



# What is a disaster ? and Community resilient workshops in Tokyo

16th, August 2022  
Taro ICHIKO

Professor, Tokyo Metropolitan University



# My Curriculum Vitae



## 1. Profile

- Professor of Tokyo Metropolitan University since 2017  
<https://www.usp-tmu.jp/en/about-us.html>
- Ph.D in Urban Science at Tokyo Metropolitan University in 2000
- Awarded the research prize from the City Planning Institute of Japan(2021)  
<https://www.cpij.or.jp/com/prize/award/list.html>

## 2. Major Outreach Activities

- The planning research council of urban seismic risk reduction plan by Tokyo Metropolitan Government (TMG) since 2010
- Chairman of the city planning board in Inagi city and Koganei city, Tokyo
- Representative of a board of directors in Disaster Collaboration Support Tokyo



<https://tokyo-saigaivc.jimdofree.com>



# Two Research Subjects

## I. Disaster research from the planning theory

### Japanese domestic

- ☑ 1995 Hanshin-awaji
- ☑ 2004 Cyuetsu
- ☑ 2007 Cyuetu-Oki (Kashiwazaki)
- ☑ 2011 Great East Japan
- ☑ 2016 Kumamoto

### International

- ☑ 1999 East marmara, Turkey
- ☑ 1999 Chichi, Taiwan
- ☑ 2004 the coast of Sumatra, Indonesia
- ☑ 2009 East Sumatra, Indonesia
- ☑ 2015 Golka, Nepal

## II. Community Resilience in Tokyo Metropolitan area

- ☑ Vulnerability analysis both building env. and society aspect
- ☑ Developing cope with capacity for the disaster
- ☑ Pre-disaster planning for post-disaster recovery





# Presentation Outline

## 1.What is a disaster? How to conceptualize a disaster?

- Classification from a Lead and Frequency time
- Vulnerability Model;  $\text{Risk} = \text{Hazard} \times \text{Vulnerability}$

## 2.Case study for Resilient vicinity community

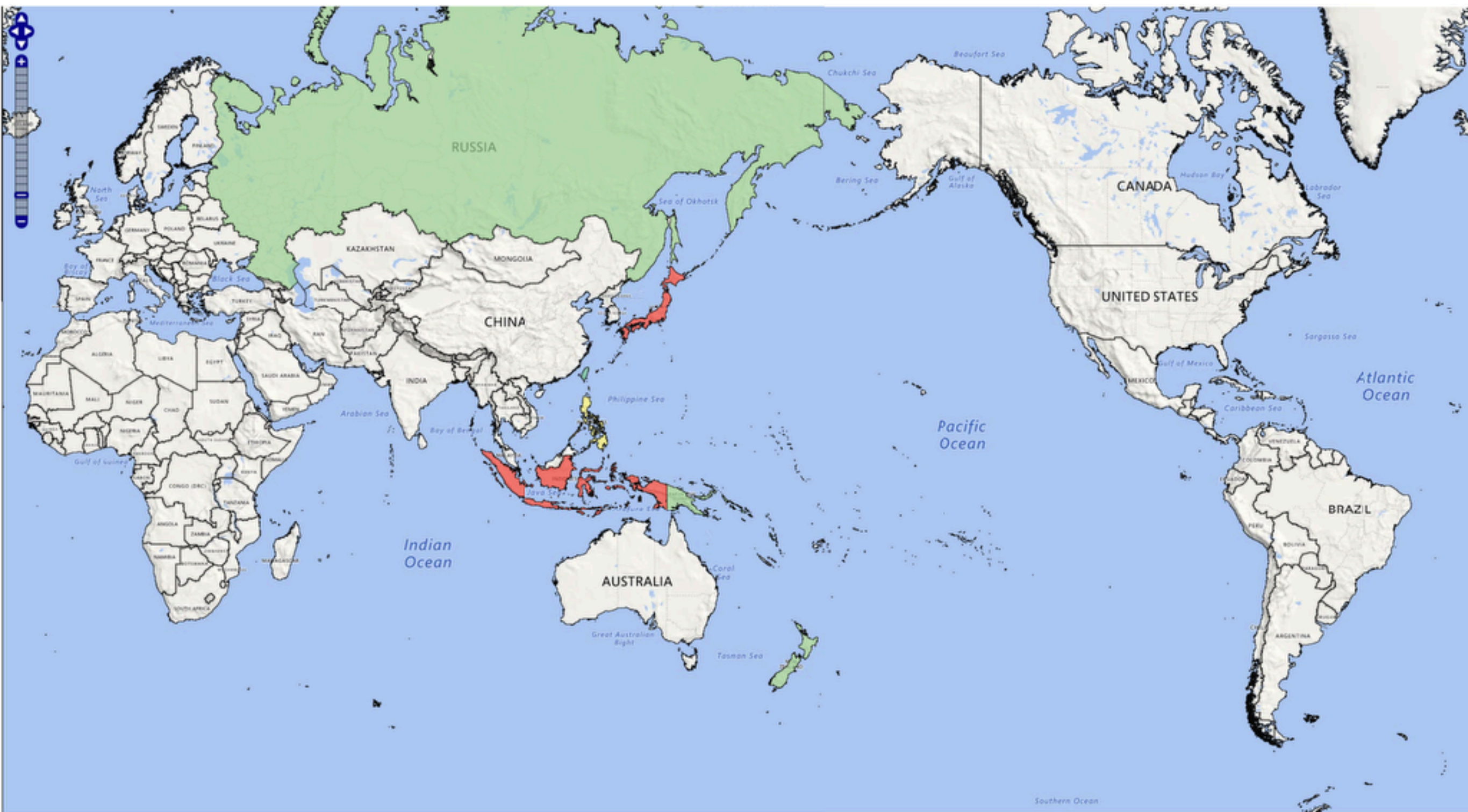
(1) "East Ikebukuro" : near Tokyo central area

(2)"Kinugaoka, Hachiouji" : hillside suburb area



# What is this hazard ?

Q1.



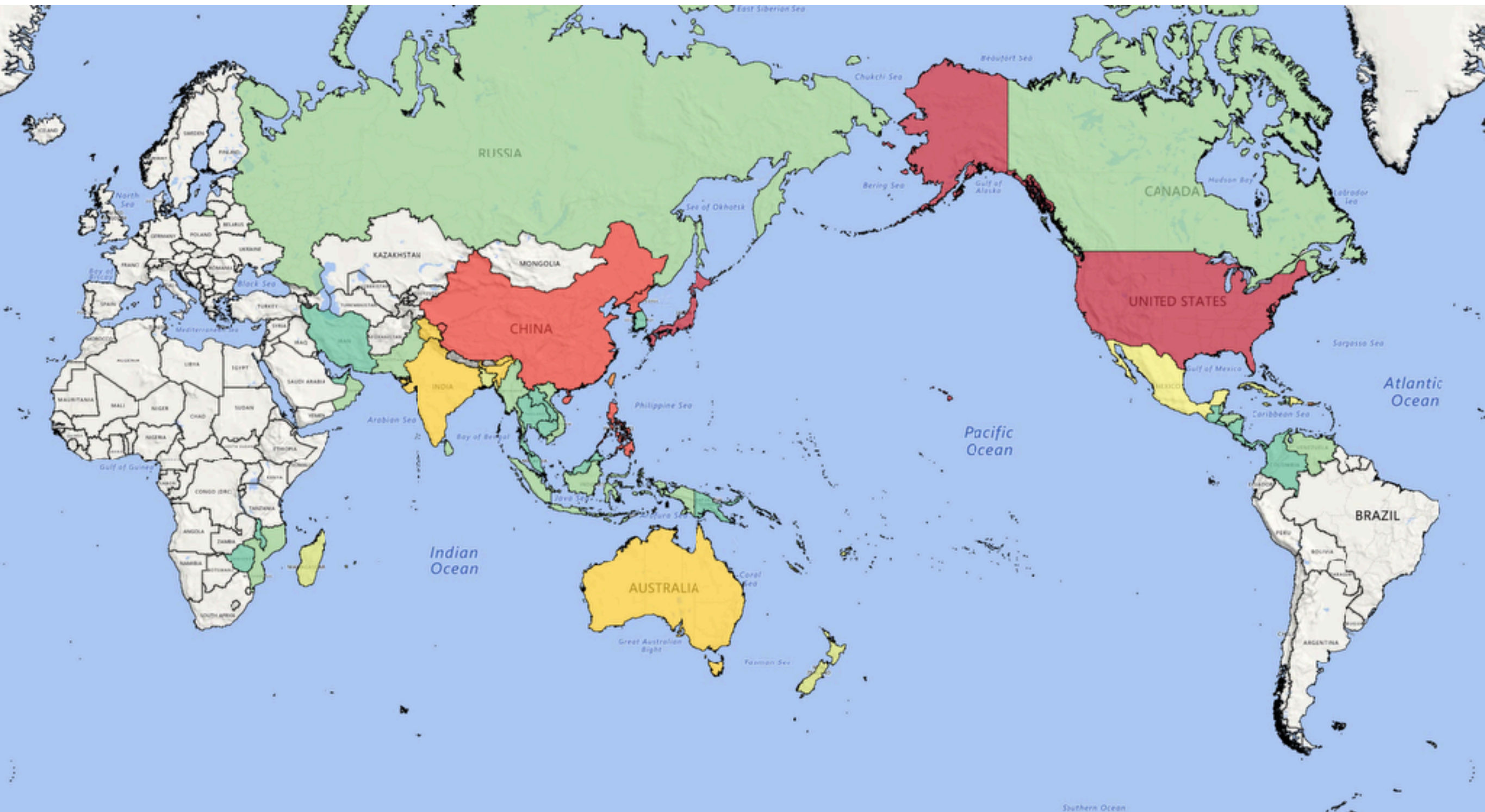
Seismic, Volcano, Cyclone

Source: EM-DAT Public, <https://public.emdat.be/>



Q2.

What is this hazard ?



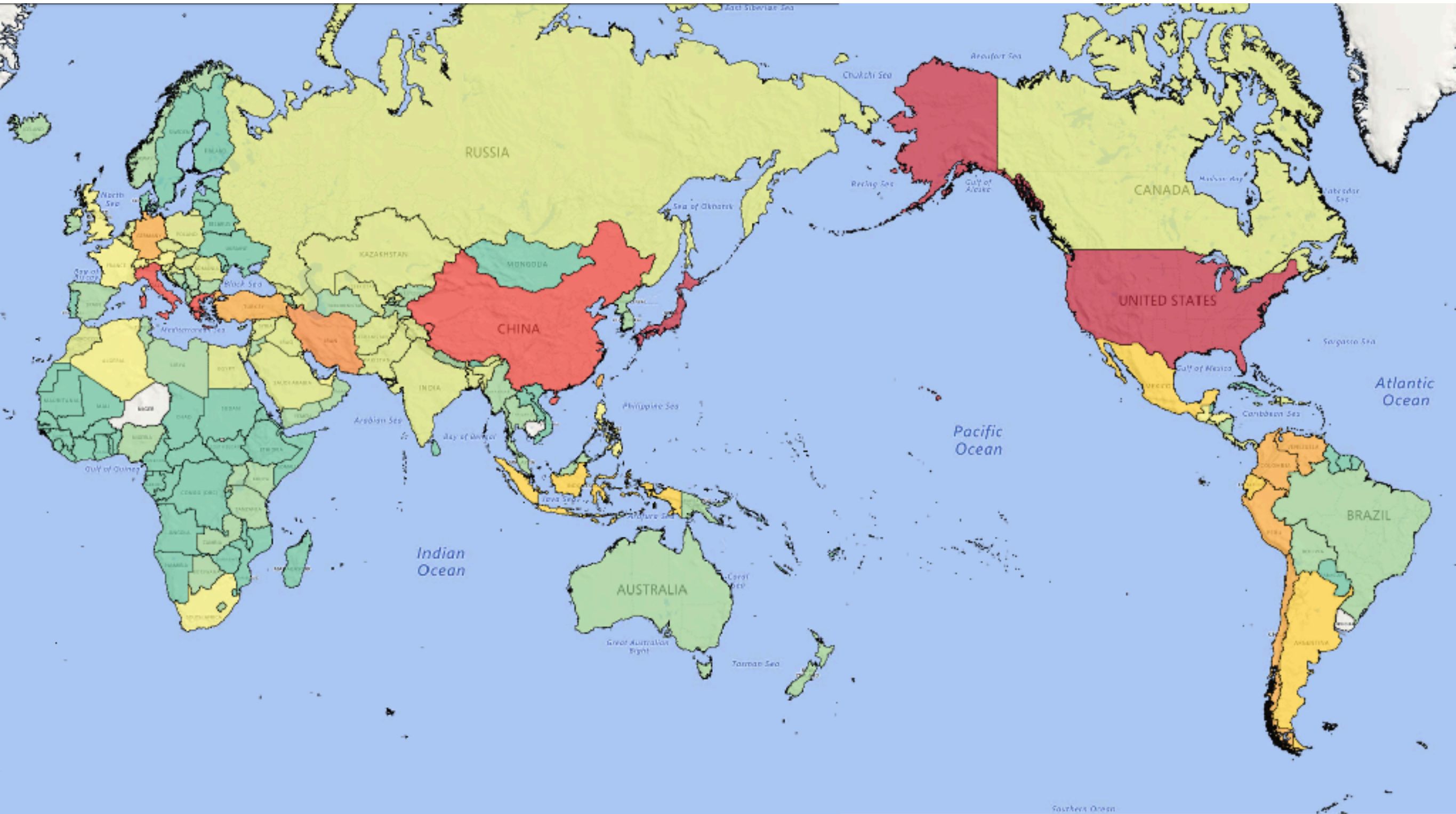
Seismic, Volcano, Cyclone

Source: EM-DAT Public, <https://public.emdat.be/>



# What is this hazard ?

Q3.



Seismic, Volcano, Cyclone

Source: EM-DAT Public, <https://public.emdat.be/>





Artwork credits

## Climate Change 2022: Impacts, Adaptation and Vulnerability

The Working Group II contribution to the IPCC Sixth Assessment Report assesses the impacts of climate change, looking at ecosystems, biodiversity, and human communities at global and regional levels. It also reviews vulnerabilities and the capacities and limits of the natural world and human societies to adapt to climate change.

### Summary for Policymakers

The Summary for Policymakers (SPM) provides a high-level summary of the key findings of the

### Technical Summary

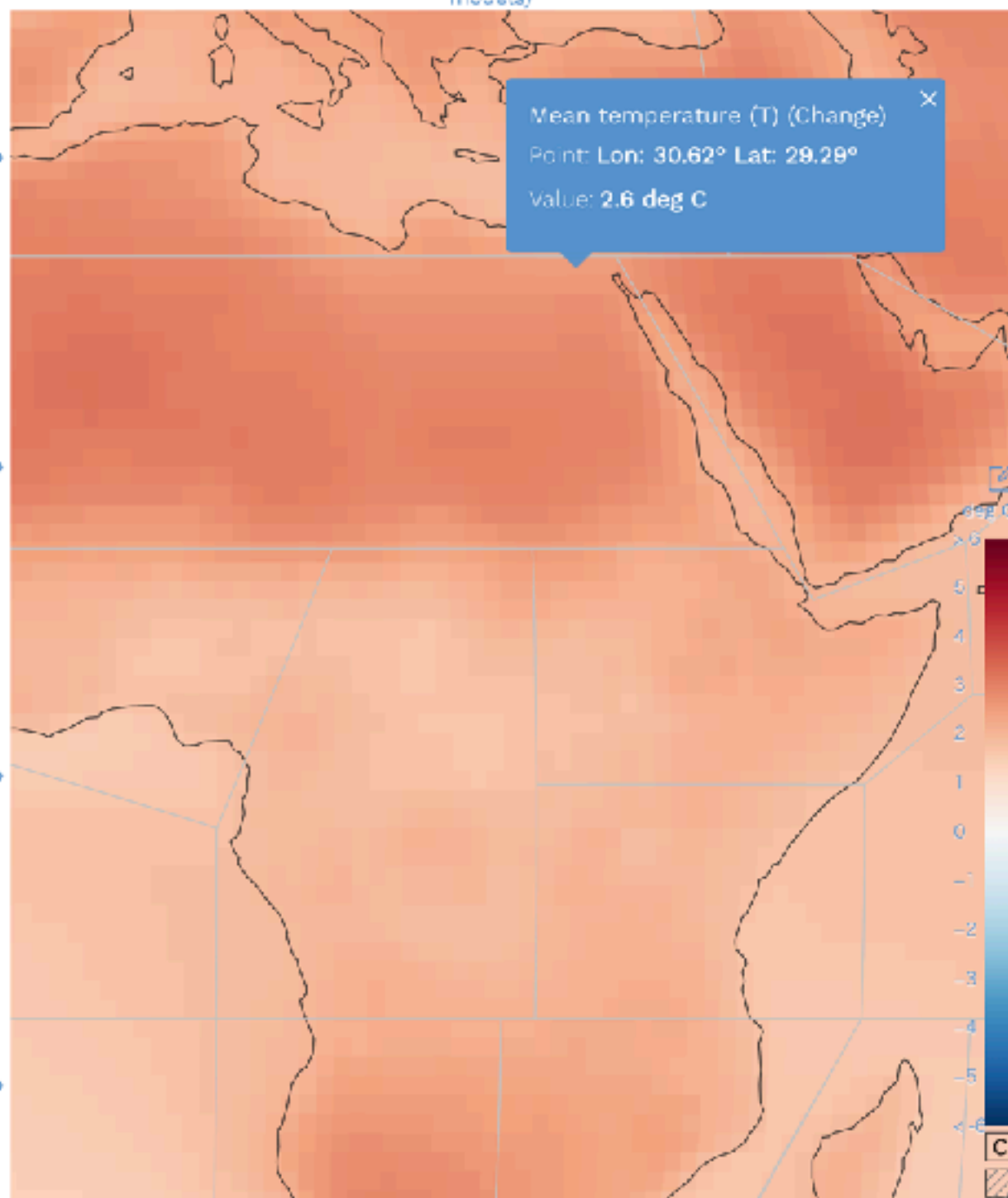
The Technical Summary (TS) provides extended summary of key findings and serves as a link

### Full Report

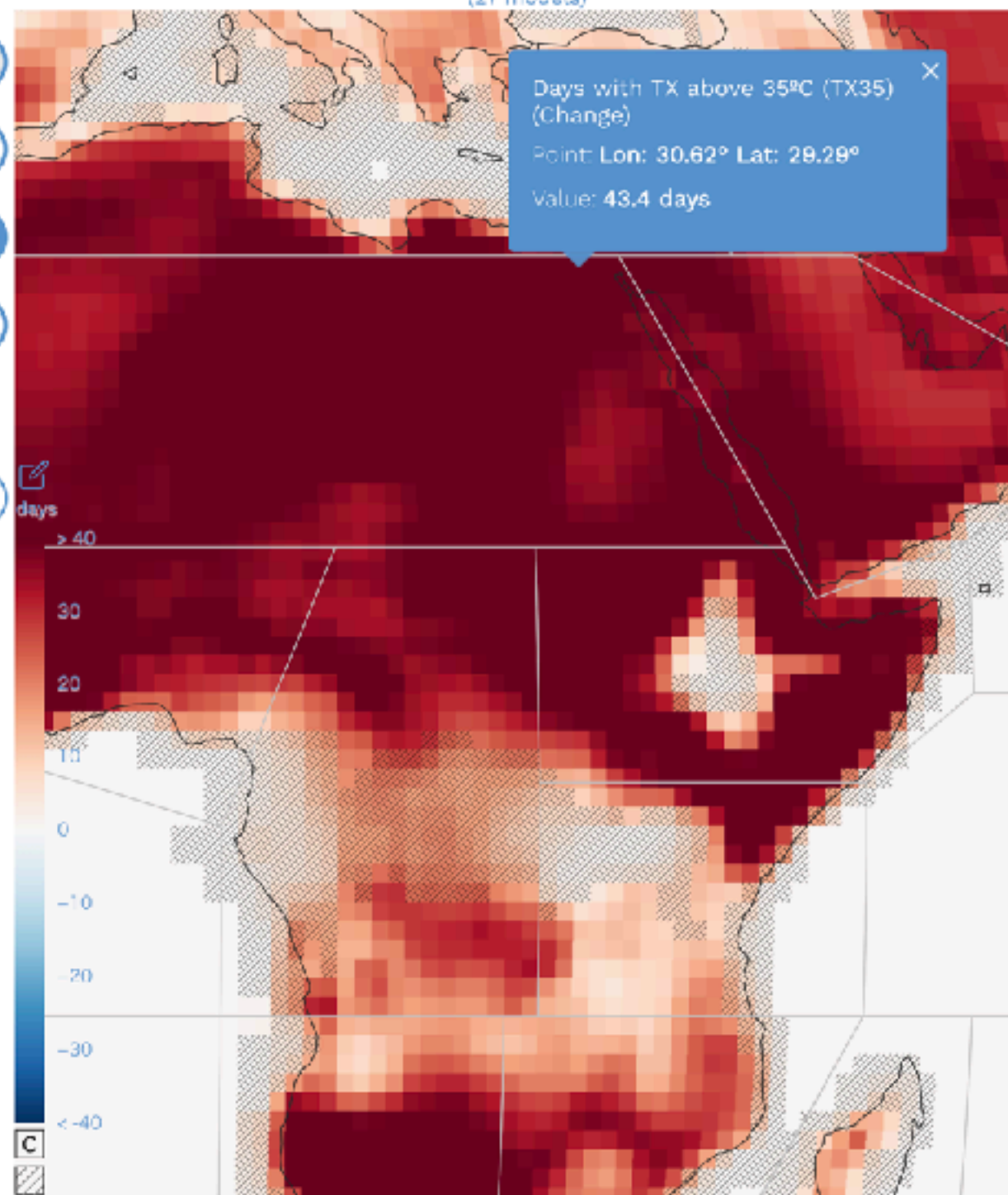
The 18 Chapters and 7 Cross-Chapter Papers of the Working Group II Report assess the impacts of



CMIP6 - Mean temperature (T) Change deg C Warming 2°C SSP5-8.5 (rel. to 1850-1900) - Annual (34 models)



CMIP6 - Days with TX above 35°C (TX35) Change days Warming 2°C SSP5-8.5 (rel. to 1850-1900) - Annual (27 models)





# Various Disaster in Japan

- Volcano Eruption
- Snow Damage
- Tunami (2011/3/11)
- Earthquake
- Flood by Typhoon (every year)
- Seasonal long rain
- Landslide

## 日本の 災害対策

### Disaster Management in Japan



A brochure made by Japan Central Government

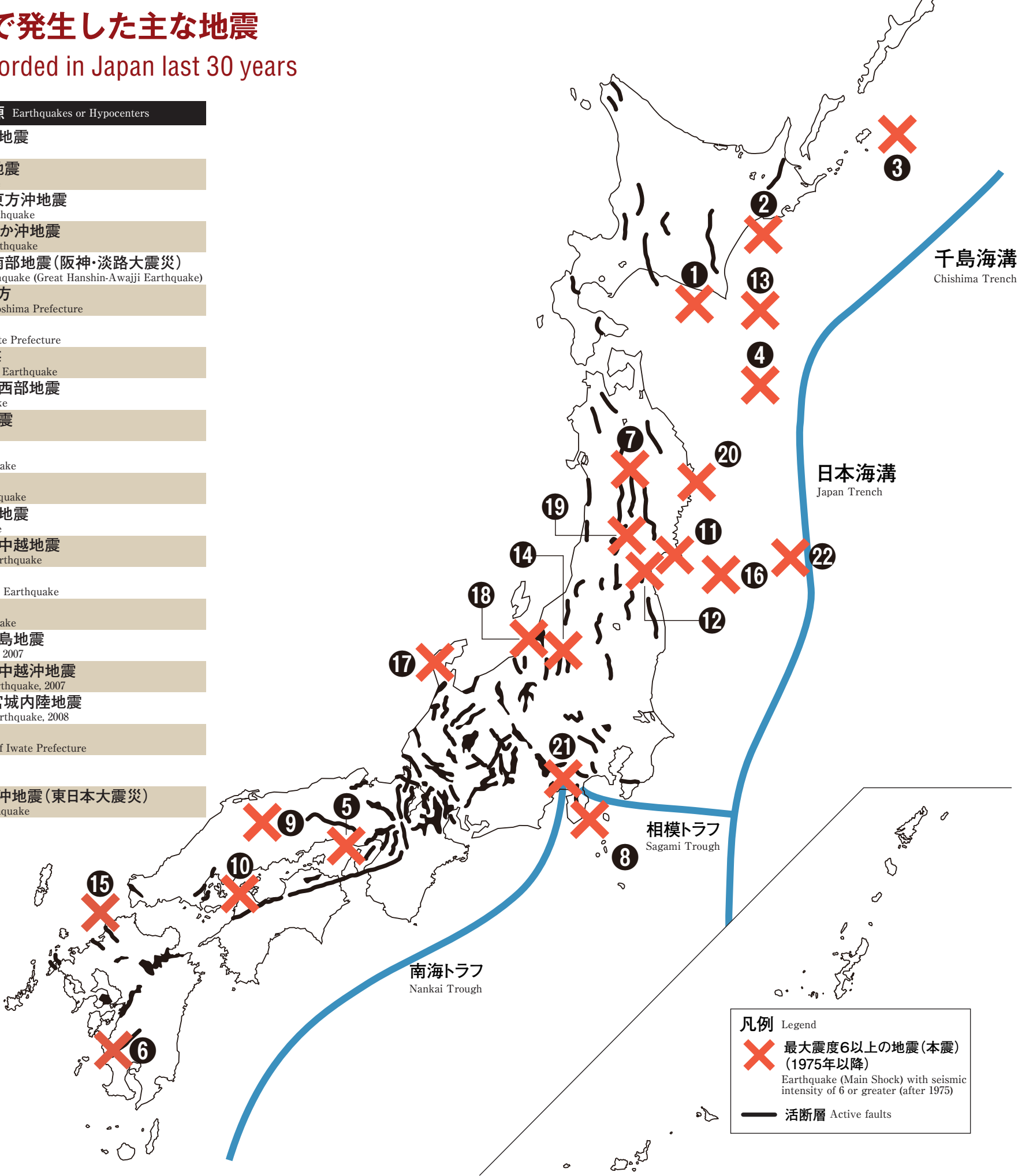




# 過去30年に日本で発生した主な地震

## Major Earthquakes recorded in Japan last 30 years

| 日付 | Date       | 地震名または震源               | Earthquakes or Hypocenters                                   |
|----|------------|------------------------|--|
| ①  | 1982.3.21  | 昭和57年浦河沖地震             | Uraga-oki Earthquake   |
| ②  | 1993.1.15  | 平成5年釧路沖地震              | Kushiro-oki Earthquake                                       |
| ③  | 1994.10.4  | 平成6年北海道東方沖地震           | Hokkaido-Toho-oki Earthquake                                 |
| ④  | 1994.12.28 | 平成6年三陸はるか沖地震           | Sanriku-Haruka-oki Earthquake                                |
| ⑤  | 1995.1.17  | 平成7年兵庫県南部地震 (阪神・淡路大震災) | Hyogo-ken-Nanbu Earthquake (Great Hanshin-Awajji Earthquake) |
| ⑥  | 1997.5.13  | 鹿児島県薩摩地方               | Satsuma region in Kagoshima Prefecture                       |
| ⑦  | 1998.9.3   | 岩手県内陸北部                | Northern region in Iwate Prefecture                          |
| ⑧  | 2000.7.1   | 新島・神津島近海               | Niijima and Kozushima Earthquake                             |
| ⑨  | 2000.10.6  | 平成12年鳥取県西部地震           | Tottori-seibu Earthquake                                     |
| ⑩  | 2001.3.24  | 平成13年芸予地震              | Geiyo Earthquake   |
| ⑪  | 2003.5.26  | 宮城県沖                   | Miyagi-ken-oki Earthquake                                    |
| ⑫  | 2003.7.26  | 宮城県北部                  | Northern Miyagi Earthquake                                   |
| ⑬  | 2003.9.26  | 平成15年十勝沖地震             | Tokachi-oki Earthquake                                       |
| ⑭  | 2004.10.23 | 平成16年新潟県中越地震           | Niigata-ken-Chuetsu Earthquake                               |
| ⑮  | 2005.3.20  | 福岡県西方沖                 | Fukuoka-ken-Seihou-oki Earthquake                            |
| ⑯  | 2005.8.16  | 宮城県沖                   | Miyagi-ken-oki Earthquake                                    |
| ⑰  | 2007.3.25  | 平成19年能登半島地震            | Noto-hanto Earthquake, 2007                                  |
| ⑱  | 2007.7.16  | 平成19年新潟県中越沖地震          | Niigata-Chuetsu-oki Earthquake, 2007                         |
| ⑲  | 2008.6.14  | 平成20年岩手・宮城内陸地震         | Iwate-Miyagi Inland Earthquake, 2008                         |
| ⑳  | 2008.7.24  | 岩手県沿岸北部                | Northern coastal area of Iwate Prefecture                    |
| ㉑  | 2009.8.11  | 駿河湾                    | Suruga Bay   |
| ㉒  | 2011.3.11  | 東北地方太平洋沖地震 (東日本大震災)    | Great East Japan Earthquake                                  |



# Disaster

Climate Change

Ground  
Subsidence

Environmental Pollution

Catastrophic Volcanic Eruption

Famine

Volcanic  
Eruption

Supernova  
Explosions

Floods  
Cyclone

Tunami

Earthquake

Astronomical Conflicts

How to conceptualize!?



# Disaster

Climate Change

Ground  
Subsidence

Environmental Pollution

Catastrophic Volcanic Eruption

Famine

Volcanic  
Eruption

Supernova  
Explosions

Floods  
Cyclone

Tunami

Earthquake

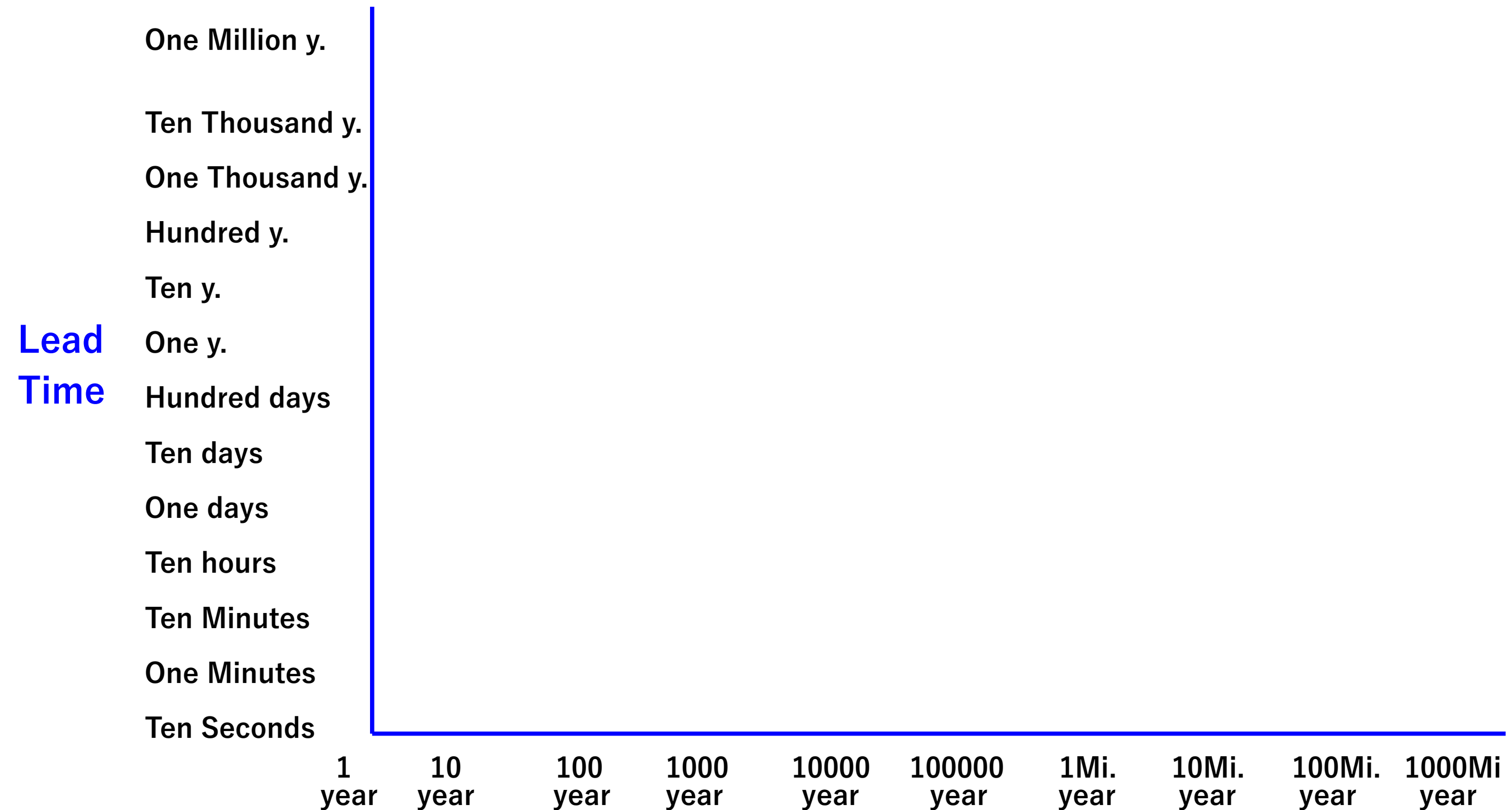
Astronomical Conflicts

How to conceptualize!?



# Disaster : How to conceptualize!?

Two Axes



Scale and Frequency Time



# Disaster : How to conceptualize!?

One Million y.

Ten Thousand y. **Environmental**

One Thousand y. **Issues**

Hundred y.

Ten y.

One y.

Hundred days

Ten days

One days

Ten hours

Ten Minutes

One Minutes

Ten Seconds

**Natural  
Disaster**

**Catastrophic  
Disaster**

1  
year

10  
year

100  
year

1000  
year

10000  
year

100000  
year

1Mi.  
year

10Mi.  
year

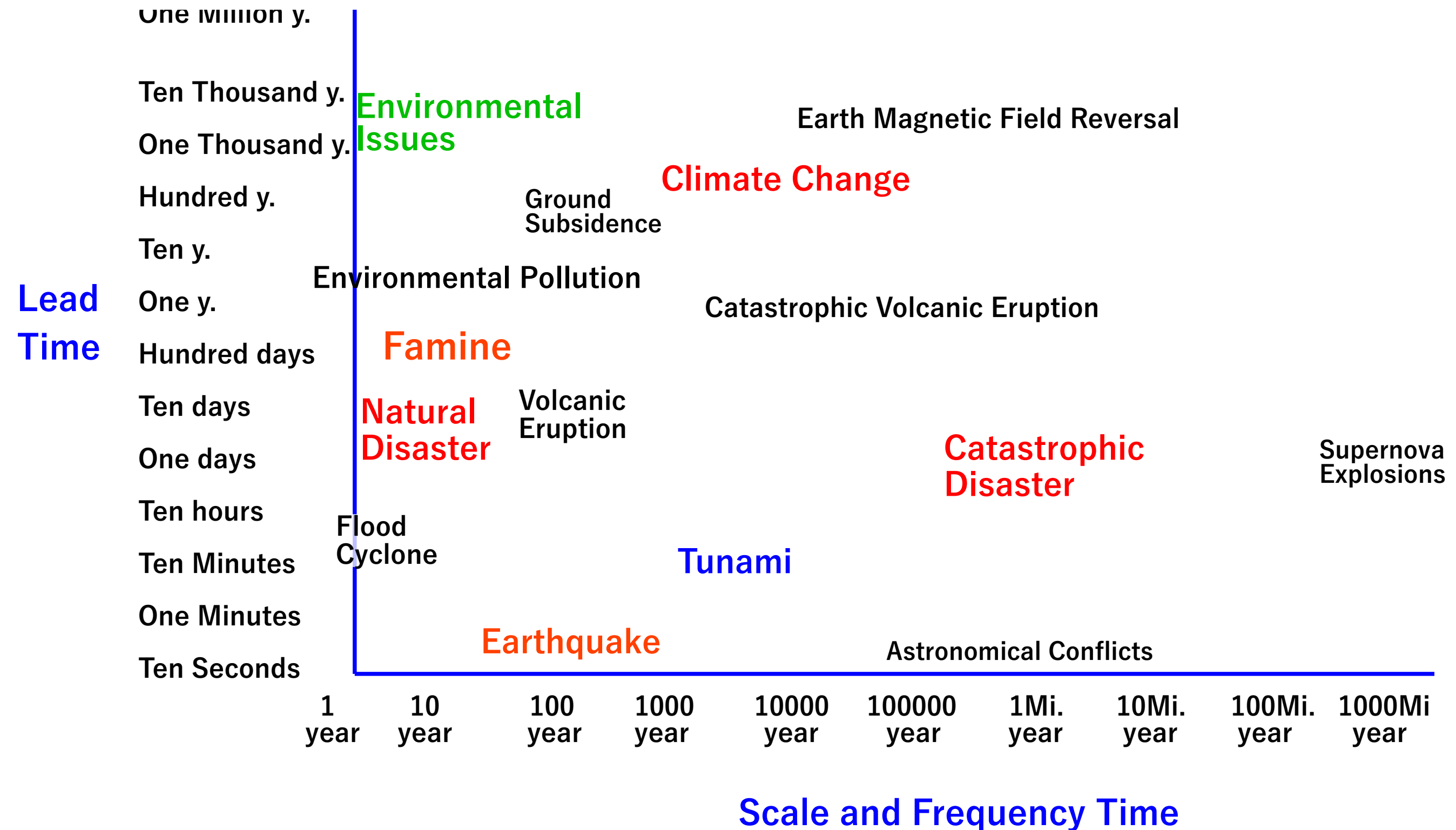
100Mi.  
year

1000Mi  
year

**Scale and Frequency Time**

**Lead  
Time**

# Disaster : How to conceptualize!?



# Disaster : How to conceptualize!?

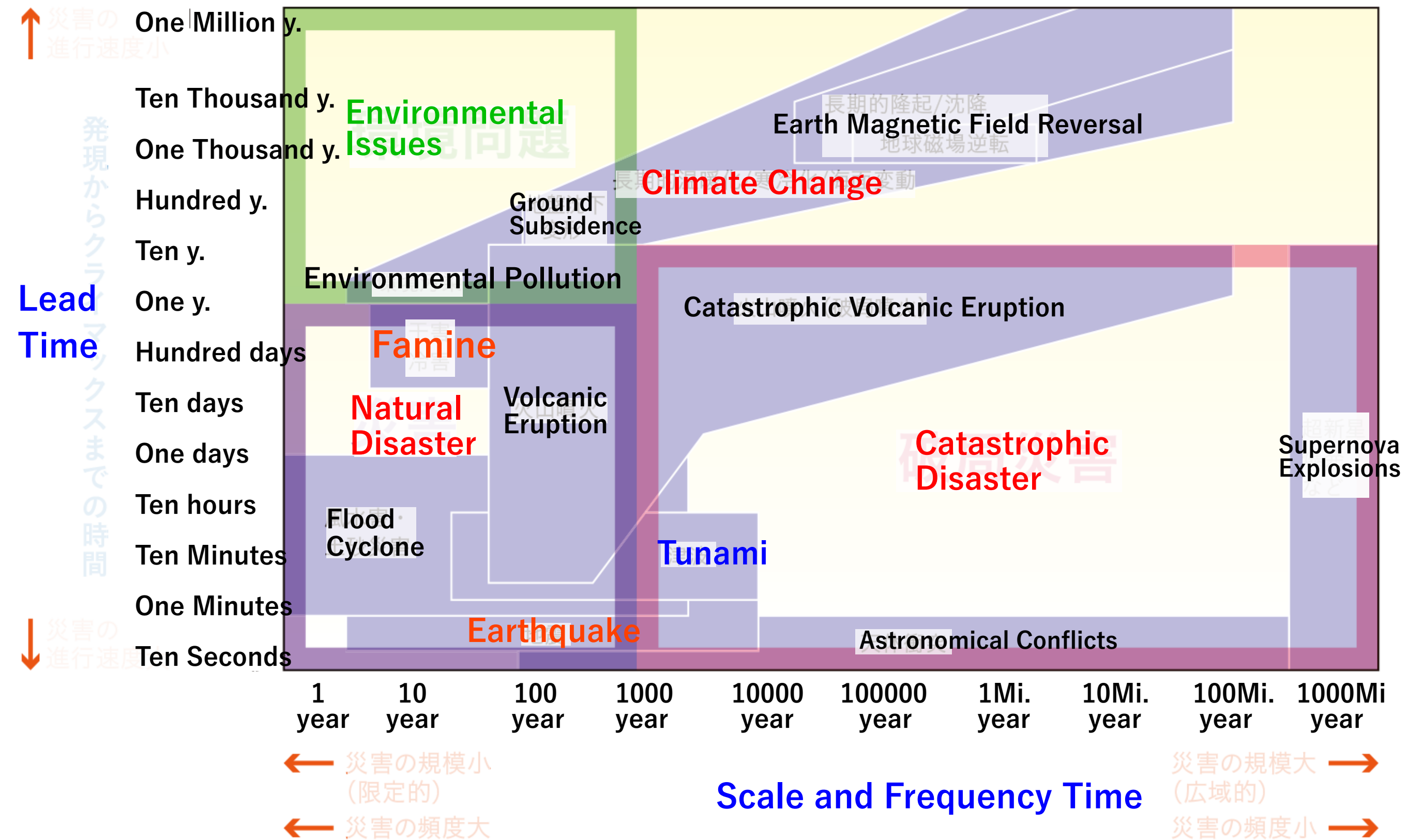


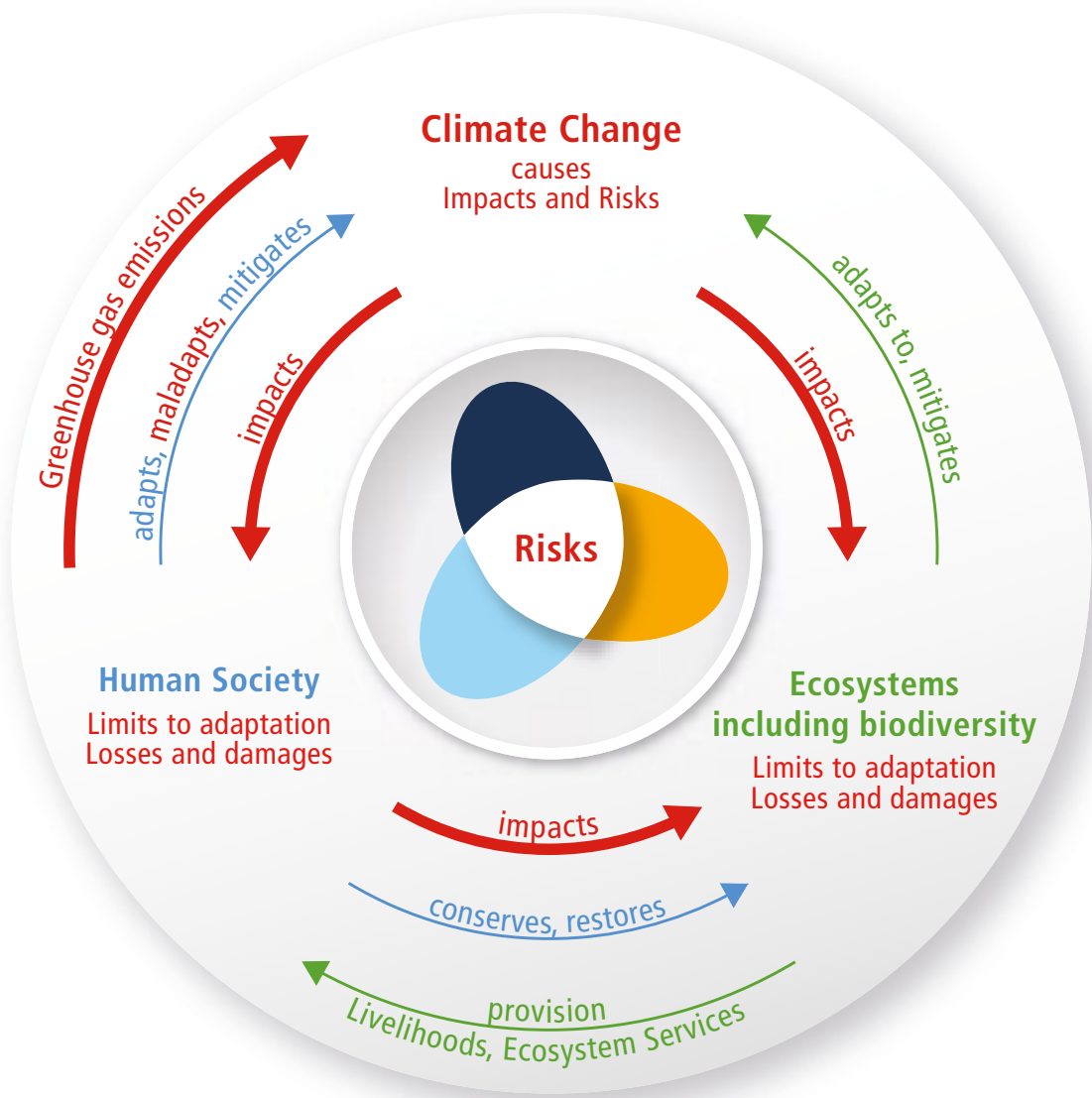
図1 自然災害の規模・頻度・立ち上がり時間の関係 (文献<sup>(1)</sup>の図を修正)

Masato Koyama 2019



From climate risk to climate resilient development: climate, ecosystems (including biodiversity) and human society as coupled systems

(a) Main interactions and trends

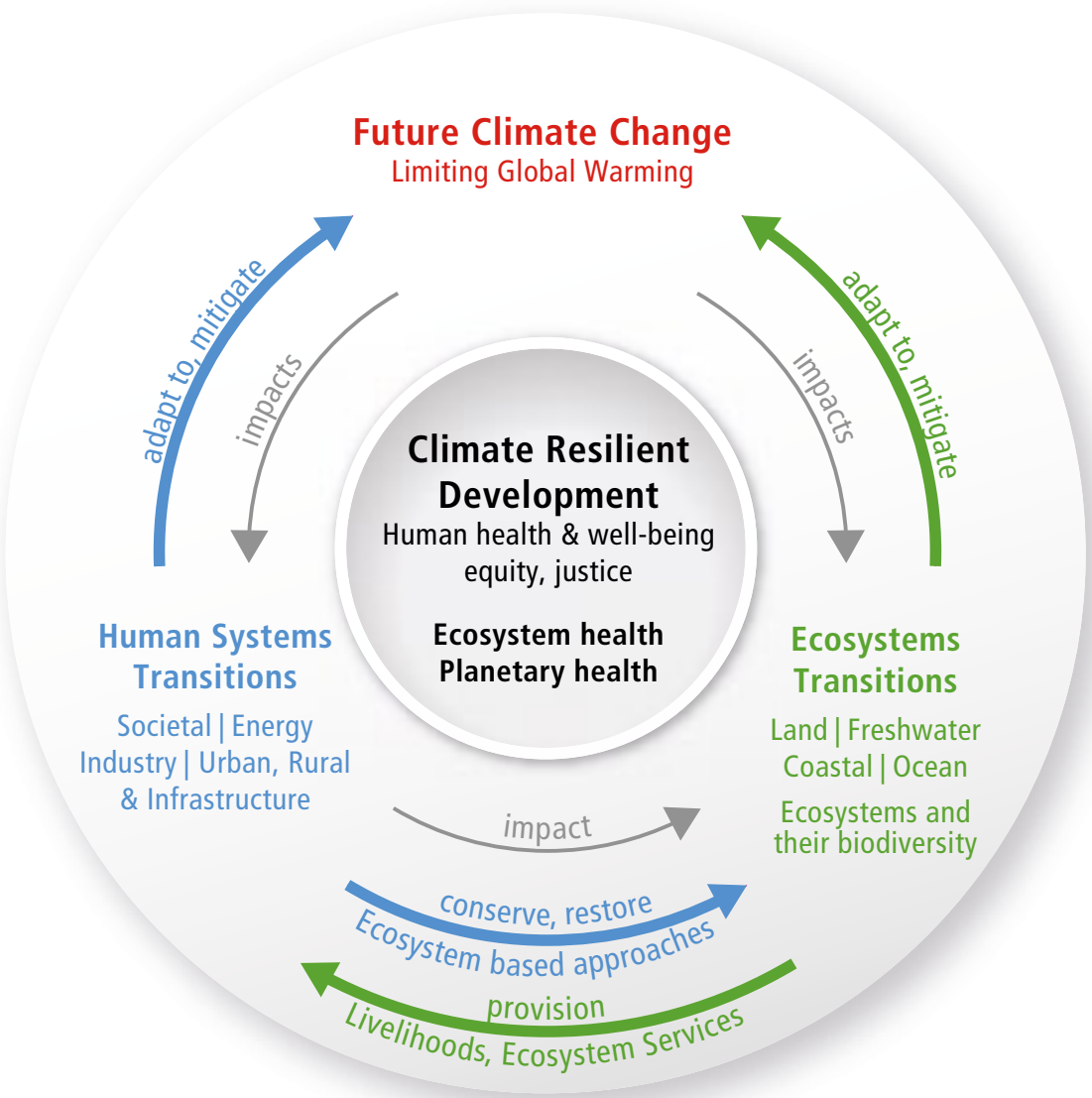


(b) Options to reduce climate risks and establish resilience

From urgent to  
timely action

►

Governance  
Finance  
Knowledge and capacity  
Catalysing conditions  
Technologies



The risk propeller shows that risk emerges from the overlap of:



# Action to **Climate Resilient** Development by IPCC

1

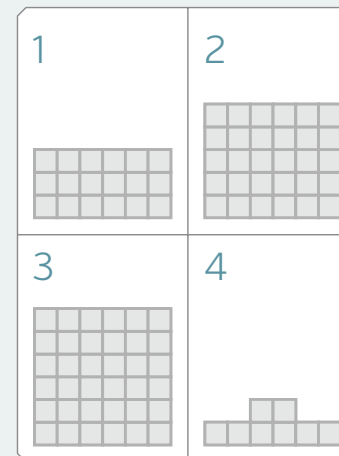


2

*Increased Exposure  
and Vulnerability*

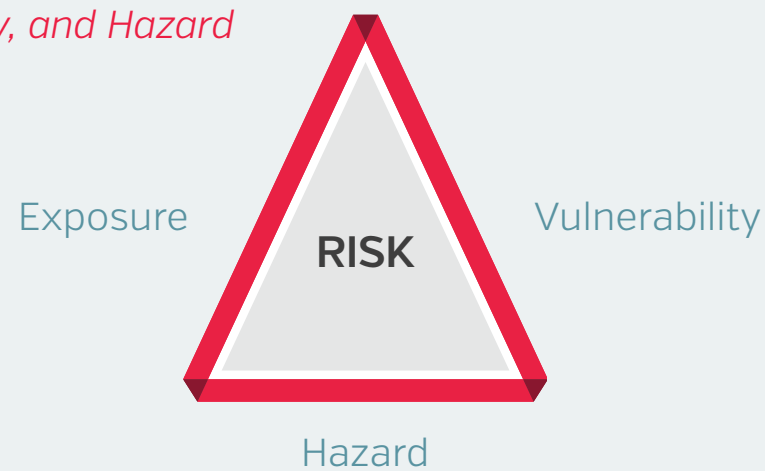


Comparing Risk



3

*Increased Exposure,  
Vulnerability, and Hazard*



4

*Reduced Exposure  
and Vulnerability*



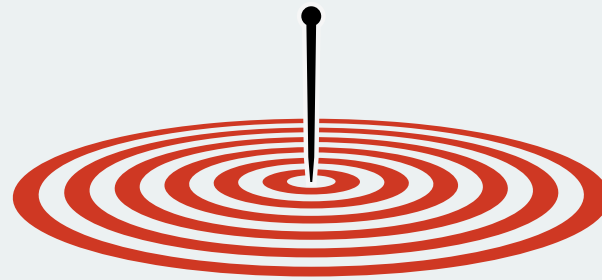
Risk as a function of hazard, exposure, and vulnerability.



# The Components for Assessing Risk

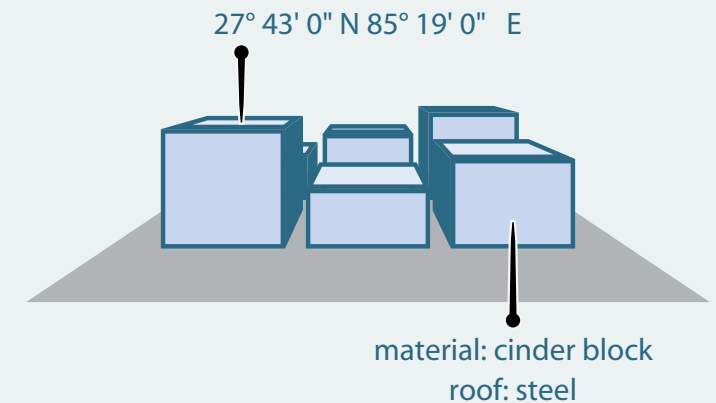
## HAZARD

The likelihood, probability, or chance of a potentially destructive phenomenon.



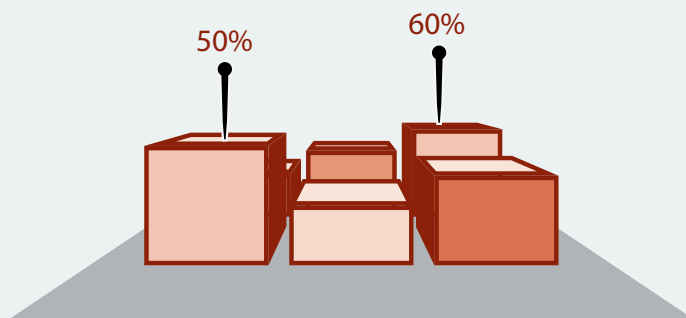
## EXPOSURE

The location, attributes, and values of assets that are important to communities.



## VULNERABILITY

The likelihood that assets will be damaged or destroyed when exposed to a hazard event.



## IMPACT

For use in preparedness, an evaluation of what might happen to people and assets from a single event.



## RISK

Is the composite of the impacts of **ALL** potential events [100s or 1,000s of models].



The components for assessing risk.

$$R(D)=H\times V$$

R:Risk, H:Hazard, V:Vulnerability

◎Definition of Vulnerability :

The characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (Ben Wisner,1994)

# At Risk

## Second edition

Natural hazards, people's vulnerability and disasters

東京都立大学付属図書館  
☎ 0426-77-2404



00-713-332-8

Ben Wisner, Piers Blaikie, Terry Cannon, and Ian Davis







# Vulnerability to Resiliency

## 1. Academic discussion

- It is similar meaning both Vulnerability and Resiliency
- Actually, there is some kinds of academic papers.

i.e.

Kathleen Tierney(2014) The Social Roots of Risk, Stanford University press

Fiona Miller , Henny Osbahr, et.al.(2010 )Resilience and Vulnerability: Complementary or Conflicting Concepts?

<https://www.ecologyandsociety.org/vol15/iss3/art11/>

## 2. In my presentation

- Resilience means community activities toward disaster prevention which was advanced through the concept of vulnerability.



# **Case study for Resilient vicinity community**

## **1. "East Ikebukuro" : near Tokyo central area**

- High wooden housing density that is fragile for ground shaking and a fire
- Disaster prevention projects has been conducting since mid 1980's.
- In 2018, resilient community workshops were worked on.experts

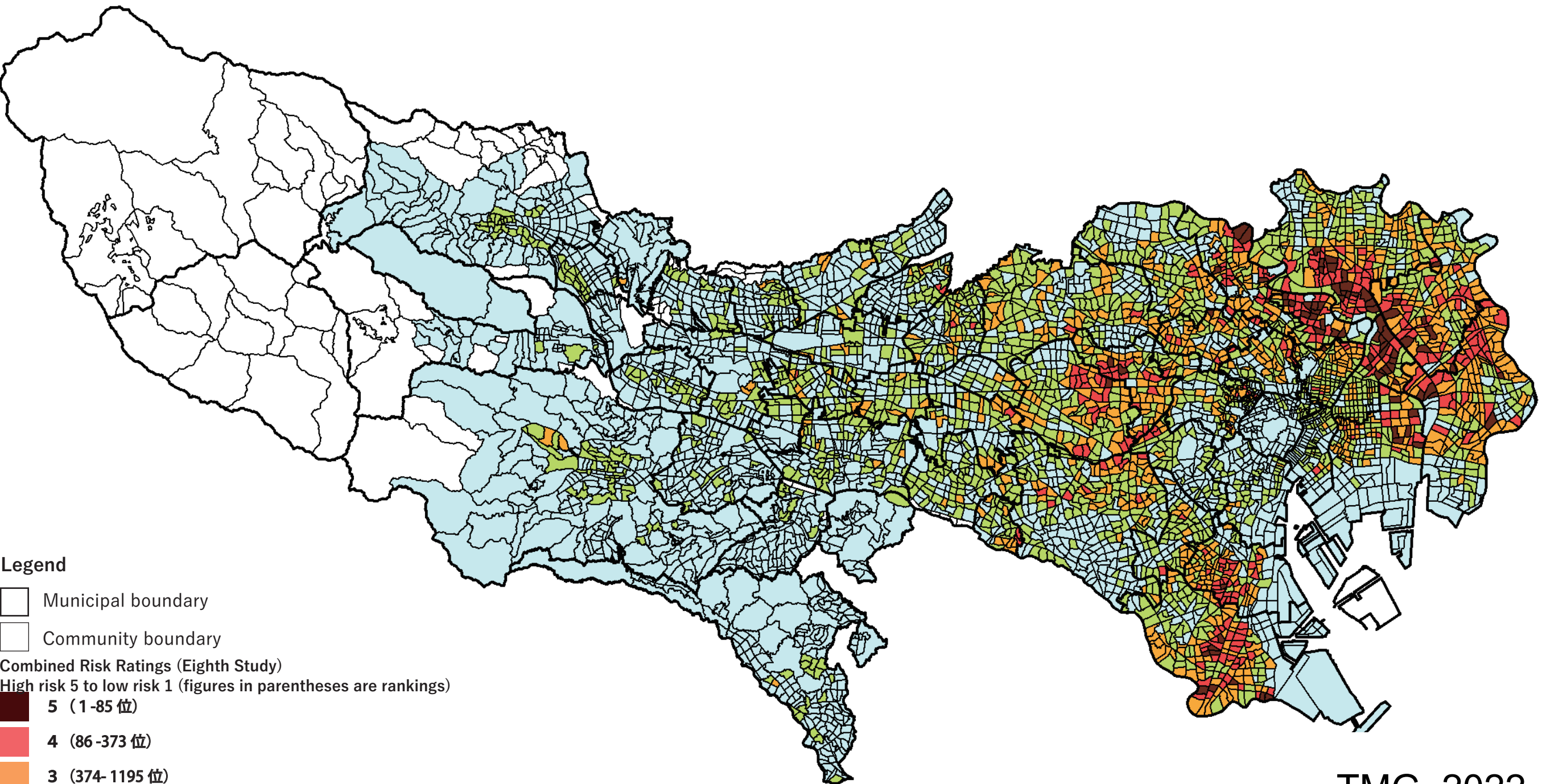
## **2. "Kinugaoka, Hachiouji" : hillside suburb area**

- Large-scale residential development since 1970's which have a landslide risk due to steep terrain
- Middle income families purchased and make a vicinity community.
- In 2019, disaster life-continuity workshops were worked on.

# Earthquake Risk Assessment 2022

## Map of Combined Risk Ratings

Communities with high combined risk are found in the Shitamachi area along the Arakawa and Sumida rivers, as well as from southwestern Shinagawa-ku to Ota-ku, and from Nakano-ku to eastern Suginami-ku.



### Legend

- Municipal boundary
- Community boundary

### Combined Risk Ratings (Eighth Study)

High risk 5 to low risk 1 (figures in parentheses are rankings)

- 5 (1-85 位)
- 4 (86-373 位)
- 3 (374-1195 位)
- 2 (1196-2848 位)
- 1 (2849-5192 位)

TMG, 2022





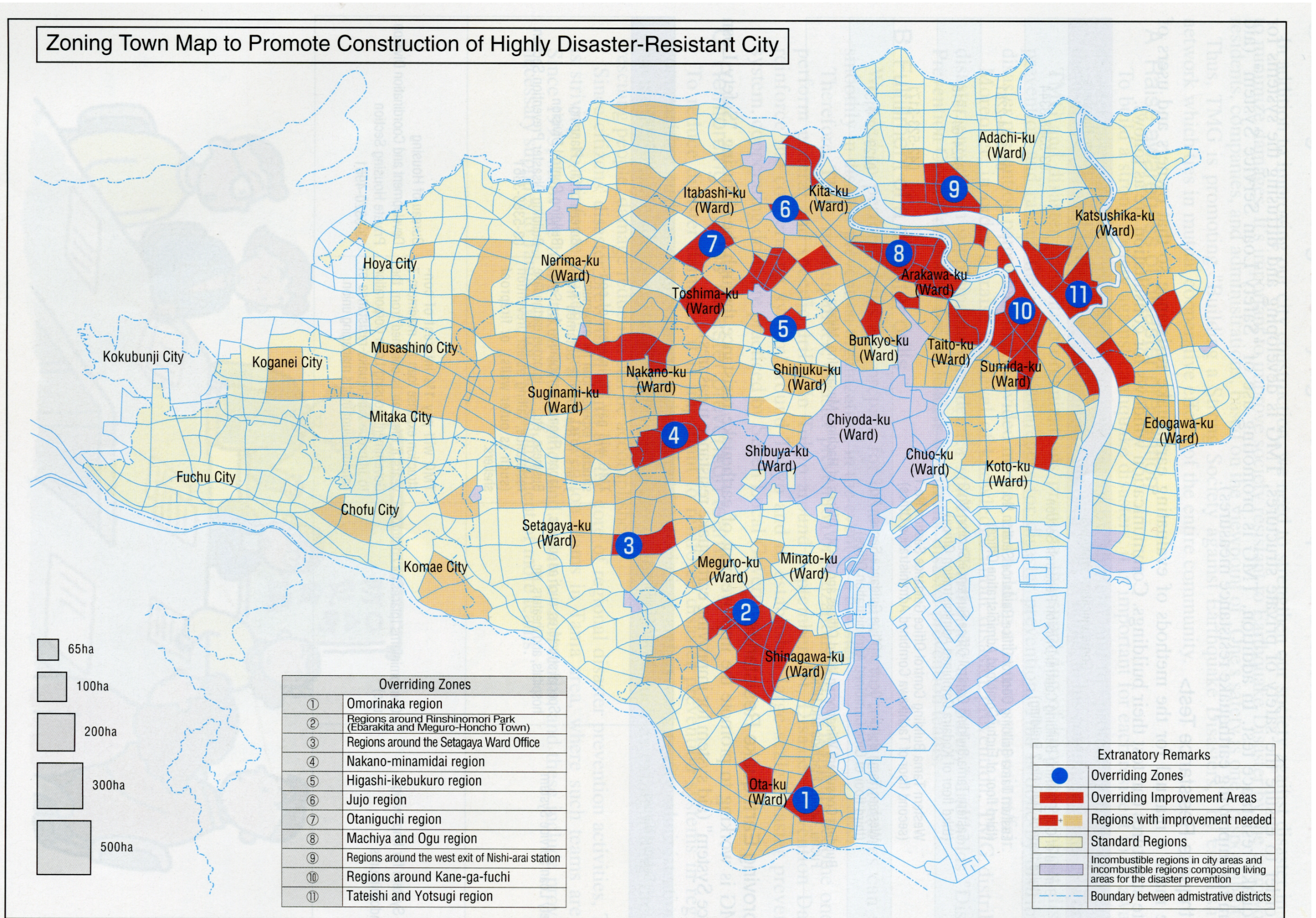
# The great fire after Hanshin-Awaji earthquake



阪神・淡路大震災（1995年1月17日5:47），灘区六甲台午前7時頃



# Rehabilitation projects for disaster prevention (1981~)



Note: Incombustible District Percentages

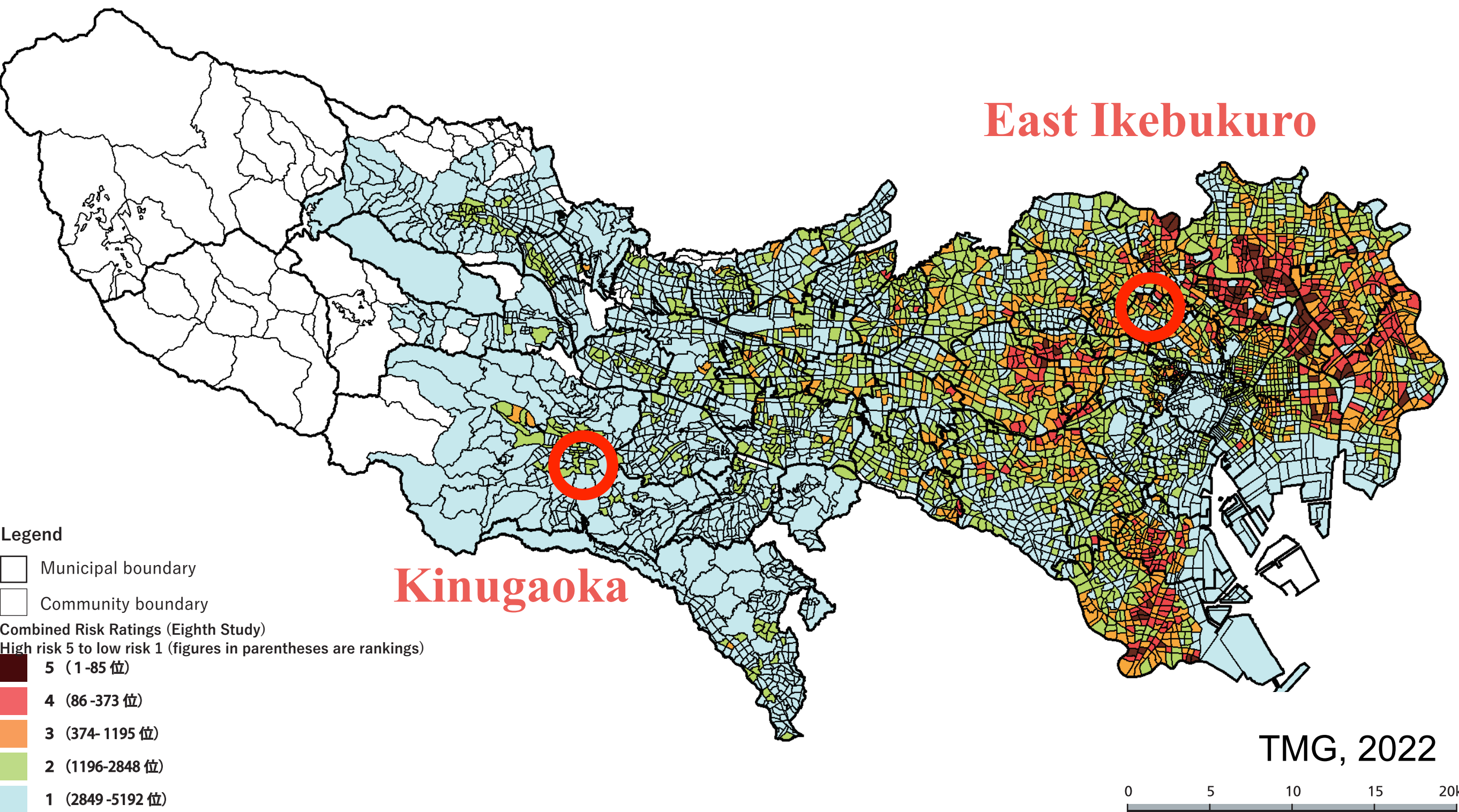
An index to measure incombustible rates of regions. Incombustible percentage is based on the building area of combustible structures and the area of empty lots. When the Incombustible District Percentage is over 40%, the rate of spreading fire is sharply reduced. In towns where the incombustible percentage reaches 70%, fire will hardly spread at all.



# Earthquake Risk Assessment 2022

## Map of Combined Risk Ratings

Communities with high combined risk are found in the Shitamachi area along the Arakawa and Sumida rivers, as well as from southwestern Shinagawa-ku to Ota-ku, and from Nakano-ku to eastern Suginami-ku.



# Total Workshop Program & Results in East Ikebukuro(1/2)

## 1. Goal

- Verifying disaster prevention projects over 30 years and developing life continuation and town recovery plans after disasters

## 2. Participants

- Resident leader about 20 people
- Local government officials about 10 people
- Various practitioners about 10 people
- Helper students about 10 people





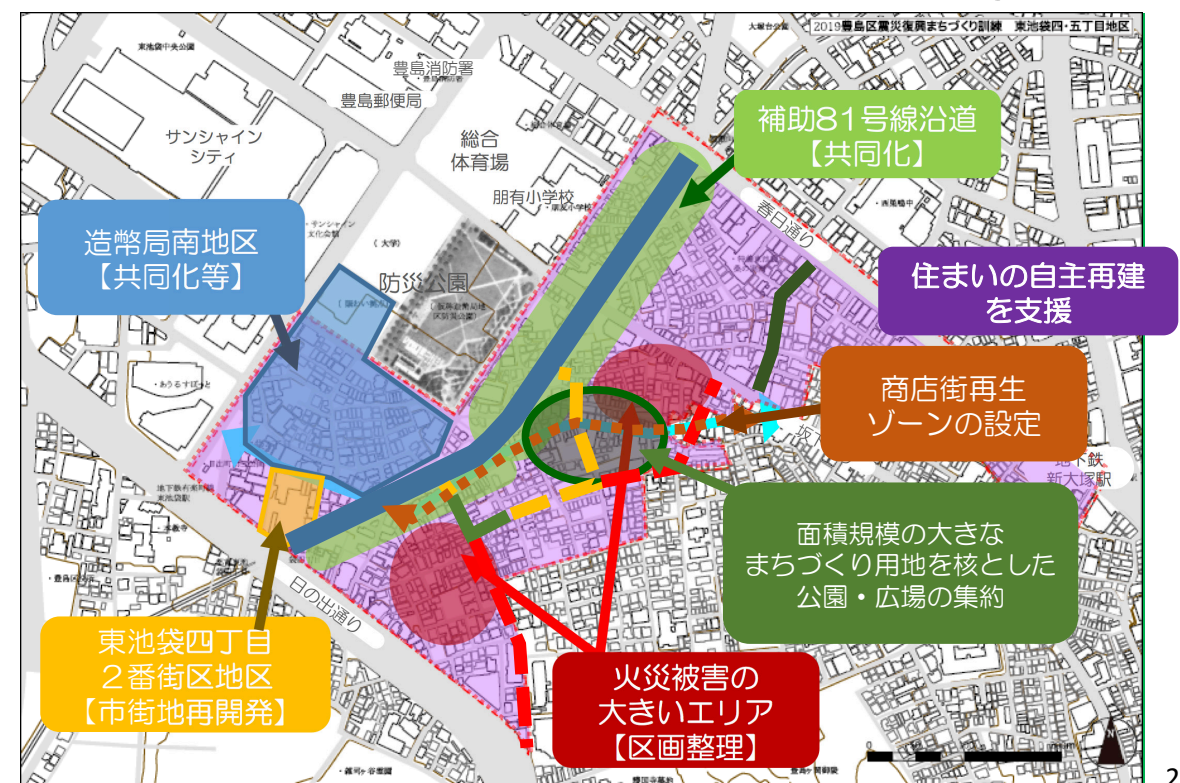
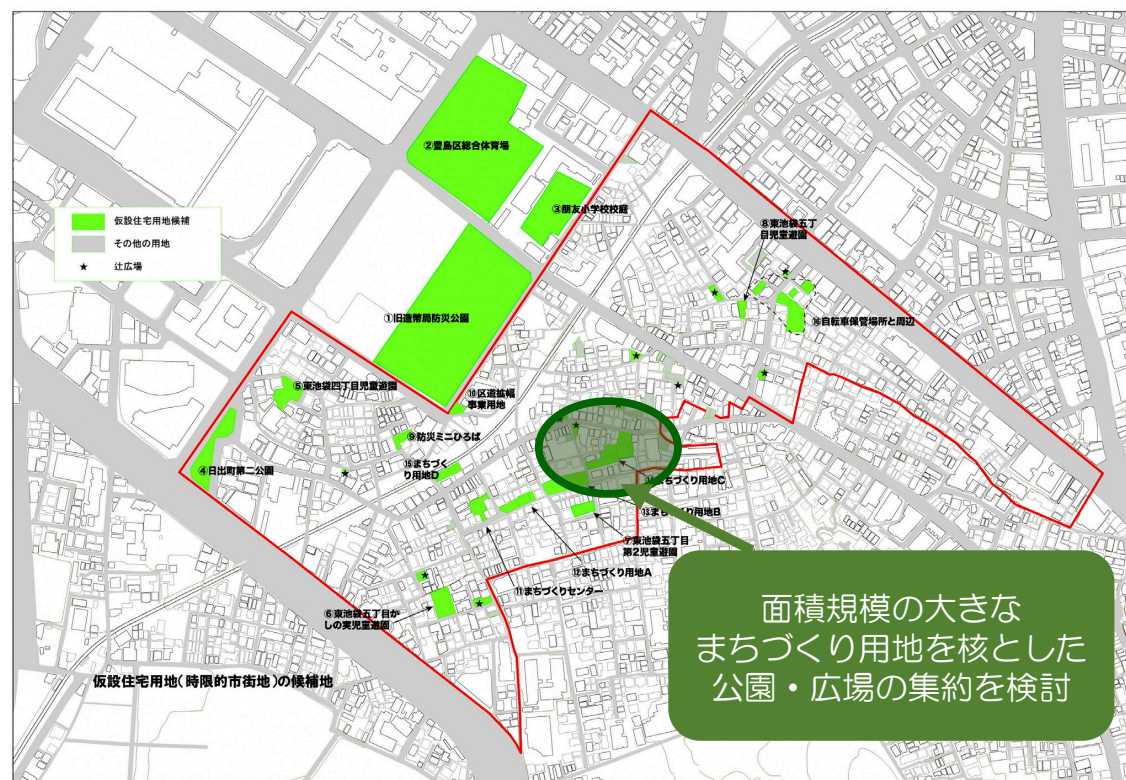
# Total Workshop Program & Results in East Ikebukuro(2/2)

## 1. Program

- 1st:** Town walking and drawing a map
- 2nd:** Imagine succession from evacuation to a long-term recovery
- 3rd:** Designing temporary shelter
- 4th:** Considering town-recovery plan by photo collage

## 2. Goal outputs

- Drawing a verification map of projects results about 30 years
- Formulating pre-disaster plan for post-disaster recovery























Widening road and Updated residential architectures





Water for fire prevention





Neighborhood Evacuation Sites developed



 Danger  
 Safety

B

東池第5回

南

震災時に問題となる被害は？

5. 10年 =  
庚子年、  
辛丑、壬寅

天恩  
一考心記

200. 200. 200.

天にもも課税は

彭氏

702 2 2002

7649

名茶名錄

十坊磨田

高底鞋 高底鞋

雪后记游

3000000

7474511

प्रतिपदः

の不定積分がわからず  
2.11

高橋街

4/14/2014

526

1

連番座り

\_\_\_\_\_

U

陈天华

(4)

5

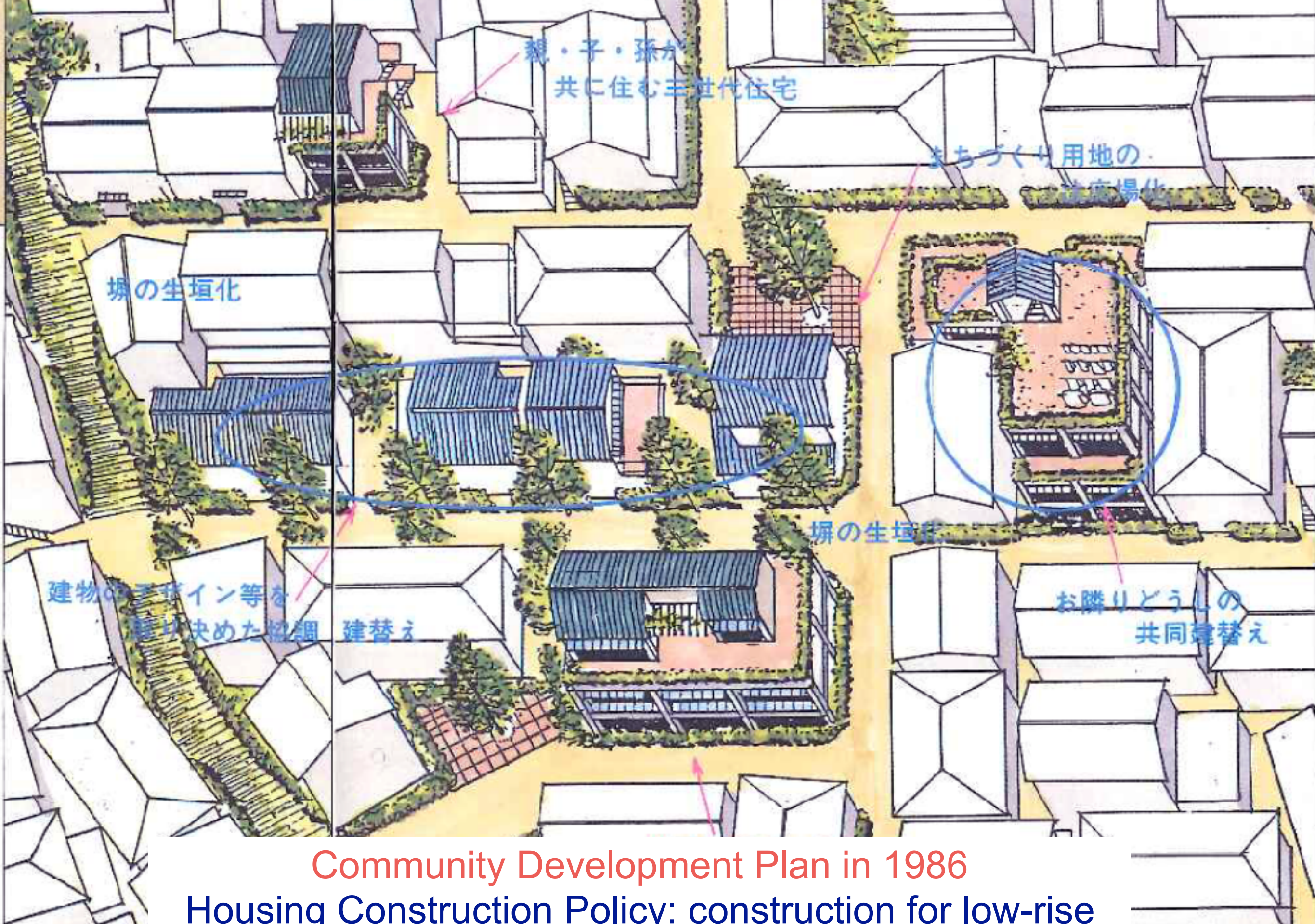
The results of the 1st workshop also served as confirmation of the results of the community projects over the past 30 years. It was an opportunity to review the community plan and reflect on the community's efforts to date.



## Community Development Plan in 1986







## Community Development Plan in 1986

Housing Construction Policy: construction for low-rise residential buildings based on a three-story structure.





Widening road and Updated residential architectures





Updated residential architectures





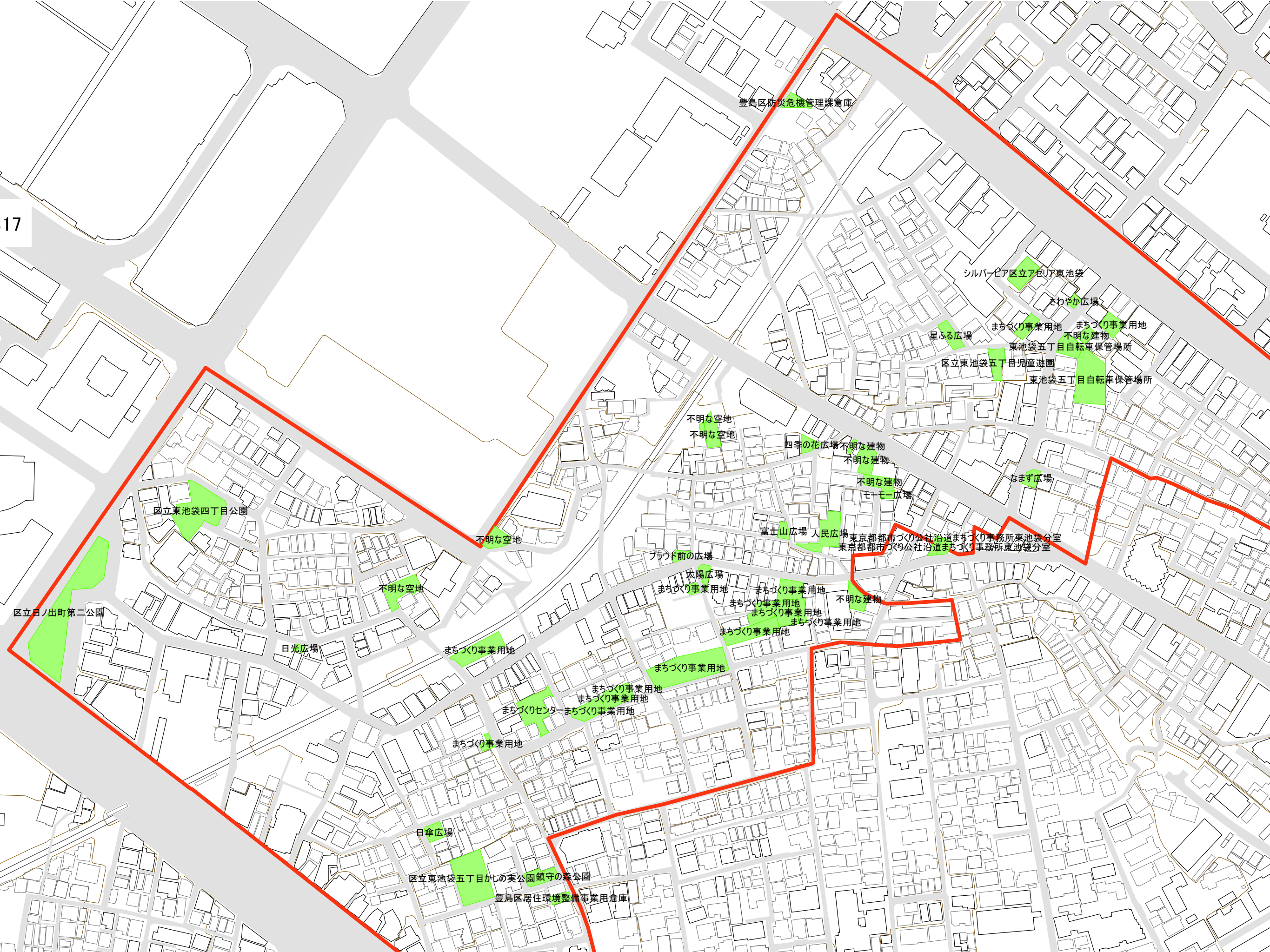
Around the footprint of the high-rise building, green spaces was installed and maintained.



# Today, I will focus on the following points

1. How developed parks and open-spaces can be an effective resource in times of disaster that in the restoration phase in addition to the immediate response phase?
  2. How are these parks and open-spaces utilized under normal circumstances?
- The system is effective in times of disaster if it can be utilized under normal circumstances.





豊島区防災危機管理課倉庫

シルバーピア区立アゼリア東池袋

さわやか広場

星ふる広場

まちづくり事業用地

まちづくり事業用地

不明な建物

東池袋五丁目自転車保管場所

区立東池袋五丁目児童遊園

東池袋五丁目自転車保管場所

不明な空地

不明な空地

四季の花広場

不明な建物

不明な建物

不明な建物

モーニング広場

なまず広場

区立東池袋四丁目公園

不明な空地

富士山広場

人民広場

東京都都市づくり公社治道まちづくり事務所東池袋分室

東京都都市づくり公社治道まちづくり事務所東池袋分室

プラウド前の広場

太陽広場

まちづくり事業用地

まちづくり事業用地

まちづくり事業用地

まちづくり事業用地

まちづくり事業用地

不明な建物

まちづくり事業用地

まちづくり事業用地

まちづくり事業用地

まちづくりセンター

まちづくり事業用地

まちづくり事業用地

日光広場

不明な空地

まちづくり事業用地

日傘広場

区立東池袋五丁目かしの実公園鎮守の森公園

豊島区居住環境整備事業用倉庫

区立日ノ出町第二公園





Square maintained green by resident volunteers.





Paved streets and plazas and updated storefront architecture





Mochitsuki (rice cake pounding) festival held every year in community play park





In addition to the elderly, children and their parents who have moved into new housing also participate.



# Total Workshop Program & Results in Kinugaoka (1/2)

## 1. Goal

- Coming up with the adaptation scenario for landslide risk and natural disasters

## 2. Participants

- Resident leader & general neighbors about 30 people
- Local government officials about 10 people
- Various practitioners about 10 people
- Helper students about 10 people



# Total Workshop Program & Results in Kinugaoka (2/2)

## 1. Program

**1st:** Walking around the town and thinking about post-disaster issues

**2nd:** Imagine life recovery after a disaster

**3rd:** Enriching the issues for life continuation and town recovery

## 2.Goal outputs

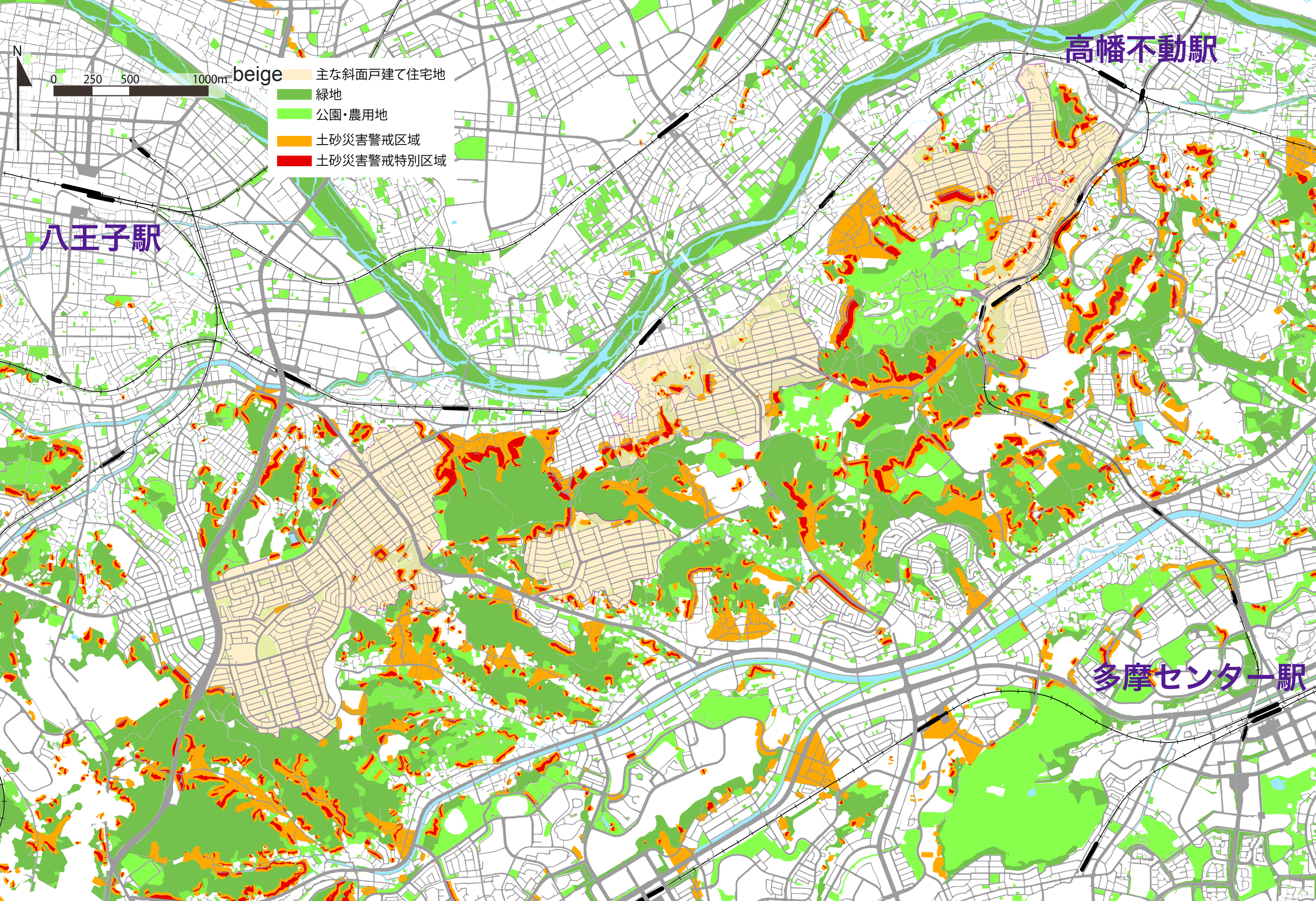
- Drawing a verification map of projects results about 30 years
- Formulating pre-disaster plan for post-disaster recovery



# Disaster prevention issues faced in Kinugaoka

1. **Landslide Risk.** However, the slope provides a good vantage point and a pleasant breeze. Steep slopes and cliffs are both danger and resources.
2. **Population Aging.** Heads of households who purchased their homes around 1980 and moved in all at once are now 75 years of age or older. Elderly couple households are increasing.





Developed hilly slope residential area and landslide warning place





Outlook of Kinugaoka





Outlook of Kinugaoka





Outlook of Kinugaoka





Outlook of Kinugaoka





Playing Park / Space for safety confirmation





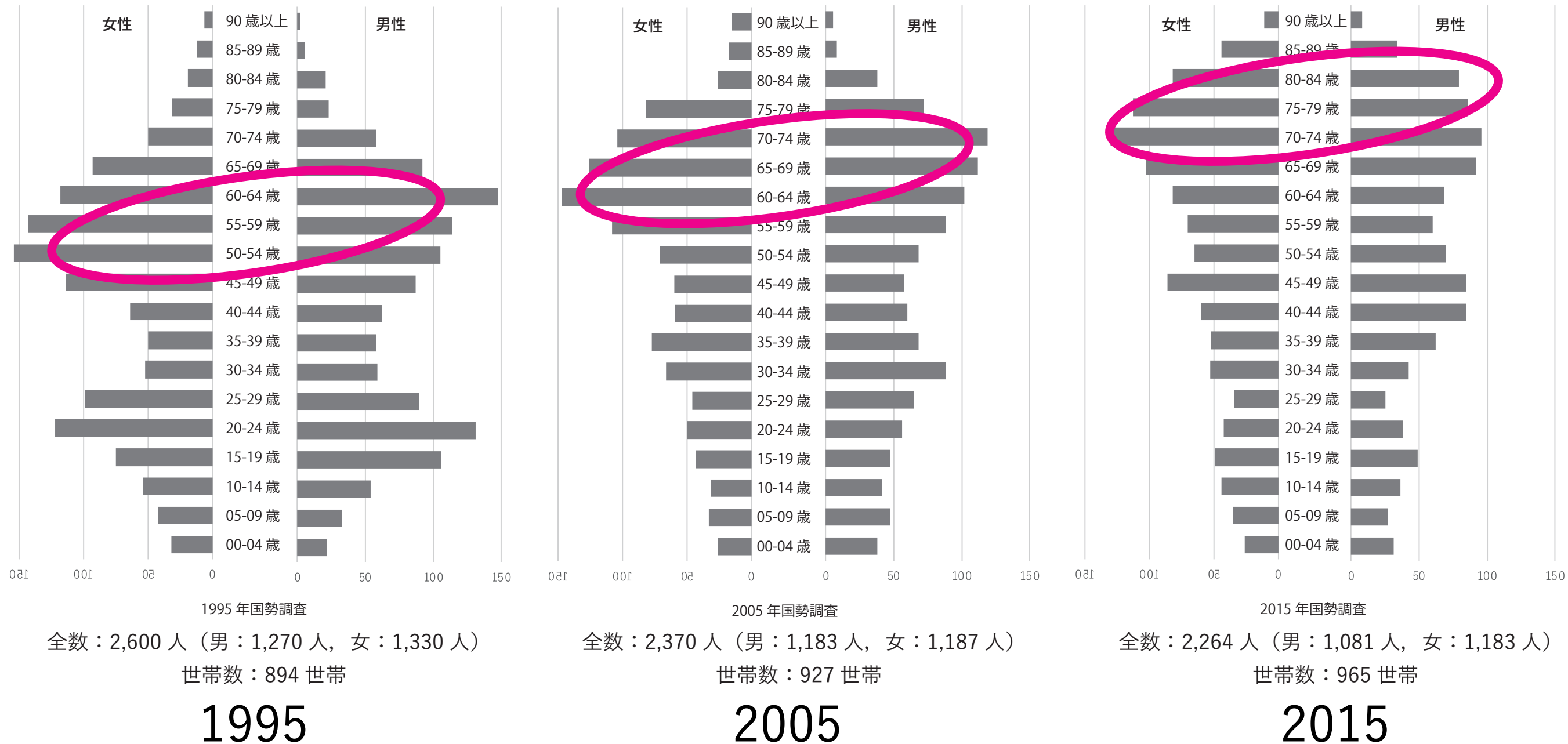
Checking a Steep Cliff in 1st workshop







# Population composition by gender, age group 5 in Kinugaoka



Population groups from the 1930s to 1950s, aged 65 to 85 as of 2015, constitute the main resident groups.

The community population aging is progressing.



# Evacuation Problem in Kinugaoka





# 令和2年、最初のポラーノが開店しました！



1月18日は雪降りてた。



雪の中、よくお出でいただきました。



店内の様子。お子さんも来てくれました。



ポラーノ特製のお汁粉です。



## Community Salon Activities





# Conclusion

## 1.What is a disaster? How to conceptualize a disaster?

- Classification from a Lead and Frequency time
- Vulnerability Model;  $\text{Risk} = \text{Hazard} \times \text{Vulnerability}$

## 2.Case study for Resilient vicinity community

(1) "East Ikebukuro" : near Tokyo central area

Participants share that developed facilities can be effective resource in times of disaster that in the restoration phase in addition to the immediate response phase. And **if it is used on a daily basis can it be utilized in times of disaster.**

(2)"Kinugaoka, Hachiouji" : hillside suburb area

Daily social activities such as community salon activities are linked to disaster preparedness and lead to mutual aid in times of disaster.