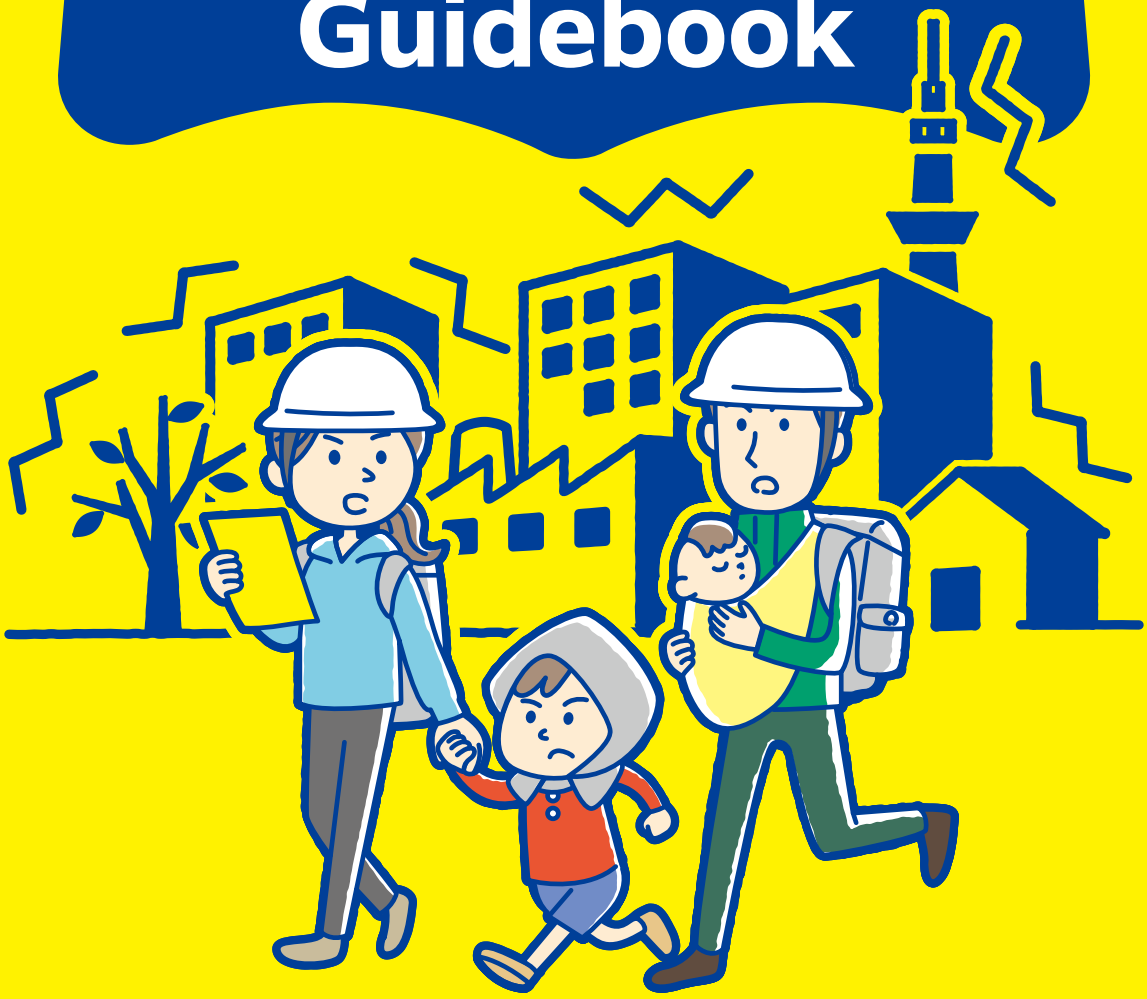
Sumida City Earthquake Preparedness Guidebook



外国語版について

外国人の方に本区の地震リスクを知ってもらうため、「墨田区地震ガイドブック（外国語版）」を作成しています。
外国語版は英語・中国語・韓国語の3種類があり、区のホームページからダウンロードすることができます。

Sumida City created foreign-language versions of the *Sumida City Earthquake Preparedness Guidebook* to inform foreign residents about the risks of earthquakes affecting the city.
The guidebook is available in English, Chinese and Korean versions, which are downloadable from the city website.

为了让外国人了解本区的地震风险，区内制作了《墨田区地震指南》。
外语版包括英语、中文、韩语3种，可以从区主页上下载。

외국인 여러분에게 스미다구의 지진 위험을 알리기 위해 '스미다구 지진 가이드 북'을 제작했습니다.
외국어 버전은 영어 · 중국어 · 한국어의 3종류가 있으며, 스미다구 홈페이지에서 다운로드할 수 있습니다.

English
简体中文
한국어

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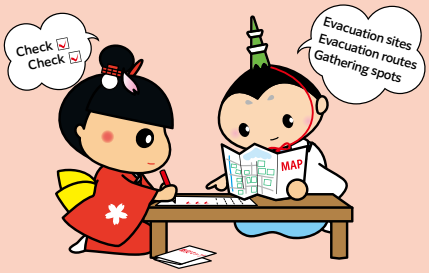


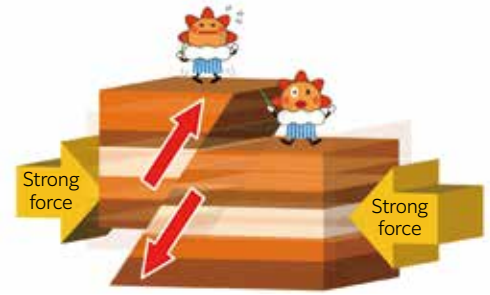
Earthquake Trivia

1–1 The Mechanisms of Earthquakes

Check together!

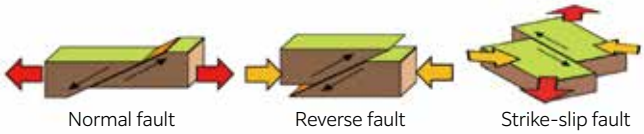
Why Do Earthquakes Occur?

The Earth's surface is made up of tectonic plates—composed of what is known as bedrock—which are pushed and pulled by strong forces from neighboring plates. This force can cause a plate to suddenly shift and move at any given moment, creating earthquakes.

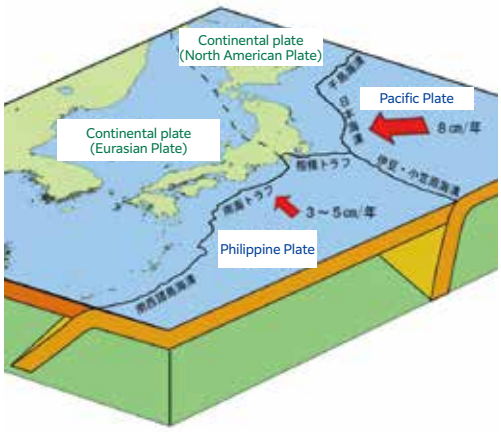


Depending on how the force is applied to tectonic plates, there are several ways they can shift.

The arrows in the figure below indicate the direction of the force on the plates.



Source: Japan Meteorological Agency



Schematic diagram of tectonic plates around Japan

Source: Japan Meteorological Agency

Magnitude and Seismic Intensity

◆ **Magnitude**

Magnitude is a measurement of the size (energy) of the earthquake. When the magnitude increases by 1, the energy of the earthquake is about 32 times greater; when it increases by 2, the energy is 1,000 times greater. This means that an earthquake with a magnitude of 8 has energy equivalent to 1,000 magnitude 6 earthquakes.

The energy an earthquake produces is significantly greater even if the difference in magnitude is only one.

◆ **Seismic intensity (*shindo*)**

This indicates the intensity of the tremors that earthquakes cause in different areas. Since the tremors vary greatly depending on soil condition and the like, there may be a disparity in intensity even in the same region.

Intensity of Tremors

The Japan Meteorological Agency Seismic Intensity Scale (commonly known as the Shindo scale), measures the intensity of the tremors an earthquake produces in a range from 0 to 7. The table below shows the approximate damage and related effects that can occur in an area when a certain seismic intensity is reached.

Seismic Intensity Scale

Seismic intensity	Anticipated scenarios
Seismic intensity 0	People do not feel the tremors, but a seismograph records them.
Seismic intensity 1	Some people who are indoors in a quiet environment may feel the tremors slightly.
Seismic intensity 2	Most people who are indoors in a quiet environment will feel the tremors. People who are sleeping may wake up.
Seismic intensity 3	Most people who are indoors will feel the tremors. People who are walking may also feel the tremors. Most people who are sleeping will wake up.
Seismic intensity 4	Most people will be alarmed; if they are walking, they will feel the tremors. Almost everyone sleeping will wake up.
Seismic intensity 5-	Most people will feel fear and instinctively seek to hold on to something.
Seismic intensity 5+	The tremors will cause difficulties in performing normal activities for most people, such as walking without holding onto something.
Seismic intensity 6-	Standing upright will become difficult.
Seismic intensity 6+	People are unable to stand normally and cannot move unless they crawl. People are unable to move and may be knocked around by the tremors.
Seismic intensity 7	

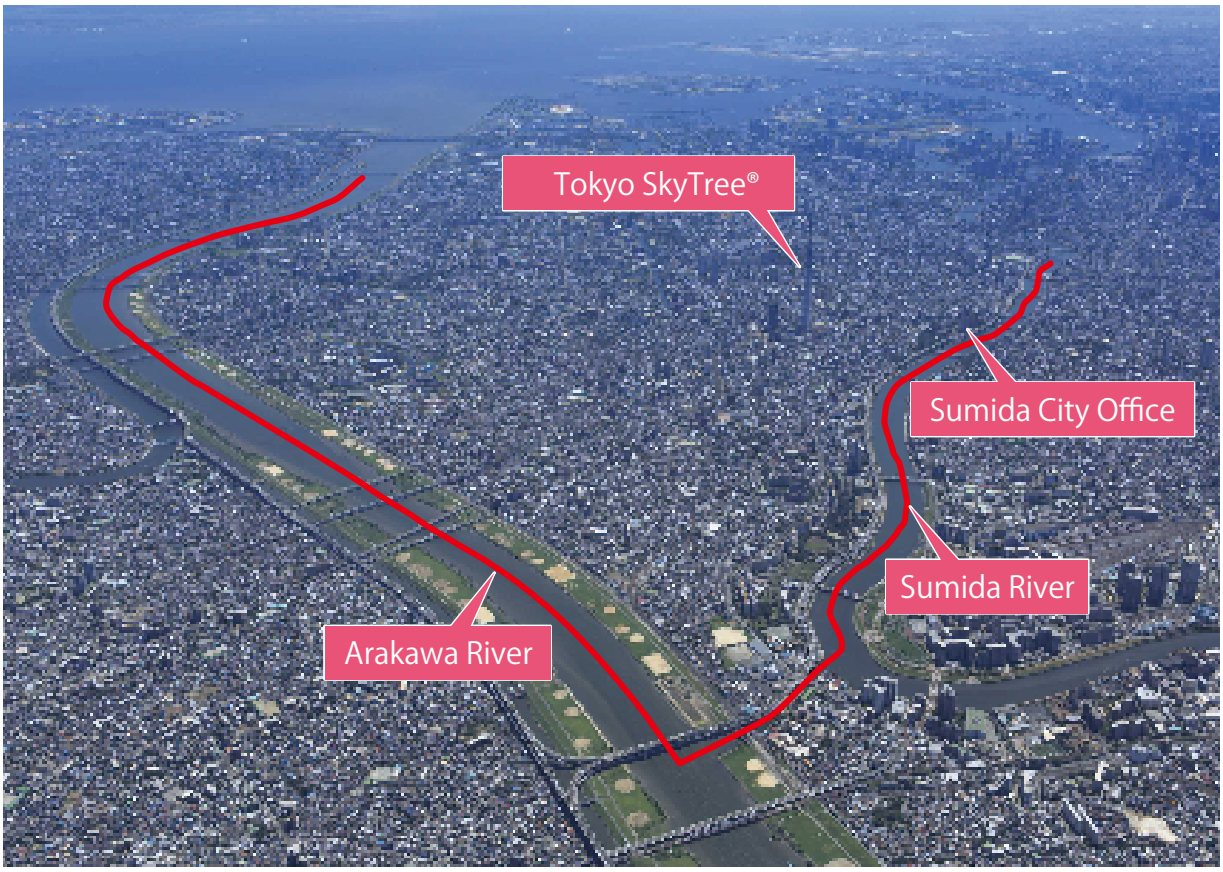
Some earthquakes of seismic intensity 7 that have struck Japan

- **1995 Great Hanshin-Awaji Earthquake Disaster** (Southern Hyogo Prefecture Earthquake)
- **2011 Great East Japan Earthquake Disaster** (Tohoku Region Pacific Coast Earthquake)
- **2016 Kumamoto Earthquake**
- **2018 Hokkaido Eastern Iburi Earthquake**
- **2024 Noto Earthquake**

1-2 Geological Characteristics of Sumida City

- Sumida City developed in the river delta area at the mouth of the former Tone River system and the Arakawa River system, and its terrain is mostly flat.
- It is a flat lowland with a maximum height of 4 meters above sea level and a minimum of 1.2 meters below sea level. It is an alluvial plain consisting of mostly sand and clay.
- The area has a mix of residential, commercial and industrial facilities. Although the number of fire-resistant buildings is increasing, the area still has a *shitamachi* (old town) atmosphere, with many narrow alleys and old wooden houses.

When an earthquake strikes, there is a risk of fires occurring in various locations at the same time.



Sumida Disaster Preparedness Column

Column 1 | Sumida City Initiatives in Response to the Noto Earthquake

We received a request from Wajima City, Ishikawa Prefecture, for relief supplies following the Noto Earthquake that occurred on January 1, 2024. In response, we sent relief supplies to Wajima with the cooperation of the Sumida branch of the Tokyo Trucking Association.

1-3 Estimated Damage from an Earthquake Directly under the Tokyo Metropolitan Area

The table below shows the estimated damage for Sumida City as calculated by the Tokyo Metropolitan Government in May 2022.

Type of earthquake	Earthquake directly under the southern part of downtown Tokyo
Size of earthquake	Magnitude 7.3
Seismic intensity in Sumida	6+ (6- or 7 in some areas)
Situation	Winter, 6 p.m., wind velocity 8 mps
Deaths	321
Injured (serious injuries)	3,307 (578)
No. of totally destroyed buildings	5,398
No. of fires and buildings destroyed by fire	19 fires, 4,143 buildings

◆ Characteristics of damage in Sumida City

Fires, building collapses, liquefaction and other serious damage may occur.

Damage to residential houses and spread of fire (1995 Great Hanshin-Awaji Earthquake)

Damage to residential houses and spread of fire (1995 Great Hanshin-Awaji Earthquake)

Manhole that rose due to liquefaction (2011 Great East Japan Earthquake)

Source: Institute of Scientific Approaches for Fire & Disaster

◆ Damage to essential services and estimated restoration periods

	Damage rate (in Sumida)	Restoration periods (Tokyo)
Gas	100%	About 6 weeks
Water	53%	About 17 days
Electricity	42%	About 4 days (excluding power outages due to spreading fires)
Communications	10.4%	About 4 days
Sewerage	6.7%	About 21 days

1-4 Regional Risk Level Measurement Survey for Earthquakes

What does "regional risk level" mean?

The regional risk level is the result of an assessment of disaster hazards for each region.

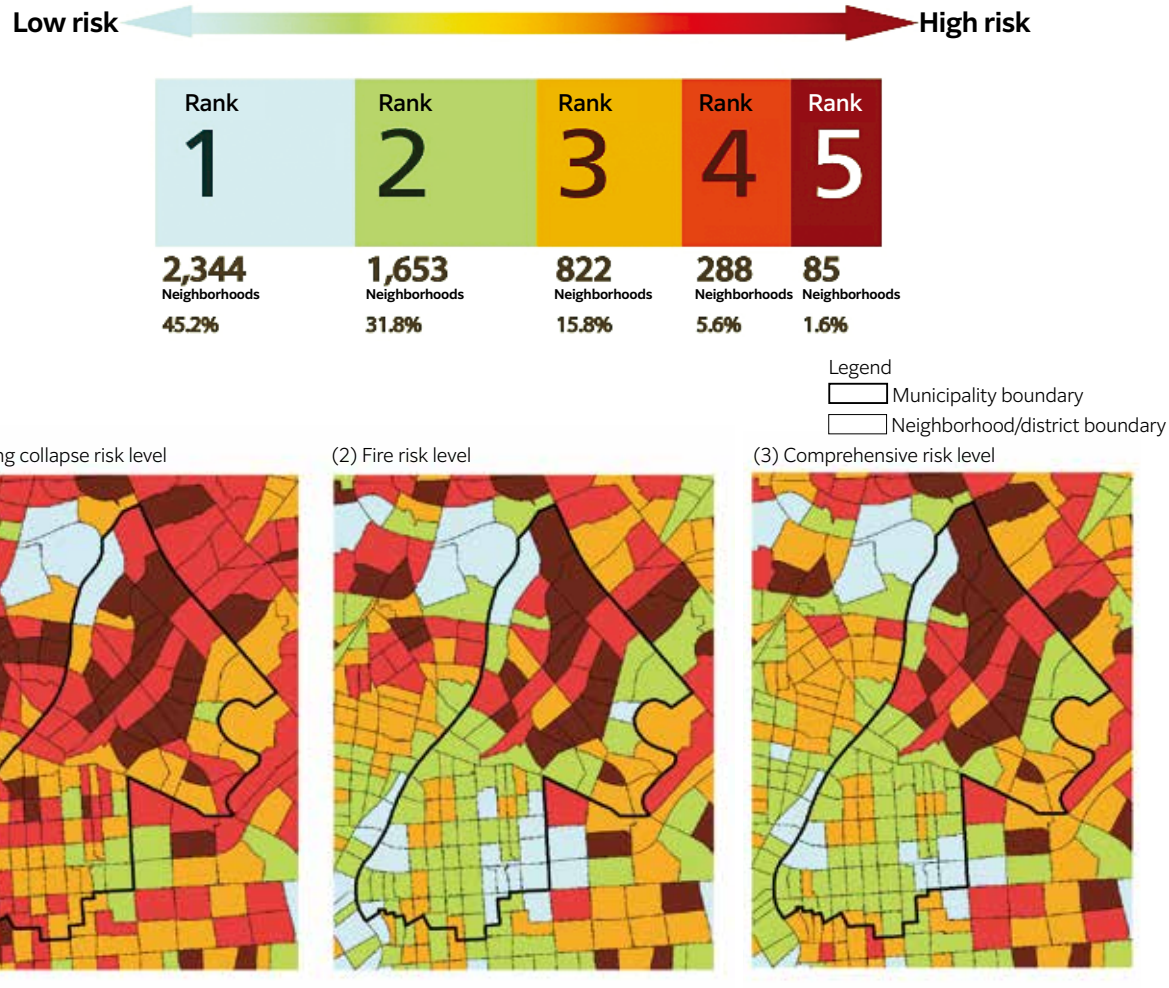
The regional risk level the Tokyo Metropolitan Government publishes is measured by evaluating the risk of building collapse, fire and evacuation (see "Survey Items" below).

Survey Items

- **Building collapse risk level**
- **Fire risk level** (risk of fire spreading)
- **Comprehensive risk level** (combines the above two items, multiplied by the disaster-relief activity difficulty factor)
- **Disaster-relief activity difficulty factor** (degree of difficulty of activities during a disaster is assessed based on road development status)

There are five levels of regional risk, based on the degree of danger in each neighborhood, and are rated as follows.

The images at the bottom show the regional risk levels of Sumida City the Tokyo Metropolitan Government published in September 2022. They indicate that areas with high levels of risk are largely found in the northern part of the city.



Source: Tokyo Metropolitan Government Bureau of Urban Development

1-5 Learning about Past Major Earthquakes

1995 Great Hanshin-Awaji Earthquake Disaster (Southern Hyogo Prefecture Earthquake)

5:46 a.m., January 17, 1995
Magnitude: 7.3 Maximum seismic intensity: 7
Casualties: Deaths: 6,434; Missing: 3; Injured: 43,792; No. of totally destroyed buildings: 104,906

Buildings constructed under the old earthquake resistance standards from 1981 and before were severely damaged. Reconstruction meeting current earthquake resistance standards is still underway.

Collapsed Hanshin Expressway

2011 Great East Japan Earthquake Disaster (Tohoku Region Pacific Coast Earthquake)

2:46 p.m., March 11, 2011
Magnitude: 9.0 Maximum seismic intensity: 7
Casualties: Deaths: 19,729; Missing: 2,559; Injuries: 6,233; No. of totally destroyed buildings: 121,996

This was the largest earthquake ever recorded in Japan, and a huge tsunami hit the Pacific coast.

The Tokyo Metropolitan Area experienced a seismic intensity of 5+, which paralyzed transportation, and a large number of people were stranded.

Sumida City also had many stranded persons, and evacuation shelters were set up for them.

The Minami-Sanrikucho Disaster Prevention Office Building immediately after the earthquake

Sumida City Gymnasium, which served as an evacuation shelter

2018 Osaka earthquake

7:58 a.m., June 18, 2018
Magnitude: 6.1 Maximum seismic intensity: 6-
Casualties: Deaths: 6; Injuries: 462; No. of totally destroyed buildings: 21

The collapse of a concrete block wall at a school caused the death of a student. After this incident, Sumida City investigated all the block walls of municipal facilities.

Stone lanterns toppled by the earthquake

2018 Hokkaido Eastern Iburi Earthquake

3:07 a.m., September 6, 2018
Magnitude: 6.7 Maximum seismic intensity: 7
Casualties: Deaths: 43; Injuries: 782; No. of totally destroyed buildings: 469

A massive landslide damaged many houses and caused Japan's first area-wide blackout (all of Hokkaido).

A house destroyed by a landslide

2024 Noto Earthquake

4:10 p.m., January 1, 2024
Magnitude: 7.6 Maximum seismic intensity: 7
Casualties: Deaths: 281; Injuries: 1,326; No. of totally destroyed buildings: 8,429 (as of July 1, 2024)

Many old wooden houses and other structures with low earthquake resistance were damaged. A large fire also broke out.

Asaichi-dori Ave., where the fire broke out

Column 2 | 1923 Great Kanto Earthquake Disaster

The earthquake that caused this disaster was estimated to have a magnitude of 7.9 (maximum seismic intensity 6), and struck on 11:58 a.m. on September 1, 1923. Approximately 370,000 buildings were damaged, and around 105,000 people were killed or went missing. The fire caused most of the human casualties, with an estimated ninety thousand people dead or missing due to the spreading flames. One fire at the former site of a clothing factory in Yokoamicho, Honjo Ward (currently part of Sumida City) alone killed around forty thousand residents who had evacuated there.

Citation: "2023 White Paper on Disaster Prevention," Cabinet Office

Charred ruins of the original Kokugikan building

Source: Sumida Heritage Museum

Fire at a former clothing factory

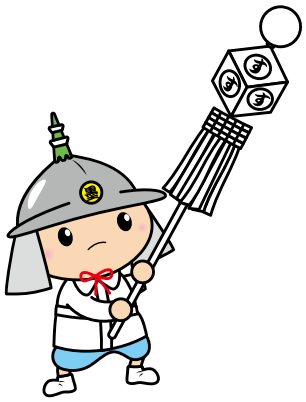
In 1922, the city of Tokyo purchased the former site of an army clothing factory with plans to develop a park. The Great Kanto Earthquake occurred in the midst of this process. Residents in the area took bedding and other household goods from their homes to the site—which was a vacant lot at the time—to evacuate.

Since the earthquake struck around noon—while many people were cooking and strong winds caused by a typhoon were blowing—fires broke out in many places. Fanned by the strong winds, the flames reached the old clothing factory site from all directions, and sparks from the flames spread to the household goods the evacuees had brought. The intense flames created a huge fire tornado (fire whirl), which quickly engulfed the people and claimed many precious lives.

Reference: Tokyo-to Irei Kyokai website

Sumida Disaster Preparedness Column

Realistic portrayal of the big whirlwind headed toward Honjo Ishihara
Source: Great Kanto Earthquake Memorial Museum



Many factors reportedly contributed to this tragedy, including flammable household goods, collapsed wooden houses, strong winds, water supply (fire hydrant) disruptions, simultaneous fires, and the firefighting system of the time.

Great Kanto Earthquake 100th Anniversary Project: Sumida Bosai 100

The year 2023 marks a century since the Great Kanto Earthquake. Sumida City, which suffered major damage and casualties at the time, launched the Great Kanto Earthquake 100th Anniversary Project as part of its city promotion. The city combined various local efforts related to *bosai* (disaster preparedness) and developed a wide range of activities.

As part of this project, a disaster-preparedness symposium took place during the annual Disaster-Preparedness Fair in fiscal 2023. The symposium included lectures on the efforts of Shinpei Goto, who contributed to city planning after the Great Kanto Earthquake, and on the future of disaster preparedness in the local community.