas whose residents can hardly evacuate before the estimated tsunami arrival time from evacuation areas.
4. Emergency evacuation point and routes.	Select and designate emergency evacuation points, target points, roads and routes.
5. Initial response system	Having clear criteria and communication methods for gathering staff
6. Ensuring the safety of participants leading the evacuation	Establishing rules for evacuation, and developing the ways to exchange information.
7. Collecting and disseminating tsunami information	Ensuring the way to collect and disseminate tsunami warning, tsunami advisory, and tsunami information.
8. Issuing evacuation recommendation and/or evacuation instructions	Ensuring that there are rules, procedures and methods for announcing the evacuation recommendation and/or instruction.
9. Tsunami disaster prevention education and awareness	The awareness of the tsunami evacuation plan and hazard map, the method of the education and awareness of tsunami knowledge
10. .Evacuation drills	Implementation and contents of evacuation drills
11. .Other notes	Safe, reliable, and secure evacuation measures for tourists, swimmers, and fishermen.

Term	Definition	
	Chapter 2	Chapter 3
Tsunami inundation area	The area which will be inundated by the maximum possible tsunami in worst case.	
Evacuation area	The area whose residents need to evacuate when a tsunami happens, and designated by the municipality based on tsunami inundation areas. The evacuation area is normally larger than tsunami inundation area for the safety and the smooth evacuation.	
Difficult to evacuate area	The area whose residents are not able to evacuate out of the evacuation area before the expected tsunami arrival time.	
Evacuation roads	The roads used for the evacuation, designated by municipalities.	Evacuation routes etc. in Chapter 3 mean evacuation roads and routes.
Evacuation routes	The routes for the evacuation, designated by voluntary disaster preventing organizations or residents.	

There is no term here. Should it be Emergency evacuation points?

Please advice

Emergency evacuation points	The elevations or facilities to evacuate from a tsunami in an emergency. In principle, they are set out of the evacuation area, and designated by municipalities. It is desirable to furnish them with informational equipment, emergency provisions and blankets, but it is possible that emergency evacuation points don't have these items, for the first priority of emergency evacuation points is the protection of lives. In this point, they are different from evacuation centers.	Evacuation points in chapter 3 mean the whole of emergency evacuation points, evacuation target points and Tsunami evacuation buildings.
Evacuation target points	The places to evacuate from a tsunami. They are set out of the evacuation area, and designated by voluntary disaster preventing organizations or residents. They ensure just the safety of life, so they do not always correspond to the emergency evacuation points.	
Tsunami evacuation buildings	The buildings where the residents of difficult evacuation area or residents failing to evacuate in time evacuate in an emergency. Municipalities select from buildings in the evacuation area.	
Evacuation centers	The facilities which shelter the residents, whose houses are damaged, for a long period (until they move to temporary housings). The centers are set out of the evacuation area, and designated by municipalities. It is desirable to furnish them with daily necessities like preventions, drinking water, household medicines, or blankets.	

1. According to the Tsunami Evacuation Countermeasures Working Group report (July 2012), enabling a smooth evacuation is the most important tsunami counter measure. They also reported the following:.

- To save lives from a tsunami, the voluntary evacuation of each resident is fundamental.
- It is important that residents assume the maximum possible tsunami and evacuate to a higher place when feeling big or long earthquake shaking. When evacuating, they should continue evacuating to a higher place as long as there is time to evacuate. They should not stop at an evacuation target point.
- Tsunami countermeasures have to ensure the following points
  - Make voluntary evacuation thoroughgoing
  - Have reliable dissemination of information urging residents to evacuate
  - Have safe evacuation sites
  - Develop safe evacuation plans
  - Promote disaster preparedness education encouraging residents to take voluntary action

As the Report states, the most important factor for saving lives from a tsunami is safe thorough-going evacuation. To ensure safe evacuation, it is necessary to have a tsunami evacuation plan that identifies evacuation areas, emergency evacuation points, communication methods and so on. Moreover, tsunami preparedness education must accompany the evacuation measures, and evacuation drills should be conducted.

The Tsunami Evacuation Plan is developed by the Municipality who has the primary responsibility for disasters, and who has the authority to issue evacuation orders. Since a tsunami often affects more than one municipality, however, it is important to take into account not also the local features, but also regional factors. Adjacent Municipality plans should utilize similar or the action criteria and follow the same procedures. As the Prefecture provides the guidelines to the Municipalities, this ensures plans are coordinated and consistent across large regions.

This chapter explains the guiding principles for Prefectures to refer to in formulating guidelines they provide to Municipalities for making Tsunami Evacuation Plans.

2. For the following reasons, all Municipalities having coastlines (including rivers or channels where the tsunami may travel upstream) need to formulate Tsunami Evacuation Plans.
- A. Past tsunami damage is based on records found in old documents, folklore and tsunami deposit research, but it is possible that past tsunamis were not recorded or found in these.
  - B. Even though the region has never been affected by a tsunami, it does not mean that this region will not be in the future, due for example, to changes in land-use and topography.
  - C. It is possible that an earthquake causing greater tsunami damage than past tsunamis could occur.
  - D. Even if a tsunami will not affect residential areas, it is necessary to also consider tsunami measures for tourists, swimmers, and fishermen.

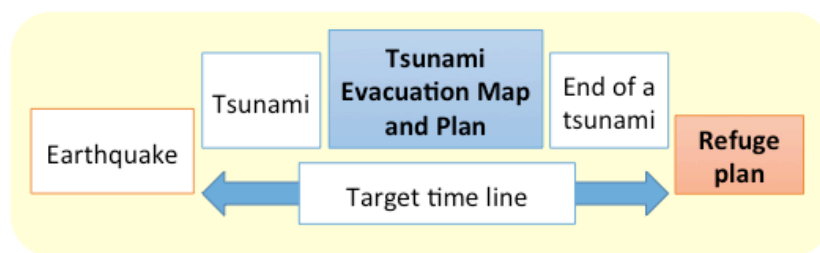
Moreover, most of the 39 Prefectures that have coastlines have records of tsunami damage. But, it is also possible that Prefectures without historical tsunami damage will be attacked in the future by a tsunami. For this reason, all Municipalities or Prefectures having a coastline have to



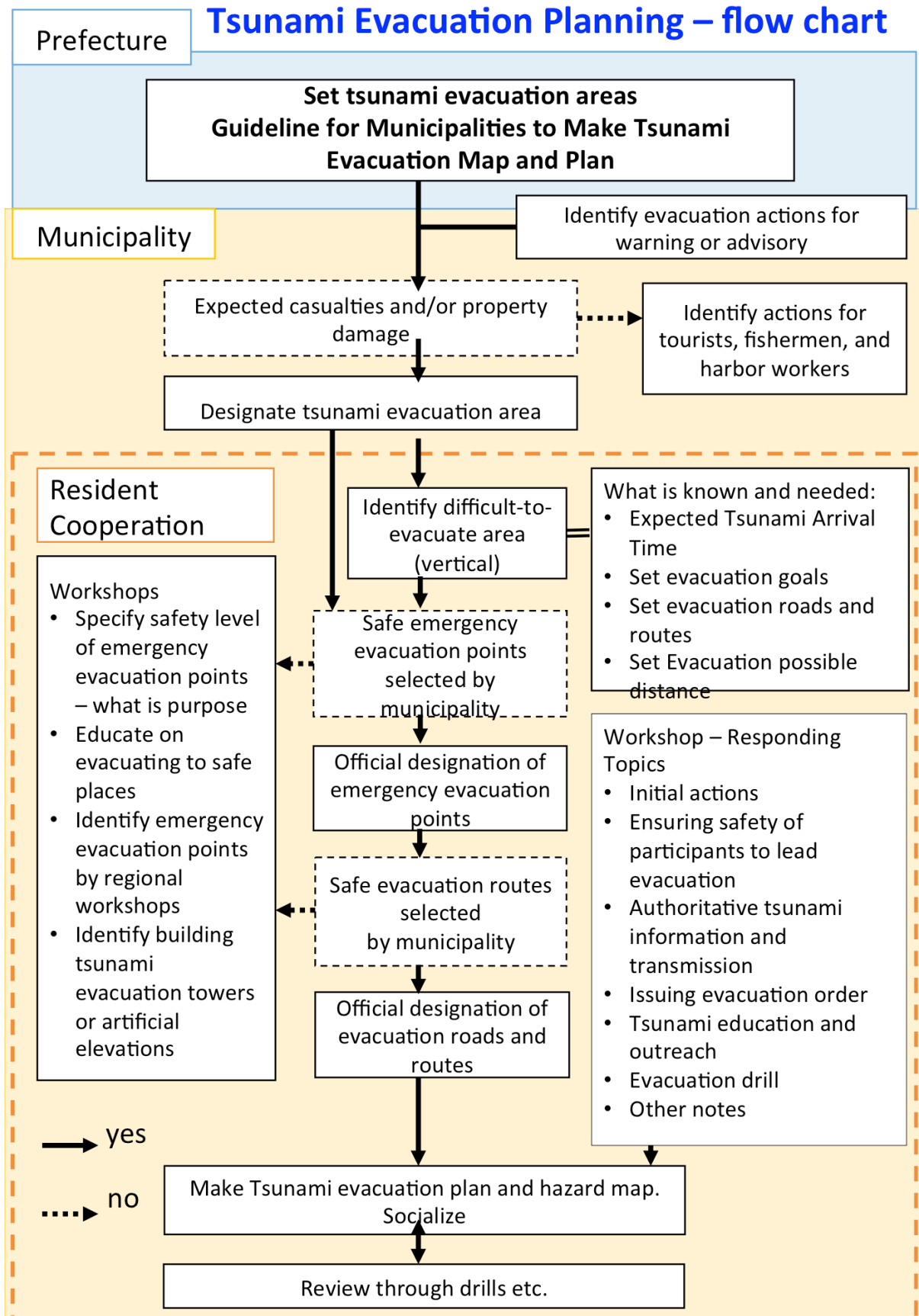
implement tsunami evacuation preparedness and awareness by encouraging voluntary evacuation by residents, and knowing how to act when tsunami warnings are issued.

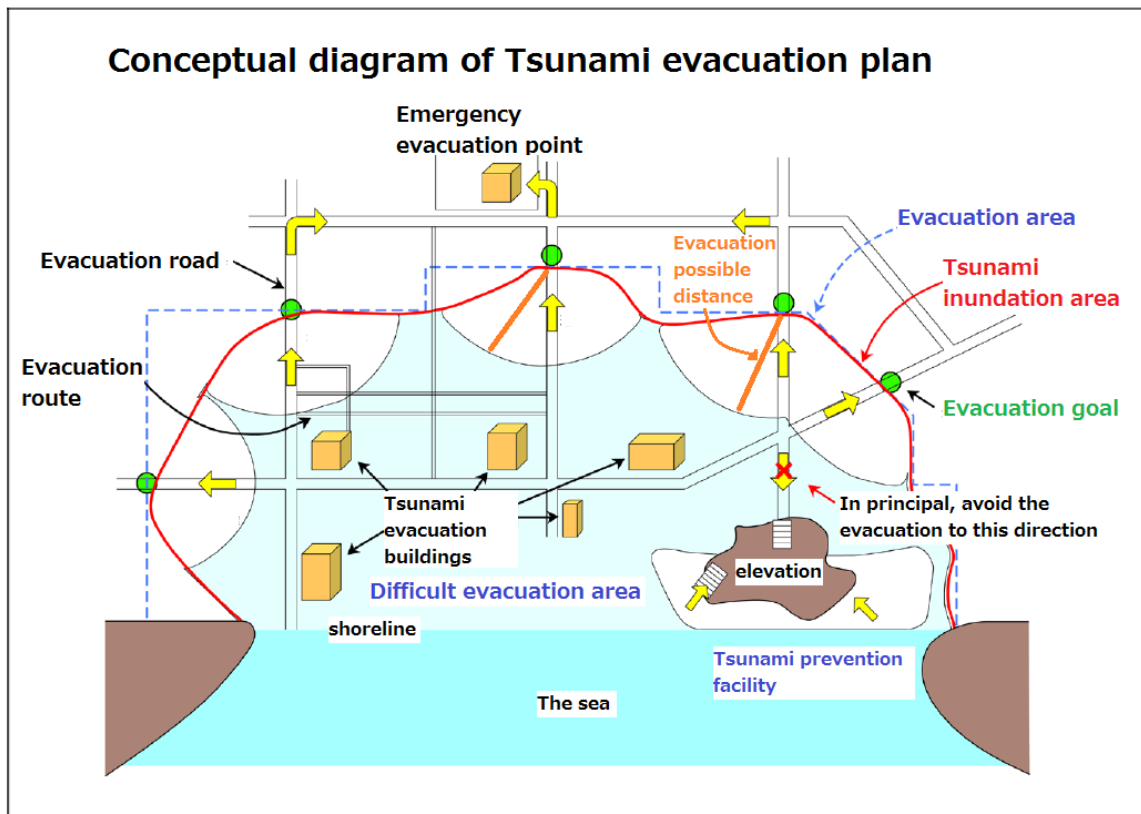
3. The Tsunami Evacuation Plan described in this guideline ensures the safe and smooth evacuation of residents covering the time from the earthquake or tsunami occurrence to the end of tsunami (e.g., few to over ten hours).

Therefore, if there are additional risks such as from landslides, fires, or house collapses during the evacuation, it will be necessary to consider of additional points that are not mentioned in this guideline. Consideration of refuge life after the evacuation is needed that will be in addition to the Tsunami Evacuation Plan outlined in this guideline. (The Tsunami Evacuation Plan in this guideline ensures safe and smooth evacuation to save lives from a tsunami, but it does not cover refugee support in the evacuation centers.)



4. Each municipality or region needs to conduct regular and continuous reviews of its tsunami evacuation plan, correcting problems identified by tsunami evacuation drills, take action on the implementation of tsunami disaster countermeasures, and review changes in social environment that might require changes to the Evacuation Plan.
5. As necessary, the target scenarios used to develop the tsunami evacuation plan should not be limited to the maximum possible tsunami of the region, but may also be selected based on factors such as the location of (critical) facilities and regional characteristics such as topography.
6. When deciding on countermeasures for each region, it is important to take into account the wishes of residents and to consider the community's development plans, in addition to the characteristics of the region such as its topography, environment, the estimated tsunami inundation and arrival time, and the built environment of each city or village. Measures should be carried out in close cooperation with stakeholders of the region.





Draft Translation (July 2016)

## 2.2 Tsunami inundation expectation

For the expected tsunami inundation, set the inundation zone and depths from the maximum possible worst case tsunami.

### 1. Basic Disaster Management Plan and Tsunami Evacuation Measures Working Group Report

(1) For the basic disaster management plan, the following two types of tsunami are used as the target scenarios for tsunami disaster countermeasures:

- The maximum possible tsunami, whose frequency of occurrence is extremely low, but which causes serious damage when it occurs. In this case, the protection of the lives of residents is the primary goal of the countermeasure. For this, comprehensive measures are taken to select safe areas for residents to evacuate to.
- The tsunami, whose frequency is more often than the maximum possible tsunami, and whose height is less than the maximum, but still causes significant damage. For this tsunami scenario, coastal protection facilities (such as sea walls and water gates) are constructed as the standard countermeasure.

[Reference] Basic Disaster Management Plan

- National and local authorities should plan for the maximum possible tsunami taking account of various scenarios and scientific knowledge. Based on the expectation, they promote tsunami countermeasures.
- To determine the expected tsunami, it is necessary to research old documents, tsunami deposits, and coastal topographies. They cooperate with the Headquarters for Earthquake Research Promotion, who conduct long-term evaluations of seismic hazard.

(2) The following recommendations for making the Tsunami Hazard Evacuation Map were made by the Tsunami Evacuation Measures Investigation Working Group in their July 2012 report

- Tsunami hazard map needs to show tsunami inundation zones from the maximum possible tsunami that is expected, taking into account various scenarios and scientific knowledge, because the map will be used for (safe) tsunami evacuation and city planning.
- It is necessary to give on the map information that will enable residents to choose an evacuation point by themselves (e.g., sea level or heights of buildings).
- It is possible that areas out of the expected tsunami inundation zones could be inundated because the size of tsunamis varies, and may be larger.
- It is also necessary to examine inundation zones by other maximum possible tsunamis in order to develop the appropriate evacuation plan.
- Use of only the Tsunami Hazard map is not enough to save lives, so we have to also install signs, such as sea level indication or evacuation signs.

[Reference] Iwate Prefecture Report on the tsunami disaster response during the 2011 Great East Japan Earthquake.

It was pointed out that areas not expected to be inundated, based on the tsunami simulation and hazard map, were recognized as safe areas.

## 2. Tsunami inundation expectation in “Act on Development of Areas Resilient to Tsunami Disasters”

Guiding principles in estimating the tsunami inundation zone following the “Act on Development of Areas Resilient to Tsunami Disasters” are as follows.

- Prefectural governors provide the estimate of the inundation area and height of the maximum possible tsunami in worst case
- The maximum possible tsunami is set using an earthquake fault model for the tsunami that is published by the Central Disaster Prevention Council.
- For areas where a fault model has not been provided by the Central Disaster Prevention Council, the fault model should be chosen based on research on past tsunamis.
- A fault model for the maximum possible tsunami is usually investigated at the National level first and then recommended to prefectures. If there is no National recommendation and the Prefecture cannot wait, the Prefecture may select the model by themselves based on their own criteria and understanding
- Thorough awareness-raising to the residents is required through public outreach, distribution of printed materials and through the Internet.

## 3. Guideline for expected tsunami inundation

For the guideline on the expected tsunami inundation, consult *Expected Tsunami Inundation Guideline* published by the Water and Disaster Management Bureau, Ministry of Land, Infrastructure, Transport and Tourism.

## 4. Municipalities whose tsunami inundation expectations are not offered by Prefectures

The “Act on Development of Areas Resilient to Tsunami Disasters” stated that Prefectures shall set the expected tsunami inundation. However, “The Basic Guidelines for the Promotion of Tsunami Resilient Regions” states that Prefectures should conduct the basic research on the expected inundation in cooperation with the national authority, which has information on tsunami disasters, and local authorities, who are familiar with the regional development. (For example, research in regions that have experienced tsunami disasters take precedence over others.)

Even if there is no tsunami inundation expected by the Prefecture, Municipalities with coastlines should formulate a Tsunami Evacuation Plan that can be followed when a Tsunami Warning is issued. .

In this case, the following two points have to be considered.

1. How to decide the expected height of a tsunami
2. How to decide the tsunami inundation zones

The following is one way to decide.

1. Set a standard of the height as 3m, which is the boundary between Tsunami Warnings (height: 1m – 3m) and Major Tsunami Warnings (height: 3m+).

## 2. Set a standard of inundation zones at 3m above mean sea level.

This is one example of the standard, but it could also be, 5m above mean sea level. The inundation zones can also be decided by Tsunami Inundation Simulation after the tsunami height is selected.

[Reference] Cabinet Office of Japan, “Investigation Committee on Nankai Trough Giant Earthquake Models,” The relation between tsunami fault model and tsunami height and inundation zone <http://www.bousai.go.jp/jishin/nankai/model/index.html>

The relation between tsunami damage and inundation height:

There are many that think that all areas lower than the tsunami height at the coast will be inundated, but this is not correct. The tsunami height at the coast will depend on and vary depending on quay walls, sea walls, coast types and other topographic conditions. Additionally, when a tsunami comes ashore, the tsunami becomes attenuated and the inundation height becomes lower.

The damage in inland areas depend on this inundation height. Therefore, we have to consider tsunami mitigation measures for not only the tsunami height at the coast but also the inundation height.

The standards of inundation heights are as follows:

- 3 m+: It is not possible to evacuate.
- 1 m+: Most of people caught by a tsunami will die.
- 2 m+: The half of wooden houses are completely destructed.
- 5 m+: Buildings having 2 floors (or part of the third floor of buildings) under water.
- 10 m+: Buildings having 3 floors (or part of the fourth floor of buildings) under water.

[Reference] Relation between tsunami inundation height and damage

According to “Suggestions on Tsunami Warning issuance criteria” by Japan Meteorological Agency, it is considered that 2 m (increase in number of wooden buildings that collapse, human damages at coastal areas) and 4 m (Complete collapse of most wooden buildings, drastic increase of human damage at coastal areas) of tsunami inundation height are the boundaries where heights where tsunami damage changes. This is the reason for the two warning categories of tsunami warning (tsunami height: 1 – 3m) and major tsunami warning (tsunami height: 3m+), This point has to be considered when tsunami countermeasures such as tsunami evacuation or hazard map examined.

## 2.3 Tsunami Evacuation areas

### 2.3.1 Designation of tsunami evacuation areas

Evacuation areas are designated based on the estimated maximum tsunami inundation areas, and also considering the geographical features and the coverage of each voluntary disaster prevention organization and neighborhood association.

Tsunami evacuation areas are those areas where damage will occur from a tsunami and therefore, where residents should evacuate from. They are the target areas for evacuation orders or advisories. For this reason, it is important that residents are involved in and agree on the tsunami evacuation areas to be designated. Tsunami evacuation areas are selected based on the expected tsunami inundation zones, but the expected inundation zones may not be entirely correct, because it is based on records of historical tsunamis and the results of tsunami inundation modeling as mentioned in Chapter 2.2. Thus, the tsunami evacuation areas should be larger than the inundation zones to be safe.

It is also important to accurately and reliably inform residents of the evacuation areas when tsunami orders are issued. During the evacuation, not only voluntary action, but also community action and cooperation to help people requiring assistance is needed. For this reason, the designation of tsunami evacuation areas is based on the coverage of each Voluntary Disaster Prevention Organization and topographic features.

### 2.3.2 Examination of Difficult-to-Evacuate areas

1. Set the expected tsunami arrival time	Set the expected tsunami arrival time based on results of tsunami inundation simulation.
2. Set evacuation target points	Set evacuation target points outside of evacuation areas (2.3.2).
3. Set the evacuation distance	Set the evacuation distance that residents can reach from the beginning of the evacuation to the estimate tsunami arrival time (lead time) based on the estimated tsunami arrival time and evacuee's walking speed.
4. Designate and select evacuation roads and routes	Select the quickest and the safest evacuation roads or routes to the evacuation goal.
5. Extract difficult-to-evacuate areas	Extract areas outside of safe evacuation areas selected based on the evacuation distance from evacuation areas. Call the areas extracted as difficult-to-evacuate areas.

1. Difficult-to-evacuate areas are areas where residents cannot safely evacuate to outside of the tsunami evacuation areas before the expected tsunami arrival time (as determined by the tsunami inundation simulation).
2. A basic rule of tsunami evacuation is to continue to evacuate to a safer place as long as there is time to evacuate. When a tsunami arrives in a short time, residents do not have time to evacuate to an emergency evacuation point designated by the Municipality. Instead, they have to evacuate using the quickest and safest evacuation routes to an evacuation target point or goal that is outside of the evacuation area. After reaching the target point, then it is necessary to consider how to evacuate to the emergency evacuation point. In selecting evacuation target points, avoid selecting points that are blind (dead-end) alleys or areas near to steep slopes that are without stairs.
3. Set the evacuation distance based on the expected tsunami arrival time and evacuee's walking speed.

(1) Evacuee's walking speed

The standard for the evacuee's walking speed is 1.0m/s (same as walking speed of normal elderly, people in a crowd, and people not familiar with the area). However, it is important to also consider the walking speed of handicapped, small children, and others, which is slower (0.5m/s), and also that research showed that the evacuee's average walking speed was 0.65m/s for the Great East Japan Earthquake.

(2) Evacuation distance

The standard for the maximum evacuation distance is 500 m. (It might be greater than 500 m, and should be set taking into account local situations or community conditions such as the amount of people requiring evacuation assistance and/or the evacuation routes.)

(3) Time required for evacuation

It is assumed that residents can start evacuating 2 -5 minutes after of an earthquake. But, this may differ depending on local situation.

(4) Notes for evacuation in night and winter

In night or winter, it takes more time to prepare for evacuation than usual, and also the walking speed can be slower.

(5) Examination by evacuation drills

It is important to examine and verify evacuee's walking speed, evacuation distance, and evacuation start time through evacuation drills.

[Evacuation distance]

Evacuation distance can be calculated in the following way

(Evacuation distance) = (walking speed) x ((expected tsunami arrival time) – (evacuation start time))

If we assume that the expected tsunami arrival time is 10 minutes, walking speed is 1.0m/s, and evacuation start time 2 or 5 minutes, then the evacuation distance is as follows

60m/s x (10 - 2) minutes = 480 m

60m/s x (10 - 5) minutes = 300 m

\* It is possible that residents cannot start evacuation smoothly. Actually, in the Great East Japan earthquake, there were areas where large earthquake shaking continued for 3 minutes. In this calculation, the time when tsunami will arrive at the coast is normally used as expected tsunami arrival time. However, if the arrival time differs significantly between coastal areas and inland areas, then it is recommended to use the tsunami arrival time for each area after consulting experts and taking into account the tsunami size and topographical features.

\* In the Nankai Trough Earthquake expected damage report published in August 2012, the evacuation start time is set as 5 minutes in the daytime, and as 10 minutes in night, for in smooth evacuation. Walking speed in night decrease to 80% to that in the daytime.

[Reference] Walking speed

Elderly: 1.1m/s

People pushing baby buggy: 0.9m/s

Handicapped or seriously sick people

Flat area: 0.8m/s



Stairs: 0.4m/s  
 People not familiar with areas or routes  
 Flat area: 1.0m/s  
 Stairs: 0.5m/s  
 Handicapped people in hurrying up  
 Handicap level C1: 1.2m/s  
 Handicap level C2: 0.44m/s

[Reference] Average walking speed during Hokkaido Nansei Earthquake tsunami (1993)

Age	20～29	30～39	40～49	50～59	60～
Average speed	0.87m/s	1.47m/s	1.03m/s	0.68m/s	0.58m/s

[Reference] Average walking speed and evacuation start time during Great East Earthquake (2011)

Average evacuee's walking speed  
 All areas: 0.62m/s  
 Flat areas: 0.78m/s  
 Ria coast areas: 0.53m/s  
*(a ria is a drowned river valley that is open to the ocean)*

The average evacuation start time of people who thought the tsunami will attack is 18 minutes. On the other hand, the average start time of people who did not think the tsunami will attack was 26 minutes, which is a difference of 8 minutes. Thus, it is very important to emphasize that tsunamis are dangerous and to start evacuation early.

4. The quickest and safest routes to evacuation target points are selected as evacuation roads and routes. The most important consideration is the safety of the routes, and noting the following:

- Evacuation routes and roads should be as wide as possible. There should be alternate routes and roads in case the primary routes and roads are blocked (e.g., by debris such as by collapsed houses)
- Do not select routes along the coast or a river, especially because the tsunami may arrive sooner than expected and/or travel up-river as a fast-moving, turbulent, tsunami bore.
- Evacuate in the same direction that the tsunami moves (even if there is a high place in the direction of the coast). Do not evacuate toward the coast.
- Do not select evacuation routes and roads that will be difficult to pass in bad weather

5. Based on the examination explained in 1-4, set safe evacuation areas to be where residents can reach the evacuation target points before the expected tsunami arrival time using designated evacuation roads or routes.

Areas that are in the evacuation areas but which will not allow safe evacuation are identified as difficult-to-evacuate areas. To select the difficult-to-evacuation areas, it is necessary to examine not only maps, but also conduct evacuation drills. For evacuees in difficult-to-evacuate areas, tsunami evacuation buildings will need to be selected. (See 2.3.3)

\* Criteria explained in 1 - 5 provide a way to determine difficult-to-evacuate areas based on evacuation distance. For more precise decision, it is necessary to take into account the local population since that may give different evacuation times, and the capacity of evacuation points. In areas where many people gather, such as commercial areas, it is desirable to formulate appropriate evacuation measures based on the precise estimation of the spatial distribution of the population in the daytime and at night.

### 2.3.3 Selection and designation emergency evacuation points and evacuation routes

Mayors and each resident should not only select, but also maintain tsunami emergency evacuation points in order to understand well emergency evacuation points, evacuation routes and evacuation methods, and to facilitate tsunami evacuation.

1. Emergency evacuation points, (including evacuation target points), evacuation buildings
  - (1) Emergency evacuation points
    - A. Mayors should select places that ensure the safety and the functionality as an emergency evacuation point.
    - B. Residents should select evacuation target points that highly ensure safety
  - (2) Tsunami evacuation buildings
 

Mayors should select public or private facilities in evacuation areas as tsunami evacuation buildings for evacuees of difficult-to-evacuate areas or people failing to evacuate smoothly.
2. Evacuation roads and routes
  - A. Mayors should select roads that ensure the safety and the functionality as an evacuation road.
  - B. Residents should select highly safe evacuation routes.
3. Evacuation method
 

Evacuation method is generally by walking.

1. Emergency evacuation points, (including evacuation target points), evacuation buildings

- (1) Emergency evacuation points

A. Mayors should select places that ensure the safety and the functionality as an emergency evacuation point.

The safety of an emergency point	<p>Generally, it is far from evacuation areas. Generally, open spaces or buildings that are earthquake-resistant are selected. Points should not be at risk from landslides or dangerous materials</p> <p>It is desirable to select points where additional evacuation will be possible if a tsunami that is larger than expected comes</p> <p>The emergency point should have a sign and the entrance should be clear.</p>
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The functionality of an emergency point	Generally, enough space must be available for each evacuee (at least, 1 m <sup>2</sup> per evacuee). It is desirable to be furnished with lights and communication equipment.

In selecting emergency evacuation points, the most important factor is that safety is ensured. Mayors should take the initiative to select and designate emergency evacuation points and continue to work to ensure and improve their functionality.

As for safety, generally, the case of maximum possible tsunami should be considered. If that is difficult, the minimum is that emergency evacuation points must be safe from relatively-frequent tsunamis, and it is necessary to encourage evacuation to continue to a safer place to be safe from the maximum possible tsunami.

For this reason, it is important to clearly mark the level of safety of each emergency point, and to install signs or panels of sea-level indicators, e.g., distance from the coast and expected inundation depth at the point.

It is desirable to select tsunami emergency evacuation points, after taking account the evacuation distance, capacity of tsunami evacuation routes, and locations of the emergency evacuation points.

As for the functionality, it is necessary to ensure enough space for evacuees and install communication equipment in order to inform evacuees on the tsunami, the damage situation, and on the tsunami warning and its cancellation.

B. Residents should select evacuation target points which highly ensure safety

The safety of an evacuation target point	It must be out of evacuation areas. In selecting evacuation target points, avoid selecting points of blind-alleys or areas near to steep slopes without stairs. It is desirable to select points that have several routes to ensure safe evacuation.
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Evacuation target points are places to evacuate from a tsunami. They ensure just the safety of life, so they are not furnished with light, communication equipment and foods. So, evacuees should bring a radio, and need to continue evacuation to emergency evacuation points or safe emergency centers. (When tsunami warnings are not canceled, evacuees must not use routes in

tsunami inundation zones). Municipalities have to implement methods to communicate with the evacuees at evacuation target points.

## (2) Tsunami evacuation buildings

Mayors should select public or private facilities in evacuation areas as tsunami evacuation buildings for evacuees of difficult-to-evacuate areas or people failing to evacuate smoothly.

The safety of a tsunami evacuation buildings	The structure must be RC or SRC (reinforced concrete or steel reinforced concrete). Generally, the buildings must be 2 stories or higher than the expected inundation depths. They must not face to the ocean. They must have be earthquake-resistant. It is desirable for the building to front to evacuation routes. It is desirable for the building to have stairs on the outside.
The functionality of a tsunami evacuation building	Generally, enough space must be available for each evacuee (at least, 1 m2 per evacuee). It is desirable for it to be furnished with lights and communication equipment.

Residential apartments, hotels, factories, warehouses and so on can be tsunami evacuation buildings. IT is essential for the owners or managers of designated buildings to fully understand fully what is needed. Their cooperation is necessary for formulating the regional plan. Designating as many tsunami evacuation buildings as possible are is desirable.

If there is no high building in the tsunami inundation areas, construction of artificial high ground or a tsunami evacuation tower should be considered.

When evacuating, each evacuee should be flexible. For example, sometimes it is safer to evacuate to upper level of building than to outside of the building.

If there are only residences on high ground or there are private lands that can be appropriate emergency evacuation points, it will be necessary to get the agreement of the owner and evacuation stairs may need to be constructed.

It is recommended to identify areas where residents should evacuate to tsunami evacuation buildings, especially if the evacuation distance and the capacity of the tsunami evacuation routes make it more difficult than to evacuate to an evacuation building.

## 2. Evacuation roads and routes

A. Mayors should select roads which ensure the safety and the functionality as an evacuation road.

They have to encourage residents to evacuate to a safer place as long as they have the time to evacuate. So, it is necessary to clarify levels of safety of the emergency evacuation points and evacuation centers by posting inundation height or sea level indicators on the tsunami hazard map or at the place.

It is also important to designate emergency evacuation points with panels or red lights.

The safety of evacuation roads	<p>They should not be at great risk from landslides, building collapses, and falling objects. They must be wide enough. (In areas with many tourists, roads have to be wide.</p> <p>If evacuation roads include bridges, the bridges must be earthquake-resistant.</p> <p>Evacuation obstacles, such as sea walls. (e.g., stairs), should be avoided.</p> <p>Generally, roads along with a coast or river should not be used as evacuation roads. Evacuation roads should evacuate in the same direction that the tsunami moves. It is desirable that there are tsunami evacuation buildings in case evacuees are attacked by a tsunami in evacuation.</p> <p>To minimize that roads are impassable because of building collapses, bridge failures, landslides and liquefaction, earthquake-resistant measures are necessary.</p> <p>In case evacuation roads are blocked, it is desirable to have alternate evacuation roads.</p>
The functionality of evacuation roads	<p>For smooth evacuation, evacuation route signs and loudspeakers giving public information must be installed.</p> <p>For the evacuation at night, streetlights are necessary.</p> <p>It is desirable that there are balusters where there are steep slopes and stairs.</p>

B. Residents should select highly safe evacuation routes

The safety of evacuation routes	<p>They should not be at great risk from landslides, building collapses, and falling objects.</p> <p>They must to be the quickest and the safest routes to evacuation roads or evacuation target points.</p> <p>They must have alternate routes in case the primary route is blocked.</p> <p>Generally, roads along with a coast or river are not used as evacuation routes.</p> <p>It is desirable to select evacuation roads that also have alternate routes..</p> <p>It is desirable that there are balusters where there are steep slopes and stairs.</p>
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### 3. Evacuation method

Evacuation is generally by walking, because the use of cars in evacuation may disrupt efficient evacuation for the following reasons:

- Building collapses or falling objects can disrupt the traffic of cars.
- If many people evacuate using cars, it can cause traffic jams and accidents.
- Evacuation in cars can disturb the efficient evacuation of walkers.
- However, the evacuation method needs to be appropriate for each region. For example, when the evacuation distance is so long and the traffic of cars does not disturb evacuation of walkers, the appropriate evacuation method is not necessarily by walking. So for this case, the evacuation methods have to be carefully examined.

[Reference] Committee for Policy Planning on Disaster Management “Tsunami Evacuation Measures Examination Working Group Report”

- In case of a tsunami, the evacuation method is generally by walking. The risks of evacuation by cars found in the Great East Japan Earthquake are as follows:
 

Traffic resulted from earthquake road damage, traffic light failure, building collapse, etc

Bottlenecks resulted because of narrow roads, intersections with big roads, or the parking of evacuated cars.

Evacuation by cars can cause traffic for cars that needed to support the evacuation.

Cars can disrupt the evacuation of walkers.
- Evacuation by cars may sometimes be appropriate (for example, when the distance to evacuation points is far), but each situation must be examined. For this case, in each region, it is necessary to minimize the risks from evacuating by car by the limiting car traffic and agreeing on a car evacuation policy.
- It is necessary to inform everyone that if an earthquake happens while driving, people have to park their car at places other than the roads, evacuate by walking, and leave the key and car doors unlocked.

- In the areas where evacuating by cars is necessary, the selection of evacuation roads is important in order to avoid cars being left along roads that would then disturb the evacuation of others.

## 2.4 Initial Response System

Criteria of gathering staff and the communication system for the case where tsunami warnings are issued or a big earthquake happens during off-duty time.

- (1) Communication and gathering
  - A. Case of big tsunami warning
  - B. Case of tsunami warning
  - C. Case of tsunami advisory
  - D. Case of strong shaking
- (2) Communication means
  - A. Receive and transmission system of tsunami warnings.
  - B. Issue and transmission system of evacuation orders.
  - C. Gathering information of situations

### (1) Communication and gathering system

In order to reduce human damage by a tsunami, the most important thing is to transmit early and precise tsunami warnings and evacuation orders. It is important to note that tsunami is a series of waves, and the first one is not necessarily the biggest, For these reasons, it is necessary to have criteria for gathering staff, such as when a tsunami warning is issued or there is strong shaking, followed by examining the situation to compile tsunami and damage.

Also, for gathering, it is necessary to have multiple ways to communicate information, such as mobile or emails, and have in place the criteria for automatic gathering when tsunami warning is issued or there is a shaking stronger than JMA level 3.

### (2) Information receive and transmit system

The transmission of major tsunami warnings, tsunami warnings and tsunami advisories is the responsibility of mayors. Municipalities have to ensure there is a system that enables appropriate actions, such as the transmission of warnings, issuance of evacuation recommendations or gathering information of situations.

## 2.5 Ensuring Safety of Persons Leading the Evacuation

The safety of officers, firefighters and the Welfare Commissioner, who will lead the evacuation, needs to be considered.

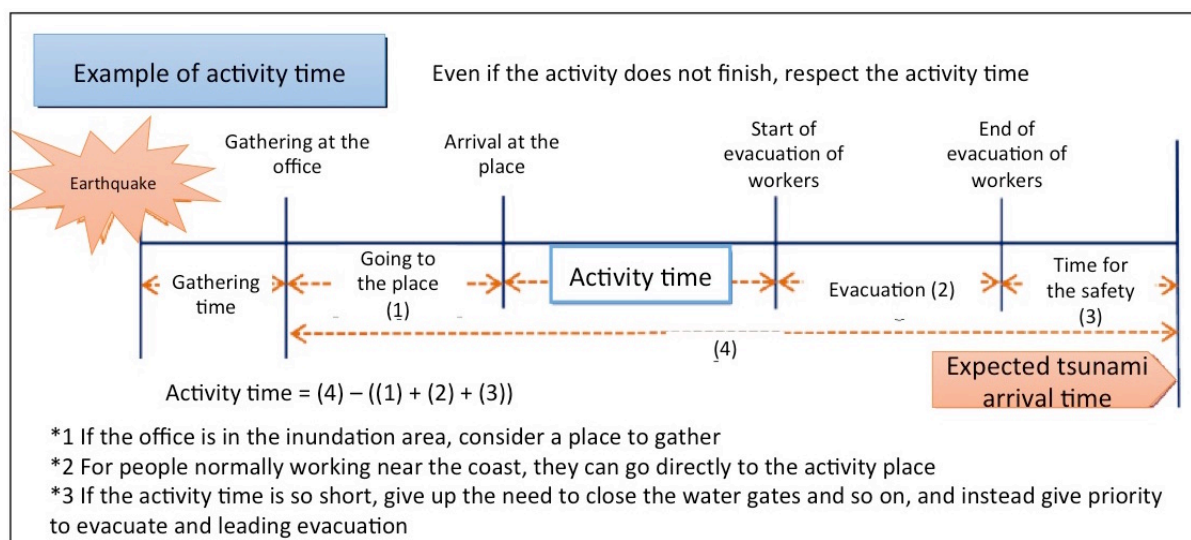
- Their first priority is to save their own lives.
- If they work in tsunami inundation areas, their evacuation procedures should be based on the tsunami arrival time, be shared regionally, and include methods of communication.

- Evacuation support to people requiring assistance and the safety of the people leading the evacuation are the biggest challenges for safe tsunami evacuation. People requiring assistance and municipalities need to discuss and plan how the assistance will be..

[Reference] Fire and Disaster Management Agency “Firemen Actions in Large-scale Disasters Investigation Committee Report”

#### Establishment of evacuation procedures and clarification of Firemen actions during tsunami disasters

- The first priority is to save their own lives by themselves.
- Clarification of fireman actions during tsunami disaster  
In cooperation with other organizations and the region, take appropriate action
  - Take action to close water gates. The goal is to close the water gates when possible, A no-close action if OK it is truly necessary due to lack of time. This action should be taken be a group with each person having a role
  - Lead evacuation actions. Encourage residents to take their own initiative to evacuate. Install communication methods, evacuation roads and routes and evacuation stairs.
- Formulate safety manual for tsunami disaster
  - Make the evacuation procedures. Explain them to residents and and get their consensus.
  - Establish the line-of-command and workgroup that is led by the group leader
  - Wear life jackets in activities
  - Decide action time considering of the expected tsunami arrival time, time needed to go to the evacuation place, and the safety time. When the action time is reached, evacuate immediately.
  - Leader decides workers’ evacuation time when sensing danger, even if it is before the action time.



- The safety of fire offices, city halls and other important offices is important and should be evaluated beforehand. The moving of offices could be necessary.



[Reference] Fire and Disaster Management Agency “Investigation Workgroup Report of Earthquake and Tsunami Measures in Regional Disaster Prevention Plan”

(December 2011) The loss of functions in attacked municipalities

○ In the 2011 Great East Earthquake, among 37 coastal Municipalities, the city hall was damaged in 22, and the city hall was forced to move in 14. In some Municipalities, the city hall was seriously damaged, and many officers were killed, for example, in Rikuzen -Takata, Otsuchi, Ishinomaki and Minamisanriku. Public facilities such as city halls, fire offices and police stations are important for disaster response, so tsunami counter measures for these facilities are important to implement

Based on the lessons from this disaster, Municipalities should review what to expect from disasters, and measures taken, including for the movement of city halls and other offices, and for the maintainance of emergency electricity systems.

For emergency electricity systems, the locations and facilities need to consider both earthquake shaking and tsunami inundation. The amount of emergency electricity required should also be well-examined.

## 2.6 Tsunami Information Gathering and Transmission

### 1 . Gathering of tsunami information

(1) Early gathering of major tsunami warnings, tsunami warnings and advisories

Decide how information will be received for major tsunami warnings, tsunami warnings, tsunami advisories, and tsunami information published by Japan Meteorology Agency.

(2) Gathering tsunami situation information

Decide processes and an information system to comprehend situations of the tsunami and its damage during major tsunami warnings, tsunami warnings and tsunami advisories, or when there is a large earthquake shaking.

### 2 . Transmission of tsunami information

Formulate transmission system and the methods by which to inform residents of major tsunami warnings, tsunami warnings, tsunami advisories, tsunami information, and evacuation recommendations and orders.

(1) System of transmission

Decide contacts for transmitting, the processes, and information paths.

(2) Transmission Method

Decide what, how and when to transmit the information, depending on the receivers.

### 3 . Installation of communication methods

(1) How to decide communication methods

Formulate communication system that is resilient to disasters, taking into account the local situation and the features of each communication method. The system should have multiple communication methods.

(2) Important features of communication system

1. Improve the resilience to disasters of the communication system

2. Make use of emergency mail priorities

3. Make use of public information system

- 4. Use automatic system of J alert
  - 5. Make use of Conveyance of Disaster Information System
- (3) Notes for the formulation of communication system
- 1. The complete system should use multiple methods
  - 2. Information should be clear and based on the disaster type and the phases of the disaster
  - 3. Use of cars with speakers and firemen
  - 4. Use in normal time to residents
  - 5. Use of the latest technology

## 1 Tsunami Information Gathering and Transmission

### (1) Early gathering of major tsunami warnings, tsunami warnings, and tsunami advisories

It is recommended that when strong shaking is felt that Municipalities judge the risk of tsunami based on the shaking and past tsunamis and then issue evacuation orders. However, in the reality, it is very difficult.

Therefore, it is important to tell residents that they must self-evacuate by themselves when feeling a strong or long earthquake shaking.

However, Municipalities must always transmit major tsunami warnings, tsunami warnings and tsunami advisories to residents.

For this reason, Municipalities must decide the timing and contents of information they will transmit for major tsunami warnings, tsunami warnings and tsunami advisories, and the way in which the information will be transmitted in the Tsunami Evacuation Plan.

Also, it is necessary for the communication system to inform all of the region. If there are areas that are difficult to be informed by the system, other methods have to be examined and implemented.

#### \* Improvement of tsunami warnings

In the 2011 Great East Japan Earthquake, the expected tsunami height published in the tsunami warnings was lower than the actual height. As a result, JMA has improved its tsunami warning system and improved its observation system.

When JMA issues major tsunami warnings, and the height is expected to be « huge », people should be especially careful.

When an earthquake happens in Japan or near to Japan, JMA analyses the seismic data to determine the earthquake center and the magnitude, and publishes the seismic intensity at different locations where the seismic intensity is greater than 2. These information are normally broadcast within 1.5 minutes after the earthquake.

When there is a risk of tsunami disaster, tsunami warnings and advisories for 66 tsunami areas are broadcast. The target time for issuing this information is in 3 minutes after the earthquake.

After that, detailed information, such as, the expected height, expected arrival time, and actual height, are provided.

If there is no risk of tsunami disaster, tsunami information is published.

## (2) Gathering information of actual situations

The issuance of evacuation recommendations are based on major tsunami warnings and tsunami warnings. Knowing the actual situation is important for deciding rescue activities and to appropriately evacuation guide residents.

The basic information needed to know this are tsunami observations published by the JMA and monitoring cameras installed by Municipalities. Other eyewitness reports of changes in sea level are also ways to know the tsunami danger. It is important to ensure the safety of the officers gathering this observational information.

It is necessary to decide how, who, when and where to gather this kind of information, and how and when this information will be used for decision-making during the disaster..

## 2. Transmission of tsunami information

The following points have to be considered when formulating the system and means to inform residents of major tsunami warnings, tsunami warnings and tsunami advisories.

It is necessary to construct a comprehensive communication system that is resilient to disasters, considering the local situation and features of each communication mean. Also, the system has to be include multiple methods.

### (1) Points to be considered

What to transmit	<ul style="list-style-type: none"><li>- Issue of major tsunami warnings, tsunami warnings or tsunami advisories</li><li>- Risk of tsunami, evacuation recommendation and order, expected tsunami arrival areas, expected tsunami arrival time and actions to do.</li><li>- The examples of transmission phrases have to be pre-prepared.</li><li>- Major tsunami warnings are published when the expected height is higher than 3m.</li><li>- The time of high tide.</li></ul>
People to be informed	<ul style="list-style-type: none"><li>- People of areas at risk from a tsunami or not at risk.</li><li>- Which type of people in the evacuation areas are targeted. (e.g., residents, tourists, swimmers, harbor workers, passengers)</li><li>- Managers of facilities in the inundation areas where more time is needed to evacuate. (e.g., social welfare facilities, schools, medical</li></ul>

	<ul style="list-style-type: none"> <li>facilities, underground mall, etc)</li> <li>- Managers of facilities where evacuation is recommended. (e.g., social welfare facilities, schools, medical facilities, underground mall, etc)</li> <li>- Evacuees in emergency evacuation points.</li> </ul>
When to transmit	<ul style="list-style-type: none"> <li>- Immediately after the earthquake. (e.g., automatic broadcast, immediate broadcast by officers of Information about the earthquake, the risk of tsunami, evacuation recommendations and orders.)</li> <li>- At time of tsunami event (major tsunami warnings, tsunami warnings, tsunami information and damage information)</li> <li>- After the end of the tsunami (Cancellation of major tsunami warnings, tsunami warnings, tsunami advisories, and evacuation orders and recommendation)</li> </ul>
How to transmit	<ul style="list-style-type: none"> <li>- Loudspeakers for public information, sirens, TV, radio, telephone, fax, email system sub subscription, emergency email, internet, etc</li> <li>- Select appropriate ways considering the receivers of the information (especially handicapped and old people)</li> </ul>

- (2) In order to implement smooth and precise transmission of information during off-duty time, the Municipal system to receive the information should be a part of the Regional Disaster Plan.
- (3) Using a loudspeaker for public information is an effective way to inform residents. However, it is possible that residents may not hear it because of climatic conditions. Therefore, it is desirable that each house has a method to receive the public information.
- (4) It is important to have multiple communication methods, such as using emergency email, community FM and so on.
- (5) In order to reach people near to the coast, such as swimmers, fishermen, and harbor workers, a transmission system through facility managers is important. This is especially important since the public broadcast or siren may not be heard. It is necessary to have other methods, such as using colors or lights.

[Reference] FDMA “Investigation Workgroup Report of Earthquake and Tsunami Measures in Regional Disaster Prevention Plan”

The features to be included in the safety manual for tsunami disasters - Evacuation Procedures and Communication Methods

1. Evacuation Procedures

○ Generally, the fire services in tsunami inundation areas disseminate a heads-up to evacuation before receiving the official JMA tsunami warning. If they have a plan to lead the evacuation, they should evacuate according to the planned action time.

○ The leader should order the evacuation when the action time comes.

○ The leader can decide to evacuate workers if he/she senses danger, even if it is before the action time.

2. Communication methods

There should be multiple methods in which to reach workers to tell them to evacuate

### 3. Development of Communication Methods

Reference: FDMA « Investigation Working Group Report of Disaster Information Transmission in Municipalities.

(1) Development of Communication Methods

It is necessary to build a robust communication system which is resilient to disasters, considering the regional situation and the features of each communication method. The system should include multiple methods for communicating.

When building the communication system, it is important to have clear requirements for the entire system and during construction, milestones and tasks should be assigned to groups or people.

(2) Important features of the Communication System

1. Development of system that is resilient to disasters

Considering that this system is normally used in disasters, resilience to disasters is essential. Also, when combining systems, integration is important since more systems can increase the risk of wrong transmissions to wide area, and thus breakdown or confuse residents.

2. Making use of emergency email

Emergency email is an effective way to inform people over a wide area (including residents and non-residents). Use of emergency email systems offered by mobile companies is possible to ensure transmission of disaster information.

However, when this system is used, officers have to conduct the same bid and proposal process for each mobile company to be consistent and fair. The development of an integrated system is essential.

3. Public information system

In order to ensure transmission, the combination of Public Information Systems, with other systems, is important. Since this system is critical for disaster information, so the resilience to disasters has to be especially well-studied

4. Automatic transmission by J Alert

In order to enable quicker transmission, Municipalities need to have at least one communication methods for automatic transmission by J Alert. It is desirable that multiple communication methods are automatized.

When linking J Alert with other communication methods, care should be taken to not overload the communications officer. For this reason, it is important that the united system having the a simple, easy-to-use interface

For emergency emails, the size of email contents should well examined. For example, there is the limit of number of words so fixed pre-decided phases are desirable. An important point also, is that there are many models on which emergency emails are not available.

FDMA should offer information about solutions to these problems to Municipalities.

5. Conveyance of Disaster Information

Conveyance of Disaster Information is an effective system in which emergency information is immediately broadcast as 'breaking news'. When there is a disaster, residents receive information via TV, radio, mobiles, the internet and so on. Alert information can also be transmitted through the Conveyance of Disaster Information System.

(3) Points to consider in the building communication system

1. Constructing a robust system taking into account features of each communication method, In municipalities, the main way of disaster information communication has been through the Public Information System. However, the installation and maintenance of the Public Information System is expensive, so it is necessary to also use other communication methods taking advantage on their features and the local situations. The following points must be considered:

- A. As the table below shows, the most effective methods depends on the receivers of the information, the type of disaster, and climatic situations. All of these points must be considered.

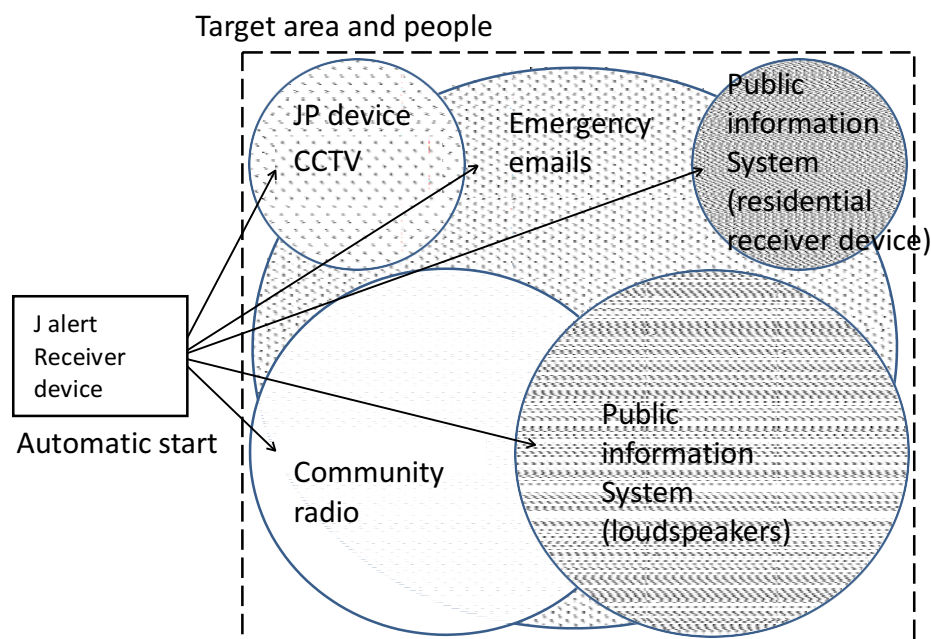
Also, there is no perfect communication method. Every methods has advantages and disadvantages, and there is risk that the method will be damaged during the disaster. For this reason, a robust system should have multiple communication methods.

### Features of communication methods

		Receiver Type					Target area	Understanding of information	Resilience		Notes
		Resident		Tourist		Passengers (on bus, Train, ...)			Climatic situation and so on	Resilience to disasters	
		indoor	outdoor	indoor	outdoor						
Public information system	Loud-speaker system	△	○	△	○	△	Depends on where speakers located. Mainly outdoor	Hard to hear in some climatic situations. Amount of information is limited	Hardly heard with heavy rain and so on	Normally high	Trigger to attract attention
	Receiver devices for residence	○	—	×	—	×	Residences have device. If device connected to speakers, target area can be bigger	Mainly speech information. Some devices can show text information	No influence	Normally high	If installing at every residence, cost very high. Trigger to attract attention
Emergency emails		○	○	○	○	○	All people area having mobile with function of emergency emails. Outdoor and indoor	Text information	No influence from climatic situations. Depends on mobiles' function.	Depends on system of mobile company	Cooperation with mobile companies. Trigger to attract attention. Necessity of integrated system
Community radio		○	○	○	○	○	Area of community radio	Detailed information	No influence from climatic situations	Lower resilience than Public Information System	Necessity of radio receivers. Necessity dissemination of community radio channel
CCTV		○	—	×	—	×	Subscribers of CCTV	Detailed information	No influence by climatic situations	Need backup in case for breakdown of cable and blackout	
IP devices		○	—	×	—	×	People with IP devices	Text information and speech information	No influence by climatic situation	Necessity of measures for breakdowns of cable and blackout	

- B. The characteristics of each receiver of information must be considered. For example, hearing-impaired people have to be informed with text information.
- C. It is important to cooperate with private operators and the mass media in order to multiply the methods of communication.
- D. Emergency warning broadcast is one of the most effective ways when there is a disaster at night. Therefore, it is necessary to encourage residents to turn on a TV or a radio, since they will start automatically to receive the emergency warning broadcast.
- E. Each Municipality needs to examine the communication system plan based on research, the analyses of their local situation (e.g., population, size, topographic features, etc) and the features of each communication method.
- F. For communication methods that provide disaster information, their resilience to disaster must be well examined.

## Concept of Multiple Communication Means to Reach Many



G. It must be noted that there is no perfect communication means and every way has disadvantages and advantages also in the actual operation.

2. Clarification for the type of disaster and phases of the disaster  
The appropriate content of the information and most effective communication method must be considered depending on type of disaster and phase of the disaster.
3. Use of public cars with speakers and firemen  
It is important to make use public cars (such as police or other government vehicles) with speakers and firemen as communication methods. It is important to communicate clearly using the administrative side using Public Information Receivers or transceivers, and to have a communication method that ensures information is transmitted to all firemen) both for their job and their own safety). At evacuation centers, communication through paper media is also effective.
4. Provide information sources to residents during normal time  
In a disaster, many workers are necessary to respond to the disaster. So, it is expected that they may not be available to answer questions from residents. For this reason, the list of information sources must be provided to residents during non-emergency normal time.
5. Use of the latest technology  
Technology advances rapidly. Municipalities needs pay attention and makes use of the best technology for disaster information communication.

## 2.7 Issuance of Evacuation Order

- 1 Set the criteria of evacuation order/recommendation issue in the following cases  
(1) Major Tsunami Warning or Tsunami Warning is issued by JMA.



- (2) A strong or long earthquake shaking is felt.
- (3) Municipality issues disaster warning on its-own.

## 2 Set the timing and the process of the issue

When a major tsunami warning or tsunami warning is issued, Municipalities issues evacuation order or recommendation automatically or based on the criteria. When tsunami advisory is issued, Municipality issues evacuation recommendation to people near to the coast if necessary. The cancel of the evacuation order and recommendation is generally based on the cancellation of the major tsunami warning, tsunami warning and advisory by the JMA.

## 3 Set the transmission system and means of the issue

### (1) Transmission system

Decide how and to whom to transmit.

### (2) Transmission method

Choose an effective method depending on the receiver of the information.

Also, pre-prepare fixed phrases for evacuation order and recommendation.

## 1. Issuance Criteria

- (1) Mayors have the authority to issue evacuation orders and recommendations during disasters and when warnings are issued.

Evacuation orders are more binding than evacuation recommendations and strongly urge residents to evacuate. Evacuation orders are issued when danger is imminent. On the other hand, evacuation recommendations encourage people to evacuate.

When, major tsunami warnings, tsunami warnings and advisories are issued, mayors must transmit them to residents, private and public organizations. When tsunami advisories are issued, the necessity of immediate transmission is not so high, but the ocean and coastal areas become dangerous. So it is necessary to inform people in these areas and issue evacuation recommendations.

Generally, Municipalities must not cancel evacuation orders and recommendations before major tsunami warnings, tsunami warnings and advisories are canceled. During this period (before the cancellation), they have to pay attention to tsunami information and try to understand and know actual situation in order to offer information to residents.

- (2) When feeling a strong (greater than seismic level 3) or long earthquake shaking, Municipalities have to issue evacuation orders and recommendations as necessary. In areas experiencing tsunamis, the decision of issue can be based on the relation between the damage caused by past tsunamis and present shaking of the earthquake. It is advisable that some standard criteria be set in advance for an immediate decision.
- (3) One example is the case where the Municipality issues a warning on its own that there is a tsunami warning issued by the local mayor because they have not yet received a tsunami warning from JMA.

## 2 Set the timing and the process for issuance

When a major tsunami warning or Tsunami warning is issued, Municipalities issue the evacuation order or recommendation automatically or based on their criteria. A delay in issuing can directly lead to an increase of human damage when a tsunami occurs near to the

coast. Municipalities need to have a system that enables immediate issuance of evacuation orders and recommendations.

The cancel of the evacuation order and recommendation is generally based on the cancellation of the major tsunami warning, tsunami warning and advisory.

When reducing evacuation areas according to the change in the status of the tsunami warning (for example, a major tsunami warning becomes a tsunami warning), residents can be confused. Therefore, it is important to have an effective communication method and to disseminate the information to also the evacuation areas, so that residents understand the information well and can take the appropriate evacuation actions.

### 3 Choose the transmission system and method of issuance

For the transmission system and transmission method, see Chapter 2.6.

If only sirens are used, residents have to understand the difference between the types of siren and their meaning. However, this can be difficult in emergency situations. Therefore, the combination of sirens and loudspeakers is necessary. Fixed phrases of evacuation orders and recommendations must be prepared and educated beforehand. These phrases have to include « major tsunami warning or tsunami warning issued », « immediate evacuation », « evacuation areas » and other essential information.

【Reference】 「Tsunami Evacuation Measures Investigation Working Group Report」  
(July 2012)

- In order to encourage evacuation, it is effective to give landmarks as evacuation target points. The expression and content of evacuation orders has to be considered to make residents understand the necessity of evacuating.
- It is necessary to tell residents not to go back to the inundation areas before the cancellation of the evacuation order and recommendation, and to ensure the transmission of the evacuation order and recommendation to evacuation points.

## 2.8 Tsunami Disaster Prevention Education and Awareness

It is necessary to implement Tsunami disaster prevention education and awareness which are necessary for each region for the smooth evacuation

- (1) Methods of tsunami disaster prevention education and awareness
- (2) Contents of tsunami disaster prevention education and awareness
- (3) Places for tsunami disaster prevention education and awareness

In tsunami disaster prevention education and awareness, it is most important that all residents understand that they themselves have to save their lives and they have to take the initiative to act. It is important to know that a local earthquake with strong shaking or long shaking could generate a tsunami, and to start evacuating to higher areas as soon as possible and before a tsunami warning is officially received.

When earthquake shaking is hardly felt, the evacuation actions are needed by evacuation orders. It is necessary to disseminate the following information:

- Residents must evacuate when major tsunami warnings are issued.

- People in low areas or near to the coast must evacuate also when tsunami warnings are issued.
- If they are on the sea side of seashore protective facilities, they must evacuate when tsunami advisories are issued.
- Everyone has to pay attention to tsunami information after an earthquake.

Generally, in case of a tsunami, residents have to evacuate by themselves. It is desirable that people working to lead the evacuation evacuate with other residents for their own safety. Municipalities have to explain this point to residents in advance and make them understand.

\* For the safety of people working for evacuation leading, see Chapter 2.5 and 2.6.2.(6)

Municipalities have to inform residents of situations at seashore protective facilities, the safety of emergency evacuation points and so on.

The following list is what residents should know about tsunami evacuation

1	If you feel strong shaking (Seismic Intensity 4 or more) or weak but long shaking, move quickly away from the shoreline and evacuate to a safe place as soon as possible.
2	Even if you do not feel shaking, move away from the shoreline and evacuate to a safe place as soon as possible when tsunami warning is issued.
3	Get official correct information from radio, TV, and public information vehicles (with loud speaker), e.g., Police, Fire, Municipality car
4	Do not go fishing and swimming when a tsunami advisory is issued.
5	Because a tsunami is a series of waves that comes ashore again and again, be careful until the tsunami warning or advisory is canceled

It is also important to encourage residents to discuss within their family how to share information within them and to ask them to implement earthquake countermeasures such as reinforcement of residences and the installation of fall prevention devices for furniture.

(1) Means of Tsunami disaster prevention education and awareness

1. Mass Media: TV, radio, journal
2. Printed matter, DVD: brochures, public magazines, DVD
3. Internet: HP, SNS, Twitter
4. Tsunami awareness facilities: Tsunami prevention center, Tsunami museum
5. Monuments: Tsunami monuments, signs of tsunami arrival time, inundation depth and inundation area
6. Experiencing and learning: workshop, disaster prevention town watching, disaster prevention map

[Reference] Tsunami Preparedness Say November 5<sup>th</sup>

The Act on Promotion of Tsunami Countermeasures was enacted in June 2011 to protect the lives and properties of citizens from tsunami disaster. In this law, November 5th is designated as "Tsunami Awareness Day" because of "A Fire of the Hill", which is a story of saving people from tsunami disaster by getting people to move to higher ground by lighting a fire on a hill to alert them during a dark night in 1854 (Ansei-earthquake and tsunami). On November 5th, National and Local government are required to conduct awareness events relating to tsunami such as training, education, or lectures.

Tips to save your life from a tsunami

1. The first thing to do is saving your life from an earthquake shaking

The shaking of the earthquake expected in our region is strong and long. If you are hurt by the shaking, you cannot evacuate quickly, and you need probably assistance of others. In order to save others' lives, it is very important to save your life by yourself.

Tip 1: Do it now, the reinforcement of your house and falling prevention of furniture.

The reinforcement of your house and falling prevention of furniture are important in order to enable smooth evacuation.

Tip 2: When feeling a shaking, save your head.

When you are inside, evacuate under a stable table. When you are outside, go to a safe place in protecting your head with bag or belongings and taking care of falling objects.

Tip 3: Watch your step, if treading on glasses, you cannot evacuate by yourself.

It is very dangerous to walk in a room with glass fragments. After an earthquake, you have to evacuate by roads with many debris. Prepare shoes in your bedroom.

2. Evacuate to a safer and higher place

In our region, a tsunami arrives at the coast line 3 minutes after the earthquake. The speed of tsunami in land areas is 10m/s. So you will be attacked if you start evacuation after seeing a tsunami. Evacuate as soon as possible.

Tip 4: If you feel a shaking, evacuate early and quickly

In order to save your life from a tsunami, the smooth evacuation is the most important. When you feel a strong or long shaking, start evacuation as soon as possible.

Do not stop evacuation actions.

Tip 5: Other things than evacuation causes the delay of evacuation.

Tsunami is approaching to you when you communicate with other family members not being with you, or check information of tsunami warnings. When you feel a strong shaking, start your evacuation immediately. In order to avoid taking time to communicate within the family, make family rules in case of tsunami in advance.

Tip 6: Do not be overconfident in inundation expectations

Published Tsunami inundation expectation shows the inundation situations just when the assumed earthquake happens. Actually, in the Great East Japan Earthquake, many people died in areas where inundation was not expected. Continue the evacuation to a safer place as long as you have time.

3. Take initiative, it saves everyone's life.

Some people starts evacuation just after others start. In order to save them, people taking initiative of evacuation are necessary. Too much evacuation causes no problem, but the delay of evacuation lasts lives.

Tip 7: Your initiative helps everyone

It doesn't matter if the evacuation is not actually necessary when you take the initiative of evacuation.

4. Ensure the safety before going back

Tsunami comes repeatedly, and the first wave is not necessarily the biggest. Do not go back before the cancel of warnings.

Tip 8. Tsunami comes repeatedly

Tsunami comes repeatedly, and the first wave is not necessarily the biggest. Get correct information and go back only after the cancel of warnings. Do not decide to go back by yourself.

5. Making the plan of evacuation

In emergency, you can do only what you do usually. For the smooth evacuation, you need to make an evacuation plan and discuss in the region or family, and practice in evacuation drills.

Tip 9: Evacuate to a selected evacuation point by the region

The discussion in the region and family enable not only smooth evacuation but also cooperation within them.

Tip 10: Evacuation drills

The damage expectation is just one of possible scenarios. Installation of evacuation points and routes, reinforcement of houses and high awareness of residents to evacuation reduce human damage. The cooperation among residents is really important for smooth evacuation in confusing situation. In order to enable it, it is necessary to make good relationship among residents through evacuation drills. The lessons learned are useful to review the evacuation plan and develop it.

(2) Contents of Tsunami disaster prevention education and awareness

1. Records of past tsunami damages: old documents, folklores, experience stories of people attacked by a past tsunami
2. Mechanism of tsunami: Basic knowledge of tsunami, such as mechanism, speed, height and timespan.
3. Hazard map: How to read hazard map showing inundation areas and emergency evacuation points.
4. Contents of tsunami evacuation plan: Transmission of big tsunami warnings, tsunami warning, advisories and information. Evacuation orders and recommendation. Emergency evacuation points and evacuation routes.
5. The importance of preparedness: evacuation drills, confirmation of emergency evacuation points, communication way within the family, reinforcement of buildings and falling prevention of furniture
6. Big tsunami warnings, tsunami warnings and advisories: Actions to do and points to be considers in case of each warning

(3) Places for Tsunami disaster prevention education and awareness

Disaster prevention education is conducted in families, schools, communities (voluntary disaster prevention organization, neighborhood association, women association, young people association and so on), and companies.

It is important to have regular occasions that residents here people having tsunami experiences or knowledge. Municipalities need to develop this kind of human resource. So Municipalities organize workshop for people who can act as the core of disaster prevention education, such as leader of association, people in charge of disaster prevention and so on. Also, disaster prevention education for small children is important.

## 2.9 Evacuation drills

When implementing evacuation drills, the following points have to be considered. It is also necessary to examine its contents and its structure based on local situations.

(1) Implementation and participants of drills

- Implementation of drills
- Participants of drills

(2) Contents of drills

- Collection and transmission of big tsunami warnings, tsunami warnings, advisories and information.
- Tsunami evacuation drill
- Tsunami prevention facility operation drill
- Tsunami observation drill

Conducting evacuation drills regularly to practice evacuating and check the time required to evacuate, the tsunami evacuation zones, and the evacuation roads and routes, and to inspect tsunami floodgates are important not only for smooth evacuation, but also for improving the awareness of disasters. For this reason, the evacuation drill should take place at least once a year. The results of the training and the lessons learned should be used to correct or improve tsunami evacuation plan.

(1) Implementation and participants of drills

- Implementation  
Implement drills in cooperation with resident organization, social welfare facilities, schools, medical facilities, fire offices, flood fighting coops, harbor workers, tourism facilities, voluntary organizations and so on.
- Participants  
Encourage the participation of not only residents, but also tourist, swimmers, harbor workers and so on. Examine necessary participants in order to enable practical drills of evacuation assistance for tourists, handicapped people and elderly.

(2) Contents of drills

Make a scenario of the drill in assuming an earthquake causing a tsunami. Contents of the drills have to match to the expected height, arrival time and duration of the assumed tsunami. The scenario must be concrete and practical. The timing of drills must be various, for example in the night. It enables smooth evacuation in various situation.

The first aim of drill is to verify evacuation routes by real evacuation or familiarize with the operation of tsunami prevention facilities. The drill is also an occasion to check the feasibility of evacuation measures. It is important to analyze results of drills, find lessons and solve problems, and then apply them to regional tsunami evacuation plan. In order to encourage participation, the selection of a good date, the cooperation with schools, and the preparation by residents are important.

### Examples of contents of drills

- Collection and transmission of big tsunami warnings, tsunami warnings, advisories and information

Verify the first response, the communication system, audible areas of loudspeakers and fixed phrase of transmission

- Tsunami evacuation drill  
By walking on evacuation routes and roads selected in evacuation plan, check the routes, evacuation signs, possible risks in evacuation, necessary time for the evacuation and necessary evacuation leading. For people who hardly walk, the shortest route does not mean the quickest route. It would be necessary to pass private areas in evacuation. In this case, the Municipality need to get the approval of the owners. It is also necessary to check street lights by drills in night. It is desirable to evacuate to real emergency evacuation points in drills. If not so, the organizer must inform the participants of emergency evacuation points. The difference between emergency evacuation points and evacuation centers must be well recognized by residents.
- Tsunami prevention facility operation drill  
The following points must be considered by drills
  1. Who, when and how to operate facilities?
  2. Is the operation before the tsunami arrival time possible?
  3. What to do in case of breakdown?
 In drills, the safety of operators must be especially examined.
- Tsunami Observation Drill      Implement drills to familiarize with tsunami observation using observation devices or by looking, and to learn making use of observation results to emergency disaster responses. It must be noted that tsunami observation by looking has risks of the safety.

## 2.10 Other notes (Safe, reliable, and secure evacuation measures for tourists, swimmers, and fishermen. Evacuation measures for people requiring assistance in disaster)

1 When formulating evacuation measures for tourists, swimmers and fishermen, the following points must be considered.
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|--|
| (1) Information transmission<br>(2) Evacuation measures taken by facility managers<br>(3) Preparedness to save lives by themselves<br>(4) Emergency evacuation points and evacuation guide signs |
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(5) Tsunami awareness and evacuation drills
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2 Evacuation measures for people requiring assistance in disaster
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It is important to make a system to assistant them and a concrete evacuation support plan in cooperation between Municipalities and regional communities.
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- |   |
|---|
| (1) Notes<br>(2) Guideline for evacuation support to people requiring assistance. |
|---|

1. As for evacuation measures for tourists, swimmers and fishermen, the following points must be considered

- (1) Transmission of Information  
Operators of tourism facilities or hotel accommodations should also be educated on how to transmit emergency Public information to their visitors or guests.

For people outside the facilities or hotels, information should be transmitted by using speakers, sirens, flags, and so on. Coastal observers need to install receivers of Public information, prepare devices such as speakers, and make a manual about information transmission and how to lead an evacuation.

- (2) Evacuation measures taken by facility managers
- (3) Preparedness to save their own lives
- (4) Emergency evacuation points and evacuation guide signs
- (5) Tsunami awareness and evacuation drills

(2) Evacuation measures taken by facility managers

Tourism facilities and hotel accommodations along the coast need to evacuate tourists to emergency evacuation points. If tsunami comes early, the evacuation to a higher level, which is 2 levels higher than inundation depths, of RC structure buildings can be safer than evacuation points. (if the expected inundation depth is 2m, higher than the level 2. If 3m, higher than the level 3). It is also possible for people who fails the smooth evacuation will come to the facility. For these reasons, the operators of facility should make a tsunami evacuation plan that is consistent with the regional tsunami evacuation plan. Thus, the participation of the operators in the formulation of regional evacuation plan is also important.

(3) Preparedness to save their own lives

If the highest tsunami warning by tsunami advisories is 1m, swimmers and fishermen have to evacuate from coastal areas. They need to bring radio to receive tsunami information, and wear lifejackets.

(4) Emergency evacuation points and evacuation guide signs

It is necessary to install detailed evacuation guide signs indicating tsunami inundation areas, sea level, tsunami arrival time, direction of evacuation and emergency evacuation points for the evacuation of people not familiar with the area, such as tourists. The signs of JIS and ISO have to be used as much as possible.

Installation of uplands and designation, selection of tsunami evacuation buildings, and their designations are necessary for evacuees failing to evacuate quickly.

(5) Tsunami awareness and evacuation drills

In order to arouse tsunami awareness of tourists, actions in cooperation with concerned people are important. The examples include distribution of flyers about tsunami at fishing tackle shops, parking along the beach, or the awareness using the internet.

Also, the participation of tourists in evacuation drills is important. So the implementation of drills in tourism season is necessary.

## 2. Evacuation measures for people requiring assistance during a disaster

(1) Notes

The table below shows examples of people requiring assistance. For them, the following points must be considered.

<Examples of people requiring assistance in tsunami evacuation>

Reason they need the assistance	Examples
They have difficulties in gathering information	People with visual and hearing disabilities Foreign people



	Children
They have difficulties in taking evacuation actions	Mentally and physically handicapped people Elderly people Sick people Small children

A. Transmission of Information

For children, it is important to prepare transmission phrases in plain terms. The dissemination of meanings of sirens is necessary.

As for people with visual and hearing disabilities and foreign people, the support from neighborhoods is necessary. Municipalities have to ensure the support in cooperation with voluntary disaster prevention organizations, local communities and welfare organizations.

B. The support in evacuation actions

For people having difficulties in evacuation actions, the support from neighborhoods, voluntary disaster preventions and volunteers is indispensable. It is necessary to ensure the support system by cooperating with them daily. Though the evacuation method is generally by walking, the use of cars has to be examined in some cases.

\* As for evacuation by cars, see chapter 2.3.3 3 Evacuation method

The evacuation to a higher level of a residential house or tsunami evacuation building can be safer than emergency evacuation points. If the inundation depth is lower than 2 m, the collapse of wooden buildings is just partial. And also, if lower than 4 m, concrete buildings can resist. They have to know this kind of knowledge just in case.

The concrete plan about the support to people requiring the assistance must be decided at regional and familial level.

C. Evacuation measures taken by facility operators

The operators of facilities, such as welfare facility, school and medical facility, need to formulate tsunami evacuation plan about leading the evacuation, evacuation drills and disaster prevention education. Municipalities have to help them.

(2) Guideline for evacuation support for people requiring assistance.

It is important that Municipalities and regional communities cooperate in making a support system and a concrete evacuation support plan for people requiring assistance, such as handicapped and old people, during a disaster..

Municipalities need to formulate an evacuation support plan, refer to « “Guidelines for Evacuation Support of People Requiring Assistance during a Disaster” (March 2006)

[https://www.jica.go.jp/english/news/focus\\_on/c8h0vm00008lxw0n-att/process\\_02.pdf](https://www.jica.go.jp/english/news/focus_on/c8h0vm00008lxw0n-att/process_02.pdf), published by the government.

Overall plan: Made by Municipalities. Basic principles of evacuation measures for people requiring assistance, the definition of people requiring assistance, ways to share information for people requiring assistance

List of people requiring assistance during a disaster: List of names of people requiring assistance. Used in the support during disasters by voluntary disaster prevention organizations, welfare commissioner

Individual plan: Concrete plan for each person requiring assistance. Used in the support during disasters by voluntary disaster prevention organizations, welfare commissioner.

In East Japan Earthquake, the communication for evacuating people requiring assistance was not enough. So, the Cabinet Office is examining the Guideline.

## 2.12 Checklist for Tsunami evacuation plan

1. Making Tsunami Inundation Area map		Check bellow
1.1 Is it made based on guidelines of “Tsunami Inundation Area map”(2.7.1)?		
2. Designating Evacuation Areas		
2.1 Damage Expectations	Is it expected that residents' lives or properties are damaged by tsunami?	
2.2 Designation of evacuation areas	Are evacuation areas designated?	
2.3 Comprehension of residents	Do residents agree with the designation of evacuation area?	
3. Designating difficult-to-evacuate areas		
3.1 Expected tsunami arrival time	Set the estimated tsunami arrival time based on tsunami simulation results.	
3.2 Emergency evacuation points	Select evacuation target points that are outside of the tsunami inundation area and that residents are able to reach in the shortest time.	
3.3 Evacuation routes and roads	Select evacuation roads and routes to evacuation target areas that residents are able to reach in the shortest time.	
3.4 Evacuation distance	Set the possible distance (area) based on ①②③and evacuee's walking speed.	
3.5 Difficult to evacuate areas	Identify difficult-to-evacuate areas in the estimated tsunami inundation areas where residents cannot safely evacuate from	
3.6 Evacuation drill	Check whether evacuation is possible by the estimated arrival time through drills.	
4. Selecting evacuation points		
4.1 Selecting and designating emergency evacuation points		
Does the municipality designate emergency evacuation points?		
Do the emergency evacuation points ensure safety?		
Are they distinguishable from evacuation centers?		
Do the points have enough functionality?		
4.2 Selecting evacuation target points		

Are the evacuation target points selected by residents (or Voluntary Disaster Prevention Groups of residents)?	
Do they ensure safety?	
4.3 Designating evacuation buildings	
Does the Municipality designate evacuation buildings?	
Do the evacuation buildings ensure safety?	
Do they have enough functionality?	
5. Selecting evacuation routes and roads	
5.1 Designating and selecting evacuation roads, evacuation routes	
Does the Municipality designate evacuation roads?	
Do they ensure safety?	
Do they have enough functionality?	
5.2 Selecting evacuation routes	
Are they selected by residents (or Voluntary Disaster Prevention Groups of residents)?	
Do they ensure safety?	
5.3 Considering how to evacuate	
Is it possible to evacuate by walking?	
Has evacuation by methods other than walking been examined?	
6 Initial response system (gathering staffs)	
6.1 Setting criteria for gathering staff	
Criteria of staff gathering in the case of tsunami advisory	
Criteria of staff gathering in the case of tsunami warning	
Criteria of staff gathering in the case of strong shaking	
6.2 Reliable communication methods	
Gathering without a call whenever notice is issued by TV or radio.	
Reliable communication means such as cellphone.	
The safety of participants leading the evacuation	
7.1 Ensuring the safety of participants leading the evacuation (such as Police)	
Do you have a rule for staff to escape considering the estimated tsunami arrival time?	
Do you have communication method, such as radio?	
Have you considered the use of life jackets?	
Have you ensured the safety of staff and government buildings?	
8 Collecting and disseminating tsunami information	
8.1 Collecting tsunami information	

Do you have a reliable system to receive tsunami alerts (especially off-hours)?	
Does every staff know the system of tsunami warnings, including how to receive and dissemination warnings?	
8.2 Tsunami Observation	
Do you have enough staff for monitoring?	
Does every staff understand the meaning of the observed tsunami data and how the tsunami observation system operates?	
Do you have any plan on how to use observed tsunami data?	
8.3 Tsunami information dissemination	
Do you have any measures to ensure the safety of staff?	
Is the chain of information built up? “What”, “When” and to “Whom”?	
Do you know how to transmit the information?	
Are drafts of the public relation statement prepared (pre-scripted templates available)?	
Does the automatic alert system (by J-alert) work?	
Do you have a reliable way to transmit information during off-hours.	
Do you ensure the Municipal Disaster Management Radio Communication Network will work?	
Do you have multiple methods to disseminate information?	
Have you ensured the safety of staff and government buildings?	
Have you ensured that government buildings are earthquake-resistant, have backup power supplies, and have implemented measures against inundation?	
Do you have good relationship to cooperate with media to broadcast information?	
9. Issuing evacuation order, evacuation advisory	
9.1 Criteria of issue	
Is there a criteria for issuing evacuation order/advisory for the case that a Major Tsunami Warning and/or Tsunami Warning is issued by JMA?	
Is there a criteria for issuing evacuation order/advisory for the case of strong earthquake shaking or weak ground motion for an extended period?	
Is there a procedure for what to do if you do ‘NOT’ receive tsunami warnings?	

Is there a criteria for deciding where to issue evacuation order/advisory?	
9.2 Timing of issue based on warnings by JMA	
Are evacuation orders or evacuation advisories issued automatically when JMA issues a tsunami warning?	
If a supervisor needs to approve the issuance, is there a procedure that enables an immediate issuance?	
Have you considered how to respond when the supervisor is away or during the off-hours?	
9.3 Process of issuance	
Is it set "Who" gets tsunami warnings by "What" method, and "How" the evacuation order or evacuation advisory is issued?	
9.4 Multiple communication methods	
Do you have multiple methods to provide residents tsunami information such as Municipal Disaster Management Radio Communication Network, siren, fire bell, public car, cable broadcast, community radio station, and/or early warning email?	
Do you publish the areas where there is evacuation order/advisory on a website?	
9.5 Dissemination to tourists	
Is there a reliable way to disseminate information to tourists, people on the beach, and fishermen?	
9.6 Content issued	
Are drafts of the evacuation order and advisory prepared? (pre-scripted templates)	
Do you have a method to directly and reliably communicate with the prefecture and JMA (such as a hotline)?	
10. Tsunami education and public awareness-raising	
10.1 Means of education	
Do you conduct education and public awareness-raising related to tsunami in various ways?	
10.2 Contents of education	
Do you continue to improve the contents of brochures?	
Did you publish a hazard map and tsunami evacuation plan?	
Do you use an online method (web) to get the attention of residents?	

10.3 Places for education		
Are educational programs held in communities and business offices?		
Do you have hub facilities and human resources to conduct the education?		
11. Evacuation drills		
11.1 Frequency	Do you conduct an evacuation drill at least once a year?	
11.2 Implementation	Is the evacuation drill conducted with the cooperation of the whole community?	
11.3 Participants	Do tourists and beach-goers/bathers participate in the evacuation drill?	
	Do social welfare facilities, schools and hospitals participate in the evacuation drill?	
11.4 Review of results	Do you review the results of evacuation drills?	
	Is the tsunami evacuation plan reviewed based on the results of evacuation drills?	
11.5 Variation of drills	Do you review or modify the scenario of evacuation drills? (Drills at night, or operation training at tsunami countermeasure facilities etc.)	
12 Other		
12.1 Evacuation plan for tourists and beach-goers / bathers		
Do you have various methods to provide information?		
Do you have a good relationship for cooperation with managers of tourist facilities and accommodations?		
Are there enough signs to indicate evacuation routes and evacuation points?		
Are the efforts in awareness-raising enough, such as the tsunami signs, brochures, and websites?		
12.2 Evacuation of those who needs assistance		
Is there a system to provide information to people with visual and hearing disabilities and foreigners (non-Japanese speakers)?		

Do you have a detailed plan to provide information to social welfare facilities, schools, and medical facilities?	
Do communities support them enough for evacuation?	
Do you have a list of those who need support to evacuate? If you have a list, do you use it appropriately?	



## Definitions – Summary (adding to information in Section 2.1.8(

Term	Definition
Tsunami inundation area (zone)	The area (zone) expected to be inundated by the maximum possible tsunami in a worst-case scenario.
Evacuation area (zone)	The area (zone) residents need to evacuate from when a tsunami happens. It is based on the tsunami inundation area and designated by the Municipality. The evacuation area (zone) is normally larger than tsunami inundation area to ensure safety and smooth evacuation.
Difficult-to-evacuate area	The area (locations) within the evacuation area (zone) where residents will not be able to evacuate out of before the tsunami arrives.
Evacuation roads	The roads used for the evacuation. Roads are designated by the Municipality.
Evacuation routes	The routes used for the evacuation, Routes are designated by Voluntary Disaster Prevention Organizations or residents.
Emergency evacuation points	<p>The elevations or facilities to evacuate to escape imminent tsunami danger. In principle, they are set outside of the evacuation area (zone), and designated by the Municipality. It is desirable to furnish these points with information communication equipment, emergency provisions and blankets, but it is possible that emergency evacuation points will not have these items, since the first priority of emergency evacuation points is the protection of lives. In this aspect, they are different from evacuation centers.</p> <p><i>ITIC: Also known as safe assembly areas (locations) or refuges (facilities).</i></p>
Evacuation target points	The places to evacuate to from a tsunami. They are set outside of the evacuation area (zone), and designated by Voluntary Disaster Prevention organizations or

	<p>residents.</p> <p>They ensure just the protection of life, so they do not always correspond to the emergency evacuation points.</p>
Tsunami evacuation buildings	<p>The buildings where residents in difficult-to-evacuate areas, or residents failing to evacuate in time, can evacuate to in an emergency. The Municipality designates buildings in the evacuation area (zone).</p>
Evacuation Center or Shelter	<p>The facilities that shelter the residents, whose houses are damaged, for a long period (until they move to temporary housing). The centers are set out of the evacuation area (zone), and designated by the Municipality. It is desirable to furnish them with daily necessities like food, drinking water, household medicines, and blankets.</p>