Coping with Natural Disasters in Japanese Urban Planning: How to Build Disaster Resilient Cities?

Disaster Prevention Base Shirahige Higashi, Sumida-ku

Pocket Park with underground water tank, Higashi Ikebukuro
Coping with Natural Disasters in Japanese Urban Planning: How to Build Disaster Resilient Cities?

1. Introduction: The Big Earthquake Ahead – Lessons from Kôbe

2. Damage Assessment and District-based Vulnerability in Tôkyô: Reflections of Physical and Socioeconomic Structures

3. Earthquake-Related Disaster Prevention Planning and its Development Path in Tôkyô after the Second World War

1. Striving for Better Disaster Prevention in the Belt of Densely Built-up Wooden Houses in Tôkyô

2. Conclusion: Tôkyô on its Way Towards a Disaster Resilient City
Coping with Natural Disasters in Japanese Urban Planning

1. Introduction: The Big Earthquake Ahead – Lessons from Kôbe

January 17th, 1995: Kôbe – not Tôkyô!
Coping with Natural Disasters in Japanese Urban Planning

1. Introduction: The Big Earthquake Ahead – Lessons from Kôbe

Hanshin daishinsai chizu. May 1995 (violet: burnt down areas, red: totally destroyed buildings, green: semi-destroyed buildings, yellow: areas with ground liquefaction)

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1. Introduction: The Big Earthquake Ahead – Lessons from Kôbe

Disruption of Infrastructure Lifelines
Coping with Natural Disasters in Japanese Urban Planning

1. Introduction: The Big Earthquake Ahead – Lessons from Kôbe

Temporary Housing on Port Island 1996
Coping with Natural Disasters in Japanese Urban Planning

1. Introduction: The Big Earthquake Ahead – Lessons from Kôbe

Integration of hardware, software and orgware aspects by:

1. strengthening standards for earthquake- and fire-proof construction
2. widening streets, building firebreaks, creating open and green spaces
3. building disaster-resistant city structures by land readjustment and urban renewal projects
4. promoting disaster prevention oriented careful urban renewal in cooperative projects of the machizukuri-type
5. improving public crisis management
6. promoting capacity building on neighbourhood level aiming at disaster prevention, emergency aid and post-disaster reconstruction
Coping with Natural Disasters in Japanese Urban Planning

1. Introduction: The Big Earthquake Ahead – Lessons from Kôbe

Obstacles towards implementing disaster prevention measures:

1. complicated ownership structures concerning land and buildings
2. land property divided into small plots
3. highly esteemed private land ownership and reluctance with regard to compulsory purchase for purposes of public utility
4. lack of financial resources and old age of many land owners
5. missing locational attraction for private developers
6. lack of public money to invest in infrastructure improvement and to give more incentives to private urban renewal
## 2. Damage Assessment and District-based Vulnerability in Tôkyô

### Assessment of Damages and Losses in Case of 3 Types of Earthquakes with Epicenters in Tôkyô Metropolitan Area

<table>
<thead>
<tr>
<th>Epicenter</th>
<th>just beneath the capital</th>
<th>at deep-see trench</th>
<th>at active fault</th>
</tr>
</thead>
<tbody>
<tr>
<td>northern Tôkyô bay</td>
<td>Tama</td>
<td>Kantô-quake of Genroku-type</td>
<td>Tachikawa fault zone</td>
</tr>
<tr>
<td>Magnitude</td>
<td>M7.3</td>
<td>M7.3</td>
<td>M8.2</td>
</tr>
<tr>
<td>Wind Velocity</td>
<td>8m/sec.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Season/Time</td>
<td>winter/18:00</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Deaths</strong></td>
<td>9,700</td>
<td>4,700</td>
<td>5,900</td>
</tr>
<tr>
<td>by earthquake</td>
<td>5,600</td>
<td>3,400</td>
<td>3,500</td>
</tr>
<tr>
<td>by fire</td>
<td>4,100</td>
<td>1,300</td>
<td>2,400</td>
</tr>
<tr>
<td><strong>Injured</strong></td>
<td>147,600</td>
<td>101,100</td>
<td>108,300</td>
</tr>
<tr>
<td>severely injured</td>
<td>(21,900)</td>
<td>(10,900)</td>
<td>(12,900)</td>
</tr>
<tr>
<td>by earthquake</td>
<td>129,000</td>
<td>96,500</td>
<td>98,500</td>
</tr>
<tr>
<td>by fire</td>
<td>17,700</td>
<td>4,600</td>
<td>9,800</td>
</tr>
<tr>
<td><strong>Buildings damaged</strong></td>
<td>304,300</td>
<td>139,500</td>
<td>184,600</td>
</tr>
<tr>
<td>by earthquake</td>
<td>116,200</td>
<td>75,700</td>
<td>76,500</td>
</tr>
<tr>
<td>by fire</td>
<td>188,100</td>
<td>63,800</td>
<td>108,100</td>
</tr>
<tr>
<td><strong>Evacuees</strong> (Peak: After one day)</td>
<td>3,390,000</td>
<td>2,760,000</td>
<td>3,200,000</td>
</tr>
<tr>
<td>People experiencing trouble returning home</td>
<td>5,170,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Coping with Natural Disasters in Japanese Urban Planning

2. Damage Assessment and District-based Vulnerability in Tôkyô

Distribution of Totally Destroyed Wooden Buildings by Collapse in Case of an Earthquake in the Northern Part of Tôkyô Bay (M7.3)

東京湾北部地震における木造全壊建物棟数の分布（揺れ）

Coping with Natural Disasters in Japanese Urban Planning

2. Damage Assessment and District-based Vulnerability in Tōkyō

Distribution of Totally Destroyed Wooden Buildings by Fire in Case of an Earthquake in the Northern Part of Tōkyō Bay (M7.3)

東京湾北部地震における焼失棟数分布（冬 18 時 風速 8m/s）（火災）

Coping with Natural Disasters in Japanese Urban Planning

2. Damage Assessment and District-based Vulnerability in Tōkyō

District-based Vulnerability to Fire in the 23 Wards of Tōkyō 2012 and Effects of Disaster-proof Reconstruction after Kantō Earthquake 1923

Tōkyō-to (2012): 'Mokumitsu-chiiki funenka 10 nen purojekuto’ jisshi hōshin (Implementation principles of the ‘10 years project to make high density wooden housing areas fire-resistant’). Tōkyō, p. 16.

Coping with Natural Disasters in Japanese Urban Planning

3. Earthquake-related Disaster Prevention Planning and its Development Path after the Second World War

Concept of Disaster Prevention Bases in Kôtô Delta 1969


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Disaster Prevention Base Shirahige East in Kôtô Delta

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3. Earthquake-related Disaster Prevention Planning and its Development Path after the Second World War

Disaster Prevention Base Shirahige West in Kôtô Delta

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3. Earthquake-related Disaster Prevention Planning and its Development Path after the Second World War

Designated Evacuation Areas in 23 Wards (2002)

Concept of Disaster-proof Living Zones Surrounded by Firebreaks

3. Earthquake-related Disaster Prevention Planning and its Development Path after the Second World War


http://www.toshiseibi.metro.tokyo.jp/bosai/gd/honbun.htm; 07.05.12
Coping with Natural Disasters in Japanese Urban Planning

3. Earthquake-related Disaster Prevention Planning and its Development Path after the Second World War

Concept of Firebreaks and Disaster-proof Living Zones
Coping with Natural Disasters in Japanese Urban Planning

3. Earthquake-related Disaster Prevention Planning and its Development Path after the Second World War

Concept of Disaster-proof Living Zones Surrounded by Firebreaks
Coping with Natural Disasters in Japanese Urban Planning

4. Striving for Better Disaster Prevention in the Belt of Densely Built-up Wooden Houses in Tôkyô

Schwerpunktdistrikte der Katastrophenschutzförderung:

1. Ōmori-Naka
2. Umfeld von Rinshi no Mori (Ebara-Kita und Meguro-Honcho)
3. Umfeld des Rathauses von Setagaya-ku
4. Nakano-Minamidai
5. Higashi-Ikebukuro
6. Jûjô
7. Ōyaguchi
8. Machiya und Ogu
9. Distrikt westlich des Bahnhofs von Nishiarai
10. Umgebung von Kanegafuchi
11. Tateishi und Yotsugi

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4. Striving for Better Disaster Prevention in the Belt of Densely Built-up Wooden Houses in Tôkyô

28 Designated Improvement Districts of Disaster Prevention 2010 (7000 ha, 1.8 Mio. Inhabitants)
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4. Striving for Better Disaster Prevention in the Belt of Densely Built-up Wooden Houses in Tôkyô

11 Designated Priority Improvement Districts of Disaster Prevention 2010 (2400 ha)

Coping with Natural Disasters in Japanese Urban Planning

4. Striving for Better Disaster Prevention in the Belt of Densely Built-up Wooden Houses in Tôkyô

Designated Priority Improvement District No. 10: Kanegafuchi and Kyôjima (218 ha, 51,900 Inhabitants)

Coping with Natural Disasters in Japanese Urban Planning

4. Striving for Better Disaster Prevention in the Belt of Densely Built-up Wooden Houses in Tôkyô

Impressions from Kyôjima
Coping with Natural Disasters in Japanese Urban Planning

4. Striving for Better Disaster Prevention in the Belt of Densely Built-up Wooden Houses in Tôkyô

Machizukuri in Kyôjima
Coping with Natural Disasters in Japanese Urban Planning

4. Striving for Better Disaster Prevention in the Belt of Densely Built-up Wooden Houses in Tôkyô

Machizukuri Model Project in Kyôjima: „Living Street“ (seikatsu dôro)
Coping with Natural Disasters in Japanese Urban Planning

4. Striving for Better Disaster Prevention in the Belt of Densely Built-up Wooden Houses in Tôkyô

Concept of „Specified Districts for Fire-Resistance Promotion“ (funenka tokku)

Tôkyô-to (2012): ‘Mokumitsu-chiiki funenka 10 nen purojekuto’ jisshi hôshin (Implementation principles of the ’10 years project to make high density wooden housing areas fire-resistant’). Tôkyô, p. 14.
Designated Zones with New Regulations for Fire-Resistance of Buildings 2012 (3140 ha)

Tôkyô-to (2012): 'Mokumitsu-chiiki funenka 10 nen purojekuto’ jisshi hôshin (Implementation principles of the ,10 years project to make high density wooden housing areas fire-resistant’). Tôkyô, p. 20.
Coping with Natural Disasters in Japanese Urban Planning

5. Conclusion: Tôkyô on its Way Towards a Disaster Resilient City

Strategic Concepts of Urban Reconstruction after TMG
„Grand Design for Post-Earthquake Reconstruction“

Coping with Natural Disasters in Japanese Urban Planning

5. Conclusion: Tôkyô on its Way Towards a Disaster Resilient City

Concept of Community Based Recovery According to the „Manual of Post-Earthquake Reconstruction“ of TMG

Coping with Natural Disasters in Japanese Urban Planning

5. Conclusion: Tôkyô on its Way Towards a Disaster Resilient City

Promoting a holistic approach in disaster prevention by integrating

1. hardware, software and orgware
2. know-how, activities and financial resources of communities, public and private sector
3. capacitiy building by education and training for citizens and experts
4. preventative, emergency and pre-disaster reconstruction planning
5. toshikeikaku and machizukuri
6. different levels of scale and hierarchies
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