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EARLY WARNING SYSTEM AND COMMUNITY BASED EMERGENCY RESPONSE MECHANISM

Presented By:
Captain Mohamed Inayath, Director – Programs
National Disaster Management Authority

Disaster Prevention Centre at Minamisanriku

An Angel’s Voice
Chapter 1 – Introduction
Chapter 2 – Literature Review
Chapter 3 – Research Methodology
Chapter 4 – Disaster Risk Profiles
Chapter 5 – Disaster Management Systems
Chapter 6 – Early Warning Systems
Chapter 7 – Emergency Response Mechanism
Chapter 8 – Findings, Recommendations and Conclusion
Introduction

- No country is 100 percent safe and disaster risk free.
- Reliable disaster early warning is a prerequisite and a vital component of preparedness for disaster response.
- EW serves as the trigger point for evacuation order and timely response initiation decision by the individuals and local government which could result in saving numerous lives and loss of property.

Objective

The overall objective of this study is to understand the importance and role of multi-hazard early warning system and the community based emergency response mechanism.
**Specific Objectives**

- To learn and understand about the early warning systems, procedures and protocols in Japan and in the Maldives;
- To identify how early warning initiates emergency response in the context of Japanese local communities;
- To identify and understand the community volunteer based emergency first response and relief mechanism in Japan; and
- To provide recommendation to establish Island Emergency Response Teams and integrate them into the emergency response and relief operations and disaster preparedness at the community level in the islands.

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**Why Community Based EW and Emergency Response is Important?**

- At the Great Hanshin-Awaji Earthquake in 1995, the number of people captured in the collapsed buildings is around 35,000. After the earthquake, 27,000 people were rescued by neighbors and 80% of them were alive. However, 8,000 people were rescued by Army, Police or Fire Fighters and less than 50% of them were alive.
- During GEJE and Tsunami, the community-level response (and community-based warnings) was the key that saved countless human lives. The volunteer fire corps are community-based organizations (CBOs) trained in disaster management used various tools such as handheld loud speakers, fire bells, sirens, and fire engine loudspeakers to warn communities throughout the affected areas.
- The community is the first responder in any disaster.
Why Community Based EW and Emergency Response is Important?

Disaster Loss in Maldives mainly because no community early warning and efficient first response

<table>
<thead>
<tr>
<th>Event/Year</th>
<th>Islands affected</th>
<th>People affected</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addu City Flood Crisis</td>
<td>03 Islands (Feydhoo, Maradhoo, and Maradhoeydhoo)</td>
<td>297 Households got severely flooded</td>
<td>US$ 0.3 million</td>
</tr>
<tr>
<td>(24-25 Nov 2015)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyclone Nilam</td>
<td>Caused flooding in 51 islands, 28 islands severe flooding, 4 islands critical</td>
<td>33,826</td>
<td>133,090.60 USD</td>
</tr>
<tr>
<td>(Oct-Nov 2012)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surge Waves</td>
<td>68 Islands in 16 Atolls</td>
<td>1649 Evacuated</td>
<td>-</td>
</tr>
<tr>
<td>(15-17 May 2007)</td>
<td>600 m inundation inland</td>
<td>579 Housing units damaged</td>
<td>470 million USD</td>
</tr>
<tr>
<td>Indian Ocean Tsunami</td>
<td>82 people killed, and 26 people missing</td>
<td>More than 3997 buildings damaged. Nearly 12,000 displaced.</td>
<td>62% GDP</td>
</tr>
<tr>
<td>(Dec 2004)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Methodology

- Descriptive in nature and mostly qualitative
- Has used both primary and secondary data
- Primary Data Collection include:
  - 18 x Institutional Briefings and presentations,
  - 15 x Tours, field visits and observations.
  - 9 x Community Disaster Awareness Programs
- Secondary Data
  - From the relevant authorities, departments and Bosai Units in Japan.
  - Published and unpublished researches and other related data
  - Books, journal articles, papers, research reports, NGO reports, documents and reports.
  - Internet websites
  - ADRC’s web portal and Research Bank with numerous English translated documents and readings
Maldives is one of the most vulnerable countries in the world.

The most flat and the lowest elevated nation with average height of 1.5 meters.

Maldives faces multi-hazard risks, and threats from the global warming and climate change induced sea level rise and extreme weather events.
The country’s geographic location, physical and geo-climatic features of its islands near the equator in the Indian Ocean exposes the country to different natural hazards from earthquakes (particularly the Southern region), tropical cyclones, storms, thunderstorms, heavy rainfall, dry spell, floods induced by heavy rainfall to storm surges, swell waves and tsunami.

**Hazard Inventory**

<table>
<thead>
<tr>
<th>Natural Hazards</th>
<th>Man-made Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tsunami</td>
<td>Fire</td>
</tr>
<tr>
<td>Floods</td>
<td>Airport Emergencies</td>
</tr>
<tr>
<td>Tropical Storms</td>
<td>Maritime Accidents</td>
</tr>
<tr>
<td>Cyclones</td>
<td>Public Health Emergencies</td>
</tr>
<tr>
<td>Sea surge</td>
<td>Oil Spill and Environmental Incidents</td>
</tr>
<tr>
<td>Drought / Water shortage</td>
<td></td>
</tr>
<tr>
<td>Sea level rise</td>
<td></td>
</tr>
<tr>
<td>Earthquake</td>
<td></td>
</tr>
</tbody>
</table>
Tsunami

Disaster Risk

Source: DIRAM
Disaster Risk

![Diagram showing the risk of various natural disasters such as Cyclone, Rainfall, Swell, Earthquake, Wind Storm, and Drought. The risk levels are High, Low, Moderate, and Low, with arrows indicating the direction of risk increase.](image)

Source: DIRAM

Disaster Management System (Japan)

![Diagram showing the Disaster Management System in Japan, including levels such as National, Prefectural, Municipal, and Residents levels.](image)

1. **Central Disaster Management Council**
2. **Designated Government Organizations**
3. **Designated Public Corporations**
4. **Prime Minister**
5. **Governor**
6. **Mayor of Cities, Towns, and Villages**
7. **Residents and Enterprises**

- Formulation and implementation of the Basic Disaster Management Plan
- Formulation and implementation of the Disaster Management Operation Plan
- Formulation and promoting implementation of the Disaster Management Operation Plan
- Formulation and promoting implementation of Municipal Disaster Management Plan
- Formulation and promoting implementation of Community Disaster Management Plan

24 ministries and agencies are designated.

66 organizations including independent administrative agencies, Bank of Japan, Japanese Red Cross Society, NHK, electric and gas companies, and NTT are designated.
Disaster Management System (Japan)

- Cabinet Office
- Line Ministries
- Self Defense Force
- Prefecture
- Hyogo Prefecture Disaster Management Division (Center)
- Police
- Municipal (City)
- Kobe City Emergency Management Division (Center)
- Firefighting Department

Central Disaster Management Council

<table>
<thead>
<tr>
<th>Chair</th>
<th>Prime Minister</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry</td>
<td>Report</td>
</tr>
</tbody>
</table>

Central Disaster Management Council

- Prime Minister
- Minister of State for Disaster Management
- Heads of Designated Public Corporations (4)
  - Governor of the Bank of Japan
  - President of the Japanese Red Cross Society
  - President of NHK
  - President of NTT
- Academic experts (4)

Committees for Technical Investigation
- Nationwide movement for DM - Tonankai and Nankai Earthquake
- Tokyo Inland Earthquakes, etc.

Secretary Organization
- Chair: Parliamentary Secretary of the Cabinet Office
- Adviser: Deputy Chief Cabinet Secretary for Crisis Management
- Vice-Chair: Director-General for Disaster Management, Cabinet Office Deputy Manager of Fire and Disaster Management Agency
- Secretary: Relevant directors-general of each ministry and agency
Basic Disaster Counter Measures Act

- Definition of responsibilities for disaster management;
- Disaster management organizations;
- Disaster management planning system;
- Disaster prevention and preparedness;
- Disaster emergency response;
- Disaster recovery and rehabilitation;
- Financial measures;
- State of Disaster Emergency
Disaster Management System (Maldives)

- Disaster Management Act (28/2015)
- Decentralization of Administrative Divisions Act (2010)
- Armed Forces Act (1/2008)
- Police Service Act (5/2008)
- Maldives Red Crescent Act (7/2009)

Outline of DM Organizations

<table>
<thead>
<tr>
<th>National Level</th>
<th>City / Atoll Level</th>
<th>Island Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Disaster management Council</td>
<td>City / Atoll Council</td>
<td>Island Council</td>
</tr>
<tr>
<td>National Disaster Steering Committee</td>
<td>City / Atoll Disaster Management Committee</td>
<td>Island Disaster Management Committee</td>
</tr>
<tr>
<td>National Disaster Management Authority</td>
<td>City / Atoll Disaster Management Unit</td>
<td>Island Disaster Management Unit</td>
</tr>
<tr>
<td>Maldives National Defence Force</td>
<td>MNDF Area Commands</td>
<td>MNDF Posts / Unit</td>
</tr>
<tr>
<td>Maldives Police Service</td>
<td>Police Divisions / City / Atoll Police</td>
<td>Island Police Station</td>
</tr>
<tr>
<td>Maldives Red Crescent Society</td>
<td>MRC Branches</td>
<td>MRC Unit</td>
</tr>
<tr>
<td>Maldives Meteorological Service</td>
<td></td>
<td>Community Based Organizations</td>
</tr>
<tr>
<td>Public Media Service</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DM Plans

- National Disaster Management Plan (Draft)
- National Emergency Operations Plan (Draft)
- National Framework for Community Based Disaster Risk Management
- National Framework for Managing Internally Displaced People
- Guide for School Emergency Operation Plan
- Disaster Management Plan for Tourism Sector
- Island Disaster Management Plans
- Public Health Emergency Plan
- Island Development Plans
Early Warning System (Japan)

JMA – Japan Meteorological Agency

Advisories, Warning, Emergency Warning
- Earthquake and Tsunami Early Warning
- Volcanic Hazard Early Warning
- Meteorological Early Warning
- Sediment Disaster Early Warning
- Emergency Warning
- J-Alert
- L-Alert

Early Warning Dissemination

[Diagram showing dissemination of early warning information to various agencies and public through multiple channels]
Early Warning Dissemination

Information by LMO

- Heavy rain advisory
  - Weather information on heavy rain
  - Outlook, amount of precipitation (24hr), disasters to prepare

- Heavy rain warning
  - Weather information on heavy rain
  - Condition of rain, outlook, disasters to prepare

- Sediment disaster alert
  - Weather information on record torrential rain

Actions of local government

- Standby of staff members
- Keep communication
- Monitor rainfall etc. in the region
- Call attention to general public

- Patrol dangerous area
- Prepare/open evacuation centers
- Emergency alert

Evacuation instruction
Evacuation directive

Actions of general public

- Pay attention to weather information (TV, radio, Internet etc.)
- Prepare against heavy rain (check windows, shutters etc.)
- Check evacuation route
- Prepare personal effects for evacuation
- Keep away from dangerous area
- Get ready for evacuation
- Report local government if unusual phenomena found
- Evacuation

User-friendly information with visual images

Prefabrual networks for disaster prevention and Internet service

Prefectures

Towns/cities

User-friendly information with visual images

Timely and appropriate countermeasures against disasters

Evacuation of residents

LMOs/DMOs/JMA HQ
Early Warning Mechanism and Dissemination (Sediment Disasters) Prefecture Level at Rokko Sabo Office

Earthquake and Tsunami Early Warning

Meteorological Early Warning

Early Warning System (Maldives)

MMS – Maldives Meteorological Service

Alerts, Advisories, Warning

- Earthquake and Tsunami Early Warning
- Meteorological Early Warning
## Earthquake and Tsunami Early Warning

<table>
<thead>
<tr>
<th>Alert Level</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 White</strong></td>
<td>• An earthquake with magnitude of 7.0 or higher in Richter scale, occurred in the Indian Ocean ring but there is no immediate threat from the event</td>
<td>Earthquake information</td>
</tr>
<tr>
<td><strong>2 Yellow</strong></td>
<td>• An earthquake occurred with magnitude of 8.0 or higher in Richter scale over the Indian Ocean region. The earthquake has the potential to generate a widely destructive regional tsunami in the Indian Ocean</td>
<td>Earthquake and Tsunami advisory, concerned authorities and public are advised to be on alert and be ready to move safer areas and high rise buildings</td>
</tr>
<tr>
<td><strong>3 Red</strong></td>
<td>• An earthquake of 8.0 or higher in Richter scale, occurred in the Indian Ocean ring and confirmation of an ocean wide destructive tsunami originated from the epicenter</td>
<td>Tsunami warning. People at risk to be evacuated from the danger zones</td>
</tr>
<tr>
<td><strong>4 Green</strong></td>
<td>• The condition has improved</td>
<td>Cancellation message, MMS assumes that the tsunami threat does not exist to Maldives</td>
</tr>
</tbody>
</table>

## Meteorological Early Warning

- **Alert 1 White**
  - Wind speed 23 – 30 mph
  - Rainfall > 50 mm
  - High tidal waves/swells
  - Issue alert 1 SMS to focal points.

- **Alert 2 Yellow**
  - Wind speed 30 – 40 mph
  - Torrential rain. Heavy rain for more than 2 hours.
  - Severe thunderstorm
  - Tropical cyclone within effective area
  - Significant tidal or swell waves
  - Issue alert 2 Inform Hotline, Fax, Send SMS to focal points, Task force: EOHIDs

- **Alert 3 Red**
  - Flash flood is expected
  - Tropical cyclone
  - Destructive tidal or swell waves or storm surge
  - Issue alert 3 Inform Hotline, Fax, SMS to focal points, Task force: EOHIDs
Emergency Response mechanism (Japan)

In Japan's disaster management system, it is the responsibility of the affected municipalities to respond to disasters, and only in extreme cases do the related prefectures support the municipalities by carrying out overall coordination efforts.

Furthermore, when even the prefectures are having difficulty handling the situation the national government steps in to help.

For large-scale disasters affecting wide areas, the Prefectural Emergency Relief Headquarters is expected to play a central role in the recovery process.

- Prime Minister's Office and Cabinet Office
### Emergency Response Coordination System

Communication and coordination system between Extreme Disaster Management Headquarters and each prefecture during the Great East Japan Earthquake.

#### Emergency Response Organizations

- Japan Self Defense Force
- National Police Agency
- Fire and Disaster Management Agency
- TEC - Force
- Disaster Medical Assistance Team (DMAT)
- Japan Coast Guard
- Japanese Red Cross Society
- JMA
- NHK

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Japanese

<table>
<thead>
<tr>
<th>Organization</th>
<th>Staff (Maximum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>日本自衛隊 (Japan Self Defense Force)</td>
<td>大約300名</td>
</tr>
<tr>
<td>国家警察庁 (National Police Agency)</td>
<td>100名</td>
</tr>
<tr>
<td>国家消防庁 (Japan Fire and Disaster Management Agency)</td>
<td></td>
</tr>
<tr>
<td>TEC - Force</td>
<td>90名</td>
</tr>
<tr>
<td>MDAE (Disaster Medical Assistance Team)</td>
<td>25名</td>
</tr>
<tr>
<td>日本海上保安庁 (Japan Coast Guard)</td>
<td></td>
</tr>
<tr>
<td>日本赤十字社 (Japanese Red Cross Society)</td>
<td></td>
</tr>
<tr>
<td>地震情報センター (Japan Meteorological Agency) (JMA)</td>
<td></td>
</tr>
<tr>
<td>NHK (National Broadcasting Corporation)</td>
<td></td>
</tr>
</tbody>
</table>

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Diagram showing coordination between various agencies and the Prime Minister's Office, with contact and coordination through Ministries and Agencies (Regional branch offices and bureaus, Self-Defense Forces, etc.).
Emergency Response Mechanism (Tokyo Prefecture)

Community Disaster Response Organizations

- Voluntary Firefighting Corps
- Voluntary Flood Fighting Teams
- Neighborhood Associations
- Voluntary Disaster Reduction Organizations
  - BOKOMI – Disaster Safe Welfare Community, Kobe
## Emergency Response Mechanism (Maldives)

<table>
<thead>
<tr>
<th></th>
<th>National</th>
<th>Atoll/City</th>
<th>Island/Local Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decision Making/Strategic</strong></td>
<td>Disaster Management Council</td>
<td>Atoll/City Disaster Management Committee</td>
<td>Island Disaster Management Committee</td>
</tr>
<tr>
<td></td>
<td>Disaster Management Steering Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Emergency Management / Operational</strong></td>
<td>National Disaster Management Authority</td>
<td>Atoll/City Disaster Management Unit</td>
<td>Island Disaster Management Unit</td>
</tr>
<tr>
<td></td>
<td>National Emergency Operations Centre</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Field Level First Responders/ Field Operations</strong></td>
<td>National Emergency Response Force (NERF)</td>
<td>City/Atoll Response Team</td>
<td>Local Emergency Response Force (LERF)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Emergency Response Organization

### National Level
- National Disaster Management Council
- Line Ministries
- National Disaster Management Steering Committee
- National Disaster Management Authority
- National Response Force (Defence Force, Police, Red Crescent, Emergency Healthcare Service)

### City/Atoll Level
- City/Atoll Council
- City/Atoll Disaster Management Committee
- City/Atoll Disaster Management Unit
- Local Response Force (MNDF Area Commands, MPS Divisional Commands and Atoll Police, MRC Branches, Regional and Atoll Hospitals)

### Island Level
- Island Council
- Island Disaster Management Committee
- Island Disaster Management Unit
- Island Emergency Response Team (MNDF, Posts, Island Police Station, MRC Units, Health Center, Auxiliary Firemen, CBO Members)
“Acting for the common good is a frequent theme in Japanese culture and it infuses the country's approach to disaster preparedness and risk reduction. The rest of the world has much to learn from Japan, if we are to make progress on saving lives and livelihoods, and reducing disaster losses”

Banki Moon, UN Secretary-General

Lessons Learnt From Japan

- Tripod Disaster Response Concept - Self Help, Mutual Help and Public Help
- Multi-hazard, End-to-end Early Warning System
- Wide Area Support System
- Volunteerism and Community based Organizations
- Emergency Kit Bag
- Disaster Drills and Exercises
- Disaster Prevention Awareness
Implementing and monitoring the action plans.

Empower and promote the island communities to take the DRR ownership.

Prepare, implement and maintain emergency response plan for every island community with whole community participation.

Establish community based early warning system in all the inhabited islands.
Recommendations

- Establish and create community emergency response team (CERT) in all inhabited island communities.
- Arrange and conduct drills and emergency exercises at all levels involving all the sectors and stakeholders.
- Teach disaster prevention skills for survival. Such as fire extinguishing, swimming and sea survival, basic first aid and maintaining emergency kit bag etc.
- Make DRM a learning module and a practical component at schools
- Develop wide area disaster support hubs in other parts of the country