

Special Issue

# Fukuroi City Flood Hazard Maps Guidebook



March 2019



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**For inquiries about the Fukuroi City Flood Hazard Map**

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TEL: 0538-44-3166 (Flood Countermeasures Office) / 0538-44-3130 (Administration)

Regarding evacuation | Fukuroi City Crisis Management Department, Crisis Management Division

2907 Kunimoto, Fukuroi-shi

TEL: 0538-86-3701

# 1. Flood Risk in Fukuroi City

\*Read this page vertically

Not expected to flood, but...!

## Low-lying areas

There are many rivers in the city. This region is lowland shaped by river floods. Although not expected to flood, there still is danger of inundation.

**This includes valley plains, floodplains, wetlands, deltas, lowland, former river beds, and former river areas colored on the natural topography classification map. (These may differ from the actual disaster area.)**

This map comprehensively displays the inundation area in the event that the Ota River, Haranoya River, Shikiji River, Ugari River, or Saka River overflow, as well as the area in danger of inundation from other rivers and sediment disaster hazard areas.

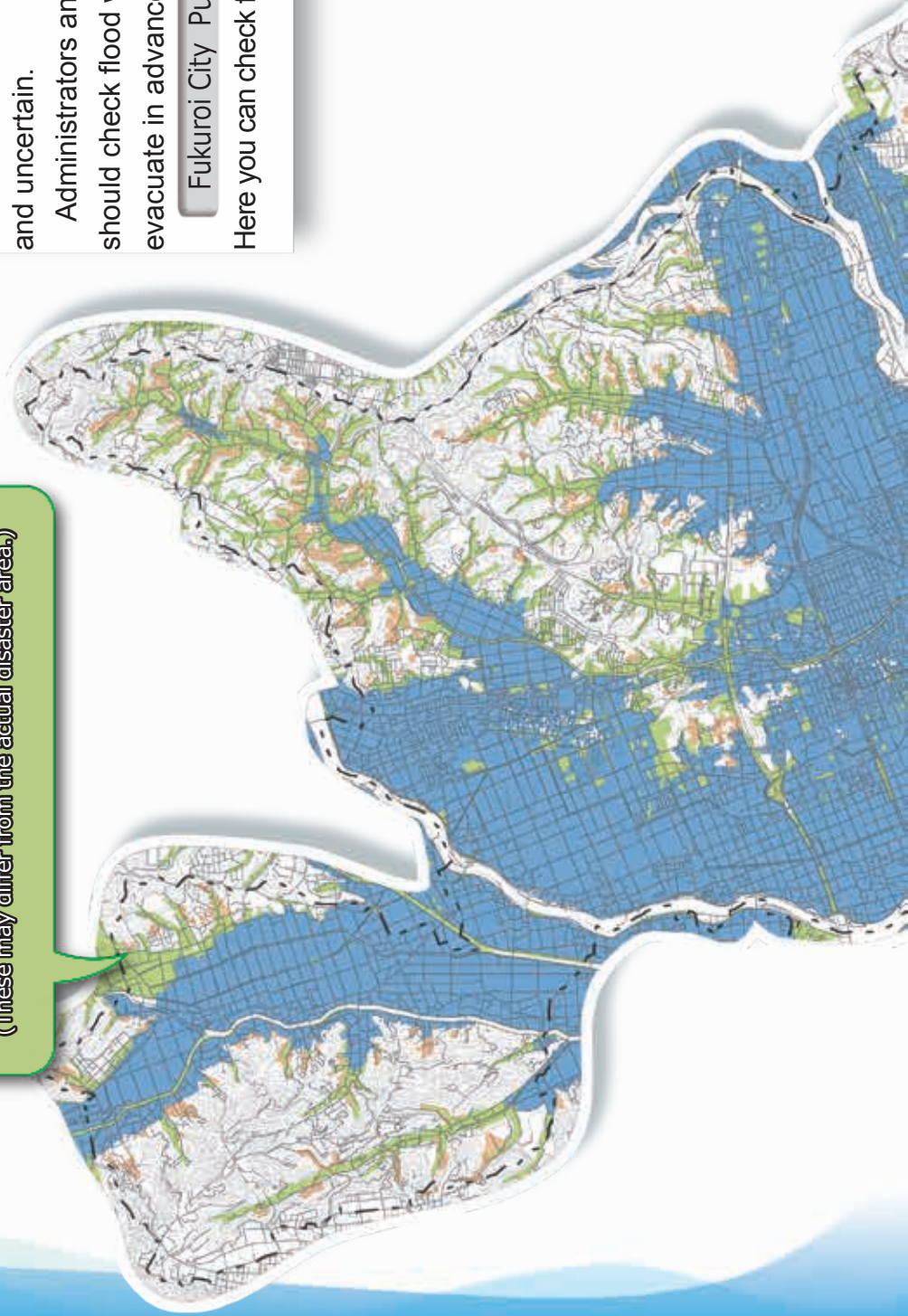
There are many scenarios depending on whether river banks will actually breach during heavy rain, which rivers breach their banks, and when they breach their banks, so future flood disasters are both complex and uncertain.

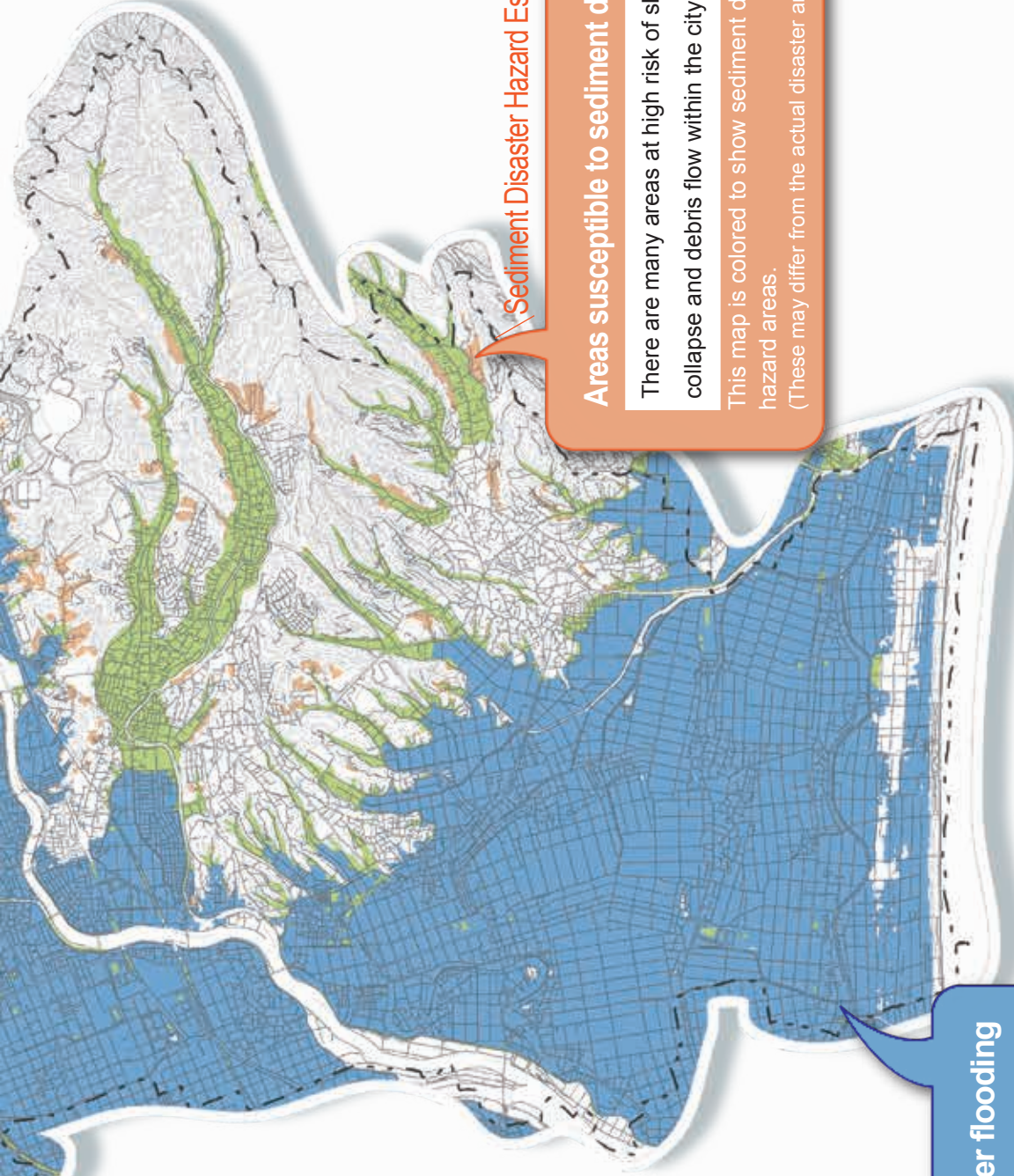
Administrators and users of public welfare facilities should check flood water depth and discuss how to evacuate in advance.

Fukuroi City Public Welfare Facilities

Search

Here you can check facilities and flood water depth.





### Flooding Estimations /

#### Areas susceptible to river flooding

In the event that the Ota River, Haranoya River, Shikiji River, Ugari River, or Saka River overflow, inundation is predicted to reach a depth of 5 meters or more in the deepest areas.

This map is colored to show estimated inundation areas of the Ota River, Haranoya River, Shikiji River, Ugari River, or Saka River. (These may differ from the actual disaster area.)

### Sediment Disaster Hazard Estimations /

#### Areas susceptible to sediment disaster

There are many areas at high risk of slope collapse and debris flow within the city.

This map is colored to show sediment disaster hazard areas. (These may differ from the actual disaster area.)

You can also check this map on your computer.

Fukuoka City Flood Hazard Map

Search

## 2. How to evacuate

### 1 Preparation for Disaster

**Most  
Important**

You are responsible for protecting your own life.  
Do not assume that disasters will not happen to you.  
Be prepared for disasters.

Act with the assumption that  
**“a flood may occur”**

It's often said that “Disasters come when you've just forgotten about them,” but recently rain fall patterns have changed such that you could say “Disasters come before you've forgotten the last one.”

**Envisioning flooding**  
from probable situations and characteristics of the area

At the flood disaster site, one often hears the words “I didn't think the water would come this far.” Possible flood situations that can occur once rain starts to fall vary depending on the characteristics of the area.

Should you evacuate? Should you stay?  
**Put your life first and do your best**

It is important to evacuate to safe shelter before inundation starts, but it can be very dangerous to force your way through flood waters in order to evacuate. Act appropriately according to the situation.



## Take responsibility to protect yourself

In order to eliminate casualties from disasters, it is important to have a basic understanding of the fact that “In an emergency, you must take responsibility to protect yourself.”

## Gather information for yourself

It is important that you get information for yourself quickly. Information is spread through various media, including television, radio, the Internet, and your own neighbors, so try heed the latest information.

## Estimations aren't everything

Each map in this guidebook is created assuming certain conditions and scenarios. Actual flood damage may not be as expected. It is important to understand that flooding is a natural phenomenon, and it can behave unpredictably.

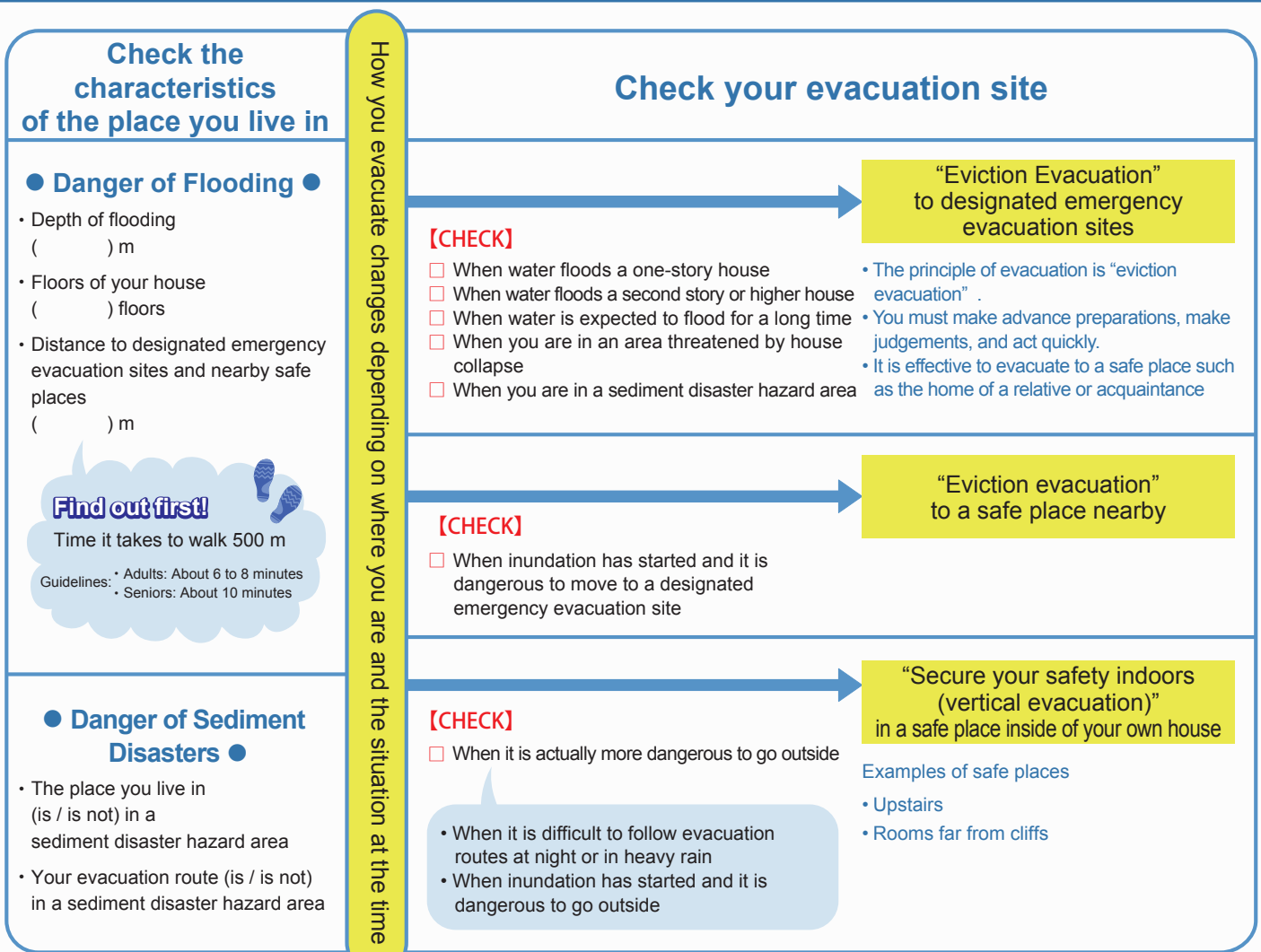
# 2. How to evacuate

## 2 From Evacuation Preparation to Evacuation

 Learn the correct steps for evacuation, so you are ready to make judgments on your own.

The most dangerous judgment you can make is “Surely I will be fine,” “Things are still safe,” or “Nothing serious will happen.” Learn the necessary information for evacuation and how to evacuate correctly, so that you can think and act on your own. In addition to the flood hazard map, make sure to check the sediment disaster hazard, tsunami hazard, and reservoir pond hazard maps.

Advance Preparation: Decide where you will evacuate to



Use this as information to decide when to evacuate!

### Evacuation information published by the city

#### Evacuation Preparation / Starting Evacuation of Seniors Warning Level 3

- **People who need more time to evacuate** ⇒ **Start evacuation.**  
Start evacuating seniors, people with disabilities, infants, and their supporters.
- **Other people** ⇒ **Be prepared to evacuate at any time.**  
Prepare to evacuate, and evacuate early if you think you are in danger based on “disaster preparation weather information” or “water level information” .

\* In a sudden disaster, orders such as evacuation advisory warnings may not come in time. If you feel that you are in danger, start evacuations.





# There are dangers you would not normally notice when there is flooding.



◆ It is dangerous to walk through rapidly flowing flood water, even if the water is shallow.

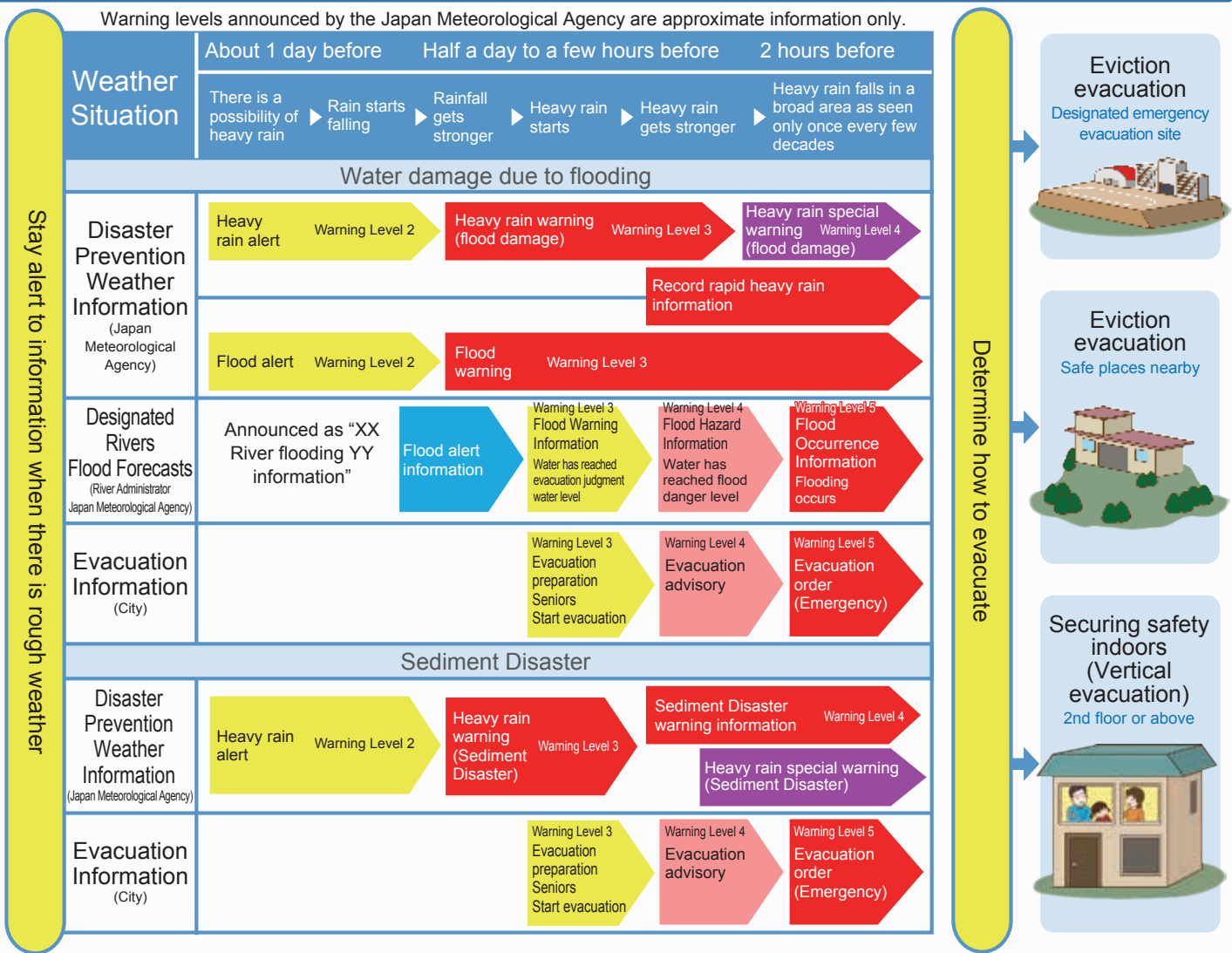


◆ Doors can be kept shut by water pressure even in flood water only a few tens of centimeters deep.



◆ Do not pass over bridge underpasses or other low-lying roads that are often flooded.

## Gather information to make judgments on evacuation ▶▶▶▶▶ Evacuate



**Evacuation Advisory**    **Warning Level 4** (Evacuate to a safe place)    **Evacuation Order (emergency)**    **Warning Level 4** (Evacuate to a safe place)

● **Evacuate immediately to designated emergency evacuation sites.**

If it is dangerous to evacuate to a designated emergency evacuation site, then evacuate to a "safe place nearby" or a "safer place within your house."


● **Evacuate immediately (urgently).**

If it is dangerous to evacuate to a designated emergency evacuation site, then evacuate to a "safe place nearby" or a "safer place within your house."

\* If you live in an area along a river in danger of rapidly rising water levels or a sediment disaster hazard area, evacuate as early as possible.

# 3. Preparation to Evacuate

## 1 Key Points In an Evacuation

 It is important to check in advance where you will escape to. Prepare so that you can evacuate safely and calmly.

### 1 Check safe evacuation routes

Make sure to confirm with your family and community an evacuation destination and route that are safe against inundation before disaster strikes.



### 2 Accurate information gathering and early evacuation

It is dangerous to evacuate from your house after it has been inundated. Stay alert of the latest weather information, disaster information, and evacuation information on the television or radio, and be prepared to evacuate if you feel you are in danger.



### 3 Evacuate with clothes that are easy to move in and emergency gear

In order to prevent accidents during evacuation, wear clothes that are easy to move in and evacuate with your family and neighbors as much as possible. Carry a backpack, keep your hands free, and wear athletic shoes with laces instead of boots.



#### 4 Knowledge of flood water

If the flood waters are strong and rise to knee height or higher, then it may be difficult and dangerous for even adults to walk through. It is important that you decide not to force your way through the waters, but instead secure your safety indoors (vertical evacuation) or evacuate to somewhere nearby. Do not enter flood waters. Escape them if possible. People and even cars can easily be swept away. The most important thing is to not approach flowing water.



#### 5 Precautions when evacuating by car

There are many cases of people losing their lives when evacuating by car, such as getting stuck in an underpass that has flooded or falling into a river from the road that runs along it. Generally, if the water is 30 cm or deeper, then it is difficult to evacuate by car.




#### 6 When inundation has started or evacuation is late

If you determine that you cannot secure enough time to evacuate or it is too difficult to evacuate to the designated emergency evacuation site you had planned on, then evacuate to the second floor or above in a safe building such as your own house (vertical evacuation).



# 3. Preparation to Evacuate

## 2 Advance preparation to evacuate

 **Speak with your family about “evacuation” before a disaster happens. If you wait until it is time to evacuate, then you may not make it out in time.**

Consider where you will evacuate to at an early stage and where you will evacuate to if evacuation starts late, in the event of a sediment disaster or flood disaster.

### 1 Checking danger in your home

Use flood hazard maps to check the danger of inundation or sediment disasters reaching your home (or workplace or school).

### 2 Checking whether you will stay at home

Eviction evacuation will be necessary in areas where early eviction evacuation is necessary (see page 15) or areas where there is danger of sediment disasters.

### 3 Checking your evacuation destination

Check where you will evacuate to at an early stage and where you will evacuate to if evacuation starts too late.

#### Evacuation destinations at an early stage

The best rule is to evacuate to somewhere safe at an early stage.

For example...  
**When?**

- If you hear about the evacuation preparation / starting evacuation of seniors, or an evacuation advisory.
- If it is forecast that a major typhoon or heavy rain is coming
- If it is expected that rain will continue into the night
- If you feel that the signs of inclement weather are different from how they normally are



#### Entry column

When?

Where?

For example...  
**Where?**

- The nearest designated emergency evacuation site that you can walk to
- A safer place even outside the city, such as the home of a relative or friends

#### Evacuation destination when you start evacuation too late

If you start evacuation too late, then protect yourself in the place that you consider safest given the location and the circumstances.

For example...  
**When?**

- If you start evacuation too late
- If there is impending inundation or sediment disaster

For example...  
**Where?**

- The nearest high and sturdy building or high ground
- A high place in your home, in a room far from any slopes
- Anywhere you can run to, even if it is not a designated emergency evacuation site



#### Entry column

When?

Where?

# Preparations to make when evacuating out of your home

## Get emergency gear.

When you evacuate to a designated evacuation site in anticipation of flooding, make certain to bring emergency gear and whatever each individual requires.

A backpack that will keep both hands free is a convenient choice for an emergency evacuation bag. Try carrying the backpack on your shoulders to make sure that it is not too heavy. Make adequate preparations yourself so that you can rest assured.

1. If your emergency gear bag is too heavy, it will hinder your evacuation, so lighten the load if it is too heavy.
2. Prepare dried food, which is relatively light and conveniently edible just by adding water.
3. Prepare one backpack for each person, and keep them distributed in various places where they are easy to pick up and go.

### Things to put in your emergency gear bag (backpack, etc.)

<input type="checkbox"/> Mobile phone charger	<input type="checkbox"/> Portable radio	<input type="checkbox"/> Emergency food (canned bread, etc.) / drinking water	<input type="checkbox"/> Flashlight (with spare batteries)
<input type="checkbox"/> Daily necessities (lighter, knife, can opener, tissue paper, plastic bags, etc.)			
<input type="checkbox"/> Candles (heavy, stable type)	<input type="checkbox"/> Clothing (underwear, outerwear, gloves, socks, handkerchief, towel, etc.)		
<input type="checkbox"/> Emergency medicine (bandages, gauze, dressing, triangular bandages, disinfectant, antipyretic, digestives, cold medicine, analgesic, eye medicine, tweezers, etc.)			

### Items that may be necessary depending on your family members

<input type="checkbox"/> Milk	<input type="checkbox"/> Paper diapers	<input type="checkbox"/> Feminine sanitary products	<input type="checkbox"/> Household medicine (especially anyone who has a chronic illness)
<input type="checkbox"/> Reserve stock for seniors and people with disabilities (nursing care items, etc.)			

### Gear necessary when evacuating


<input type="checkbox"/> Rain gear (rain coat)	<input type="checkbox"/> Gloves	<input type="checkbox"/> Helmet (disaster hood)
<input type="checkbox"/> Fukuroi City Flood Hazard Map Guidebook (this booklet)	<input type="checkbox"/> Valuables (copies of bankbook, health insurance card, licenses, address book, etc.)	

### Things that are convenient to have

<input type="checkbox"/> Blankets/sleeping bags	<input type="checkbox"/> Portable stove	<input type="checkbox"/> Disposable body warmers	<input type="checkbox"/> Disposable chopsticks	<input type="checkbox"/> Sheets to lay on the floor
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# Consider where you will meet and how you will contact family in the event you are separated from them.

A meeting place decided upon with family	Emergency contact info for family, relatives and friends Name : _____ Memo TEL # : _____ Name : _____ Memo TEL # : _____
Means of contact decided upon with family	Name : _____ Memo TEL # : _____ Name : _____ Memo TEL # : _____



# 4. How to read a flood hazard map

## 1 How flood hazard maps are made

 The following is an explanation of the conditions and methods for making flood hazard maps.

### ① Target rainfall of the flood hazard

The “Fukuroi Flood Hazard Map” is made based on the results of simulating flood situations in the estimated maximum rainfall\* assumed in the Ota River basin (flood estimated inundation area created by the Shizuoka Prefecture).

\*The estimated maximum rainfall was defined by dividing Japan into 15 regions with similar rainfall characteristics, and finding the maximum rainfall amount measured in each region.

- 629.5 mm for a 24-hour period in the Ota River basin. This is about 1.8 times the amount of rainfall on the conventional flood hazard map (355.1 mm in 24 hours).

- In addition, you can check flood estimated inundation areas in Shizuoka Prefecture on the Internet.

Shizuoka Prefecture Flooding

Search 

- The heaviest rainfall ever measured around Fukuroi City was 508.0 mm in 24 hours, at the Shizuoka Regional Meteorological Observatory during the great Tanabata rains (July 1974). In addition, rainfall of over 1,000 mm in 24 hours has been recorded in other part of Japan.

(1,114 mm in 24 hours at Hiso Station in Nakacho, Tokushima Prefecture)

- Including the heavy rain of July 2018, there was rain exceeding past records for each region in recent years, so there is also a strong probability that Fukuroi City will experience 『rain like never before』 .

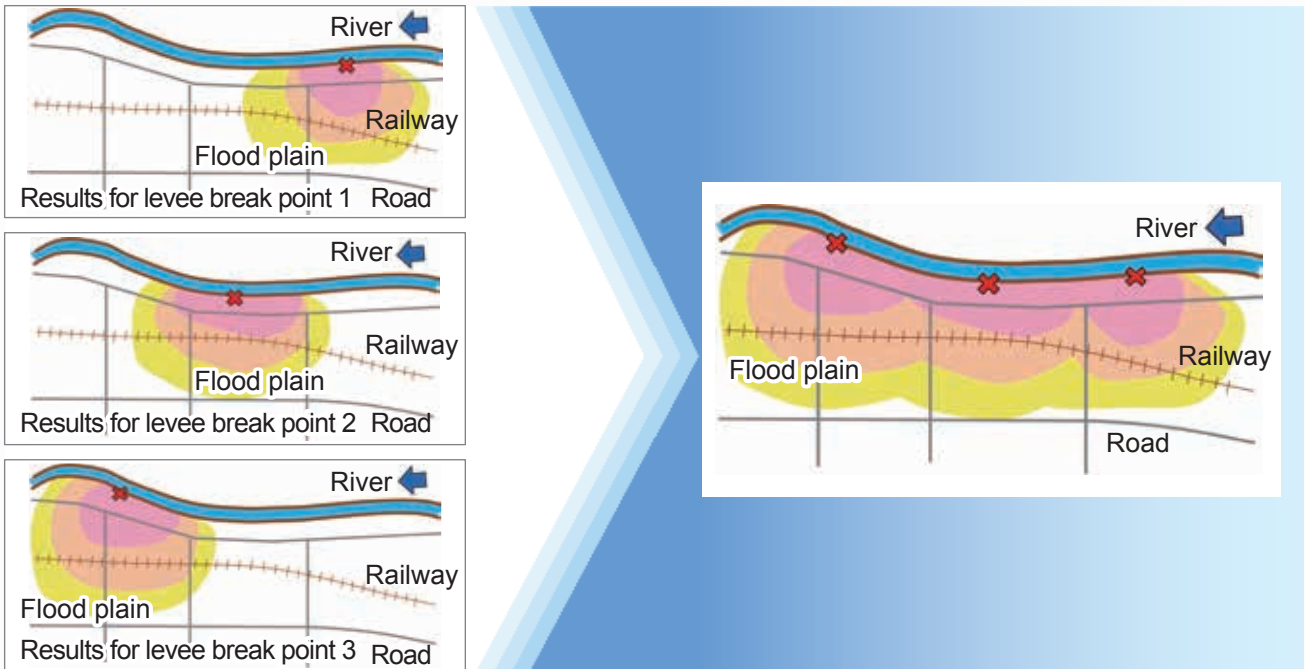
	24-hour rainfall volume (at the point of maximum rainfall measured)	Number of places that reached a new record high measurement
July 2018 Heavy Rain	691.5 mm (Umaji Village, Aki District, Kochi Prefecture)	Nationwide: 77 places
July 2017 Northern Kyushu Heavy Rain	545.0 mm (Asakura City, Fukuoka Prefecture)	Nationwide: 12 places
September 2015 Kanto & Tohoku Heavy Rain	551.0 mm (Nikko City, Tochigi Prefecture)	Nationwide: 16 places

Source: From the Japan Meteorological Agency website “Meteorological events that caused disasters”

## ② How flood hazard maps are made

### 1 Flood estimated inundation map (Made by the Shizuoka Prefecture)

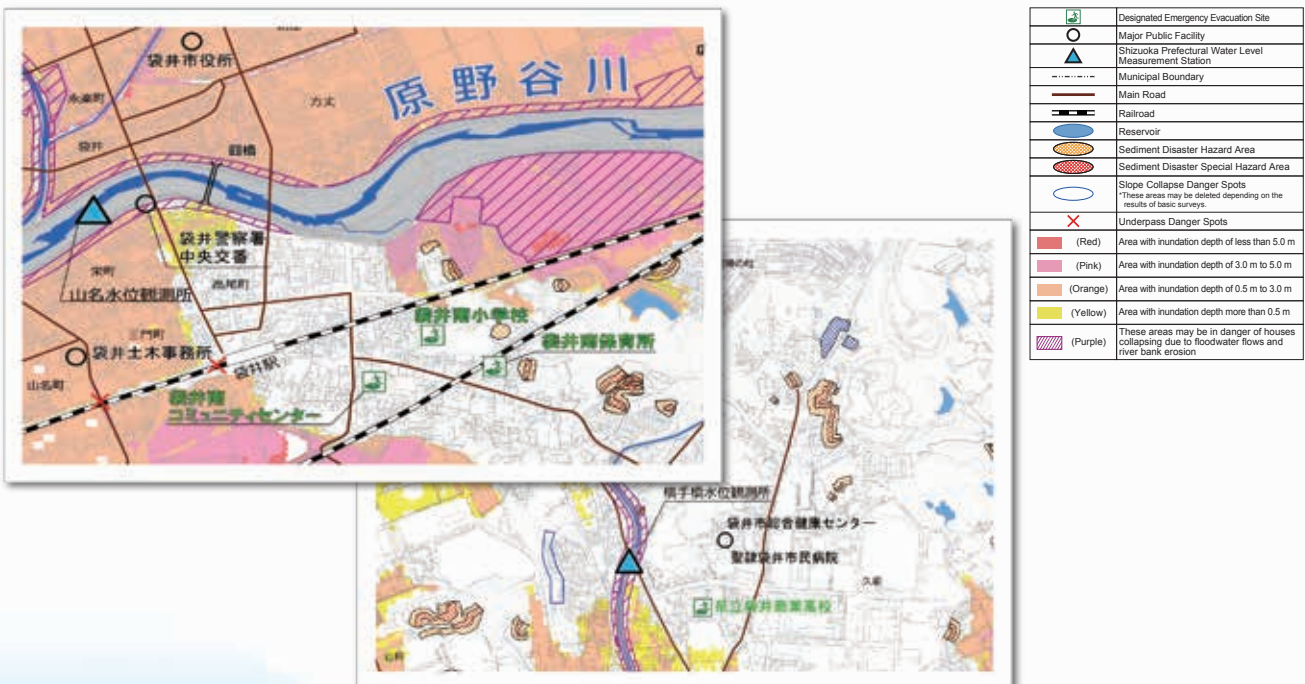
Simulations were made of the flooding situation or the largest expected rainfall, assuming multiple levee breaches for each target river, and created the map by overlapping the maximum inundation depth for each levee break point.



For this reason, the entire range shown will not be inundated by a single flood. This map shows how much risk there is of a target river flooding.

### 2 Flood Hazard Map


This map lists information about evacuation such as designated emergency evacuation sites in flood estimated inundation area maps.



\*Flood estimated inundation area maps may differ from the real disaster.

# 4. How to read a flood hazard map

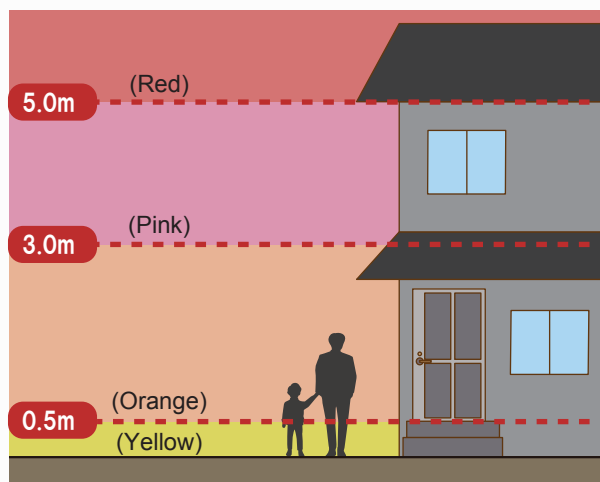
## 2 Information for better understanding the flood hazard map

 Try to understand the content of the flood hazard map and discuss where you will evacuate to with your family on a regular basis.



### Rankings for maximum water depth

The rankings for water depth when there is flooding have the following meaning.



- 5.0 m: This will submerge the second floor of a typical house.
- 3.0 m: This would reach the height of the bottom of the second floor in a typical house. When the water rises above this height, then it will be dangerous to evacuate even to the second floor.
- 0.5 m: This would reach the height of the first floor in a typical house. When the water rises above this height, it is likely to flood the floor.



### Areas with danger of houses collapsing

This indicates areas in danger of houses collapsing due to the flood waters from levee breaks knocking down houses, or flood waters within river channels eroding river banks and causing houses to collapse.

The range of houses collapsing due to flood water is based on calculations made for the structure and weight of standard two-story wooden buildings subjected to maximum water depth and flow speed found by numerical simulations.

The range of houses collapsing due to river bank erosion is estimated based on past experiences of river erosion width which has occurred throughout the country.



### Continuous inundation time

Beware that if you do not follow eviction evacuation in areas expected to be inundated for a long time, then the following problems may occur.

- If the flood water is deep, you may be unable to leave your house.
- You may run out of water and food even if you had stores.
- The general hygiene of your environment may deteriorate.
- You may be unable to help if those who gets sick.
- Those who receives regular medical care will not be able to receive it.
- Electricity going out will make it impossible to get information.
- Electricity, gas, and water stopping will make it a more difficult environment to live in.





## Water level at water gauging stations

Shizuoka Prefecture has installed water gauges on the main rivers in Fukuroi City, and announces observation results in real time over the Internet. Major gauging stations can tell the degree of danger based on the water level, with the relationship between river water level and evacuation information issued shown in the following graphic. (See page 27 of this guidebook for the position of the water gauge)

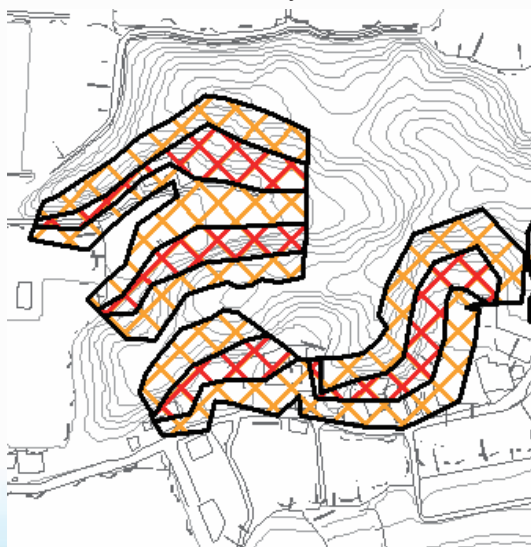
River water level	Information issued by Fukuroi City	Issuance standards, etc.
▼ Flooding occurs	▲ Evacuation order (emergency) issued▲ Warning Level 4	Issued when there is a risk of water reaching the top of the dike, or when the risk of levee breaks increases due to abnormal water leakage, cracks, slides, etc.
▼ Flooding Danger Water Level	▲ Evacuation advisory issued▲ Warning Level 4	Issued when water has reached the flooding danger water level and there is danger that it will rise even higher
▼ Evacuation Judgment Water Level	▲ Evacuation preparation / starting evacuation of seniors order issued▲ Warning Level 3	Issued when water has reached the evacuation judgment water level, and there is danger that it will rise even higher
▼ Flooding Alert Water Level		



## Sediment Disaster hazard areas

The prefectural government designates areas that should beware of sediment disasters as sediment disaster hazard areas and special hazard areas.

Sediment disaster hazard areas and special hazard areas may have “debris flow”, “slope collapse”, and “landslides”, but these categories are not shown on the map, and only the areas are shown. There are no designated areas in danger of “landslides” in Fukuroi City.



### [Sediment Disaster Special Hazard Area (Red Zone)]


These areas are recognized as being in danger of severe harm to the life or limb of residents from buildings being damaged in the event that steep slopes collapse.

### [Sediment Disaster Hazard Area (Yellow Zone)]

These areas are recognized as being in danger of severe harm to the life or limb of residents in the event that steep slopes collapse.

# 4. How to read a flood hazard map

## 3 Areas that require early eviction evacuation

 **Fukuroi City pays special attention to “Areas that require early eviction evacuation,” which face the following 3 threats**

There have been cases of houses collapsing due to flood waters and people being inundated so they can no longer move, such as the levee break caused by Kanto & Tohoku heavy rains of September 2015 or the Northern Kyushu heavy rains of July 2017. Houses can be washed away near rivers or flooded for more than 3 days in low lying areas. In areas 1 to 3, evacuate to a safe place, rather than going to the second floor or above of a building.

### 1. Areas in danger of houses collapsing

### 2. Areas in danger of flood water depth exceeding 3 meters

“Areas in danger of houses collapsing” and “Areas in danger of flood water depth exceeding 3 meters” are on the flood hazard map.

### 3. Areas in danger of flooding continuously for 3 days or more

“Areas in danger of flooding continuously for 3 days or more” can be checked in the “Continuous Flood Time Maps” on pages 21 to 26 of this guidebook.

#### The Day Before Project

#### Surprised by the violence of turbid waters

- The earth under houses was swept away -

Uji City, 70s, male, district officer

I am a member of a local disaster prevention team. When I was patrolling my neighborhood flooded in water, my older sister who lives alone called and cried to me “Help! There’ s flood of turbid water in front of my house!”

I rushed to get in my car, but found that the road was covered by a flow of turbid water and there was no way I could have driven through it, so I abandoned my car and walked.

My sister’ s house is at the back of a cul-de-sac with 8 houses. The house was flooded up to the floor, but the turbid water flowing in from the road leading to the temple on a hill pooled in this cul-de-sac. Her house was surrounded by a 2-meter concrete wall, and with nowhere else to go the turbid flow swirled and swept away all of the earth under house. The house still stood, but there was no earth under it. In the neighboring houses, earth and sand had piled up nearly to the second floor.

No one had expected water would flow from the road leading to the temple on a hill, so I think people in that area were shocked.



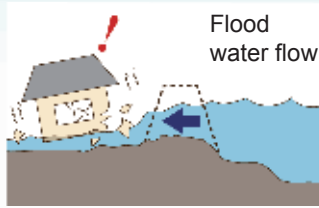
Source: From the Cabinet Office website “The Day Before Project: Heavy Rain from a Front (August 2012)”

# “Areas that require early eviction evacuation” defined by Fukuroi City

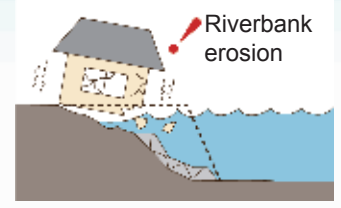
## 1. Areas in danger of houses collapsing due to flood water or riverbank erosion

Areas where it is expected that wooden houses will collapse due to strong water flows caused by levees breaking or levees and the ground will be eroded by strong flows from the river

Display on the map  
 Purple



Kurihara City, Miyagi Prefecture  
 (From Flood Report 2015)

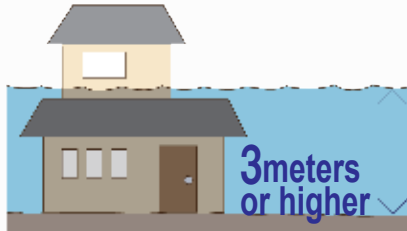


Asakura City, Fukuoka Prefecture  
 (From Flood Report 2017)

## 2. Areas in danger of flood water depth exceeding 3 meters

Areas where it is expected that flood waters will reach the second floor or higher of typical houses


Display on the map  
 (Red)  
 (Pink)



Tanabe City, Wakayama Prefecture  
 (From Flood Report 2015)

## 3. Areas in danger of flooding continuously for 3 days or more

Areas in danger of flood waters exceeding 50 cm and continuing for 3 days or longer

Display on the map  
 (Green)



Daisen City, Akita Prefecture  
 (From Flood Report 2011)

### The Day Before Project

#### Direction for evacuation was decided in advance

- How evacuating from a landslide without hesitation saved lives -

Ube City, 40s, Male, Government Worker

This is a story about a married couple I spoke with. They had lunch on their plates and were ready to eat around noon, when they heard a loud rumbling noise from the direction of the mountains. They wondered what it was and looked outside, only to see the mountain had collapsed, and debris was flowing towards them.

They knew they were in danger, and the husband was only had his long underwear and an athletic shirt on, but he grabbed a shirt and ran with his wife up the mountain behind their house where there are no roads. When I asked why they ran up the mountain, he told me “When we built the house we talked about where we could escape to in a disaster, and settled on the mountain behind the house.”

They left their car by the side of the road, but that was in the direction the debris was flowing. If they had fled to the road, they certainly would have died.

If you learn about where you live, what kind of danger it is exposed to, and what has happened in that area in the past, you can consider what you should do to prepare and where you can evacuate to. It is important that you think in specific terms and take responsibility for protecting yourself.



Source: From the Cabinet Office website “The Day Before Project: July 2009, Chugoku & Northern Kyushu Heavy Rains (July 2009)”

# 5. How to get information

## 1 How to get evacuation information

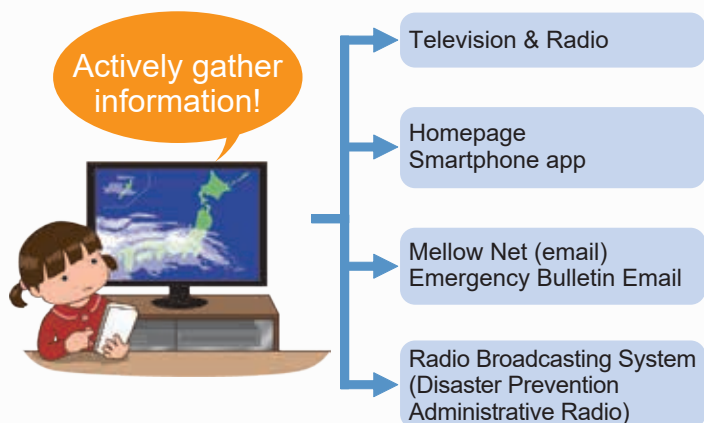
**It is important to obtain information yourself, and obtain the latest information**

When the danger of flood and sediment disasters is approaching, all sorts of information are put out there. However, due to various factors, it may be difficult for you to obtain that information.

- ◆ If you close rain shutters in a storm and go to sleep...
- ◆ If you do not have the television or radio on...
- ◆ If the power goes out...

If you just wait for information, the situation may get worse, and you may miss the right time to evacuate. When disasters are likely to occur, obtain information yourself and pay attention to the circumstances around you.

**When there is expected to be heavy rain due to Don't just wait for information to reach you,**



### Receive emails

#### ▶ Fukuroi City Information Distribution Service – Mellow Net

This service delivers information from Fukuroi City on disaster prevention and crime to a registered mobile phone or PC email address.

How to register

Use the QR code on the right to send a blank email to the registration email address (no subject or text is necessary).








#### ▶ Emergency Bulletin Email

This service delivers emergency information to mobile phones which support emergency alert emails.

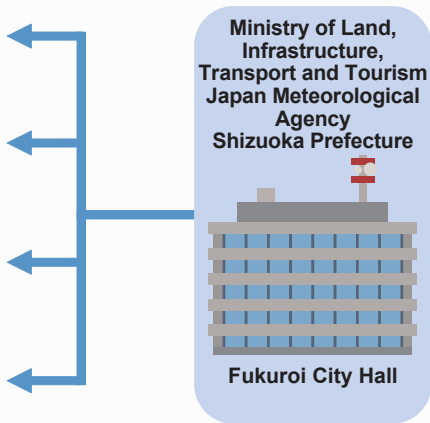
How to register

Sometimes settings must be made, so contact your mobile phone service provider for more information.

## 2 How to get information on rainfall and river water level

Information Sources	Internet Access	Information you can obtain
Japan Meteorological Agency Website	<a href="https://www.jma.go.jp/jma/index.html">https://www.jma.go.jp/jma/index.html</a> 	Danger level of flooding and sediment disasters on small to medium size rivers
JMA: Shizuoka Local Meteorological Office (For PC and smartphone)	 <a href="https://www.jma-net.go.jp/shizuoka/">https://www.jma-net.go.jp/shizuoka/</a>	Weather forecast Earthquake and tsunami information Alerts and warnings, etc.
Ministry of Land, Infrastructure, Transport and Tourism: Disaster prevention information for rivers (For PC and smartphone)	<a href="https://www.river.go.jp">https://www.river.go.jp</a> 	Nationwide rainfall, flood forecasts Alerts and warnings, etc.
Ministry of Land, Infrastructure, Transport and Tourism: Disaster Prevention Information Service Center (For PC and smartphone)	 <a href="http://www.mlit.go.jp/saigai/bosaijoho/">http://www.mlit.go.jp/saigai/bosaijoho/</a>	Real time rainfall, etc.
Shizuoka Prefecture: Sipos Radar (For PC and smartphone)	<a href="http://sipos.pref.shizuoka.jp/">http://sipos.pref.shizuoka.jp/</a> 	Rainfall, river water level Live cameras Alerts and warnings, etc.

approaching typhoons are low pressure fronts but be ready to find that information yourself.



Find it on television

▶ Data broadcast

On televisions compatible with data broadcasts, press the “d button” to check weather information and disaster information.



Get information on the smartphone app

▶ Yahoo! Disaster Prevention Bulletin

This service broadcasts emergency information about the approach of typhoons and the opening of evacuation sites.

How to register

<https://emg.yahoo.co.jp>

Install the app, and set our area to “Fukuroi City” .

You can also access the app from the QR code below.

Check the Yahoo! Disaster Prevention Bulletin website for information about how to use the app.

For iPhone  
(App Store)



For Android  
(Google Play)








▶ NHK News and Disaster Prevention

This service offers information about the expected path of typhoons and flooding of rivers.

▶ NHK Net Radio Rajiru ★ Rajiru

Using this app, you can listen to NHK radio broadcasts on the Internet.

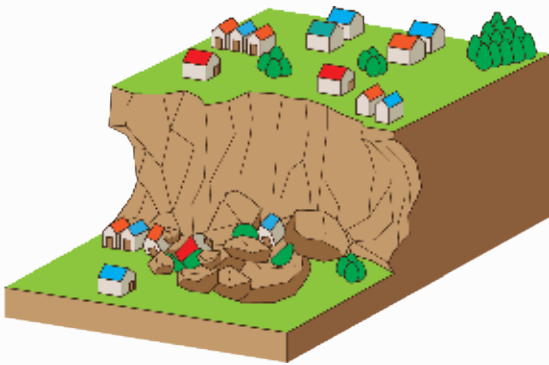
Information Sources	Internet Access	Information you can obtain
Shizuoka Prefecture: Sediment Disaster Hazard Information (For PC and smartphone)	<a href="https://www.pref.shizuoka.jp/kensetsu/ke-350/keikai/">https://www.pref.shizuoka.jp/kensetsu/ke-350/keikai/</a> 	Information on debris flows and destruction of slopes
Shizuoka Prefecture: River Works Bureau (For PC and smartphone)	 <a href="https://www.pref.shizuoka.jp/kensetsu/ke-320/index.html">https://www.pref.shizuoka.jp/kensetsu/ke-320/index.html</a>	Estimated inundation Area Maps Sediment Disaster Information Maps Designated status of sediment disaster (special) hazard areas
Fukuroi City Website	<a href="https://www.city.fukuroi.shizuoka.jp/">https://www.city.fukuroi.shizuoka.jp/</a> 	Disaster and prevention information of various types in Fukuroi City
Fukuroi City Website (For smartphone)	 <a href="http://www.city.fukuroi.shizuoka.jp/i/">http://www.city.fukuroi.shizuoka.jp/i/</a>	
Fukuroi City Mellow Net	<a href="https://plus.sugumail.com/usr/fukuroi/home">https://plus.sugumail.com/usr/fukuroi/home</a> 	Weather information, disaster prevention information

# 6. Disasters caused by heavy rain

## 1 Sediment Disasters

 You must be aware of sediment disasters when there is heavy rain.

It is commonly said that there are tell-tale signs of sediment disasters which you can feel right before they happen based on past experiences, but in fact slopes frequently collapse without any such signs, offering no reprieve in which to evacuate. If you feel that something is unusual, evacuate immediately. If the rain is too strong and you actually feel that it would be more dangerous to evacuate, then take shelter on the second floor or higher of a strong building, as far from the slope as possible.



### Slope Collapse

This is when the portion close to the surface of a slope is weakened by the permeation of rain or earthquakes and suddenly collapses. The entire collapse takes only a few moments from start to finish, and when it happens near houses people frequently fail to escape in time and die as a result.



### Debris Flow

This is when the stones, soil, and sand on hillsides or riverbeds is swept away all at once due to long lasting rains or severe heavy rainfall. Debris can flow at a speed of 20 to 40 kilometers per hour, destroying houses and fields in an instant.

### Landslide

This is when part or all of a slope slides slowly downhill due to the effects of groundwater and gravity. A huge amount of soil moves at once, so it can cause tremendous damage.

Fukuroi City does not have any areas designated as being in danger of landslides.



## Check the Sediment Disaster Hazard Map

Shizuoka Prefecture has designated sediment disaster hazard areas and sediment disaster special hazard areas based on the Sediment Disaster Prevention Law.

Select "Sediment Disaster Danger Points Map" to see hazard areas.

On computers...

Shizuoka Prefecture Sediment Disasters

Search

On smartphones...



## The Day Before Project

### Caught off guard by light rain in the morning

- The danger didn't seem as severe as a typhoon -

Amami City, 70s, Male, Neighborhood Officer

There were no signs of heavy rain that day. There was only light rain in the morning, so I told my wife we ought to go out to the fields. If it was a typhoon, I would have been more alert to danger.

Then just after 10 AM torrential rain started to pour, and 80% of our village looked like it had been swallowed by the sea. The roads were flooded and water had reached the entire floor of our house. No one was prepared for this, so most of the village evacuated to the community center.

The local FM radio station broadcasted information saying that the roads were closed due to flooding and who had evacuated to where, but because the power went out only people who had battery powered radios could hear this information, and some people didn't realize anything was wrong because they didn't notice that the power was out in the middle of the day.

In fact, when a youth group went to a senior home that had not been evacuated, they were told "I first noticed the flooding when the tatami mats started to float up off the floor." The youth group carried those seniors on their backs to evacuate.

There was only light rain when it first started to fall, so no one expected it to get so bad.

Source: From the Cabinet Office website "The Day Before Project: Heavy Rain from a Front (October 2010)"



## The Day Before Project

### All the residents knew each other

- How evacuations went smoothly -

Sanjo City, 60s, Male, City Hall Staff

I live in a small village with only 26 households in the mountains of Sanjo City. Aside from snow piling up in winter, nature is mostly peaceful here. There is a river nearby, but it flows in a deep channel, so we lived without any concern for floods until then.

However, on July 29th, 2011, the rainfall was abnormal. I sensed danger approaching, so I started to patrol the village with the president of the neighborhood association. The evacuation advisory came soon after. Seniors realized that it takes time to evacuate, so they took the initiative for evacuation preparations. I think it was only because we live in such a small village that everyone in the neighborhood knew each other, so we all knew who would have difficulty evacuating, and were able to exchange information. We planned out our work and cooperated to get things done.

There was also an evacuation shelter designated by Sanjo City, but ultimately we decided to designate the village meeting hall as our evacuation shelter.

The evacuation shelter designated by the city is a little bit far away, so we decided that it would be difficult for seniors to get there.

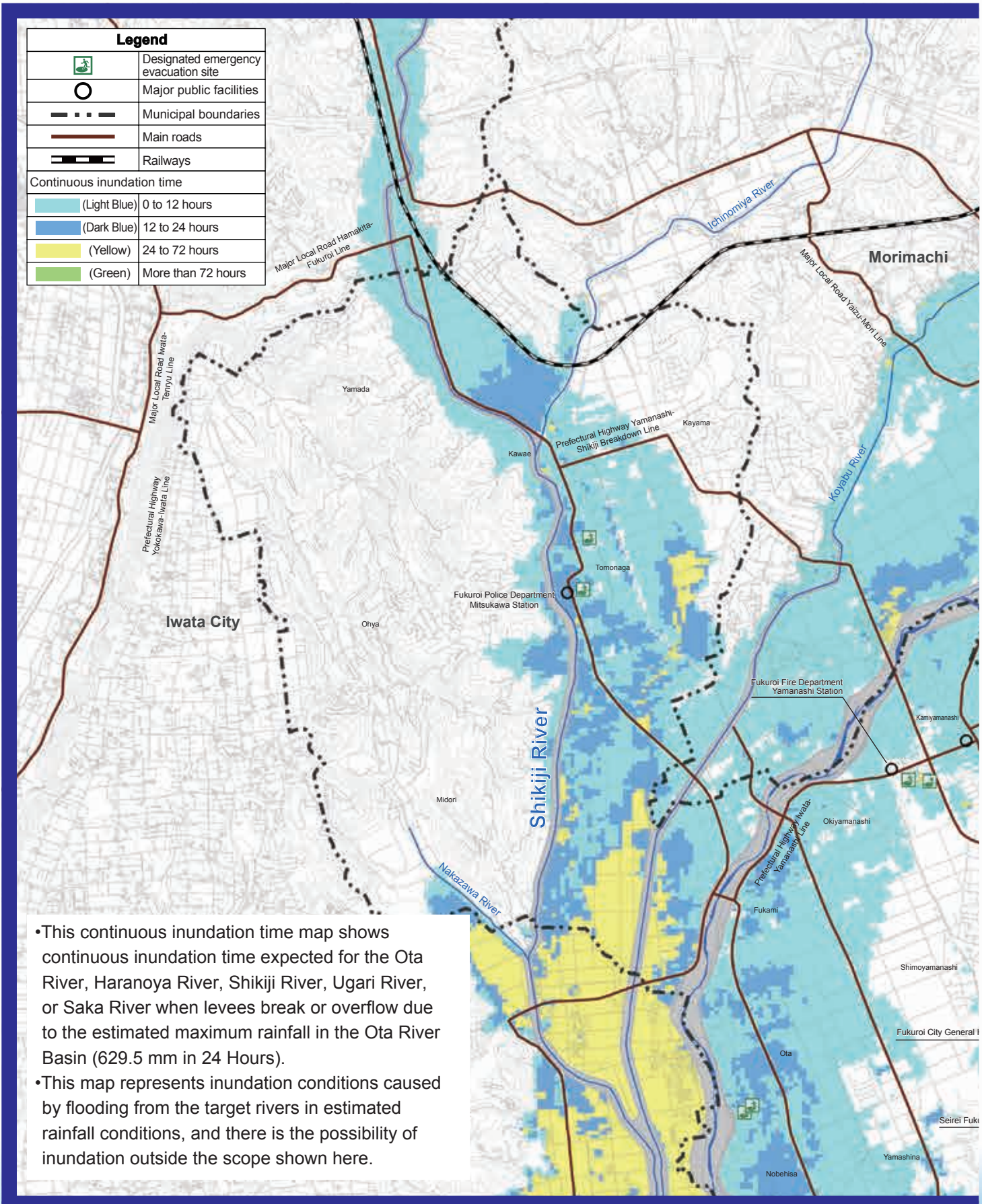
We made judgments quickly, so people who still had energy after evacuating worked together to secure the roads and direct traffic.

We also had the time to assist rescue activities in the neighboring village. I think we were able to move so smoothly because we stay so close from day to day and engage in unified civic activities.

Source: From the Cabinet Office website "The Day Before Project: Heavy Rain in Sanjo City (July 2004 and July 2011)"

# 7. Continuous Inundation Time Map [Northern Region]

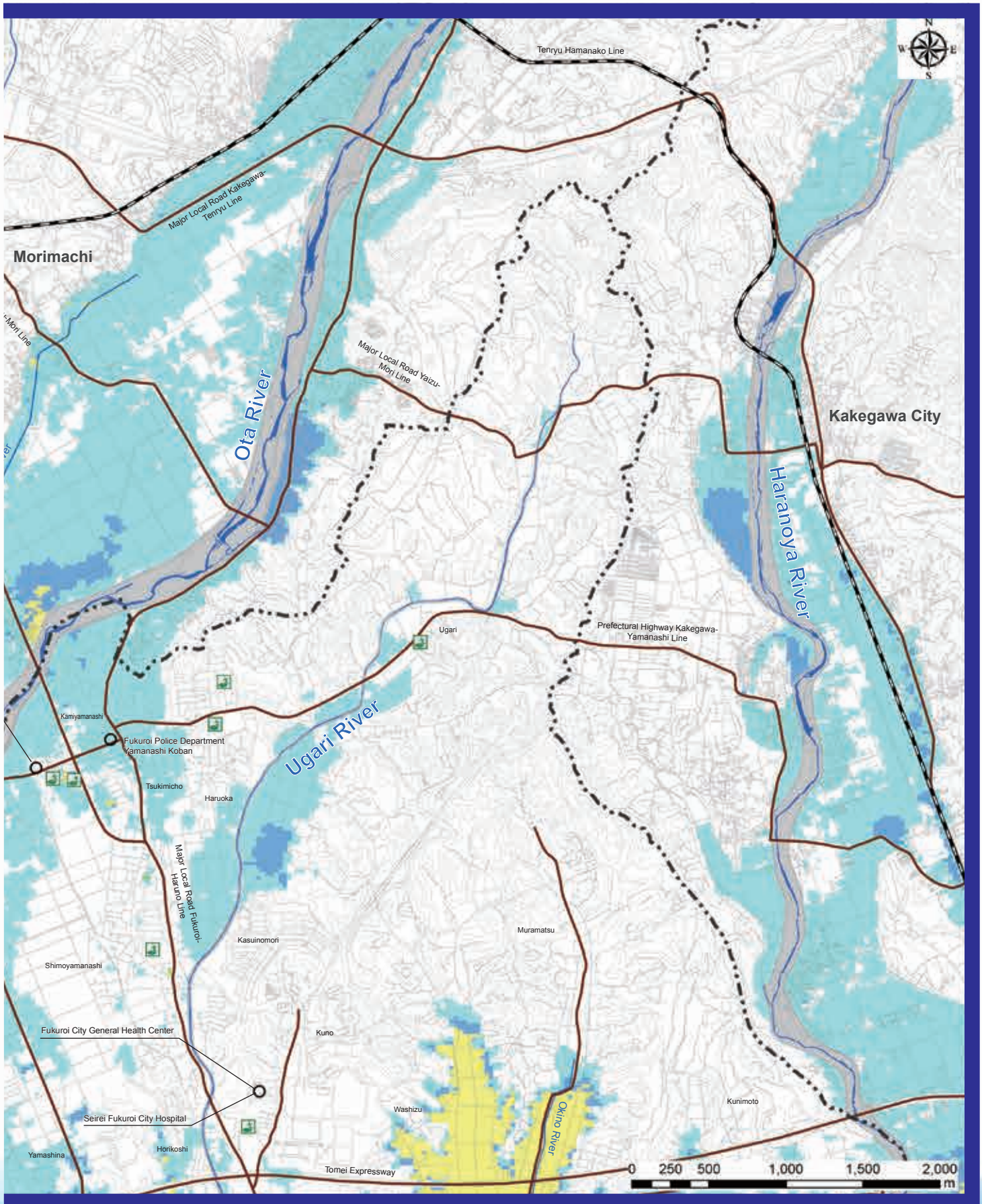
When there is inundation, electric power, tap water, and sewage stop. Living in such an environment for a prolonged period of time can be very difficult. Take the time to think about whether or not you can secure safety indoors (vertical evacuation) and actions to take in advance. **Areas in green (continuous inundation time of more than 72 hours) require eviction evacuation as early as possible.**



- This continuous inundation time map shows continuous inundation time expected for the Ota River, Haranoya River, Shikiji River, Ugari River, or Saka River when levees break or overflow due to the estimated maximum rainfall in the Ota River Basin (629.5 mm in 24 Hours).
- This map represents inundation conditions caused by flooding from the target rivers in estimated rainfall conditions, and there is the possibility of inundation outside the scope shown here.

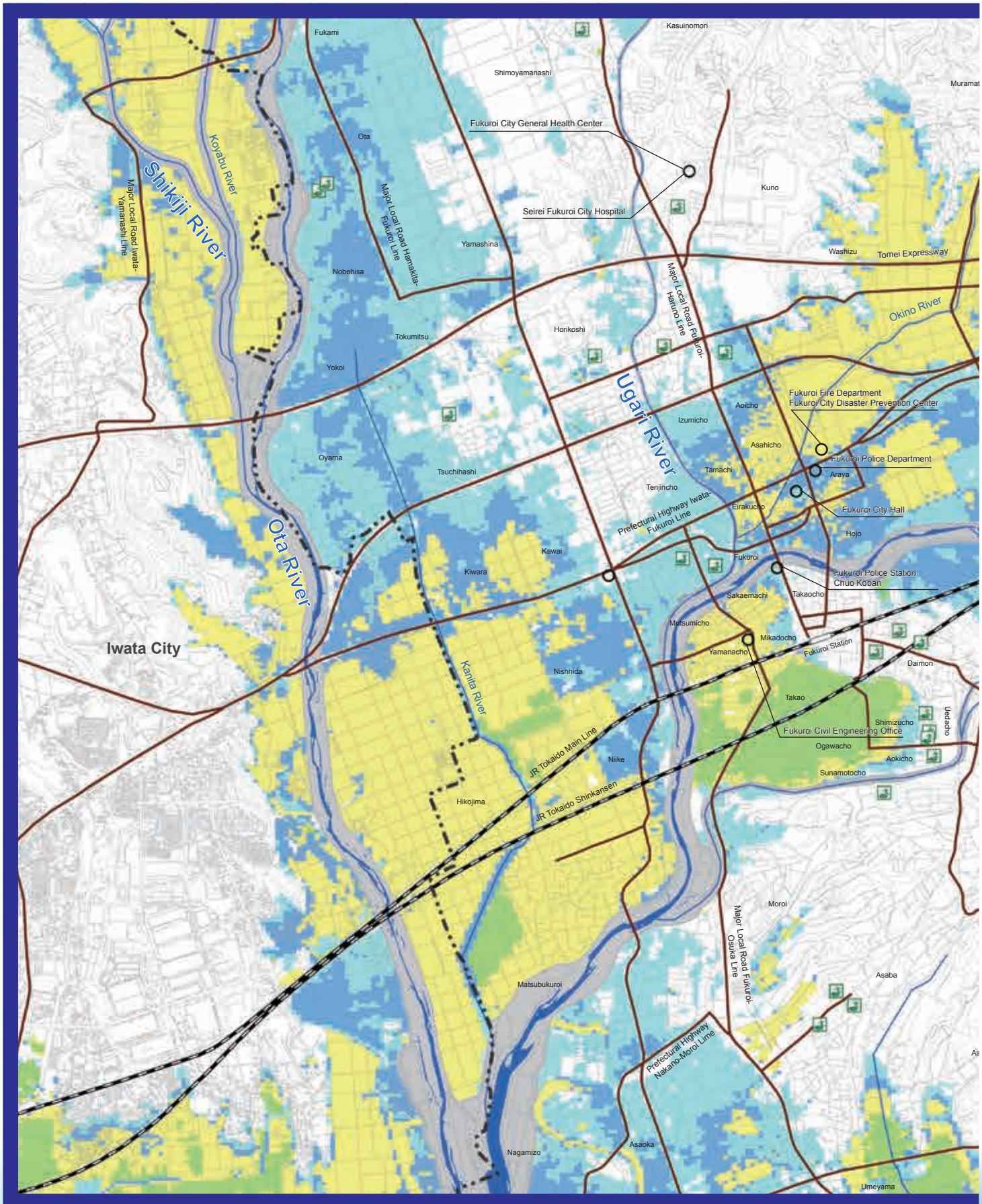


- This figure shows the length of time that water depth will be 50 cm or deeper.
- Be careful in areas where it is assumed that flooding will continue for a long time, as you may get left behind.

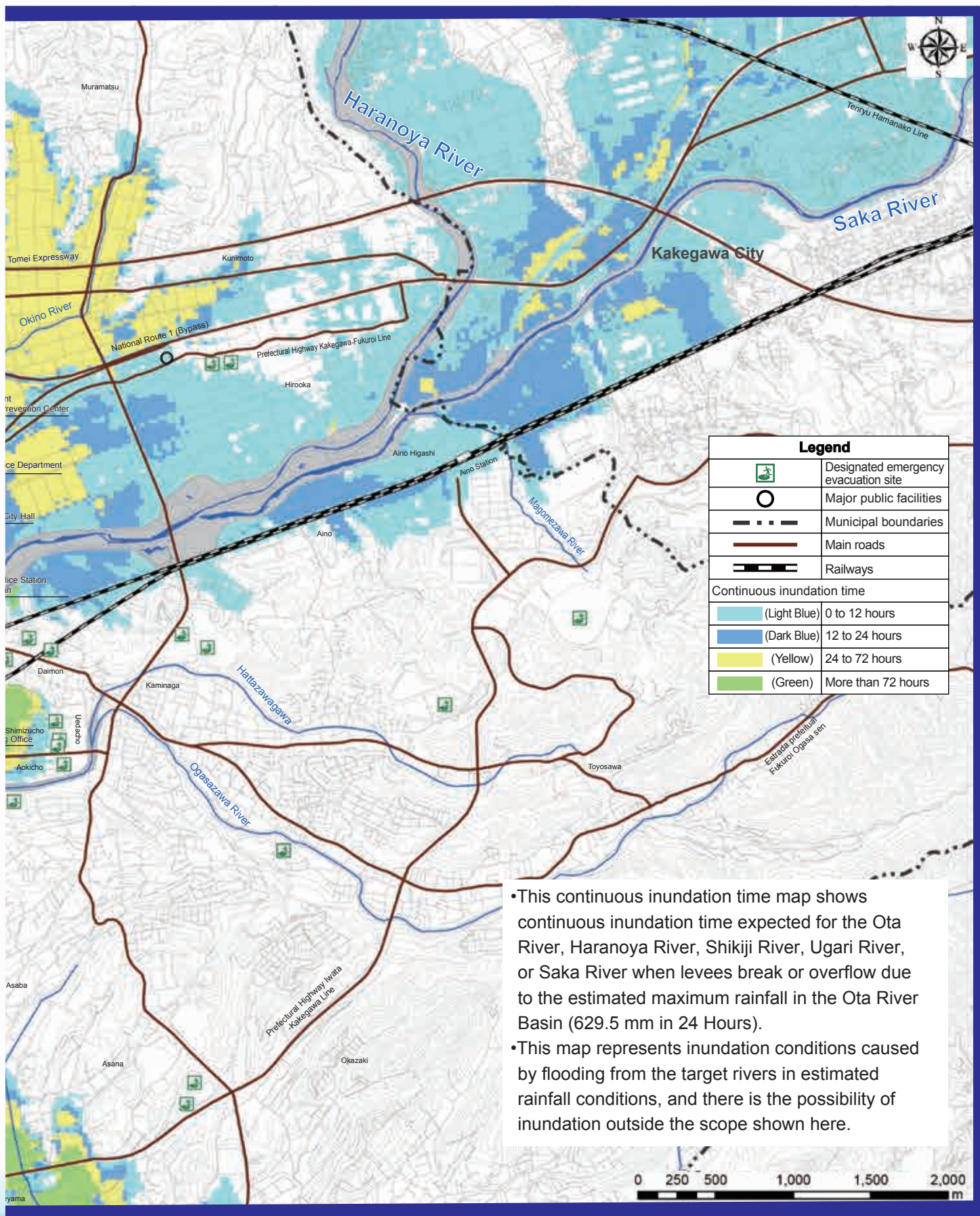


# 7. Continuous inundation time map [Central Region]

When there is inundation, electric power, tap water, and sewage stop. Living in such an environment for a prolonged period of time can be very difficult. Take the time to think about whether or not you can secure safety indoors (vertical evacuation) and actions to take in advance. **Areas in green (continuous inundation time of more than 72 hours) require eviction evacuation as early as possible.**



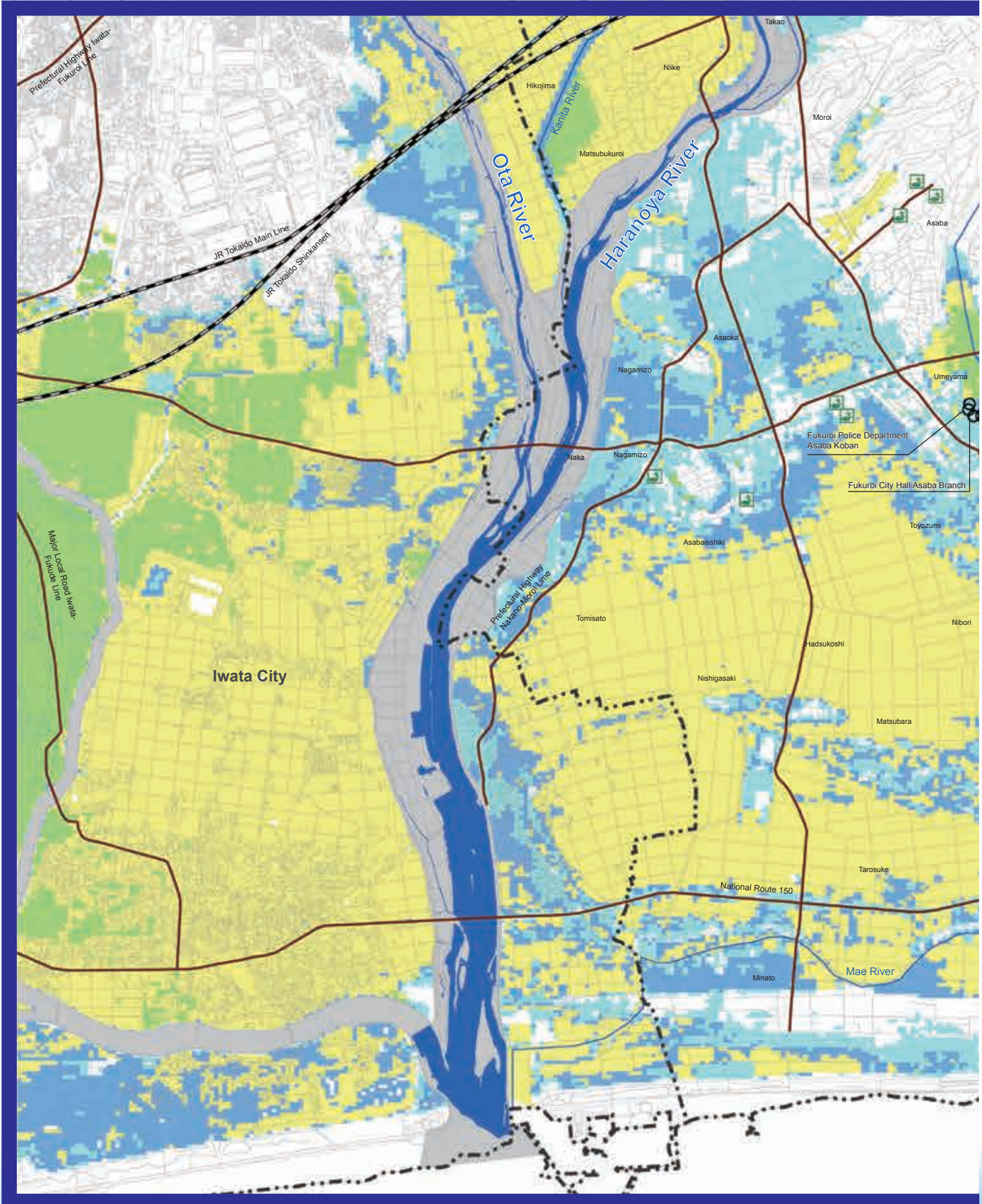
- This figure shows the length of time that water depth will be 50 cm or deeper.
- Be careful in areas where it is assumed that flooding will continue for a long time, as you may get left behind.



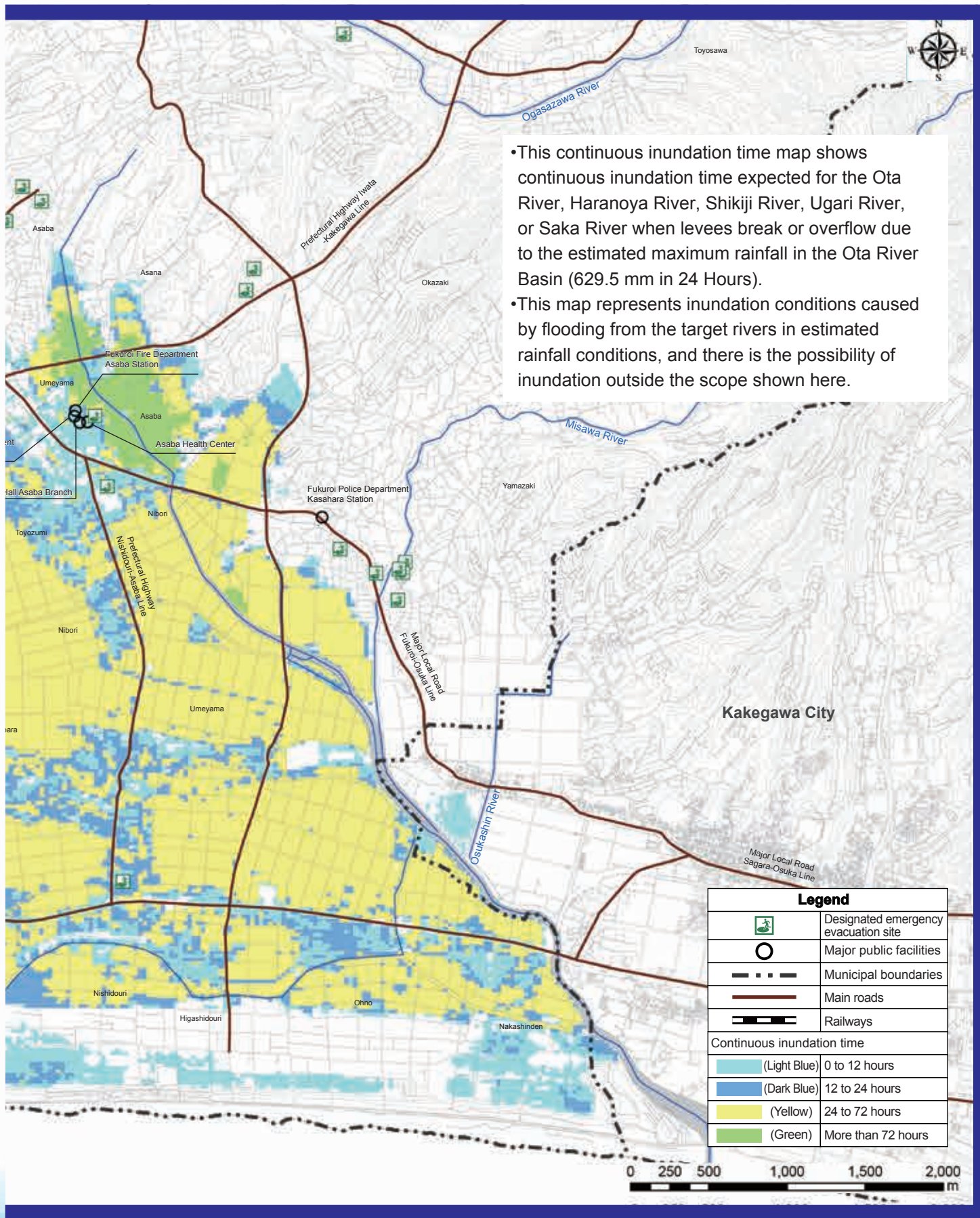
- This continuous inundation time map shows continuous inundation time expected for the Ota River, Haranoya River, Shikiji River, Ugari River, or Saka River when levees break or overflow due to the estimated maximum rainfall in the Ota River Basin (629.5 mm in 24 Hours).
- This map represents inundation conditions caused by flooding from the target rivers in estimated rainfall conditions, and there is the possibility of inundation outside the scope shown here.

# 7. Continuous inundation time map [Southern Region]

When there is inundation, electric power, tap water, and sewage stop. Living in such an environment for a prolonged period of time can be very difficult. Take the time to think about whether or not you can secure safety indoors (vertical evacuation) and actions to take in advance. **Areas in green (continuous inundation time of more than 72 hours) require eviction evacuation as early as possible.**




- This figure shows the length of time that water depth will be 50 cm or deeper.
- Be careful in areas where it is assumed that flooding will continue for a long time, as you may get left behind.



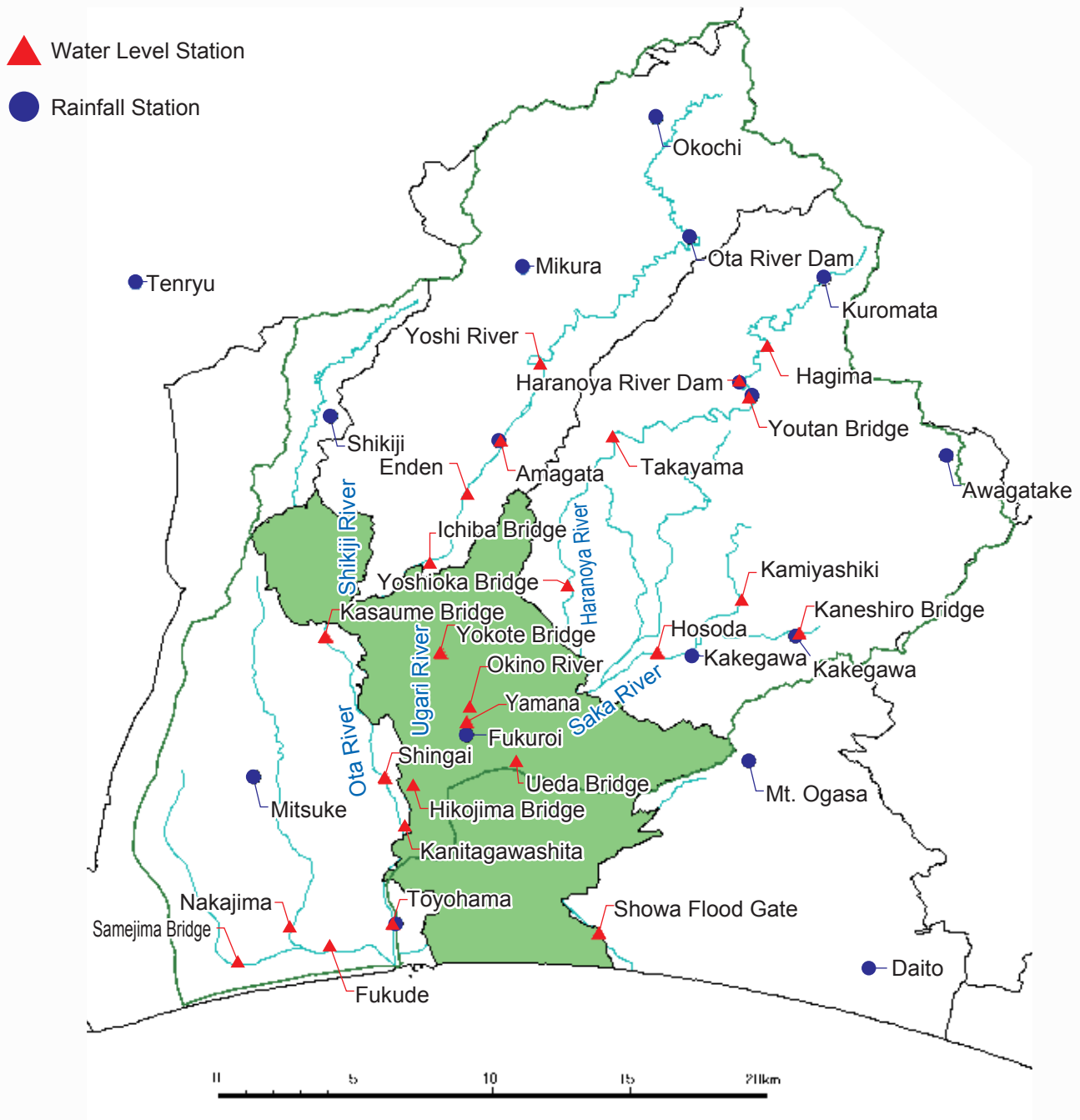
- This continuous inundation time map shows continuous inundation time expected for the Ota River, Haranoya River, Shikiji River, Ugari River, or Saka River when levees break or overflow due to the estimated maximum rainfall in the Ota River Basin (629.5 mm in 24 Hours).
- This map represents inundation conditions caused by flooding from the target rivers in estimated rainfall conditions, and there is the possibility of inundation outside the scope shown here.


Legend	
	Designated emergency evacuation site
	Major public facilities
	Municipal boundaries
	Main roads
	Railways
Continuous inundation time	
	(Light Blue) 0 to 12 hours
	(Dark Blue) 12 to 24 hours
	(Yellow) 24 to 72 hours
	(Green) More than 72 hours

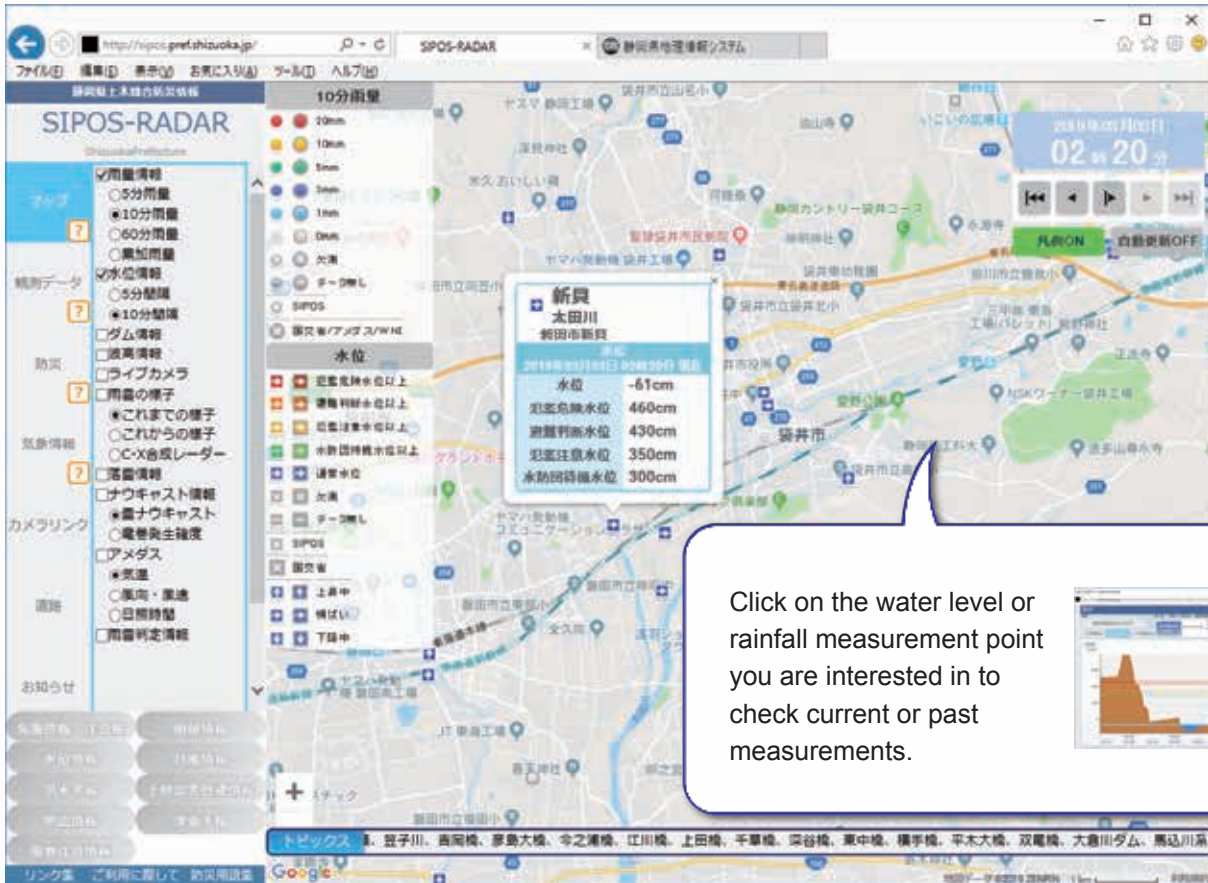
# 8. Water Level / Rainfall Measurement Point

 Rainfall and river levels can be checked on the Internet using a computer or a smartphone.

Many rivers such as the Ota River, Shikiji River, Haranoya River that flow through Fukuroi City have large catchment areas outside of the city. Even if there isn't heavy rainfall inside the city, heavy rainfall in the mountains upstream can cause flooding and have an impact inside Fukuroi City, so beware of wide area rainfall and water level.



 You can check rainfall and river water levels on the Shizuoka Prefecture “Sipos Radar”

The screenshot shows the SIPOS-RADAR website interface. On the left is a sidebar menu with options like '雨量情報' (Rainfall Information), '水位情報' (Water Level Information), and 'カメラ' (Camera). The main area features a map of Shizuoka Prefecture with various data points. A callout box for '新井 太田川' (Shinai, Otsubi River) displays the following data:


水位	-61cm
注意危険水位	460cm
避難判断水位	430cm
注意注意水位	350cm
水防団待機水位	300cm

A callout box with an arrow pointing to a data point on the map contains the text: "Click on the water level or rainfall measurement point you are interested in to check current or past measurements." To the right of this text is a small inset image of a line graph showing historical data.

At prefecture water level measurement stations, there are points with flood danger water levels or evacuation judgment water levels set to serve as a guideline for evacuation judgments. Beware of changes in water level and use them as a reference for evacuation.

River Basins	Points	Location	Flood Danger Water Level (cm)	Evacuation Judgment Water Level (cm)
Ota River (Upstream)	Amagata (Prefecture)	Mori, Morimachi, Shuchi County	280	240
Ota River (Midstream)	Shingai (Prefecture)	Shingai, Iwata City	460	430
Ota River (Downstream)	Toyohama (Prefecture)	Toyohama, Iwata City	—	—
Shikiji River	Kasaume Bridge (Prefecture)	Kasaume, Iwata City	584	540
Ugari River	Yokote Bridge (Prefecture)	Kuno, Fukuroi City	320	280
Haranoya River	Yamana (Prefecture)	Fukuroi, Fukuroi City	700	650
Saka River	Kaneshiro Bridge (Prefecture)	Kaneshiro, Kakegawa City	490	450
Saka River	Saida (Prefecture)	Hosoda, Kakegawa City	610	520
Benzaiten River	Showa Flood Gate (Prefecture)	Nakashinden, Fukuroi City	—	—

# 8. Water Level & Rainfall Measurement Point

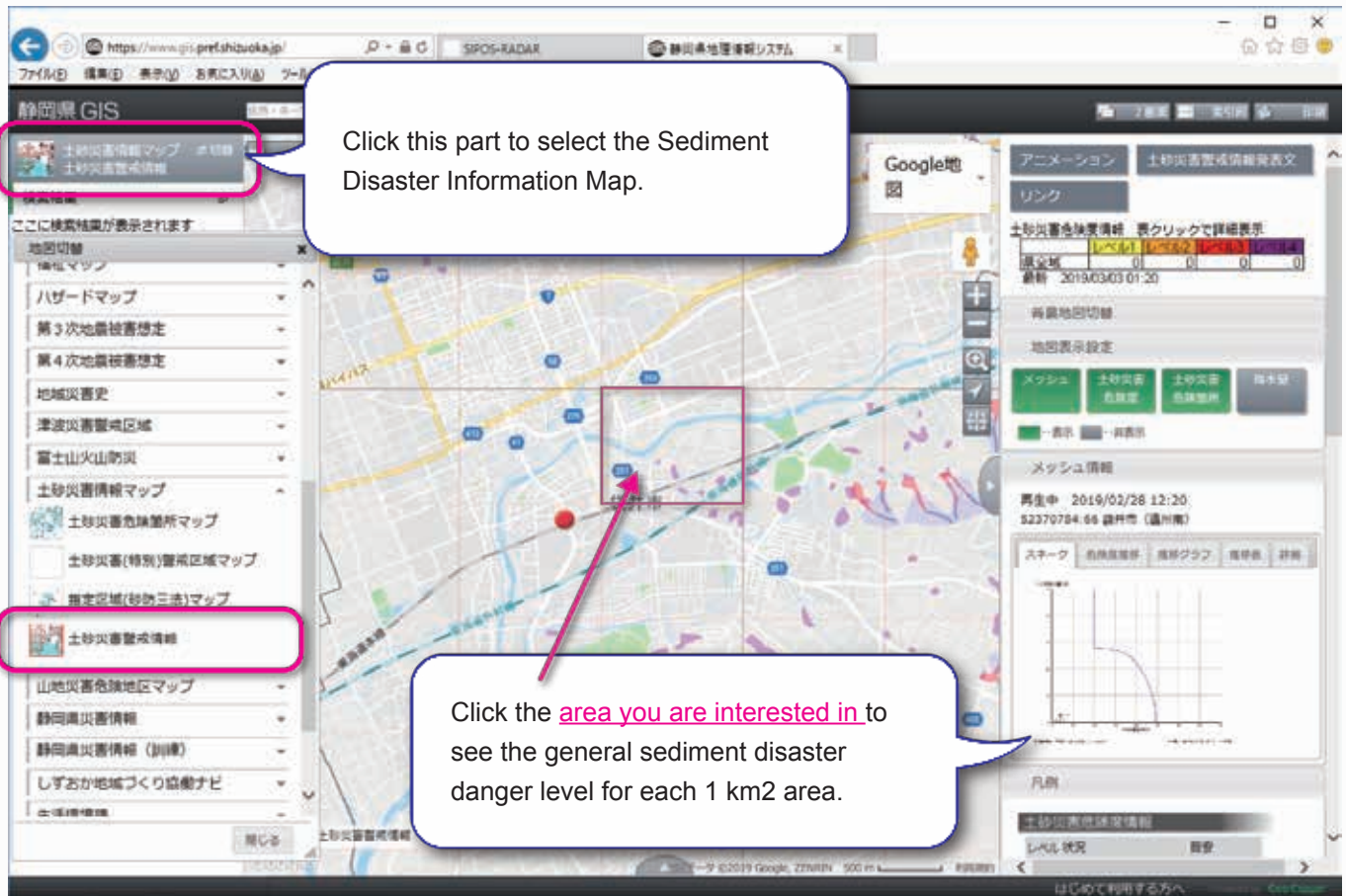
 You can check sediment disaster information on the “Shizuoka Prefecture Geographic Information System” .

Shizuoka Prefecture Geographic Information System



[Sediment Disaster Hazard Information]

Sediment disaster hazard information is announced jointly by Shizuoka Prefecture and the JMA Shizuoka Local Meteorological Office as disaster prevention information on a municipality level that mayors can reference when deciding to issue evacuation advisories and residents can reference to evacuate voluntarily when there is increased danger of sediment disasters caused by heavy rain. Because sediment disasters are frequently triggered by rain, on this website you can check danger levels on a 1 km<sup>2</sup> grid, rainfall amount, sediment disaster hazard information announcements, and sediment disaster danger points, as supplementary information to sediment disaster hazard information.



Click this part to select the Sediment Disaster Information Map.

Click the area you are interested in to see the general sediment disaster danger level for each 1 km<sup>2</sup> area.





ライブカメラ

 ライブカメラ設置場所



雨量計設置場所

-  雨量観測所(県施設)
-  雨量観測所(国交省・気象庁)



# 9. Strength and type of rain

In weather forecasts, the type of rain is expressed as “heavy rain” , “very heavy rain” or the like.

Expressions for the strength of rain and guidelines for rainfall are categorized in the following table. Use this to become more familiar with disaster prevention weather information.

Expressions for the strength of rain	Rainfall guidelines	Type of rainfall	Image
Somewhat strong rain	10 – 20 mm per hour	Rain falls in sheets, bouncing off the ground so your feet get wet.	
Strong rain	20 – 30 mm per hour	Rain pours, so you get wet even if you are holding an umbrella.	
Heavy rain	30 – 50 mm per hour	Buckets of rain fall, so that roads become like rivers.	
Very heavy rain	50 – 80 mm per hour	Rain comes down like a waterfall, so it is no use at all to hold up an umbrella.	
Torrential rain	80 mm – More per hour	Rain falls so hard that it is stifling, and even frightening.	

## How much is “50 mm of rain per hour”?

There is danger of extremely heavy rain, with 50 mm or more falling per hour.



“50 mm of rain per hour” means rain on a scale such that rain pools up without flowing anywhere else, “rain water pooling to a depth of 50 mm (= 5 cm) in 1 hour” .

5 cm may not sound like very much, but when this much rain falls over a wide area, it can exceed the capacity of rain drainage routes, such as rivers and water channels, and cause flooding.



From the Flood Report 2010

# 10. Topography and Disaster Characteristics of Fukuroi City

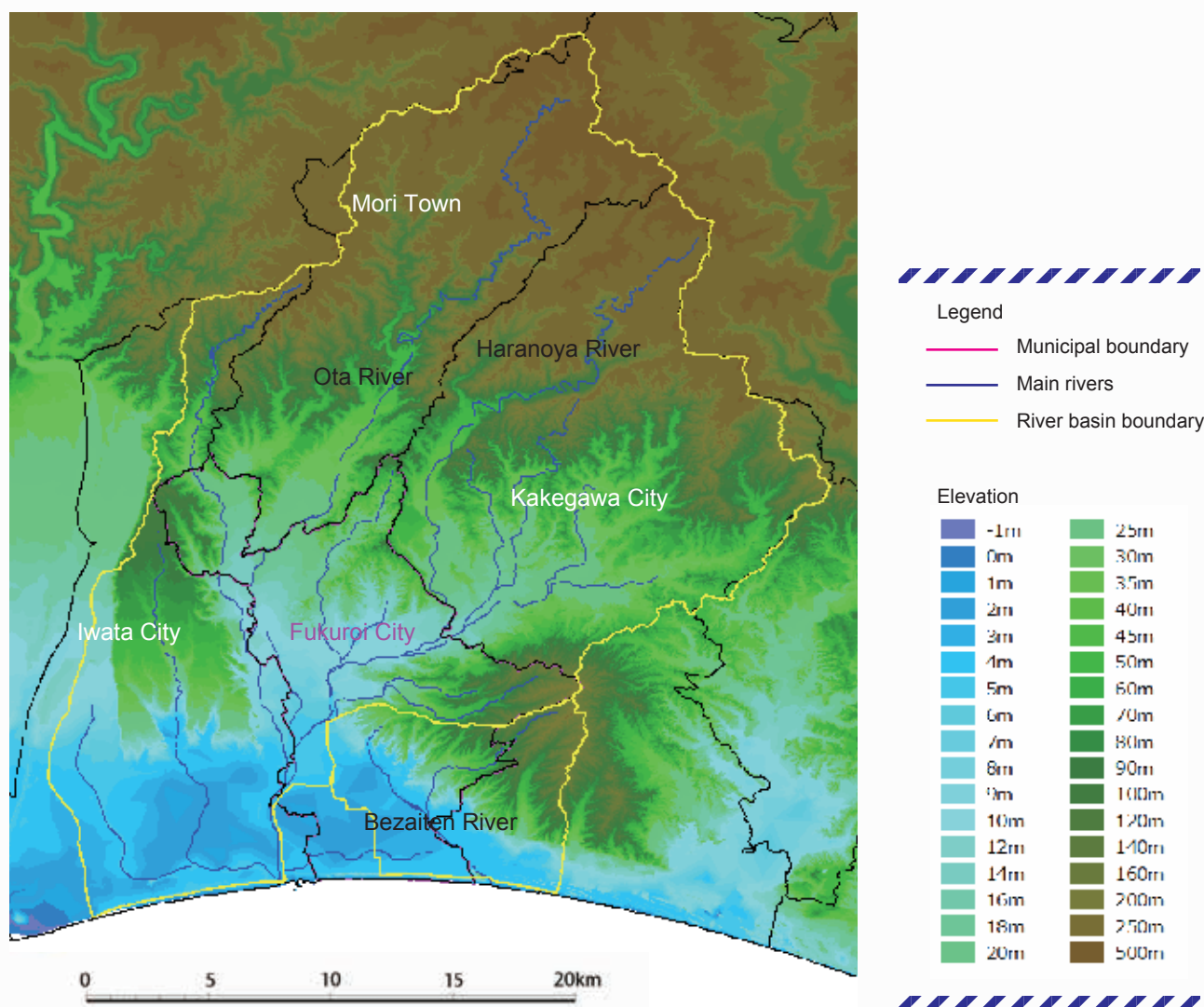
Fukuroi City borders Kakegawa City to the east, Iwata City to the west, Mori Town, Shuchi County to the north, and the Sea of Enshu (Pacific Ocean) to the south. The topography is flat on the whole, including many alluvial plains that have developed along the Haranoya River that flows from east to west across the center of the city and the Ota River that flows from north to south through the west side of the city.

As a result, the area is susceptible to wind storms caused by typhoons, heavy rains caused by low pressure fronts, and strong seasonal winds in winter.

The northern central part of Fukuroi City is in the Ota River Basin, and the southern part closer to the sea is in the Benzaiten River Basin.

The water level of rivers that flow through Fukuroi City is greatly affected by rainfall upstream, outside of the city on the Ota River, Haranoya River, and Shikiji River.

Fukuroi City has many low lying areas, so there is danger of massive inundation caused by river levees breaking and danger of inundation because it is impossible to drain water.



**Features of Fukuroi City**  
(As of January 1st, 2019)

Area: 108.33 km<sup>2</sup>  
Population: 88,234  
Households: 34,370

## Pictures of past inundation events in Fukuroi City



Jul 1974 flooding (Tanabata heavy rain) Imai District



Jul 1974 flooding (Tanabata heavy rain)



Jul 1976 flooding



Sep 1991 flooding Fukuroi Higashi District



Sep 1998 flooding



Nov 2004 flooding Fukuroi Higashi District

## Pictures of past inundation events in other prefectures



Aug 2014 (Hiroshima City heavy rain and sediment disaster)  
Midorii, Asaminami Ward, Hiroshima City, Hiroshima Prefecture



Aug 2014 (Hiroshima City heavy rain and sediment disaster)  
Kabe Town, Asakita Ward, Hiroshima City, Hiroshima Prefecture



Sep 2015 (Kanto & Tohoku heavy rain)  
Misaka Town, Joso City, Ibaraki Prefecture



Jul 2017 (Northern Kitakyushu heavy rain)  
Asakura City, Fukuoka Prefecture)



Oct 2017 (Typhoon No. 21)  
Kinokawa City, Wakayama Prefecture



Oct 2017 (Typhoon No. 21)  
Kinokawa City, Wakayama Prefecture

(From the MLIT Flood Report 2014 – 2018)



**March 2019**

**For inquiries about the Fukuroi City Flood Hazard Map**

Regarding inundation estimates Fukuroi City Urban Construction Department, Construction Division

1-1 Araya 1-chome, Fukuroi-shi

TEL: 0538-44-3166 (Flood Countermeasures Office) / 0538-44-3130 (Administration)

Regarding evacuation Fukuroi City Crisis Management Department, Crisis Management Division

2907 Kunimoto, Fukuroi-shi

TEL: 0538-86-3701