THE FUTURE OF
GLOBAL
DISASTER
RISK REDUCTION

Background and Overview of the Recommendations:

Science, Technology and Innovation to Strengthen Disaster Resilience in Megacities Facing Catastrophic Disaster Risks

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Building Resilient Megacities:
The Need for Risk-Informed Development

Why are we formulating this recommendation?

As of 2023, there are 44 megacities worldwide with populations exceeding 10 million, along with 56 cities with over 5 million residents that are likely to become megacities soon.

Many Megacities in the Asia-Pacific region have prioritized economic development over risk-informed urban planning in the course of their growth, resulting in vulnerability to catastrophic disasters.

Promoting "Risk-Informed Development," the goal of IRDR, is essential for both urban design and disaster response.

Through this initiative, Megacities should serve as models for enhancing resilience across the region.

How the United Nations Defines Megacities and Large Cities

Source: *World Urbanization Prospects 2018,* Department of Economic and Social Affairs, United Nations

"**Urban agglomeration" refers to a contiguous territory inhabited at urban levels of residential density,** while "metropolitan area" comprises an urban agglomeration and surrounding areas at a lower settlement density but with strong economic and social linkages to the central city.

Urban Agglomerations

Category	Population
Megacities	10 million or more
Large cities	5 to 10 million
Medium－sized cities	1 to 5 million
Cities	500,000 to 1 million

Megacities of the World (2018)

As of 2018, there are 33 megacities worldwide, each with a population of 10 million or more(see map above.) Additionally, there are 34 large cities with populations ranging from 5 to 10 million. In 1970, there were only 3 megacities and 15 large cities worldwide.

Source: *World Urbanization Prospects 2018,* Department of Economic and Social Affairs, United Nations

Megacities of the World (2030)

Legend ●:Cities that were megacities in 2018 and will remain megacities in 2030.
Legend ●:Cities that were not megacities in 2018 but are expected to become megacities by 2030.

	1970	2018	2030
Megacities	3	33	43
Large cities	15	34	66
Total	18	67	109

By 2030, an additional 10 cities are projected to surpass 10 million inhabitants, increasing the number of megacities from 33 in 2018 to 43. The number of large cities will also rise from 34 to 66, an increase of 32.

Source: *World Urbanization Prospects 2018,* Department of Economic and Social Affairs, United Nations

Japan’s Experience and the IRDR Subcommittee’s Initiatives

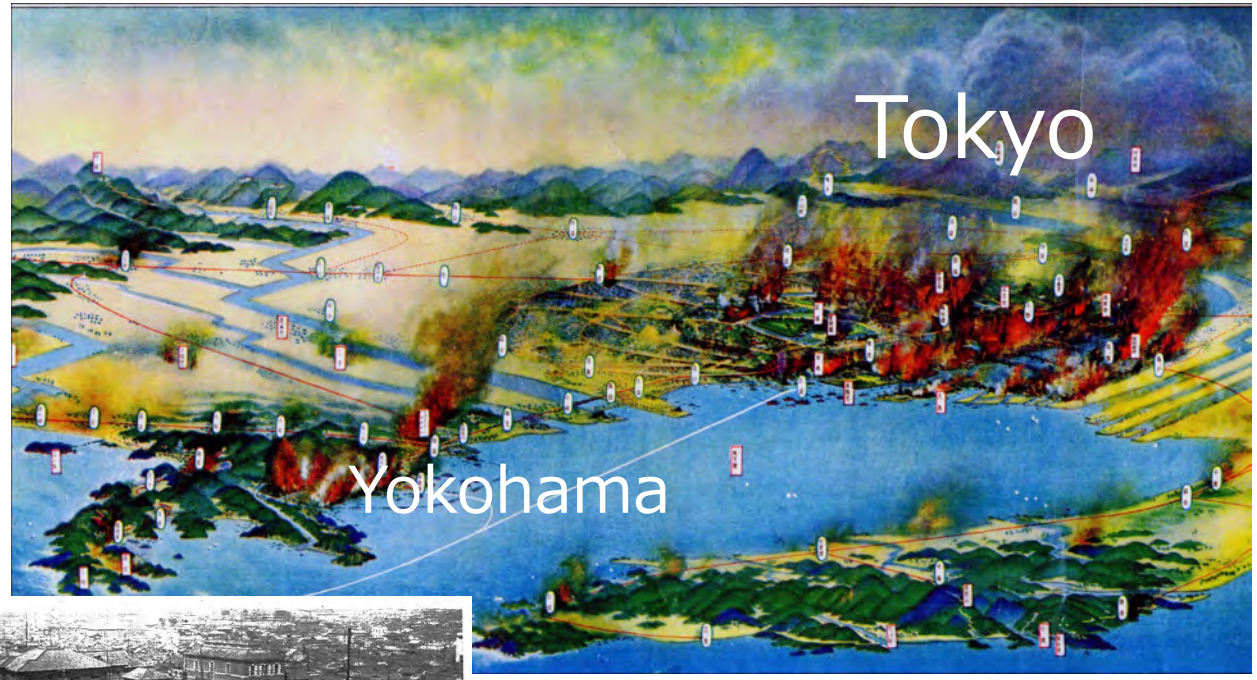
Japan, a country frequently affected by various natural hazards, has accumulated extensive experience and developed a wide range of effective countermeasures across all disaster phases: observation, experiment, forecasting, prevention, emergency response, recovery, and reconstruction.

Climate change and tectonic activities are increasing severity of disasters in Megacities—home to large populations and vast assets—
Megacities face extreme disaster risks, but often lack disaster preparedness and sufficient resilience.

As one of the internationally active subcommittees within the Science Council of Japan(SCJ), the IRDR Subcommittee is leading efforts to compile science, technology, and innovation (STI) to strengthen Disaster Resilience in Megacities, while actively sharing advanced approaches and insights with the global community.

Earthquake Disaster in Japan's Megacities

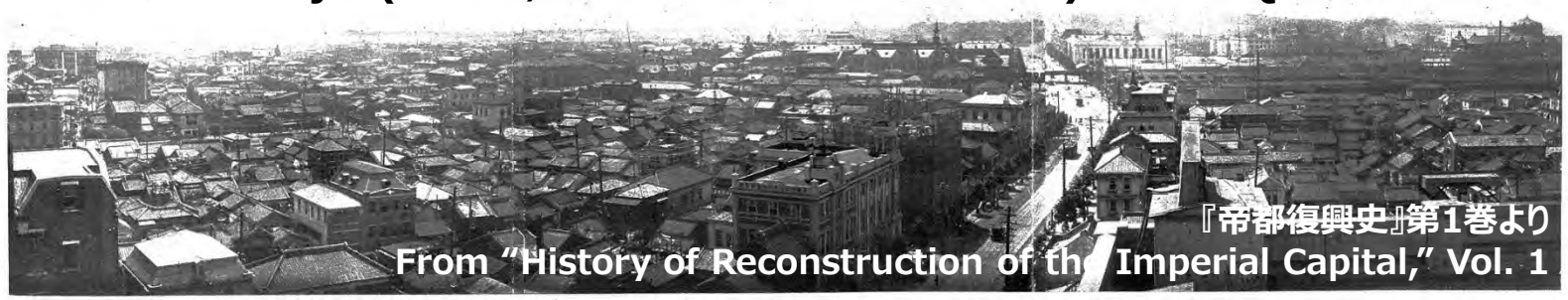
In the **1923 Great Kanto Earthquake**, which struck **the Tokyo Metropolitan Area, about 105,000 people lost their lives or went missing**, causing extensive damage: 366.7 % of the national budget.



吉田初三郎作
Drawn by YOSHIDA Hatsusaburo

Central Tokyo before EQ

Central Tokyo (Ginza, Nihonbashi and Kanda) after EQ



『帝都復興史』第1巻より
From "History of Reconstruction of the Imperial Capital," Vol. 1

These pictures were presented By Prof. TAKEMURA Masayuki , Nagoya Univ., at Sustainability Conference 2023, SCJ, Tokyo

Earthquake Disaster in Japan's Megacities

In the **1995 Great Hanshin-Awaji Earthquake**, which struck **the southern part of Hyogo Prefecture in the Kinki Major Metropolitan Area (M.M.A.), 6,437 people lost their lives or went missing**, causing extensive damage: 13.5 % of the national budget.

Photos: Courtesy of Prof. NAKANO Yoshiaki, NIED

Collaborative Framework for Developing the Recommendations

SCIENCE COUNCIL OF JAPAN
日本学術会議

Committee on Civil Engineering and Architecture

Subcommittee on IRDR

Collaboratively developing the Recommendations

JHOP 防災減災連携研究ハブ Japan Hub of Disaster Resilience Partners

ICoE COHERENCE | JAPAN

- IRIDeS, Tohoku U.
- ERI, U.TOKYO
- CIDIR, U.TOKYO
- UTokyo Global Environment Data Commons
- GRIPS SciREX
- NHDR, Niigata U.
- DMRC, Nagoya U.
- DPRI, Kyoto U.
- WENDI, Kyoto U.
- Kagawa University Institute of Education, Research and Regional Cooperation for Crisis Management Shikoku
- KUDRC, Kyushu U.
- R²EC
- NIED
- JAMSTEC (MAT)
- ICHARM
- DRI
- Japan Bosai Platform
- Research Center for Social Transformation
- Japanese Red Cross College of Nursing Disaster Management Research Institute
- Kumamoto University Center for Water Cycle, Marine Environment and Disaster Management

20 institutions

Collaborating with IRDR as ICoE-Coherence

IRDR
Integrated Research on Disaster Risk

- **Scientific Committee (SC)**
- **International Programme Office (IPO)**
- **National Committees (NC)**
- **International Centres of Excellence (ICoE)**

Structure of the Recommendations and the 14 Key Recommendations (1)

1. Background and Objectives of the Recommendations

2. Disaster Risk Reduction (DRR) in Megacities

3. DRR Measures for Disaster Resilient Cities

- Recommendation 1: Implement land use management based on disaster risk
- Recommendation 2: Accounting for uncertainties of future changes and disaster risks

4. Public Health in Megacities during Disasters

- Recommendation 3: Minimize health impacts
- Recommendation 4: Prevent indirect disaster-related deaths
- Recommendation 5: Maintain health, medical, and welfare systems

5. Damage and Loss Assessment of Urban Disasters

- Recommendation 6: Develop standards for disaster risk assessment
- Recommendation 7: Promote DRR investment

Structure of the Recommendations and the 14 Key Recommendations (2)

6. Dissemination and Distribution of Disaster Information

- Recommendation 8: Utilize latest technologies and knowledge in disaster information
- Recommendation 9: Lead in developing AI technologies effective for DRR
- Recommendation 10: Promote international dissemination, communication, and sharing of information

7. Capacity Building for Urban Disaster Reduction

- Recommendation 11: Promote interdisciplinary education to understand comprehensive nature of disasters
- Recommendation 12: Build societal systems that incentivize disaster education

8. Science and Technology and Innovation (STI) for DRR in Megacities

- Recommendation 13: Establish a STI platform for DRR
- Recommendation 14: Provide strategic recommendations that address DRR challenges grounded in societal needs

Strengthening Disaster Resilience in Megacities: The Way Forward

The initiatives outlined in this presentation are critical to ensuring that science, technology, and innovation play a vital role in strengthening disaster resilience in megacities. By advancing these efforts, we can build safer, more sustainable cities and protect future generations from catastrophic disasters. Strengthening disaster resilience in megacities requires collaboration across disciplines, regions, and sectors.

We strongly encourage all stakeholders—scientists, policymakers, and practitioners—to contribute to this collective effort and turn these priorities into actionable solutions.

We welcome your insights and look forward to future collaboration.

Thank you.