A Presentation
On
Cyclone Risk Reduction and Resilience

HRDI – NIDM Three Day Programme on "Coastal Disaster Risk Reduction and Resilience"
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1. Background: The role of DDMA/SDMA/NDMA

The role of DDMA/SDMA/NDMA is very important on Cyclone Risk Reduction and Resilience as it has been mandated by Sub-section 8 and 9, Section 42, Chapter 7 of Disaster Management Act 2005 to develop training modules and educational materials, undertake training, research, documentation and publication for capacity development and dissemination of knowledge / information related to disaster management, assist in formulation of policies, plans, strategies and frameworks for disaster risk reduction and resilience as well as promote awareness among different stakeholders for enhancing human capacity to avoid, prevent, mitigate, prepare, respond and recover efficiently in a proactive, holistic and integrated manner.
2. Introduction - The Geography of Cyclone:

- India's 7,516 kilometer coastline (5400 kms along the mainland, 132 kms in Lakshadweep and 1900 kms in Andaman and Nicobar Islands), almost 5,700 kilometers are highly vulnerable to the impacts of tropical cyclones and related hydro-meteorological hazards and consequently to recurrent loss of life and properties.

- These coastal states are also susceptible to the impacts of tsunami, drought and floods etc. Studies indicate that natural disaster losses equate to up to 2% of India's Gross Domestic Product (GDP) and up to 12% of Central government revenue.
2. Introduction - The Geography of Cyclone:

- The cyclones that occur between Tropics of Cancer and Capricorn are known as Tropical Cyclones.

- Indian sub-continent is the worst affected region of the world, is exposed to nearly 10% of the world's Tropical Cyclones.

- There are 13 coastal states/UTs encompassing 84 coastal districts which are affected by cyclones. Four States (Andhra Pradesh, Odisha, Tamil Nadu and West Bengal) and one UT (Pondicherry) on the East Coast and One State (Gujarat) on the West Coast are more vulnerable to cyclone disasters.

- 40% of the total population lives within 100 km of coastline. Data for the period 1980-2000 shows that on an average, annually 370 million people are exposed to cyclones in India.
3. Cyclone and their impacts in India

<table>
<thead>
<tr>
<th>Type of Disturbance</th>
<th>Associated Wind Speed in the Circulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low pressure Area</td>
<td>Less than 17 knots (&lt;31 kmph)</td>
</tr>
<tr>
<td>Depression</td>
<td>17 to 27 knots (31 to 49 kmph)</td>
</tr>
<tr>
<td>Deep Depression</td>
<td>28 to 33 knots (50 to 61 kmph)</td>
</tr>
<tr>
<td>Cyclonic Storm</td>
<td>34 to 47 knots (62 to 88 kmph)</td>
</tr>
<tr>
<td>Severe Cyclonic Storm</td>
<td>48 to 63 knots (89 to 118 kmph)</td>
</tr>
<tr>
<td>Very Severe Cyclonic Storm</td>
<td>64 to 119 knots (119 to 221 kmph)</td>
</tr>
<tr>
<td>Super Cyclonic Storm</td>
<td>119 knots and above (221 kmph and above)</td>
</tr>
</tbody>
</table>
### 4. History of Major Tropical Cyclones in India (1891-2002):

The major Tropical cyclones which struck the coastal districts in India during the period 1891-2002 are as under:

<table>
<thead>
<tr>
<th>State</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerala</td>
<td>3</td>
</tr>
<tr>
<td>West Bengal</td>
<td>69</td>
</tr>
<tr>
<td>Karnataka</td>
<td>2</td>
</tr>
<tr>
<td>Odisha 98</td>
<td>98</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>43</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>79</td>
</tr>
<tr>
<td>Goa</td>
<td>2</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>54</td>
</tr>
</tbody>
</table>
5. Suggested Objectives:

The objective of DDMA/SDMA /NDMA should be to reduce vulnerability of coastal communities to cyclone and other hydro meteorological hazards through:

(i) improved early warning dissemination systems

(ii) enhanced capacity of local communities to respond to disasters

(iii) improved access to emergency shelter, evacuation, and protection against wind storms, flooding and storm surge in high areas

(iv) strengthening DRM capacity at central, state and local levels in order to enable mainstreaming of risk mitigation measures into the overall development agenda.

(v) enhance the understanding of the issues and solutions on governance and administration

(vi) discuss about current practices in the coastal disaster risk reduction and monitoring technologies

(vii) Highlight the emerging issues in context with urbanization climate change
6. Management of Cyclones:

- There are many structural and non-structural measures for effective disaster management of cyclones.

- The structural measures include construction of cyclone shelters, construction of cyclone resistant buildings, road links, culverts, bridges, canals, drains, saline embankments, surface water tanks, communication and power transmission networks etc.

- Non-structural measures like early warning dissemination systems, management of coastal zones, awareness generation and disaster risk management and capacity building of all the stakeholders involved.

- These measures can be adopted and tackled on State to State basis under National Cyclone Risk Mitigation Project (NCRMP) being implemented through World Bank Assistance.
7. Home Work Ahead

a. Early warning and communication system by improving the Last Mile connectivity.

b. Construction and sustainable maintenance of Multi-purpose Cyclone Shelters (MPCSs), Improved access and evacuation to these and already exiting MPCSs and habituations through construction of roads and bridges, construction of coastal embankments in selected places for protection against storms, flooding and storm surge in high risk areas and underground cabling.

c. Enhanced capacity and capability of local communities to respond to disasters, and Strengthening Disaster Risk Mitigation (DRM) capacity at Central, State and Local levels in order to enable mainstreaming of risk mitigation measures into the overall development agenda. Management of Cyclones:

d. There are many structural and non-structural measures for effective disaster management of cyclones. The structural measures include construction of cyclone shelters, construction of cyclone resistant buildings, road links, culverts, bridges, canals, drains, saline embankments, surface water tanks, communication and power transmission networks etc. Non-structural measures like early warning dissemination systems, management of coastal zones, awareness generation and disaster risk management and capacity building of all the stakeholders involved. These measures are being adopted and tackled on State to State basis under National Cyclone Risk Mitigation Project (NCRMP) being implemented through World Bank Assistance.
Benefits of Tropical Cyclones:

- Although Tropical cyclones are known for destruction they cause, when they strike they also bestow certain benefits to the climatic conditions of that area such as
  - Relieve drought conditions.
  - Carry heat and energy away from the tropics and transport it towards temperate latitudes, thus helps to maintain equilibrium in the Earth troposphere
  - Maintain a relatively stable and warm temperature worldwide.
Build Back Better

Disaster Risk Reduction
- Resilient Physical Assets
- Multi-hazard based Land-Use
- DRR Education and Awareness

Community Recovery
- Psychological and Social Recovery
- Business Recovery

Effective Implementation
- Institutional Mechanism
- Legislation and Regulation
- Monitoring and Evaluation
THANK YOU ALL