Disaster Prevention Information Provided by Japan Meteorological Agency -- Our perspective to XML and CAP --

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Counsellor, Administration Department
Japan Meteorological Agency (JMA)
Today’s presentation

• Natural disaster management in Japan
  – Japan as a disaster prone country
  – Disaster mitigation and prevention framework in Japan
  – The role of Japan Meteorological Agency
  – Legal framework

• Disaster mitigation and prevention information provided by JMA
  – Weather related disaster
  – Earthquake / Tsunami / Volcanoes
  – Our contribution to the world through the international framework

• Dissemination of information to public
  – Multiple media such as TV, radio, mobile phone
  – What we have learnt from massive disasters in 2011
  – Our activities on JMX (JMA XML) and our future approach to the global standard

• Our perspective to the global standard
**Japan - disaster prone country -**

Needs Multi-Hazard Risk Management!
JMA covers for all natural hazards

Hypocenters around Japan
135,700 quakes in 2009
(approx. 370/day)

110 volcanoes in Japan

We can contribute to world-wide communities on disaster mitigation / prevention

11 TCs / year (approach)
3 TCs / year (landfall)

Asian Monsoon: heavy rain/snow
Natural disaster management

**Structural Measures**

- Combination is required for disaster management

**Non-Structural Measures**

- Residents need to be educated so that they can act properly.
- Coordinated action is crucial

- No needs for evacuation as long as hazards do not exceed the limit
- The cost is unlimited if we consider the extremely rare cases

**Collaboration**

- Two aspects of Collaboration are important for Met service
  - Collaboration among non-structural measures (media, evacuation authorities)
  - Collaboration with structural measures (river/coast/sediment control/life lines)
Preventing against natural disasters:
- Build robust infrastructure
- Increase public awareness
- Improve quality of information

Natural Disasters Prevention/Mitigation

Preventive Actions

JMA
- Observation, Monitoring, Forecasting
- Warnings / Advisories
- Weather information

Disaster Management Headquarters
Chair; Prime Minister

Emergency Team

Related Authorities

River Management Authorities

Prefectures

Municipalities (Cities, Towns)

Evacuation Instruction

Media

Citizens

JMA’s information is used as a trigger to start national disaster action

Natural Disaster Recovery
Action of local governments and citizens

JMA Headquarters

JMA Local Offices

Public-Help

Self-Help

Co-Help

• Prefectures
• Municipalities

Information

Forecast

Warnings

Evacuation Order
and Instruction

✓ Staff assembling
✓ Patrol/Caution

Citizens

Evacuation
The Basic Act on Disaster Control Measures (1961) After Ise-Bay Typhoon in 1959

- Provides basis for disaster management in Japan
  - Such as “Definition of responsibilities for disaster management”
- Provides mission of both national and local governments for disaster management
- Description related with JMA responsibility
  - To observe and to forecast meteorological, terrestrial, and oceanographic phenomena.
  - To improve forecast and warning against disaster.
  - To cooperate internationally to enhance global observation system.
The Meteorological Service Act (1952)

• JMA’s mission
  – To contribute to extend public welfare
  – Prevention and mitigation of natural disasters
  – Safety of transportation
  – Development and prosperity of industry ...
  – To cooperate internationally

• Provides duties and services of JMA
  – Observations (Meteorology, Seismology, Volcanoes)
  – Framework for warnings and information on natural disasters
    • Including tsunami and storm surge
  – Promotion of private weather businesses
  – Duties for issue and dissemination of warnings
    • Asks relevant parties to re-distribute warnings
      (National authorities, Local authorities, TV, T&T etc.)
Warning and advisory
--- Weather related disasters ---

Warning

Heavy Rain (Sediment disaster, Inundation), Heavy Snow, Storm, Snow-storm, Flood, High Wave, Storm Surge,
(Tsunami, Earthquake motion, Volcanic phenomena)

Advisory

Heavy Rain (Sediment disaster, Inundation), Heavy Snow, Gale, Gale and Snow, Flood, High Wave, Storm Surge, Thunderstorm, Dense Fog, Frost, Dry Air, Avalanche, Low Temperature, Snow-melting, Ice (snow) accretion,
(Tsunami, Earthquake motion, Volcanic phenomena)

Information jointly issued

Joint Flood Warning for designated river with the river authority
Joint Sediment Disaster Alert with the sediment control authority
Warning and advisory for each city

- Disaster prevention organizations and citizens to narrow down the area of required caution.
- According to “Basic Act on Disaster Control Measures”, a mayor of municipality is responsible for evacuation advisory.
- Easier to understood by public

Number of subdivisions

<table>
<thead>
<tr>
<th>Month</th>
<th>Subdivisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar. 2001</td>
<td>226</td>
</tr>
<tr>
<td>Mar. 2002</td>
<td>294</td>
</tr>
<tr>
<td>Mar. 2003</td>
<td>356</td>
</tr>
<tr>
<td>Mar. 2004</td>
<td>362</td>
</tr>
<tr>
<td>Mar. 2005</td>
<td>368</td>
</tr>
<tr>
<td>Mar. 2006</td>
<td>370</td>
</tr>
<tr>
<td>Mar. 2007</td>
<td>373</td>
</tr>
<tr>
<td>Mar. 2008</td>
<td>374</td>
</tr>
<tr>
<td>Mar. 2009</td>
<td>375</td>
</tr>
<tr>
<td>May. 2010</td>
<td>1777 (municipalities)</td>
</tr>
</tbody>
</table>
Time Sequence of Earthquake Information and Tsunami Warning in JMA

1. Earthquake Information (Hypocenter and Magnitude)
2. Seismic Intensity Information at each Site
3. Tsunami Information (Estimated Tsunami Heights and Arrival Times)
4. Seismic Intensity Information
5. Earthquake Early Warning
### Tsunami Warning Classification

<table>
<thead>
<tr>
<th>Type of Tsunami Bulletin</th>
<th>Estimated Tsunami Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tsunami Warning</td>
<td>&quot;3m&quot;, &quot;4m&quot;, &quot;6m&quot;, &quot;8m&quot;, &quot;over 10m&quot;</td>
</tr>
<tr>
<td>Major Tsunami Warning</td>
<td>&quot;1m&quot;, &quot;2m&quot;</td>
</tr>
<tr>
<td>Tsunami Advisory</td>
<td>&quot;0.5m&quot;</td>
</tr>
</tbody>
</table>

- Leave coastal areas immediately and evacuate to a safe place.
- Leave coastal areas and do not engage in fishing or swimming.

Will be updated in the near future based upon the investigation of 3.11.
# Response to the earthquake

<table>
<thead>
<tr>
<th>6-lower</th>
<th>Cabinet Secretariat</th>
<th>➔ call of an urgent gathering team</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-lower</td>
<td>Ministry of Defense</td>
<td>➔ investigation of damages</td>
</tr>
<tr>
<td></td>
<td>Japan coast guard</td>
<td>➔ investigation of damages</td>
</tr>
<tr>
<td>4</td>
<td>Cabinet Office</td>
<td>➔ estimation of damages</td>
</tr>
<tr>
<td></td>
<td>Metropolitan Police Department, Fire and Disaster Management Agency</td>
<td>➔ investigation of damages</td>
</tr>
</tbody>
</table>
The Concept of Earthquake Early Warning (EEW)

- JMA is providing residents in Japan with Earthquake Early Warnings, new prompt earthquake alerts to be issued immediately after the occurrence of earthquakes, in order to secure time to protect yourself before strong tremors arrive.
- On 1 October 2007, JMA started providing Earthquake Early Warning through several media such as TV and radio.
Importance of public awareness and collaboration with our partners

- **Tsunami warning**
- **Closing tide gates**
- **Immediate evacuation from areas of the tsunami**
- **Train control system**
- **Traffic control signals, traffic regulation**
- **Elevator Control System**
- **People in hazardous locations → Ensuring the safety**
- **Precautionary measures in homes, schools, halls, shopping centers, etc.**
- **Controlling factory lines → To mitigate damage**
- **Hospitals → Prevention of errors in operations**

News
## Volcanic Warning

### Volcano alert levels

<table>
<thead>
<tr>
<th>Abbreviated Term</th>
<th>Target area</th>
<th>Levels &amp; Keyword</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Warning</strong></td>
<td>Residential areas</td>
<td><strong>Level 5</strong> Evacuate</td>
</tr>
<tr>
<td><strong>Near-crater Warning</strong></td>
<td>Non-residential areas near the crater</td>
<td><strong>Level 4</strong> Prepare to evacuate</td>
</tr>
<tr>
<td><strong>Forecast</strong></td>
<td>Inside the crater</td>
<td><strong>Level 3</strong> Do not approach the volcano</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 2</strong> Do not approach the crater</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 1</strong> Normal</td>
</tr>
</tbody>
</table>

**Observations at each volcano**

**Volcanic Observations and Information Center**

**Issurance of Volcanic Warnings**

- Japan Coast Guard
- NHK
- Police
- Prefectural Offices
- NTT
- Local Meteorological Observatories
- Local municipalities
- Vessels
- Citizens / Inhabitants
Provision of Tsunami Bulletins to countries around the Northwest Pacific and the Indian Ocean

Japanese Seismic Network

Global Seismic Network

Sea Level Stations

Pacific Tsunami Warning Center (PTWC)

Data

Information Exchange

Tsunami Bulletins (NWPTA) *1 (TWI) *2

Contribute to the mitigation of tsunami disasters of countries around the Northwest Pacific and the Indian Oceans

Analysis
- Hypocenter
- Magnitude
- Evaluation of Tsunamigenic Potential
- Tsunami Observation etc.

*1) NWPTA: Northwest Pacific Tsunami Advisory
*2) TWI: Tsunami Watch Information for the Indian Ocean
TC advisory from RSMC Tokyo

Tropical Cyclones 1945 - 2006

RSMC Tokyo

25.6/year
(1981-2010)

3.0/year

16.4/year

4.4/year

RSMC TC advisory (WTPQ20-25)
(for 3-day forecast)
issued within 50 minutes from observation times at 00, 06, 12, 18 UTC

from Wikipedia
http://en.wikipedia.org/wiki/Tropical_cyclone
JMA's international mission

Tropical Cyclone Warning Centres

The Global Maritime Distress and Safety System (GMDSS) Services

Volcanic Ash Advisory Center

Northwest Pacific Tsunami Advisory Center

WMO region
Telecommunication, Environmental Emergency Response, etc.

JMA's international mission

JMA advisory NMHS warning people

Tropical Cyclone Warning Centres

The Global Maritime Distress and Safety System (GMDSS) Services

Volcanic Ash Advisory Center

Northwest Pacific Tsunami Advisory center

WMO region
Telecommunication, Environmental Emergency Response, etc.
Dissemination of Information

JMA

Official Single Voice

Information System

Government

Prefectures/Cities

Media

Private activities

Public

JMA website

Weather Warning

Typhoon information

Volcanic Warning

>Rapid progress in ICT
>Each media has its own advantage
>International visitors in Japan
3.11

Photo by JMA from the helicopter of JSDF
As of 12 March

<<Inundated Area>>
Population: 16,640
Death and Missing: 2,170
What we have learnt from 3.11

- Information should be linked to disasters so that the people can understand what they act
  - Tide level, precipitation forecast map, inundation forecast map, tide level calendars etc.

- Appropriate information dissemination system should be established.
  - Use of portal site and mobile phones
  - Ensure several routes of communications

- Appropriate support to citizens and disaster management agencies (including municipalities) is important.
  - To enhance public awareness including children
  - To provide best suitable products
JMX (Japan disaster prevention information XML)

• Our concept
  – Profitableness to users:
    • adaptability to users’ system and working.
    • cost-effective system in the long run
  – Unified Format:
    • from various forms of conventional texts to a unified and comprehensive format.
  – Consolidated description:
    • Multiple information in one single bulletin; from observations to forecasts
  – Flexible format:
    • Format allowing new elements to be added for future services

• Project collaborators
  – Technical support from the XML Consortium on XML standardization
  – Coordination with governmental organizations and the mass media
• CAP can be generated from JMX
  • JMX to domestic users
  • CAP to international users (outside or inside Japan)
  • Typhoon information will be served in CAP as a trial this year through internet
Our perspective to the global standard

• It is reasonable to optimize the emergency alerts considering the domestic requirements.
  – Natural features, government, law, culture, history, etc.
• Emergency alerts must be reached to everyone who needs
  – After the huge disaster, ways of dissemination are limited due to various reasons
  – Disseminate the information to people who cannot understand Japanese
• Standardization may help the various media to deliver the information
  – Multiple ways of dissemination from a single authentic voice
  – May support the people in the country lacking proper alert information
• Tasks to be solved in future
  – How to inform the meaning and the required action of the alert
    • Which is the most important aspect for saving the lives!
  – National authority   International authority
  – National standard   International standard