Experience from Japan

Best practices, technologies and capacity development tools for earthquake risk reduction from Japan

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1. Geographical features of Japan

2. Disaster management in Japan

3. Good practices in Japan - Earthquake countermeasures -
   
   Case 1: Earthquake-proofing of schools in Hyogo
   
   Case 2: Hyogo Wide-Area Disaster Prevention Center
   
   Case 3: DRR activities at community level (Hirono-town, Iwate prefecture)
   
   Case 4: Information sharing -National Early Warning System (J-Alert)-
   
   Case 5: Residents in Need of Assistance for evacuation –Fukuoka city-

4. Conclusion
1. Geographical features of Japan
Geographical Features around the world

https://www.data.jma.go.jp/eqev/data/jishin/about_eq.html
Tectonic Plates around Japan

Continental plate (North American Plate)

Pacific Plate

Continental plate (Eurasian Plate)

Philippine Plate

Izu-Ogasawara Trench

Chishima Trench

Nankai Trough

Sagami Trough

Nansei-Shoto Trench

8 cm/year

3-5 cm/year

https://www.data.jma.go.jp/eqev/data/jishin/about_eq.html
Traditional “UKIYOE” drawing after 1855 October Ansei-Edo Earthquake

Edo (Old name of Tokyo) citizens beating the legendary Catfish Monster which was believed to cause earthquake
Modern Japan is still full of Tragedies & Lessons Learnt

Meiji Sanriku Earthquake and Tsunami (1896)

This disaster struck the same area as the Great East Japan Earthquake in 2011. It was killing about 22,000 people.
Modern Japan is still full of Tragedies & Lessons Learnt

Great Kanto Earthquake (1923)
Modern Japan is still full of Tragedies & Lessons Learnt

Typhoon Isewan (1959)

• Hit Nagoya area during midnight on 26th September in 1959.
• 5,098 people died.
• 551 Billion yen lost (4.2% of GDP)

Source: Cabinet Office
Modern Japan is still full of Tragedies & Lessons Learnt

Great Hanshin-Awaji earthquake (1995)

- Hit Kobe area in the early morning on 17th January in 1995.
- Magnitude 7.3
- 6,434 people died.

Source: Cabinet Office, White paper on Disaster Management
Modern Japan is still full of Tragedies & Lessons Learnt

Great East Japan earthquake (2011)

Source: Ishinomaki City, "Great East Japan Earthquake Archive Miyagi"
Modern Japan is still full of Tragedies & Lessons Learnt

Kumamoto Earthquake (2016)

Source: Kumamoto Castle General Office (Distant view of the Small and Large Keep)

Source: Kumamoto Castle General Office (the East 18-Ken Turret)

Source: Kumamoto City (A slope failure)

Source: Kumamoto Castle General Office (Survey of stone walls)
<table>
<thead>
<tr>
<th>Date</th>
<th>M</th>
<th>Name of earthquake</th>
<th>Location</th>
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</thead>
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<tr>
<td>1923/9/1</td>
<td>8.3</td>
<td>Great Kantō earthquake</td>
<td>大正関東地震</td>
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<td>1927/3/7</td>
<td>7.6</td>
<td>Kita Tango earthquake</td>
<td>北丹後地震</td>
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<td>1933/3/3</td>
<td>8.4</td>
<td>Sanriku earthquake</td>
<td>昭和三陸地震</td>
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<td>Tōnankai earthquake</td>
<td>昭和東南海地震</td>
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<td>1945/1/13</td>
<td>6.8</td>
<td>Mikawa earthquake</td>
<td>三河地震</td>
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<td>1946/12/20</td>
<td>8.1</td>
<td>Nankai earthquake</td>
<td>昭和南海地震</td>
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<td>1948/6/28</td>
<td>7.1</td>
<td>Fukui earthquake</td>
<td>福井地震</td>
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<td>7.3</td>
<td>Hanshin–Awaji earthquake</td>
<td>兵庫県南部地震</td>
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<td>2011/3/11</td>
<td>9.1</td>
<td>Great East Japan earthquake</td>
<td>東北地方太平洋沖地震</td>
</tr>
</tbody>
</table>

Possibility of next earthquakes in Japan

Nankai Trough earthquake

Tokyo Inland Earthquake
Tokyo Inland Earthquake

There is a 70% probability of a major earthquake occurring directly beneath the metropolitan area within the next 30 years.

[Damage Forecast]
- Mw 7.3
- Num. of damage houses (totally collapse): Approx. 175,000
- Casualties: Approx. 11,000

https://www.bousai.go.jp/kohou/kouhoubousai/h25/74/special_01.html
The probability of a major Nankai Trough earthquake is now estimated at around 30% within 10 years, 70% to 80% within 30 years, and around 90% within the next 40 years.

Number of houses completely destroyed or burned down: Approx. 2,386,000
Estimated death toll: Approx. 323,000
Total economic damage: Approx. 220 trillion yen
2. Disaster management in Japan
Disaster Countermeasure Basic Act

- Enforced in 1962
- Formulates comprehensive and strategic disaster management system

Main Contents;
1. Definition of responsibilities for disaster management
2. Disaster management organizations
3. Disaster management planning system
4. Disaster prevention and preparedness
5. Disaster emergency response
6. Disaster recovery and rehabilitation
7. Financial measures
8. State of disaster emergency
<table>
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<tr>
<th>Disaster Events</th>
<th>Disaster Management Acts</th>
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<tr>
<td>1959 Typhoon Ise-Wan</td>
<td>1961 • Disaster Countermeasures Basic Act (DCBA)</td>
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<td>1964 Niigata Earthquake</td>
<td>1966 • Act on Earthquake Insurance</td>
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<td>1978 Miyagi–Ken–Oki Earthquake</td>
<td>1981 • Amendment of Building Standard Law</td>
</tr>
<tr>
<td>1995 Great Hanshin–Awaji Earthquake</td>
<td>1995 • Amendment of DCBA • Act on Promotion of Earthquake-proof Retrofit of Buildings</td>
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</table>
| 2011 Great East Japan Earthquake     | 2011 • Tsunami Resident City Development Act  
|                                       | 2012 • Amendment of DCBA                                     
|                                       | 2013 • Amendment of DCBA                                     |
Central Disaster Management Council

The Central Disaster Management Council
- chaired by the Prime Minister.
- consists of Ministers, heads of public institutions and experts.

The Roles of the Council are…

to formulate and promote implementation of the Basic Disaster Management Plan, etc.

©Cabinet Public Affairs Office, Cabinet Secretariat.
(https://www.kantei.go.jp/jp/101_kishida/actions/202209/30bousai.html)
Structure of Basic Disaster Management Plan in Japan

Natural hazards
- Earthquake
- Tsunami
- Water hazard
- Volcanoes
- Snow hazard

Accidental hazards
- Maritime Disasters
- Aviation Disasters
- Railroad Disasters
- Road Disasters
- Nuclear Disasters
- Hazardous materials D.
- Large-scale Fires D.
- Forest Fires D.

Presented according to the order of disaster management phase
- Prevention / Preparedness
- Emergency Response
- Disaster Recovery

Stipulated concrete countermeasures by each stakeholder
- National Government
- Local Government
- Residents
JAPAN’s Administrative System

3 Layers of Government

National Government

(Prime Minister is elected by the National Diet)
Population 126.1 million

47 Prefectural Government

(Governor is elected by the residents)
Largest Prefecture: Tokyo 14.0 million
Smallest Prefecture: Tottori 0.6 million (cf. Hyogo 5.5mln)

1,718 Cities, Towns, Villages Municipal Government

(Mayor is elected by the residents)
Largest City: Yokohama 3.8 million (cf. Kobe 1.5mln)

(as of April 2022)
National and Local Disaster Management Plan

**National level**
- Prime Minister
- Central Disaster Management Council
- Designated Government Organizations, Designated Public Corporations

Formulation and promoting implementation of the **Basic Disaster Management Plan**

Formulation and implementation of the Disaster Management Operation Plan

**Prefectural level**
- Governor
- Prefectural Disaster Management Council
- Designated Local Government Organizations
- Designated Local Public Corporations

Formulation and promoting implementation of the **Local Disaster Management Plan**

**Municipal level**
- Mayors of Cities, Towns and Villages
- Municipal Disaster Management Council

Formulation and promoting implementation of the **Local Disaster Management Plan**

**Residents level**
Disaster Reduction Drills and Exercises

Comprehensive Disaster Reduction Drills
“Disaster Reduction Day (1 Sep)”

- **Target**: Simulating response to the Major Nankai Trough Earthquake, conducted drill with Prime Minister and his Cabinet
- **Contents**: Holding a meeting of Extreme Disaster Management Headquarters, extraordinary Cabinet meeting, report from Governors of affected prefecture, press conference by Prime Minister and Minister of State for Disaster Management

![to be put appropriate picture](https://www.cao.go.jp/minister/2208_k_tani/photo/2022_004.html)
3. Good practices in Japan
– *Earthquake countermeasures* –
Importance of Disaster Risk Reduction Investment

- Appropriate DRR investment expect to reduce disaster damage
- Need to invest for Structural measures Non-structural measures
- Need to have a certain budget each year.
3. Good practices in Japan

Case 1: Earthquake–resistant of schools in Hyogo
Earthquake-resistant of schools in Hyogo

- Based on the experience of past large-scale disasters, Japanese government and prefectures promoted the earthquake-proofing of public schools. To promote the earthquake resistance of public schools, “the Ministry of Education, Culture, Sports, Science and Technology (MEXT)” provided government subsidies for earthquake reinforcement and renovation projects, and made efforts to provide financial support to local governments.
- At present, 100% of public schools have been made earthquake resistant.
Earthquake-resistant of schools in Hyogo


https://www.ikeuchi-koumuten.co.jp/government_archive/%E6%92%AD%E7%A3%A8%E8%BE%B2%E6%A5%AD%E9%AB%98%E7%AD%89%E5%AD%A6%E6%A0%A1%E7%AC%AC%EF%BC%91%E6%9C%9F%E8%80%90%E9%9C%87%E8%A3%9C%E5%BC%B7%E5%B7%A5%E4%BA%8B/
Earthquake-resistant of schools in Hyogo

Many gymnasiums are used as temporary evacuation site during disasters

https://sd-arc.jp/works/ikedajhs_gym_retrofitting/

https://www.nippon-foundation.or.jp/what/projects/activity/26404
Earthquake-resistant of schools in Sendai

Sendai City Hall built in 1965 (before the 1981 seismic standard)  
Earthquake Resistance Analysis done in 1996 ⇒ necessity for seismic retrofit  
Seismic retrofit work done in 2007 to 2008
3. Good practices in Japan

Case 2: Hyogo Wide-Area Disaster Prevention Center
Hyogo Wide-Area Disaster Prevention Center

Operation of wide-area disaster prevention bases in Hyogo Prefecture

Network wide-area disaster prevention base
(1) Storage of food and supplies
(2) Gathering and accommodation of disaster response personnel
(3) Accumulation and distribution of relief supplies
Hyogo Wide-Area Disaster Prevention Center

Operation of wide-area disaster prevention bases in Hyogo Prefecture
Union of Kansai Governments

The Union of Kansai Governments (UKG) was established in December 2010 as Japan’s first region-wide union of prefectural governments. We aim to deal with the challenges that spread beyond prefectural borders, thus establishing foundations of the decentralization of authority.

The Merits of Region-wide Disaster Prevention Efforts

1. With the UKG as a leader/coordinator of the entire region, it is possible for the UKG to make quicker decisions and provide faster disaster response for the Kansai region.

2. With excellent know-how shared by member governments, it is possible for the UKG to offer a higher quality disaster response.

3. It will become easier to cooperate with the private sector and national agencies based in the Kansai region and also be possible for the UKG to provide disaster response more smoothly.

4. It will become easier to conduct region-wide disaster prevention/mitigation projects with other member governments beyond prefectural borders.
3. Good practices in Japan

Case 3: DRR activities at community level (Hirono-town, Iwate prefecture)
DRR activities at community level (Hirono-town, Iwate)

Lesson learned from the Great East Japan Earthquake

Hirono Town is a municipality located in the northernmost coastal area of Iwate Prefecture, with population of 15,903. (as of April 2021)

*18,107 (as of January 2015)
DRR activities at community level (Hirono-town, Iwate)

Lesson learned from the Great East Japan Earthquake

Hirono town
DRR activities at community level (Hirono-town, Iwate)

Lesson learned from the Great East Japan Earthquake

- Monument of Showa-sanriku earthquake in 1933
  - Need caution when you feel earthquake
  - Need to escape to height place when tsunami coming
  - Do not construct house in low place
DRR activities at community level (Hirono-town, Iwate)

Lesson learned from the Great East Japan Earthquake

Community leaders

Yagi minami community leader, Hirono town
DRR activities at community level (Hirono-town, Iwate)
Lesson learned from the Great East Japan Earthquake

Maintenance for evacuation site and route by community
DRR activities at community level (Hirono-town, Iwate)

Lesson learned from the Great East Japan Earthquake

Maintenance for warehouse in case of disaster
DRR activities at community level (Hirono-town, Iwate)

Lesson learned from the Great East Japan Earthquake

Developing community hazard map and listing personal information for mutual support
3. Good practices in Japan

*Case 4: Information sharing – National Early Warning System (J-Alert)*
National Early Warning System (J-Alert)

- J-Alert is a system which can send emergency information such as earthquakes, tsunami and any other bad weather through an artificial satellite and the terrestrial line to prefectures, cities and towns.

National Early Warning System (J-Alert)

Residents can receive an information via J-Alert
(1) Earthquake Early Warning
(2) Tsunami Warnings
(3) Emergency Warnings
(4) Hazard / Evacuation Information
3. Good practices in Japan

Case 5: Residents in Need of Assistance for evacuation –Fukuoka city–
Local Disaster Management Plan (Fukuoka-city)

Section 3. Preparation for residents in Need of Assistance

Part 3. Countermeasure of residents in Need of Assistance

1. List of residents in Need of Assistance for evacuation

To be clear;

✓ Description of people involved in the formulation of the plan
✓ Understanding the actual status of activities
✓ Enlist the cooperation of local residents

Local disaster management plan in Fukuoka city

February 2020

Fukuoka-city Disaster Management Council
Local Disaster Management Plan (Fukuoka-city)

List of residents in Need of Assistance for evacuation

Need to;
• Consider an appropriate management of list
• Consider system for updating latest information
• Save a list by electric data and printing data

(https://www.city.fukuoka.lg.jp/shimin/t_bousai/bousai/yousiensya.html)
Local Disaster Management Plan (Fukuoka-city)

List of residents in Need of Assistance for evacuation

Application Format for list

- Name
- Gender
- Date of birth
- Address
- Tel and mobile number
- FAX

Reasons (why do you need support?)

Classification in the Physical Disability Certificate (e.g., level 2 on official document)

Application by proxy

*If the person is unable to fill out the form
4. Conclusion
• Basic Act on Disaster Management was enacted in 1962. Having experienced various large-scale disasters, various committees have been established and disaster management plans have been formulated in Japan.

• As good practices of earthquake countermeasures taken by the government, activity of “the earthquake-resistant for school buildings” and “Union of Kansai Governments” were introduced.

• “Efforts to provide disaster information to residents” and to manage “evacuation site/routes at the community level” were also introduced.

• **Assuming a large-scale earthquake that is feared to occur in the future, wide-area cooperation beyond national borders and technical cooperation are necessary.**
ADRC promotes disaster risk reduction through multi-national/multi-stakeholder/multi-lateral cooperation in the Asian region.

http://www.adrc.asia

Thank you very much