CIGS Special Seminar
Catastrophic Disasters: Confronting Novel Preparedness Challenges

Speaker: Arnold M. Howitt
Executive Director, Ash Center for Democratic Governance and Innovation
Faculty Co-Director, Program on Crisis Leadership (PCL)
Harvard Kennedy School

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Program

1. Welcome remarks:
   Michio Suzuki, Secretary-General, CIGS

2. Introduction: Revisiting the Tohoku Crises
   Jun Kurihara, Research Director, CIGS

3. Catastrophic Disasters:
   Confronting Novel Preparedness Challenges
   Arnold M. Howitt

4. Q&A
   Moderator: Jun Kurihara
Today’s Topics

Emergency preparedness in most countries concentrates on risks that can be anticipated because of direct experience, events elsewhere, formal risk analyses, or scenario development.

But how can society more effectively prepare for novel threats or events that either have not been seen before (e.g., emergent infectious disease, undiscovered seismic faults), or arise at a scale that far exceeds expectations (Hurricane Katrina, the March 11 earthquake/tsunami), or involve simultaneous disasters that together pose novel challenges (earthquake, tsunami, nuclear accident)?
CIGS Special Seminar “Catastrophic Disasters: Confronting Novel Preparedness Challenges”

Latest Book edited by Dr. Howitt
(with his colleague H. B. Leonard)

*Managing Crises: Responses to Large-Scale Emergencies*, CQ Press, 2009
Managing Crises: Responses to Large-Scale Emergencies, CQ Press, 2009

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5. The 9/11 Pentagon Emergency

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6. The Hurricane Floyd Evacuation in Florida
7. The 2003 San Diego Firestorm
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9. Wal-Mart’s Response to Hurricane Katrina

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CIGS Special Seminar “Catastrophic Disasters: Confronting Novel Preparedness Challenges”

Asia Public Policy Forum: Disaster Management in Asia
May 13-15, 2012
Lee Kuan Yew School of Public Policy, National University of Singapore

Program

Session 1: Disaster Management and Public Policy in Asia

Session 2A: Disaster Preparedness and Capacity-Building
Session 2B: Emergency Response in Landscape-Scale Disasters

Session 3A: Coordinating Humanitarian Relief: National Responses and International Organizations and NGOs
Session 3B: Innovations in Disaster Recovery

Session 4A: Enhancing the Role of Civil Society in Disaster Preparedness and Response
Session 4B: Looking Forward Insights from Ongoing Disaster Recovery

Session 5A: Business and Disaster Preparedness: BCP and Beyond
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Session 6A: The Risks of Infrastructure and Technology Failures
Session 6B: Disaster Resilience and Mental Health
### Crisis: A Typology

#### A Typology of Collective Stress Situations

<table>
<thead>
<tr>
<th></th>
<th>Global/National</th>
<th>Regional</th>
<th>Segmental</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sudden</strong></td>
<td>Nuclear war</td>
<td>Earthquake</td>
<td>Ethnic massacre</td>
<td>Tornado</td>
</tr>
<tr>
<td></td>
<td>Enemy Invasion</td>
<td>Major flood</td>
<td>Corporate layoff</td>
<td>Explosion</td>
</tr>
<tr>
<td></td>
<td>Economic crash</td>
<td>Nuclear meltdown</td>
<td>Expropriation of property of a class</td>
<td>Ghetto riot</td>
</tr>
<tr>
<td></td>
<td>Rebellion</td>
<td>Hurricane</td>
<td></td>
<td>Plant closing</td>
</tr>
<tr>
<td><strong>Gradual</strong></td>
<td>Depression</td>
<td>Famine</td>
<td>Aborigines dying off</td>
<td>Decline of main industry</td>
</tr>
<tr>
<td></td>
<td>Epidemic</td>
<td>Drought</td>
<td>Obsolete occupation</td>
<td>Environmental pollution</td>
</tr>
<tr>
<td></td>
<td>Environmental decay</td>
<td>Price collapse</td>
<td>Group discrimination</td>
<td>Land sinking</td>
</tr>
<tr>
<td></td>
<td>Government breakdown</td>
<td>Land exhaustion</td>
<td>Addictions to harmful substances</td>
<td>Coal seam fire</td>
</tr>
<tr>
<td><strong>Chronic</strong></td>
<td>Poverty</td>
<td>Backward regions</td>
<td>Enslavement</td>
<td>Slum, ghetto</td>
</tr>
<tr>
<td></td>
<td>Endemic disease</td>
<td>Endemic disease</td>
<td>Class discrimination</td>
<td>High crime areas</td>
</tr>
<tr>
<td></td>
<td>Wartime bombing</td>
<td>Civil war</td>
<td>Persecution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Colonialism</td>
<td></td>
<td>Gender discrimination</td>
<td></td>
</tr>
</tbody>
</table>

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Multi-Agency Coordination Challenges

<table>
<thead>
<tr>
<th>Types</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>Clear and effective leadership&lt;br&gt;Adequate multi-agency response procedure&lt;br&gt;Clear and reasonable role and responsibility of each agency&lt;br&gt;Clear coordination principle of conflicting goals</td>
</tr>
<tr>
<td>Information Management</td>
<td>Adequate Knowledge/information management&lt;br&gt;Clear common operational picture</td>
</tr>
<tr>
<td>Communication</td>
<td>Clear common communication structure&lt;br&gt;Communication of accurate, consistent, and complete information&lt;br&gt;Communication with an appropriate interval</td>
</tr>
<tr>
<td>Situation Awareness</td>
<td>Entire membership of coordinating agency&lt;br&gt;Adequate common situation awareness&lt;br&gt;Adequate understanding of each agency’s role, capability, and resources</td>
</tr>
<tr>
<td>Equipment</td>
<td>Adequate and compatible communications technology&lt;br&gt;Common level of sophisticated equipment</td>
</tr>
<tr>
<td>Cultural Issues</td>
<td>Compatible procedures&lt;br&gt;Adequate understanding of each agency’s organizational culture</td>
</tr>
<tr>
<td>Training</td>
<td>Sufficient multi-agency training exercise&lt;br&gt;Each agency’s working experience with other agencies</td>
</tr>
</tbody>
</table>

Letters from Quake-hit Japan
—Stories Unfolding amidst Tragedies—

Material prepared for Disaster Management in Asia Seminar Series
“Japan in Crisis: Exploring the Consequences of a Cascading Disaster”

March 22, 2011
Harvard Kennedy School

Jun KURIHARA
Senior Fellow, Ash Center for Democratic Governance and Innovation, Harvard Kennedy School
Research Director, Canon Institute for Global Studies, Tokyo
Emails: Jun_Kurihara@hks.harvard.edu

Minами-sanriku, Miyagi Prefecture (Source: Kyodo News, via AP)

Note: The crisis in Japan is still ongoing. Therefore, it should be noted some of data in this presentation are tentative and subject to revision afterwards.
Letters from Quake-hit Japan
— Stories Unfolding amidst Tragedies —

A Tentative Assessment of the Tohoku-Pacific Ocean Earthquake

1. Disaster Diagnoses (Tentative)
   *Series of huge earthquakes, tsunamis, and resultant blackouts . . .*

2. Disaster Responses amidst Cascading Disasters
   *Disaster responses during the first TWO hours after the earthquake*

3. Nuclear Power Plant (NPP) Disaster Management
   *Organizational structure of Japan and the case of Fukushima I NPP*

4. Evaluations (Tentative)
   *Preparedness, responses, recovery, communications and globalization*

Jun KURIHARA, Senior Fellow, Harvard Kennedy School
1.1. Trembling Earth

Quakes between Mar. 10 and 16

Number of Quakes:
M≥7: 4; 7>M≥6: 43

Source: The Economist, March 11, 2011
1.2. Lethal Danger Is NOT Quakes BUT Tsunamis

All Nuclear Power Plants Withstood Quakes, but . . . .
No. of Houses Suffering Blackouts, Unit: Million

<table>
<thead>
<tr>
<th>Time</th>
<th>Tokyo Electric</th>
<th>Tohoku Electric</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar. 11</td>
<td>15:30</td>
<td>4.05</td>
<td>4.40</td>
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<tr>
<td></td>
<td>20:00</td>
<td>3.94</td>
<td>4.38</td>
</tr>
<tr>
<td></td>
<td>22:00</td>
<td>3.44</td>
<td>4.40</td>
</tr>
<tr>
<td>Mar. 12</td>
<td>0:00</td>
<td>2.58</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4:00</td>
<td>1.62</td>
<td>Tokyo: 0</td>
</tr>
<tr>
<td></td>
<td>5:00</td>
<td>1.44</td>
<td>Kanagawa and Shizuoka: 0</td>
</tr>
<tr>
<td></td>
<td>6:00</td>
<td>1.24</td>
<td>Saitama and Yamanashi: 0</td>
</tr>
<tr>
<td></td>
<td>7:00</td>
<td>1.77</td>
<td>Gunma: 0</td>
</tr>
<tr>
<td></td>
<td>10:00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21:00</td>
<td>0.45</td>
<td>2.30</td>
</tr>
<tr>
<td>Mar. 13</td>
<td>15:00</td>
<td>0.26</td>
<td>1.58</td>
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<tr>
<td>Mar. 14</td>
<td>16:00</td>
<td>0.07</td>
<td>0.97</td>
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<tr>
<td>Mar. 15</td>
<td>14:00</td>
<td>0.05</td>
<td>0.76</td>
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<tr>
<td>Mar. 16</td>
<td>22:00</td>
<td>0.03</td>
<td>0.48</td>
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<tr>
<td>Mar. 17</td>
<td>19:00</td>
<td>0.36</td>
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</table>

Note: The size of the largest blackout in the Tokyo metropolitan area in recent years is the case of August 14, 2006, when 1.26 million houses suffered the blackout.

Source: Tokyo Electric Power Company (TEPCO) and Tohoku Electric Power Company
1.4. Unfolding Tragedies and Spreading Fears of Nuclear Disasters

<table>
<thead>
<tr>
<th>Date</th>
<th>Death</th>
<th>Missing</th>
<th>Injured</th>
<th>Evacuees</th>
<th>Radiation Level, Unit: μSv.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/14</td>
<td>4,227</td>
<td>8,194</td>
<td>2,282</td>
<td>16,150</td>
<td>429,180</td>
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<tr>
<td>3/17</td>
<td>5,692</td>
<td>9,508</td>
<td>2,409</td>
<td>16,160</td>
<td>389,870</td>
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<tr>
<td>3/19</td>
<td>7,348</td>
<td>10,847</td>
<td>2,603</td>
<td>22</td>
<td>366,858</td>
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<tr>
<td>3/20</td>
<td>8,133</td>
<td>12,272</td>
<td>2,612</td>
<td>4,140</td>
<td>362,887</td>
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<tr>
<td>3/21</td>
<td>8,649</td>
<td>13,261</td>
<td>2,644</td>
<td>-</td>
<td>337,300</td>
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<tr>
<td>3/22</td>
<td>9,080</td>
<td>13,565</td>
<td>2,675</td>
<td>-</td>
<td>268,510</td>
</tr>
</tbody>
</table>

Source: Author’s compilation based on statistics published by various organizations

Jun KURIHARA, Senior Fellow, Harvard Kennedy School
2.1. Emergency Responses: (1) Timeline: First 50 Minutes Slide No. 15

14:46 Quake off Sanriku Coast M9.0
14:46 **Nuclear and Industrial Safety Agency (NISA)**, the Japanese counterpart of the U.S. Nuclear Regulatory Commission (NRC), establishes an emergency headquarters
14:49 **Fire and Disaster Mgmt Agency (FDMA)**, through J-Alert, a satellite warning system, warns 37 local governments against huge tsunamis
14:50 **Prime Minister’s Official Residence** sets up an emergency team, aiming at (1) damage assessment, (2) ensuring the safety of people, (3) recovery of infrastructure, and (4) providing of accurate information
15:06 Quake off Sanriku Coast M7.0
15:14 **Central Disaster Mgmt Council** is established
15:15 Quake off Sanriku Coast M7.4
15:15 Tsunami 3.2m Ofunato, Iwate
15:21 Tsunami 4.1m Kamaishi, Iwate
15:21 Tsunami 4.0m Miyako, Iwate
15:21 **Bank of Japan (BOJ)** sets up a disaster mgmt team
15:26 Quake off Sanriku Coast M7.2
15:27 Prime Minister orders the **Japan Self-Defense Forces (JSDF)** to make a maximum effort for disaster response
15:30 **Tokyo Electric Power Company (TEPCO)** makes its first announcement: All reactors of nuclear power plants (NPPs), found automatically shut down; it also reports blackout of 4.05 million houses

Source: Author’s compilation from various materials
2.2. Emergency Responses: (2) Timeline: Next 70 Minutes

15:37  Gov't convenes the 1st Central Disaster Mgmt Council
15:42  TEPCO reports to NISA about malfunctioning of Fukushima I NPP's Reactor Nos. 1, 2, and 3
15:50  Tsunami 7.3m at Soma, Miyagi
15:57  Quake off Ibaragi Coast M6.1
16:00  Gov't convenes the 2nd Central Disaster Mgmt Council
16:00  NISA initiates an emergency headquarters to collect information on 55 nuclear reactors in Japan
16:15  Quake off Fukushima M6.7
16:29  Quake off Sanriku M6.6
16:30  TEPCO makes its second announcement: All NPPs are under control but 7 thermal power plants have been closed
16:36  TEPCO reports NISA about malfunctioning of the emergency cooling systems of Fukushima I NPP's Reactor Nos. 1 and 2
16:36  Prime Minister's Official Residence sets up an emergency headquarters
16:45  TEPCO reports to NISA about malfunctioning of Fukushima I NPP's Reactor No. 2

Source: Author’s compilation from various materials
3.1. Nuclear Emergency Responses at Fukushima I NPP

amidst Continuing Quakes and Tsunamis

Evacuation (Fukushima II NPP)
3/12 07:45: 3km; 17:39: 10km

Cooling reactors with seawater and boron
3/12 20:20: No. 1
3/13 13:12: No. 3
3/14 16:34: No. 2

Hydrogen Explosions
3/12 15:36: No. 1
3/14 11:01: No. 3

Explosion and Fire
3/15 06:10: No. 2
3/15 09:38: No. 4

Explosion and Fire
3/14 11:01: No. 3

Evacuation
3/11 20:50: 2km (1.2 mi.)
3/12 01:45: 3km (2.4 mi.)
3/12 05:44: 10km (6.2 mi.)
3/12 18:25: 20km (12.4 mi.)

Source: Author’s compilation based on materials published by Prime Minister’s Official Residence

Jun KURIHARA, Senior Fellow, Harvard Kennedy School
3.2. Nuclear Emergency Responses
Situation at Fukushima I Nuclear Power Plant (NPP)

Time to Examine the “Myth” about Nuclear Power Safety

1. Disaster Preparedness
   Difficulty of predicting tsunami impacts on NPPs
   Cooling system: Britleness of the triple safety system—Power lines and generators

2. Disaster Responses
   Recovery operations amidst earthquakes and tsunami warnings
   Inevitable human errors
   Disruption of communications and evacuation
   Difficulty of handling simultaneously occurring crises (Fukushima I and II)

3. Disaster Recovery
   Long way to restore “trust” and to scrap “safely” Fukushima I
   Difficulty of restoring activities in radiation contaminated areas

4. Evaluations (Tentative)
   Disaster preparedness: Structural strength of NPPs, Redesigning contingency plans
   Importance of communications: Intra- and inter-organizational, and public
1. **Disaster Preparedness:** Effectiveness and Efficiency Are of Great Essence

   Redesigning contingency plans regarding, e.g., rolling blackouts, metropolitan commuters, hospitals, and elderly people

2. **Disaster Responses:** Resources Are Limited and Speed Is of Great Essence

   Assessment and prioritization of simultaneously occurring crises
   Sophistication of organizational structure for optimum division of labor

3. **Disaster Recovery:** A Pile of Uncertainties

   Fiscal strength of Japan’s economy
   Restoration of global supply chain networks
   Legal consideration of the reconstruction of tsunami-hit areas
   Resuscitation of quake-hit communities and social capital

4. **Evaluations:** Time to Think Seriously

   **Disaster preparedness:**
   Structural strength of NPPs

   **Implications of globalization:**
   Information travels fast and forcefully like tsunami

   **Importance of communications (accountability & transparency):**
   domestic and global

Source: Nuclear Safety Commission (NSC)
4.2. Implications of Globalization: Photos and Fears Travel Fast on the Globe

Disaster Management Center, Minami Sanriku, Miyagi, (Source: Kyodo)

Fukushima I NPP (Source: New York Times/AFP)

Tokyo (Source: Nihon Keizai Shimbun)


Jun KURIHARA, Senior Fellow, Harvard Kennedy School