

My Disaster Preparedness Memo Be sure to fill out

Risk of Disaster Where I Live:

Sediment Disaster (Landslide, etc.)	Flood	Tsunami
<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No

Reservoir Flooding	Stormwater Flooding	Storm Surge
<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No

Evacuation site(s)	
Rendezvous place for family	
Emergency kit storage loc.	

Be prepared for disasters, just in case... with My Timeline!

My Timeline helps you chronologically organize the disaster management steps you and your family will take in the event of heavy rain, typhoons, etc. My Timeline forms are available on the Matsuyama City website. Prepare for disasters by deciding in advance what you will do, when you will do it, and where you will evacuate.

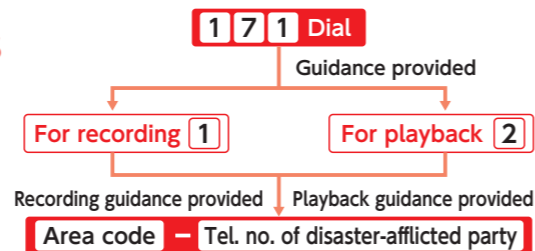


Name (family/relative/friend)	Emergency contact (work/school/mobile ph.)	Date of birth, blood type, etc.

Confirming Safety Status During Disasters

171 Disaster Emergency Message Dial

During times of disaster, ordinary telephones may experience connectivity issues. 171 Disaster Emergency Message Dial is a voice-based message board where safety status information can be recorded and relayed to others. Messages can be recorded and played back using ordinary telephones, public telephones, mobile phones, etc. Advance registration is not required for use.



Web171 Disaster Message Board

Safety status information can be posted in text format. Posted safety status information can then be confirmed with a mobile phone or computer using a telephone number as a key.

Mobile Phone Disaster Message Board



Emergency Broadcast System Telephone Service

Area code within Matsuyama: 089

☎986-7755 Matsuyama / Hōjō
☎997-1193 Nakajima

Matsuyama City Disaster Management Portal

Find information on weather, earthquakes, evacuation, and evacuation shelters in the city.



Emergency Contacts Area code within Matsuyama: 089

- Fire Dept. (fire/emergency/rescue) (No area code) **119**
- Police St. (incidents/accidents) (No area code) **110**
- Matsuyama City Fire Dept. **926-9200**
- Matsuyama City Disaster Mgmt. HQ (when est.) **987-7000**

Contacts for fires & emergency hospital (tel. service)

- Fire **925-6622**
- Emerg. Hospital **925-6633**

Matsuyama Comprehensive

Disaster Prevention Hazard Map

Central Area Edition

Banchō / Shinonome / Yasaka / Soga / Yūgun / Aratama / Misake / Shimizu / Kuwabara / Dōgo

Disaster & Crisis Management Div.,
General Affairs Dept., Matsuyama City
4-7-2 Niban-chō, Matsuyama City, Ehime 790-8571
TEL:089-948-6793 FAX:089-934-1813
<https://www.city.matsuyama.ehime.jp/>

Coop.: Center for Disaster Management Informatics Research, Ehime Univ.



Published Mar. 2022

Matsuyama

Comprehensive

Central Area Edition

Banchō / Shinonome / Yasaka / Soga / Yūgun / Aratama / Misake / Shimizu / Kuwabara / Dōgo

Disaster Prevention Hazard Map




Matsuyama City

Published Mar. 2022

Check Your Disaster Preparedness

How well prepared are you for disasters? Use this guide to check your level.

You understand alert levels and how/when to evacuate. → p.1	You have decided on emergency contact methods for household members. → p.3	You have considered multiple evacuation options in case the time comes. → pp.1,3	You have a grasp of designated evacuation shelters in the area. → pp.17,20-37
You understand the risk of disasters in your area and around your home. → pp.20-37	You have taken part in local disaster prevention drills. → p.40	Your home has been evaluated for seismic resistance and upgraded accordingly. → p.42	
You keep the entrance to your home clear to maintain an evacuation path. → pp.42-43	Your furniture, appliances, etc. have been secured to keep them from falling. → p.43	You keep at least 3 days' worth of water, food & daily necessities on hand. → pp.44-45	

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The Matsuyama Comprehensive Disaster Prevention Hazard Map is available on the Matsuyama City website in multiple languages: English, Chinese (Simplified & Traditional), Korean, and Japanese versions.



5 Key Points to Protect Your Life During Disasters

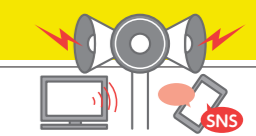

It has become increasingly important to prepare for disasters in daily life. Make sure you have a good grasp of the following 5 key points.

1. Understand Degrees of Risk (Alert Levels) & Evacuation Information

When there is a potential for disaster from heavy rain, typhoons, etc., weather and river information will be reported on an ongoing basis, and Matsuyama City may announce evacuation information. It is important to check the appropriate evacuation measures to take in accordance with Alert Levels, and consider the timing when you and your family should evacuate.

Alert Level	Evacuation Information, etc.	Actions for All Residents to Take	Weather Information (JMA) / River Information (MLIT)
Level 5 Risk of death Protect yourself at once!	Emergency Safety Measures¹ (Announced by Matsuyama City)	A disaster is occurring or is imminent. Take the best course of action to protect your life.	Heavy Rain Emergency Warning Information on Flooding, etc.

Be sure to evacuate by Alert Level 4 at the latest!

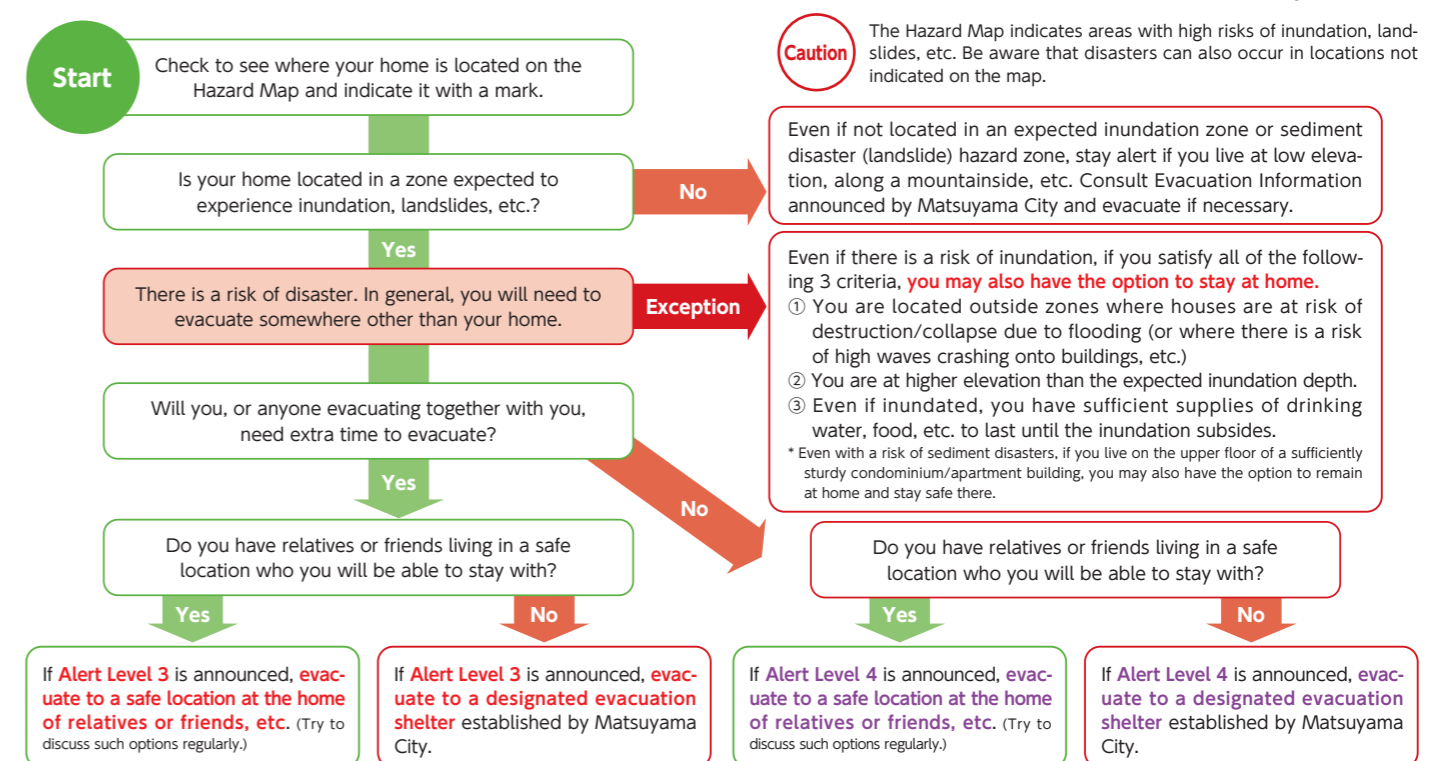
Level 4 All residents must evacuate from hazardous locations	Evacuation Instruction (Announced by Matsuyama City)	Evacuate promptly. If it seems dangerous to travel to an evacuation site, evacuate to a safe location nearby or to a safer place in your home.	Landslide Alert Information Information on Potential Flood Hazards Storm Surge Emergency Warning, etc.
Level 3 The elderly must evacuate from hazardous locations	Evacuation of the Elderly, etc.² (Announced by Matsuyama City)	Those who need more time to evacuate, including elderly people, people with disabilities, infants, and very young children should begin to evacuate together with their caretakers.	Heavy Rain/Flood Warning Information to provide a warning on flooding, etc.
Level 2	Heavy Rain/Flood Advisory Information to call attention to flooding, etc.	Prepare to evacuate. Check Hazard Maps, etc. to be sure of how you should evacuate.	
Level 1	Early Advisory Information	Pay attention to weather information, etc. and mentally prepare for a potential disaster.	

¹ Announcement is made to the extent possible. Please be aware that it may not be possible to make announcements in all Alert Level 5 scenarios.

² When Alert Level 3 is reached, those other than the elderly should also begin to postpone ordinary activities as necessary. If you sense danger, this may be a good time to evacuate voluntarily.

2. Work Through the Evacuation Flowchart

Be sure to check the risk of disaster for your home and review the appropriate evacuation actions for you to take.



3. Gather Information to Help Protect Your Life

Matsuyama City disseminates evacuation information through a variety of methods. During disasters, it is extremely important to obtain correct information, so be sure to acquaint yourself with methods of gathering information in advance.

Information from Matsuyama City

Social media Official Matsuyama City LINE account (Advance registration required)

Receive information on evacuation, evacuation shelters, weather, and earthquakes through LINE



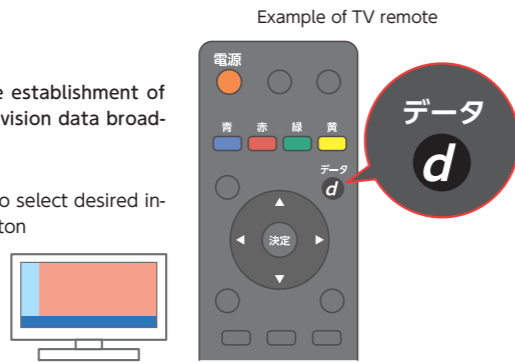
Email Matsuyama Disaster Prevention Email Service (Advance registration required)

Receive information on fires, etc. as well as evacuation and weather information by email
Email address for registration: regist.matsuyama@mail.e-bousai.net



TV Data Broadcasting

- Check information on evacuation, the establishment of evacuation shelters, etc. through television data broadcasting
- Press the d button on your TV remote
- Use the arrow buttons on the remote to select desired information, then press the 'Confirm' button
- Automatically displayed (in bands at the left and bottom of the screen) when a typhoon is approaching, a disaster has occurred, etc.



Web Matsuyama City Website [Matsuyama City Disaster Management Portal]

Find emergency information, weather and earthquake information, evacuation and evacuation shelter information, etc. Accessible with smartphones as well



Voice Emergency Broadcast System

Disaster and evacuation information is broadcast from speakers in 284 outdoor locations within the city
Accessible by telephone (telephone service) if you would like to hear the information one more time as well



Telephone Service
● Matsuyama / Hōjō
TEL 089-986-7755
● Nakajima
TEL 089-997-1193

Email Emergency Information

- Emergency Alert Email Service Earthquake Early Warnings (EEW) and tsunami information announced by JMA, evacuation information announced by the city, etc. is sent to all mobile phones in affected areas (Advance registration not required)

- Ehime Prefecture Disaster Prevention Email Service (Advance registration required)

Receive disaster prevention information and emergency notifications by email



Email address for registration: bousai.ehime-pref@ehime-pref.ktaiwoi.jp

Social media Matsuyama City Disaster Prevention Information

- Matsuyama City Disaster Prevention (Facebook)
- Matsuyama City Disaster Prevention (Twitter)

Help spread information announced by Matsuyama City by sharing posts on Facebook or retweeting on Twitter



App Smartphone Apps

- Yahoo! Disaster Prevention Bulletin
- Hime Shelter

The Yahoo! Disaster Prevention Bulletin app enables access to information from municipalities in a designated area.
Hime Shelter is an official Ehime Prefecture smartphone app that provides multilingual visual displays of disaster information, evacuation routes, etc.



Helpful Websites, etc.

Web Ministry of Land, Infrastructure, Transport and Tourism (MLIT) "River Flood Information"

<https://www.river.go.jp/index>

Find flood forecasts, water levels & images from river monitoring stations, dam conditions, etc.



Web Japan Meteorological Agency (JMA) Website

<https://www.jma.go.jp/jma/index.html>

Find weather information, earthquake & tsunami information, marine forecasts, weather forecasts, etc.



Web Ehime Disaster Prevention & Crisis Management

<https://ehime.secure.force.com>

Find out weather & earthquake information, evacuation & evacuation shelter information, etc. for Ehime Prefecture



Internet TV NHK NEWS WEB

<https://www3.nhk.or.jp/news>
<https://www3.nhk.or.jp/news/live>

Watch NHK News online



Internet radio NHK Radio RADIRU★RADIRU

<https://www.nhk.or.jp/radio>

Listen to NHK Radio 1/Radio 2 and NHK-FM programs online



App NHK NEWS & Disaster Info

https://www3.nhk.or.jp/news/news_bousai_app

Smartphone app providing the very earliest access to the latest news & disaster information from NHK



4. Have Family Meetings on Disaster Preparation

Discuss with your family what actions you will take if disaster strikes. In particular, consider what you will do in the event family members are separated from one another when a disaster occurs.

Confirm Evacuation Routes, Evacuation Sites, and Rendezvous Locations

Be sure to confirm with all household members details such as evacuation routes from your home, evacuation sites and evacuation shelters near your home/school/workplace, and rendezvous locations in case a disaster occurs while one of you is away on travel or business.



Decide on Rules About Picking Up Children

Be sure to decide on rules/agreements about picking up children from their nursery school/kindergarten/school, what you will do if it is not feasible to pick them up, etc.



Prepare Multiple Family Contact Methods

Try to think of multiple ways for household members to contact one another, such as mobile phones, social media, etc. Other convenient options include 171 Disaster Emergency Message Dial for landline telephones and Disaster Message Board for mobile phones. You may also be able to relay messages to one another through relatives or friends who live outside the area.



Consider What to Do If Away from Home

Decide on what actions you will take if you are away from home for work, leisure, shopping, etc. when a disaster occurs.



5. Protect Your Own Life

The spirit of self-preservation, to protect your own life, forms the foundation of disaster prevention. Please be sure to exercise proper judgment suited to you in making evacuation decisions.

If you sense danger, evacuate early without waiting for evacuation information!

Before it gets dark, reach out to neighbors and help each other evacuate.

Before leaving home, turn off gas at the mains, shut down the circuit breaker, leave nothing lit, and be sure to lock up.

As a rule, evacuate on foot. Cars may break down and cause secondary disasters or obstruct emergency vehicles.

Keep a constant eye on your children. If there is flooding, use a rope to stay connected.

Stay away from dangling power lines!

The group leader should walk ahead in the middle of the roadway with a long walking stick to check out gutters, manholes without covers, etc.

If there is flooding, don't walk through water that comes as high as the knee. If any deeper, find a higher spot to wait for rescue.

Choose attire for ease of mobility!

Throw a minimal emergency kit in your backpack and make sure both your hands are free

Cover your head with a helmet or cushioned hood and attach a headlamp

Bring a whistle to alert others to your location, just in case

Protect your hands with work gloves or leather gloves

Dress in long sleeves & full-length pants

Wear athletic footwear
Tall boots may fill with water and be hard to walk in
Going barefoot is a no-go

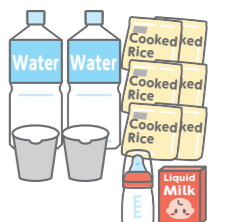
Evacuating to a Relative's or Friend's House

To evacuate does not necessarily mean going to an evacuation shelter. To avoid close contact with others as well, also consider evacuating to the home of relatives or friends who live in a safe area. Be sure to consider multiple evacuation options and discuss them in advance.



The Option of Staying at Home

If you live in an area where there is no danger of flooding or landslides, or if you live on the upper floor of a sturdy condominium/apartment building, consider in-home evacuation as well. Make sure you have sufficient supplies of food, drinking water, etc. to last until the water recedes even if the area is inundated.



Storm & Flood Damage Fundamentals

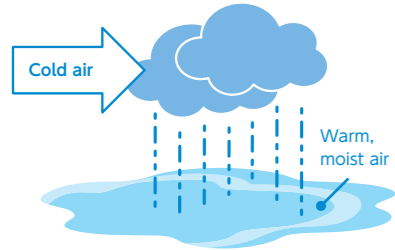
In recent years, disasters from heavy rain and typhoons have been occurring frequently throughout Japan. Such climatic phenomena are expected to increase further in the future, raising the risk of floods, landslides, and so on.

Why Abnormal Weather Events Occur

The average temperature in Japan is rising, and annual occurrences of heavy rain are increasing. Global warming associated with increased greenhouse gas emissions is thought to be one factor in the occurrence of abnormal weather events such as heat waves with temperatures approaching 40°C (104°F) and record-setting heavy rain. When the average temperature rises, more moisture evaporates from the oceans and the ground, increasing water vapor content in the Earth's atmosphere. This leads to a greater amount of rainfall and, in turn, the occurrence of heavy rain events.

Stationary Fronts

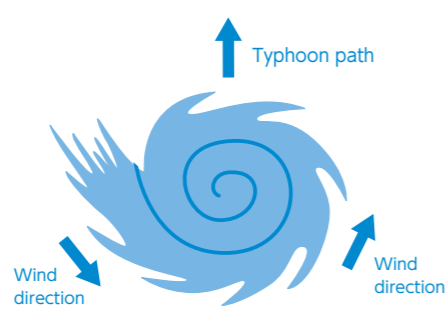
In the area around Japan, the Baiu front forms around June, and the autumnal rain front forms around September. When cold air comes up against warm air in a stationary front, rows of cumulonimbus clouds develop, and linear rainbands form. Weather fronts can remain stationary in the same place for hours and bring about heavy rain.



Cumulonimbus clouds form from atmospheric instability where there is warm, moist air near the ground and cold air in the sky above.

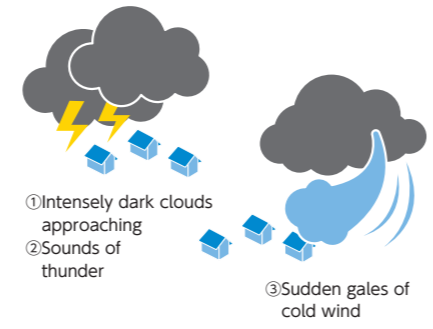
Typhoons

Typhoons are formed by winds blowing in counterclockwise vortices. The half to the east of the center is known as the "dangerous semi-circle" where gales blow violently. When typhoons approach, winds suddenly intensify toward their eastern side, causing an increased risk of abnormally high wave heights.



Torrential Rain

A type of localized heavy rain that falls in a short period of time. As they tend to occur on a small scale and suddenly, without warning, they are said to be difficult to predict. Torrential rain can occur when atmospheric instability causes cumulonimbus clouds to develop. Signs that cumulonimbus clouds are on their way in are as shown below.



Rain Intensity Forecast Terminology & Criteria (Hourly rainfall)

Slightly heavy rain

10-20 mm

Pouring rain that splashes back from the ground and gets feet wet. Loud enough to make regular speech hard to make out. Puddles of water form.



Heavy rain

20-30 mm

A downpour. Even an umbrella won't keep you dry. Hard to see while driving, even with windshield wipers on high.



Intense rain

30-50 mm

Like buckets of rain coming down. Roadways are like rivers. When driving at high speeds, brakes may fail.



Extremely intense rain

50-80 mm

Cascading deluges of rain. Umbrellas rendered completely useless. Sprays of water give surroundings a whitish appearance, impairing visibility. Driving is dangerous.



Violent rain

80+ mm

Induces stifling feelings of oppression and fear.



Wind Force Scale Forecast Terminology & Criteria (Average wind speed)

Moderate gale

10-15 m/s

Walking into the wind is challenging. Umbrellas cannot be opened. Whole trees and power lines begin to sway. When driving at high speed, feels as if being blown by a crosswind.



Gale

15-20 m/s

Walking into the wind becomes impossible, and some people are even knocked down. Working in elevated locations is extremely dangerous. Signboards and galvanized sheet iron start to be blown loose.



Storm

20-25 m/s

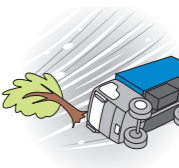
It is no longer possible to stand upright without holding on to something. Risk of injury from objects blown through the air. Driving at ordinary speeds is difficult. Roof tiles may be dispersed in the wind.



Storm

25-30 m/s

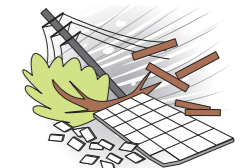
Outdoor activity is extremely dangerous. Trucks in motion may be toppled. Slender tree trunks snap, and trees not firmly rooted are blown down.



Violent storm

30+ m/s

Many trees are blown down. Utility poles, streetlights, and concrete-block walls may be knocked down. Houses and buildings may collapse.



Types of Storm & Flood Damage

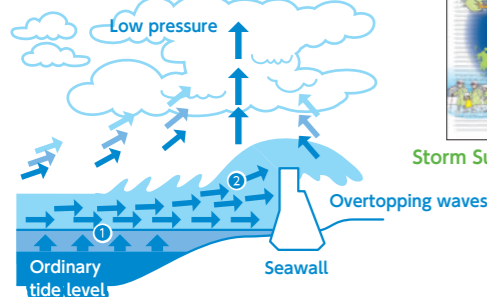
Phenomena like stationary fronts and approaching typhoons can cause a range of different disasters. It is important to correctly understand the risks of disaster near your home and check that you are prepared on a regular basis.

Typhoon

Weather front

Mechanisms of Storm Surge Occurrence

The approach of a typhoon or low-pressure system can cause tide levels to surge to abnormal heights. This has two primary causes: (1) an upward suctioning effect on the sea surface produced by the drop in atmospheric pressure, and (2) seawater being driven in toward shore by gales of wind. If seawall embankments have water surge over them into inland areas, it can cause damage.



Storm Surge Hazard Map



Floods (Stormwater Flooding) (See pp.6-7)

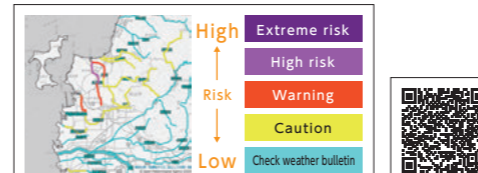
Check the KIKIKURU Real-Time Inundation Risk Map! *



Storm Surge

Floods (River Flooding) (See pp.6-7)

Check the KIKIKURU Real-Time Flood Risk Map! *



Sediment Disasters (Landslides) (See pp.8-9)

Check the KIKIKURU Real-Time Landslide Risk Map! *



Reservoir Collapse

* KIKIKURU provides distribution maps indicating risks from rain-induced sediment disasters, inundation, and flood damage, color-coded to represent 5 levels of risk, with updated information provided every 10 minutes. It is available on the JMA website.

Be Prepared for Floods

In recent years, localized torrential rain events have been occurring frequently and causing water damage throughout Japan. It is vital to be prepared for water damage from river and stormwater flooding, etc. in Matsuyama as well.

Causes of Floods

River Flooding

Heavy rain causes the volume of water in rivers to swell and can cause them to overflow when embankments collapse or are exceeded by water levels. With the massive quantities of water that can flow out and suddenly cover vast areas, such flooding can inflict tremendous damage, inundating, destroying, or washing away houses, submerging farmland, injuring people, etc.

Stormwater Flooding

Heavy rain that falls in a short period of time can exceed the drainage capacities of waterways and sewage systems, causing backed up rainwater to overflow onto the ground. When rivers' water levels swell and the excess water cannot be drained off, they can also reverse their flow and cause water to overflow from waterways, etc. When rainwater pools on the ground due to such causes, damage can occur, such as inundation of houses, etc.

Caution!

Standard Rainfall Capacity: 40 mm/hr

Metropolitan drainage systems are designed to handle up to about 40 mm of rainfall per hour. Above this level there is a risk of stormwater flooding, as they may not be able to keep up.

Check Water Level Information

(Hazardous water levels & evacuation warning water levels for rivers in Matsuyama City)

	Shigenobu-gawa River	Ishite-gawa River	Ono-gawa River	Tateiwa-gawa River
Hazardous Water Level (Alert Level 4 eq.)	5.1m	6.1m	2.8m	2.4m
Evacuation Warning Water Level (Alert Level 3 eq.)	4.6m	5.5m	2.5m	2.1m
Advisory Water Level (Alert Level 2 eq.)	3.0m	4.9m	2.3m	1.8m
Criteria for Flood Fighting Standby	2.0m	4.0m	1.4m	1.5m
Ordinary water level				

Check River Conditions Online!

Swollen rivers are dangerous. Keep your distance! Visit the River Water Level Information website to review the latest water level information, images from river monitoring cameras, etc. <http://k.river.go.jp/>



River Water Level Information



Check!

Review the Hazard Map!

Matsuyama City has produced a Flood Hazard Map and Stormwater Hazard Map. Be sure to review them for details on risks of river & stormwater flooding.



Flood Hazard Map
Includes details such as the expected inundation zone, inundation depth, duration of inundation, etc. during an occurrence of river flooding, assuming a rainfall event of the largest scale



Stormwater Hazard Map
Includes details such as zones with a potential for inundation during heavy rain events, expected inundation depths, etc.



Guide to Inundation Depth Levels

Under 0.5 m inundation

- Below-floor levels of inundation
- Water levels generally below adults' knees
- Water that comes above the knee is dangerous to wade through



0.5–3.0 m Inundation

- Inundation may come up to the below-floor level of a 2nd floor
- Inundation of ground floors
- Water with strong currents is dangerous to walk through



3.0–5.0 m Inundation

- Inundation may reach 2nd-floor roofs
- If water currents are strong, wooden houses risk collapsing or being swept away



Over 5.0 m Inundation

- Inundation beyond 2nd-floor roofs
- If water currents are strong, wooden houses risk collapsing or being swept away



Key Points for Evacuation!

Water that Comes Above the Knee is Hard to Walk Through

Even if water currents are weak, walking on submerged roadways is hazardous. If water comes above the knee, it will be difficult to walk through. A depth of about 50 cm is the limit for wading through water.



Use a Rope to Keep Children Connected

Be sure to use rope to keep children connected to adults, just to be safe.



Be Careful of Underfoot Ditches & Gutters

Flood waters tend to be murky, so the ground surface may not be visible. Use a long walking stick to probe ahead and try to walk in the middle of the roadway as much as possible.



Keep Children & Elderly People Safe

Carry small children and elderly people who may have trouble walking on their own on your back to help everyone evacuate safely.



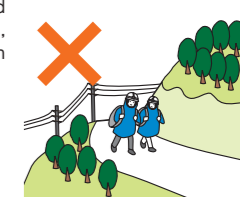
Keep Your Distance from Rivers & Waterways

Avoid walking near rivers, waterways, and submerged rice fields as you evacuate. Try to take an evacuation route familiar to you that you have decided on in advance.



Avoid Dangerous Places like Cliffs

Be careful to avoid walking near cliffs, and never approach dangling power lines.



River Flooding

Based on the water level, etc., information on Flooding (Alert Level 5 eq.), etc. may be announced

Stormwater Flooding

Waterways, sewage systems, have their capacities exceeded and are unable to drain excess water into rivers.

Manhole Covers

On submerged roadways, you may not be able to tell where there are gutters, waterways, or manholes missing covers.

Waterway

Basements

When water flows in, belowground locations can be inundated in a flash, and water pressure from even a little water can keep doors from opening. During heavy rain, come up above ground immediately.



Don't go out to check the rice fields!

Evacuate the Area

As a general rule, evacuate on foot.



Evacuating by Car is Dangerous

The engines of many cars will stop at depths of over 30 cm. Getting trapped inside the car is a risk as well.

Consider Multiple Evacuation Options

Don't get stuck on the idea of staying at an evacuation shelter. Consider evacuating to a safe relative's or friend's home as well.

Vertical Evacuation

If you are able to evacuate to a location higher than the expected inundation depth, move to the upper floor of your home.

In an Emergency, Seek Safe Shelter Indoors!

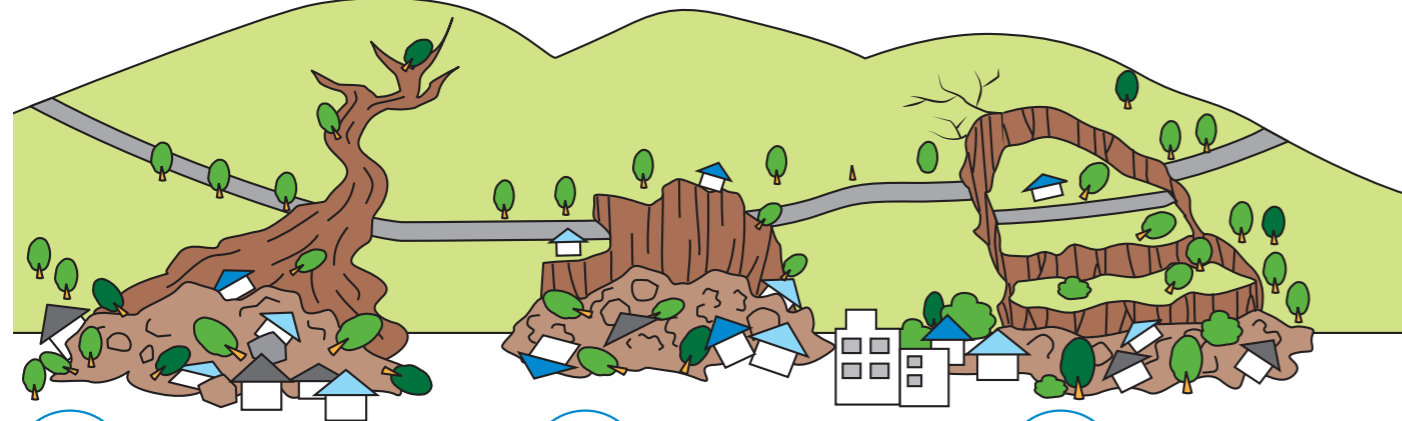
If unable to evacuate the area in time, move to an indoor location that offers even a relative degree of safety.

Be Prepared for Sediment Disasters (Landslides, etc.)

Landslides and other sediment disasters caused by typhoons, heavy rain, earthquakes, etc. are terrifying natural phenomena that are difficult to predict and can cause considerable loss of life or property in the blink of an eye. It is crucial to check on a regular basis to make sure you are prepared mentally and logistically.

Sediment Disaster Types & Precursors

There are three types of sediment disasters. Familiarize yourself with the precursors to each of them, and if you recognize any, notify those nearby you and evacuate without delay.



Debris Flow Earth & rocks come pouring down a ravine

A phenomenon whereby earth, sand, stones, etc. that have accumulated on a mountainside or in a valley/ravine suddenly come rushing down together with heavy rainfall. Expanding in size with a snowball effect as they scrape away ground layers of mountain slopes, riverbeds, etc. along the way, the flows can wipe out houses, fields, roads, etc., traveling at speeds of 20 to 40 km/h. With their considerable destructive force, the potential for damage is tremendous.

Precursors

- Muddy-looking river water with tree/wood debris mixed in
- Falling water level in rivers despite ongoing rain
- Sound of mountain rumbling
- Sounds of trees splitting & rocks/boulders clacking together
- Smell of decaying soil

Slope Failure Part of a slope or cliff comes crashing down

A phenomenon whereby rainwater, earthquakes, etc. loosen portions of a mountain slope or steep precipice close to the surface, leading to sudden collapse. Slope failures can crush houses, roads, etc. below, causing disasters, and they occur in considerable numbers. As they take place so suddenly, failing to evacuate in time can be fatal.

Precursors

- Scattered falling of little rocks/pebbles
- Water issuing from a cliffside
- Cracking or deformation seen in sloped ground
- Cessation of groundwater/springwater flow
- Sound of tree roots snapping

Landslide A whole slope gradually gives way

A phenomenon whereby the effects of groundwater and gravity cause all or part of a slope to slowly give way and come sliding downward. The huge amount of soil displacement can cause extensive and considerable damage, causing houses on the slope to collapse, trees on it to fall, farmland to be damaged, etc.

Precursors

- Cracks/fissures in the ground
- Water issuing from sloped ground
- Muddy-looking streams or well water
- Sound of mountain rumbling
- Sounds of trees splitting & rocks/boulders clacking together

Key Points for Evacuation!

First & Foremost: Evacuate the Area

The basic rule in evacuating from sediment disasters is to evacuate the area and head to a safe location, such as the home of a relative or friend, a designated evacuation shelter, etc. Consider multiple evacuation options.



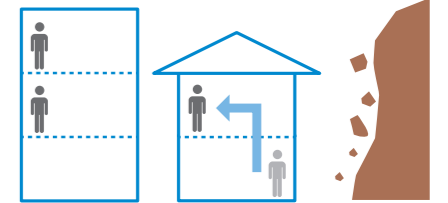
Run Away Perpendicular to the Flow

Debris flows come rushing down at such a fast pace that you must run away at a right angle to the direction of their flow. Also, if you are next to a cliff, make sure you run away a distance of at least twice its height.



Seek Shelter Indoors, Upstairs, Away from the Cliff

When conditions make it dangerous to be outside due to extremely intense rainfall, lack of visibility at night, etc., seek safe shelter indoors in a building at least 2 floors high, on the side away from the cliff.

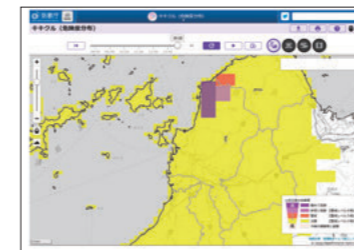


Landslide Alert Information

Landslide Alert Information is information on sediment disasters that is announced by Ehime Prefecture in cooperation with the Matsuyama Local Meteorological Observatory when there is considered to be a potentially life-threatening risk of sediment disasters that could occur at any time following the announcement of a Heavy Rain Warning. Detailed views of areas at increased risk of sediment disasters can be found on the KIKIKURU Real-Time Landslide Risk Map.

Scope Individual town/city level

Risk Alert Level 4 eq.



KIKIKURU Real-Time Landslide Risk Map

Check!

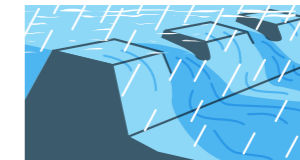
Review the Reservoir Hazard Map!

The collapse of reservoir embankments due to heavy rain, earthquakes, etc. can cause damage to downstream areas. Matsuyama City has produced a Reservoir Hazard Map that can be viewed on the Matsuyama City website indicating expected inundation zones for 517 reservoir locations. Be sure to check the details of risks from reservoir flooding.



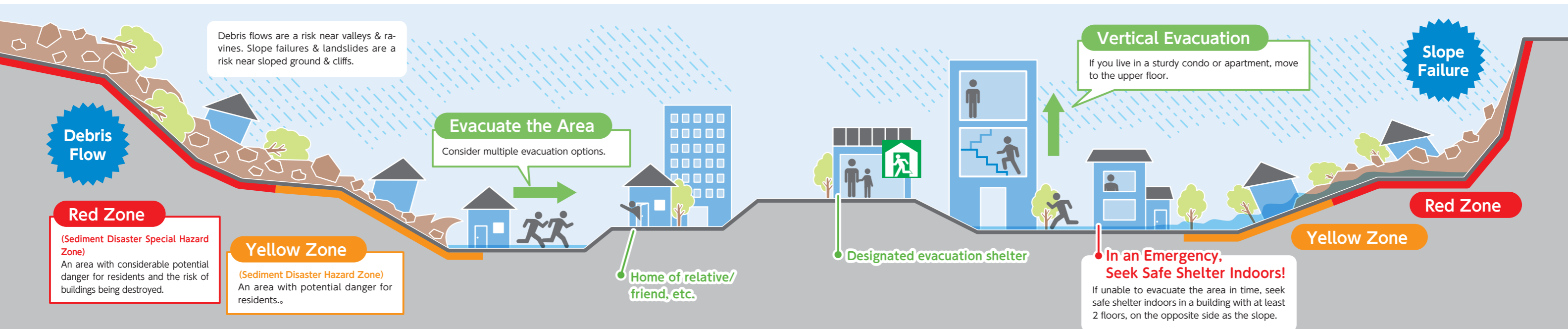
In the Event of Heavy Rain:

The water level in reservoirs may swell and overflow the embankments, causing the embankments to erode or collapse.



In the Event of Earthquakes:

Shaking from earthquakes can cause cracks or fissures in embankments, which may cause the embankments to collapse due to ground liquefaction.

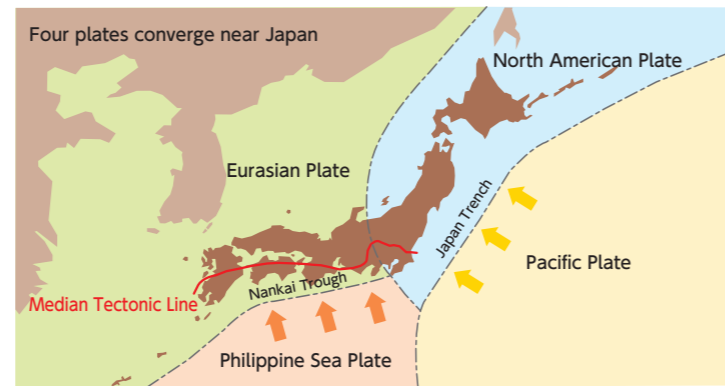


Earthquake Fundamentals

A Nankai Trough megaquake occurrence is feared. Equipping yourself with basic knowledge about earthquakes is a good first step.

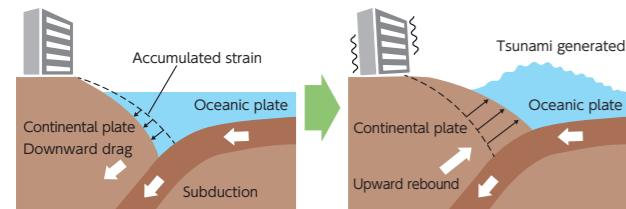
Japan: Land of Earthquakes

Due to its location near the convergence of four tectonic plates, the area around Japan is particularly prone to earthquakes, more than almost anywhere in the world. Earthquakes can be separated into two main types. Trench-type (or subduction-zone) earthquakes occur when the tip of a continental plate is dragged downward by an oceanic plate, causing strain to accumulate in it. When the continental plate can no longer withstand the strain, it rebounds upward toward its original position, generating an earthquake. Near-field inland earthquakes are caused by active fault slips that occur when plates are unable to withstand the combined strain of forces within them that may press them together or pull them in opposite directions.



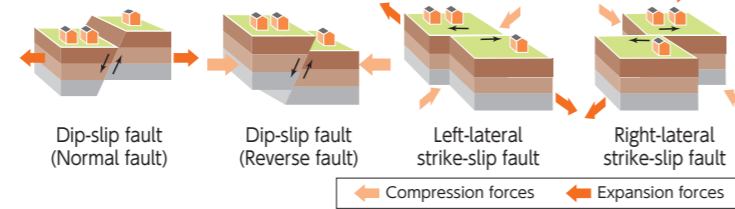
Trench-Type (Plate-Boundary) Earthquakes

Magnitudes tend to be large. Examples: 1923 Great Kantō Earthquake, 1968 Tokachi-Oki Earthquake, 2011 Great East Japan Earthquake.



Inland Earthquakes

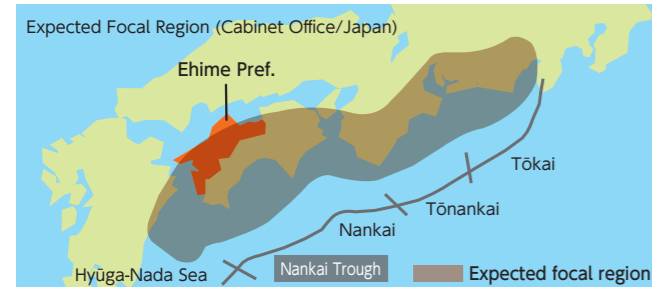
When epicenters are shallow, damage tends to be huge. Examples: 2011 Great Hanshin-Awaji Earthquake, 2001 Geiyo Earthquake.



(Ref.: Japan Govt./Headquarters for Earthquake Research Promotion website)

Nankai Trough Megaquake

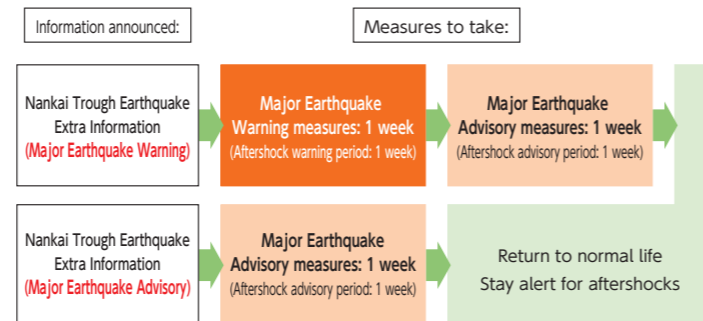
The Nankai Trough is located along the boundary where the Philippine Sea Plate is being subducted at a rate of several centimeters per year beneath the Eurasian Plate, the continental plate on top of which part of the Japanese archipelago is situated. Megathrust earthquakes occur here at intervals of about 100 to 200 years to release the strain caused to accumulate along the boundary of the plates by this subduction. There is apprehension now about when the next might occur, as over 70 years have now passed since the last, which was the 1946 Nankai Earthquake. The level of damage is expected to exceed that of the 2011 Great East Japan Earthquake.



Probability of occurrence **within 30 years: 70~80%**

Nankai Trough Earthquake Extra Information

The Japan Meteorological Agency (JMA) makes announcements of Nankai Trough Earthquake Extra Information when it has been assessed that there is a relatively high risk of a Nankai Trough earthquake. Such announcements will be made in conjunction with key phrases corresponding to the threat level (Major Earthquake Warning, Major Earthquake Advisory, etc.) In such an event, we should all try to heed the city's call for appropriate disaster prevention measures to be taken.



Feature Column: The Difference Between Magnitude & Seismic Intensity

Magnitude (M) represents the scale of seismic energy released by earthquakes, while seismic intensity (shindo) expresses the intensity of localized shaking at the ground surface. Seismic intensity can be high even though magnitude is small due to factors such as a shallow epicenter depth or close proximity. Conversely, it can also be low even though the magnitude is high if the epicenter is deep, far away, etc.

1.0 increase in magnitude = Approx. 32-fold increase in seismic energy



If a Nankai Trough megaquake occurs...

Max. magnitude **M9.0**

Max. seismic intensity **7**

Damage Projections for Matsuyama

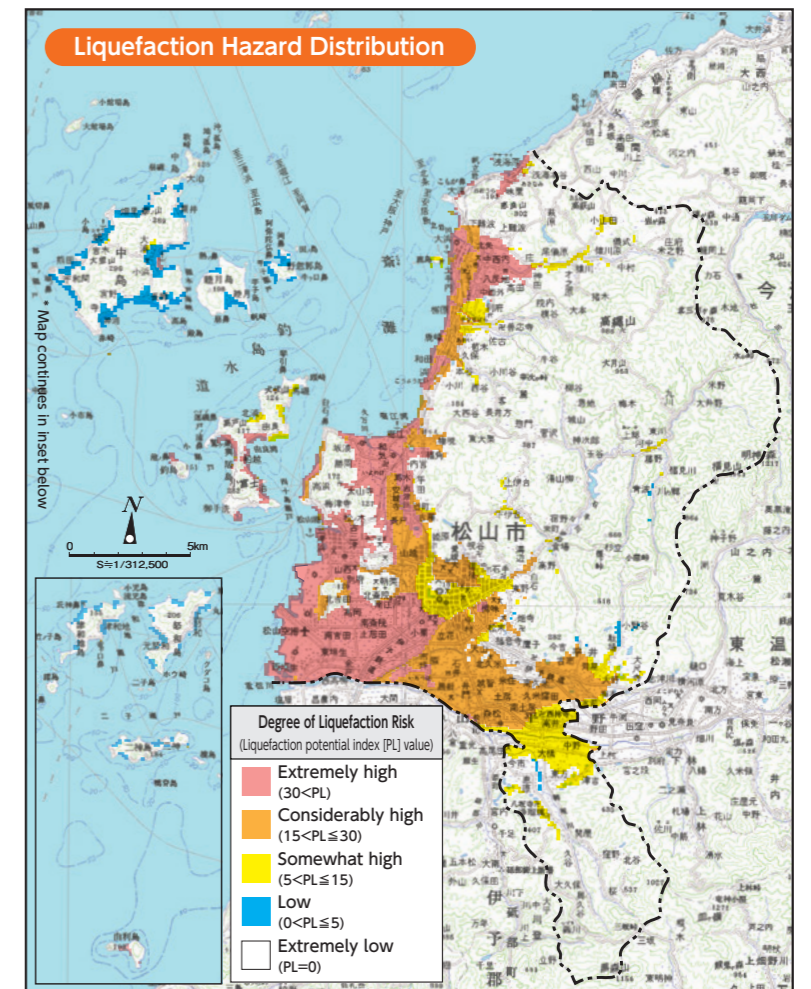
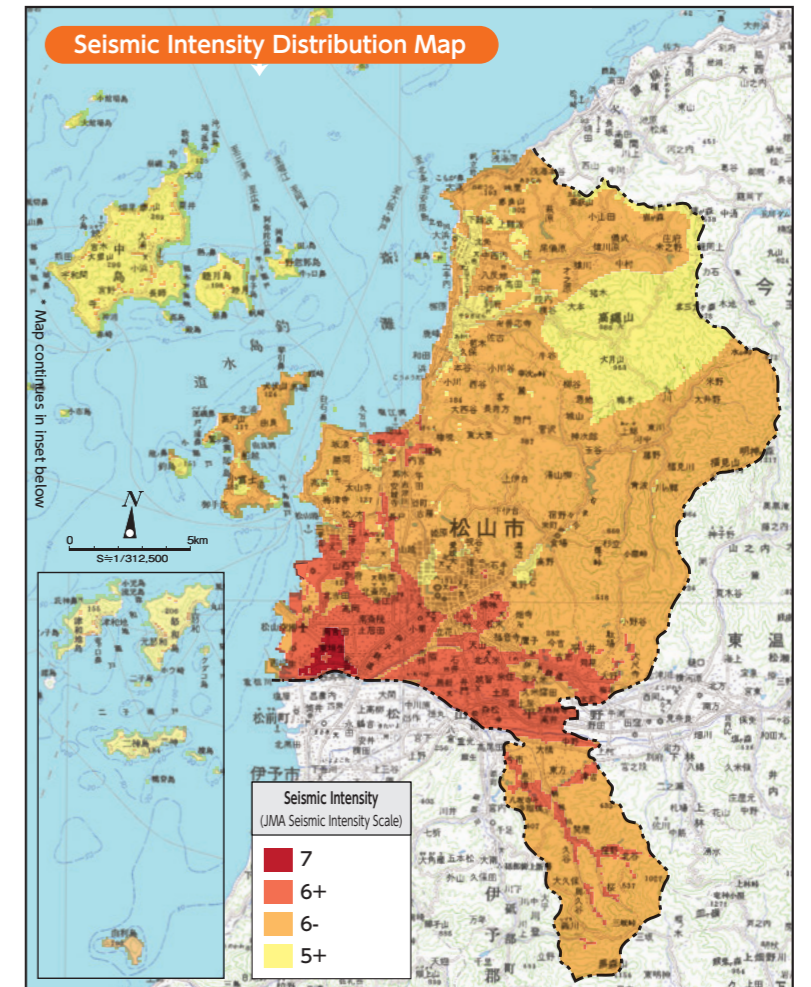
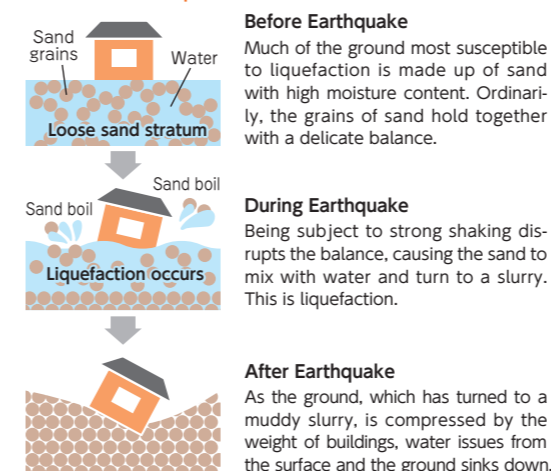
Harm to People	Fatalities	715
	Injuries	5,707
Damage to Buildings	Completely destroyed	35,759
	Partially destroyed	25,974
Evacuees	After 1 day	89,002
	After 1 week	85,628
	After 1 month	60,518
Damage to Lifeline Utilities	Water supply (People with water outages)	288,134
	Sewage system (People affected)	174,982
	Electrical power (Houses with power outages)	198,243
	City gas supply (Households affected)	49,900

Source: Ehime Prefecture Earthquake Damage Projection Survey, Dec. 2013
 "Scale of earthquake: M9.0; Scenario for projections: late at night in winter for Harm to People, 6pm in winter for other categories; Wind speed: gale force"

Beware of Liquefaction

Liquefaction is a phenomenon whereby shaking causes sediments with high groundwater levels, such as sandy soils and old river channels, to turn to a liquid-like state. This can cause buildings to lean at an angle or topple over, can damage water pipes buried underground, and can cause manholes to be pushed above ground. Be careful near areas of sandy soil or reclaimed land along the coast and along the former river channels of the Shigenobu-gawa and Ishite-gawa Rivers.

Mechanisms of Liquefaction



Source: Results of 2013 Ehime Prefecture Earthquake Damage Projection Survey (Initial Report)

Be Prepared for Earthquakes

Earthquakes strike all of a sudden. In order to protect your life during an earthquake, make a regular habit of considering approaches to protecting yourself and safely evacuating when the critical time comes.

Actions to Protect Yourself During a Quake



Follow these 3 simple steps!

- 1 **DROP!**
Crouch down low to the ground
- 2 **COVER!**
Keep your head & body protected
- 3 **HOLD ON!**
Stay put until the shaking subsides

(When you don't have a desk)
Crouch down & protect your head with a cushion or book.



Act to protect your life in a spot where you won't be in danger of objects falling on you, furniture toppling over, etc.

Actions to Take When the Shaking Subsides

● Leave Nothing Lit

Turn off and extinguish all cooking appliances, heaters, etc. If anything has caught fire, stay calm and make sure to extinguish the flames.



● Secure an Exit

Open a door, window or entryway to secure an evacuation route.



Immediate Actions to Take in Different Settings

Living Room/Kitchen

Beware of furniture toppling, glass shattering, tableware getting flung in the air, etc. Open a door to secure an evacuation route.



Office

Protect your head with something like a briefcase and get under your desk. Beware of office equipment toppling over.



Underground Shopping Center

Protect your head and check for an emergency exit. Emergency lighting should come on, so try to stay calm as you act.



Supermarket, etc.

Protect your head with a shopping basket or hand-carried bag. Distance yourself from shelves, get up against a wall, and follow store clerks' instructions.



Coastal Area

Evacuate to high ground, as there may be a tsunami risk. Keep your distance from rivers as well.



Mountainous Area

Stay away from cliffs and mountain slopes, as the ground may loosen and cause a landslide. Keep your distance from streams and valleys/ravines as well.





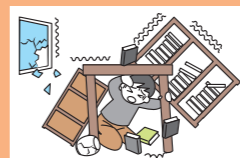


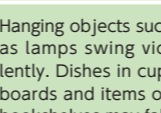
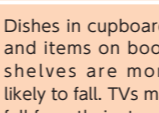
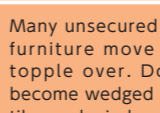
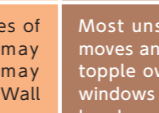
Evacuate Immediately in These Circumstances

- Your house is at risk of collapse.
- Your area is at risk of gas leaks or fire outbreaks.
- There could be a tsunami coming.
- The city has announced evacuation information, etc.



Shaking from Earthquakes

* Produced based on Tables Explaining the JMA Seismic Intensity Scale

Seismic Intensity	5 Lower	5 Upper	6 Lower	6 Upper	7
Human Perceptions & Reactions	Many people are frightened and feel the need to hold on to something stable. 	Many people find it hard to move; walking is difficult without holding on to something stable. 	It is difficult to remain standing. 	It is impossible to remain standing or move without crawling. People may be thrown through the air. 	Expected intensity of Nankai Trough Megaquake 
Indoor & Outdoor Situations	Hanging objects such as lamps swing violently. Dishes in cupboards and items on bookshelves may fall. Many unstable ornaments fall. Unsecured furniture may move. 	Dishes in cupboards and items on bookshelves are more likely to fall. TVs may fall from their stands, unsecured furniture may topple over, and windows may break and fall. 	Many unsecured pieces of furniture move and may topple over. Doors may become wedged shut. Wall tiles and windows may sustain damage and fall. 	Most unsecured furniture moves and is more likely to topple over. Wall tiles and windows are more likely to break and fall. Most unreinforced concrete-block walls collapse. 	Most unsecured furniture moves and topples over, or may even be thrown through the air. Wall tiles and windows are even more likely to break and fall. Reinforced concrete-block walls may collapse.

Evacuation No-Gos!

Driving Your Car is Out!

When an earthquake has occurred, damaged roadways, intermittent traffic signals, etc. make driving difficult. Traffic jams can obstruct emergency vehicles, so in general, try to evacuate on foot.



Taking the Elevator is Out!

Even if elevators are still functioning, aftershocks, power outages, etc. may occur, so take the stairs to evacuate, even if the shaking has subsided.



Extinguish Fires Right Away!

It is crucial that fires get put out while they are still small. Initial-attack fire extinguishment is only an option until flames reach the ceiling.



To use a fire extinguisher, pull out the safety ring at the top, point the nozzle at the end of the hose at the source of the fire, and squeeze the lever to spray fire retardant. Fire extinguishers generally have a range of about 3-5 m and a discharge time of 10-15 seconds. Take aim and give the lever a squeeze.

Feature Column Beware of Misinformation!

When disasters occur, false rumors and other misinformation often spreads through social media. Beware of sensational or fear-inspiring claims, or hearsay about supposed occurrences. False information can increase disaster victims' anxiety and hinder relief efforts. Misinformation can also end up getting spread by people with good intentions. Be sure to check whether information has been posted by a reliable source or not.

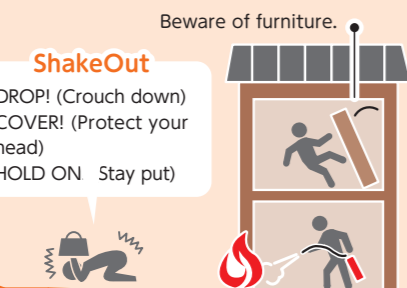


EARTHQUAKE OCCURS
It's a quake!
Protect yourself!

Earthquake Early Warning (EEW)

A warning system that provides advance announcement of powerful shaking via television, emergency broadcast systems, mobile phones, etc. from several seconds to a minute or more before the shaking is expected to start. If you receive one, take necessary actions to protect yourself.

ShakeOut
DROP! (Crouch down)
COVER! (Protect your head)
HOLD ON! Stay put!



Beware of fires!

Wooden house

Beware of furniture.
Beware of office equipment toppling over.

Condo/Apt. building, etc.

Elevators can potentially trap you inside. Push buttons for all floors & exit wherever you can. If stuck inside, press the emergency button.

~1 min.

Beware of collapsing concrete-block walls & falling objects like roof tiles, shards of glass, etc.

Outside

Beware of vending machines, too!

Lifeline Utility Outages



Never touch snapped power lines!

Pull your car to the left side of the road, leave the keys in & evacuate.



Beware of collapsed buildings & fires.

Beware of liquefaction & sediment disasters around unstable ground.

~10 mins.

In-Home Evacuation
Upper floors are safer than ground floors

Wooden house/Condo, etc.

~3 days

Beware of aftershocks!

Shut down the circuit breaker & turn off gas at the mains before leaving your home to evacuate.

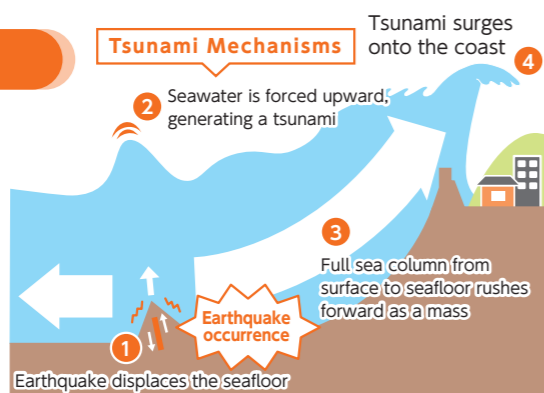
Evacuation shelter

Be Prepared for Tsunamis

In the event of a Nankai Trough megaquake, a tsunami could be expected to reach the shores of Matsuyama City. Be sure to familiarize yourself with the characteristics of tsunamis and key points regarding evacuation.

What's a Tsunami?

A tsunami can be formed when an earthquake occurs beneath the floor of the sea and thrusts the seafloor upward or causes it to subside, generating a huge wave surge with the displacement of the seawater above. Picture a whole expanse of the sea's surface swelling to form a massive, sheer wall of water that rushes in with ferocious speed and force.



Projections for Nankai Trough Megaquake

- Maximum Tsunami Water Level (at Yura-machi)

3.9 m (T.P.)
T.P. ... (Tokyo Peil) Mean sea level of Tokyo Bay, the standard reference (0 m) for elevation in Japan

- Arrival Time

1 m wave height **1 hr 55 mins**
2 m wave height **3 hr 18 mins**

Tsunami Warnings/Advisories & Actions to Take

	Expected tsunami height	Action to take	
			Qualitative expression
Major Tsunami Warning	Huge	over 10 m (10 m < Height)	Evacuate from coastal or river areas immediately to safer places such as high ground or a tsunami evacuation building.
		10 m (5 m < Height ≤ 10 m)	
		5 m (3 m < Height ≤ 5 m)	
Tsunami Warning	High	3 m (1 m < Height ≤ 3 m)	
Tsunami Advisory	—	1 m (20 cm ≤ Height ≤ 1 m)	Get out of the water and leave coastal areas immediately.

After the occurrence of a massive earthquake in the magnitude M8.0 class or greater, JMA will issue an initial tsunami warning expressing estimated maximum tsunami heights in concise qualitative terms such as "Huge" and "High" to announce a state of emergency.

5 Key Points of Tsunami Evacuation



- Point 1** If you feel strong shaking (or even light but prolonged shaking) near the sea, hurry to get away from the shore.
- Point 2** Even if you don't feel shaking but a tsunami warning has been announced, hurry to get away from the shore.
- Point 3** Seek refuge somewhere higher, not farther away.
- Point 4** Evacuate as far as possible from the seacoast or rivers.
- Point 5** Tsunamis can continue for a long time, so continue to evacuate until the tsunami warning or advisory has been lifted.

Be sure to check for evacuation information & evacuation shelter establishment information announced by the city as well.

Learn the Characteristics of Tsunamis & Be Alert

Life-Threatening Even at 20 cm

Even at depths of 20 to 30 cm, the force of a tsunami can sweep you off your feet and prevent you from standing upright. At a depth of 1 m, almost all people are killed.



Tremendous Power

At depths of 1 to 2 m, houses risk being completely destroyed or swept away. As they pick up debris and other drifting objects, the power of tsunamis increases even more, and they may even destroy seawall embankments, etc.



Ferocious Speed

Tsunamis surge in at an incredibly fast pace. In the open ocean, a tsunami can move at the speed of a jet plane; closer to shore, like a speeding car. If you wait until you catch sight of one to make your escape, you probably won't get away in time.



Incredibly Destructive when Receding

The drawback of a tsunami gradually picks up speed as it recedes, making it even more destructive than the leading wave surge. There's a risk of getting swept up in the drawback and getting carried out to sea, too.



Tsunamis Surge Upstream Rivers, etc.

When a tsunami reaches shore, it may surge into rivers and waterways, driving water upstream. The reverse flow may cause embankments to collapse and can even bring the threat of tsunamis to inland areas.



Tsunamis Occur in Series

Tsunamis often come in multiple surges, one after another, and the initial surge is not always the most intense. Sometimes a second or third tsunami striking many hours later can be even more powerful.



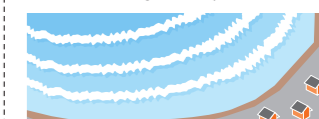
They Vary Depending on Topography

Tsunami height can vary depending on the form of coastal terrain. Tsunami energy tends to concentrate at places like V-shaped inlets and tips of capes, causing a localized increase in wave height.



Don't Let Your Guard Down Early

Tsunami surges can occur over the course of many hours. They may even last for several days after the occurrence of an earthquake, so be sure to stay on guard and wait for the Tsunami Warning/Advisory to be lifted.



How Do Tsunamis Differ from Ordinary Waves?

Tsunami

- Earthquake-generated
- Long wavelengths of several km to several hundred km

A tsunami forms a massive wall of water with the full sea column from the seafloor to the surface moving together, destroying everything in its path as it surges onto land.

Waves

- Wind-generated
- Short wavelengths of several m to several hundred m

With ordinary waves, only seawater near the surface is driven forward. This means that even with the same height as a tsunami, the force of each individual wave will break onshore with relatively little force. Relatively little water washes over seawall.

If a Nuclear Disaster Occurs

Let's consider the actions to take if a nuclear accident were to occur at the Ikata Nuclear Power Plant with a release of radioactive materials.

- Actions to Take**
- Try to maintain access to accurate information and avoid false rumors & misinformation.
 - If shelter-in-place (indoors evacuation) instructions are announced:
 - When you get home, wash your hands & face, and change clothes
 - Shut all doors & windows
 - Turn off ventilation fans, etc. and prevent outside air from coming in
 - Cover foods with plastic wrap
 - If evacuation instructions are announced:
 - Shut down the circuit breaker, turn off gas at the mains, lock windows & doors, and cooperate with others in your neighborhood to help each other evacuate. Wear a hat, mask, gloves, comfortable shoes that are easy to walk in, long sleeves, and long pants.

* Matsuyama City falls outside the Urgent Protective Action Planning Zone (UPZ), as it is located over 30 km from the Ikata Nuclear Power Plant.

TSUNAMI ARRIVES



Tsunami Hazard

Symbol indicating tsunami danger in the area.

Evacuate to High Ground

Tsunamis wash up shore over the land, so hurrying to higher ground is an absolute must.

If you can't get away in time... Evacuate to the highest place possible, such as a tall, sturdy building

Wooden houses are out

Designated emergency evacuation site on high ground

Evacuation shelter, etc.

Buildings Appropriate for Tsunami Evacuation

- Conform to new seismic standards
- Steel-reinforced concrete construction
- At least 3 floors high

Guide to Inundation Depth Levels

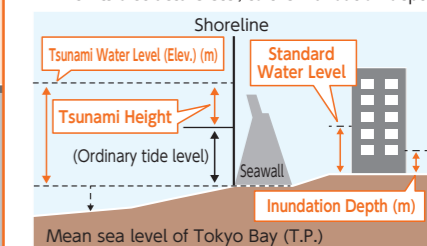
Even at a depth of 30 cm, getting caught in a tsunami can sweep you off your feet and keep you from moving.

- 10 m Buildings of about 3 floors are entirely submerged
- 5 m Buildings of about 2 floors are submerged
- 3 m Almost all wooden houses are completely destroyed
- 2 m About half of wooden houses are completely destroyed
- 1 m Most people caught in the tsunami die
- 0.3 m Evacuation is no longer feasible

Even with an inundation level of 0.5 m, direct hits from objects drifting in the waves can cause damage. Tsunamis have tremendous destructive force, as they may also pick up various forms of wreckage with them as they surge upshore over the land, including demolished buildings and cars, grounded ships and boats, etc.

Tsunami Terminology

- Tsunami Height (Wave Height)** ... The height of a tsunami measured from ordinary sea level
 - * Heights estimated by JMA
- Tsunami Water Level** ... The water level of a tsunami approx. 30 m offshore
 - * Expressed as elevation
- Inundation Depth** ... The height measured from the ground to the water surface during inundation
- Standard Water Level** ... A reference water level determined by adding the increase in water level of a tsunami when it hits a structure etc., to the inundation depth



As a general rule, evacuate on foot. Cars may get stuck in traffic jams and hinder evacuation.

