Applying a Climate Disaster Resilience Index to Enhance Planning Decisions in Chennai, India

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Overview

• **Urban Disaster Risk and Climate-related Disasters**
  – Stresses and shocks

• **Climate Disaster Resilience Index in Chennai**
  – Research Objectives
  – Methodology
  – Results

• **Enhancing the Resilience to Disasters in Chennai**
  – Action-oriented Resilience Assessment and Climate Action Plan
  – Safer Chennai Campaign
Urban Disaster Risk in Chennai

Urbanisation:

- Current population (2011): 4.68 million, Chennai City (176km$^2$)
  - Population growth: 1971-2001: 1.72%/year
  - Population growth 2001-2011: 0.75%/year
- Population density (avg): 26,597 (p/km$^2$)
- Chennai Metropolitan Area expected at 9.9 million inhabitants by 2025

→ **Stress**: urban infrastructure, social conflicts (migration), urban poverty, challenged institutions
→ **potential urban disaster risks**
Climate-related Disasters in Chennai

Climate-related Disasters:
(during October-December)
  – Total 29 cyclones in past 50 years

(during March-June)
• Heat waves
• Droughts (rare)

→ Shocks: low probability, rapid onset, and high impact events causing immediate damage
Climate Disaster Resilience Index in Chennai (1)

Research Objectives

• **Key Objective 1:** to measure the level of resilience to climate-related disasters in the 10 administrative zones of Chennai Corporation (Municipality).

• In the adopted *Climate Disaster Resilience Index* framework, the concept of resilience is applied at an urban entity which is regarded as a system defined by 5 dimensions, 25 parameters and 125 variables.

→ **Urban disaster risks are linked to climate-related disasters**

• **Key Objective 2:** to trigger DRR-related planning at the local level.
## Climate Disaster Resilience Index in Chennai (2)

### Methodology

**CDRI tool: 5x5 matrix**

<table>
<thead>
<tr>
<th>Physical</th>
<th>Social</th>
<th>Economic</th>
<th>Institutional</th>
<th>Natural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>Population</td>
<td>Income</td>
<td>Mainstreaming of DRR and CCA</td>
<td>Intensity of natural hazards</td>
</tr>
<tr>
<td>Water</td>
<td>Health</td>
<td>Employment</td>
<td>Crisis management</td>
<td>Frequency of natural hazards</td>
</tr>
<tr>
<td>Sanitation, Solid waste</td>
<td>Education and awareness</td>
<td>Household assets</td>
<td>Knowledge dissemination and management</td>
<td>Ecosystem</td>
</tr>
<tr>
<td>Infrastructure and Roads</td>
<td>Social capital</td>
<td>Finance and savings</td>
<td>Institutional collaboration</td>
<td>Land-use</td>
</tr>
<tr>
<td>Housing and land-use</td>
<td>Community Preparedness</td>
<td>Budget and subsidy</td>
<td>Good governance</td>
<td>Environmental policies</td>
</tr>
</tbody>
</table>

→ CDRI tool derived through extensive literature review
Climate Disaster Resilience Index in Chennai (3)

Study Details

- **Target Group**: Zone Officers from the 10 administrative zones

Source: modified from Google Earth, 2010
Climate Disaster Resilience Index in Chennai (4)

Results: Overall Resilience

Areas with higher economic development, lower population density and better environmental condition have higher resilience levels.

CDRI Zone Profile:
Prepared by: University of Madras, Chennai Corporation and Kyoto University
Climate Disaster Resilience Index in Chennai (5)

Results: Physical and Social Resilience

Lower in old and densely populated areas of the city

Less variation, but northern areas have lower social resilience due to poorer health conditions and social capital
Climate Disaster Resilience Index in Chennai (6)

Results: Economic and Institutional Resilience

Little economic development in northern areas compared to south where large IT centres and car companies are being established.

Little variation between zones due to their administrative character with little space for own decision-making.
Climate Disaster Resilience Index in Chennai (7)

Results: Natural resilience

Key finding:
Lower resilience in northern areas due to heavy polluting industries (waste disposal site, coal-fired power plant, port) reducing the ecosystem quality.
Enhancing the Resilience of Chennai to Climate-related Disasters (1) – *Implications of CDRI*

- **Action-oriented Resilience Assessment**
  - Views of Councillors (155) of city on how (which stakeholder) and what type of action would enhance the resilience to disasters.
  - **Key finding**: governmental-led solutions are favoured over people-led approaches

- **Climate Action Plan (CAP)**
  - Based on analysis of CDRI, local characteristics and feasibility; focus on non-structural measures (soft adaptation)
  - Draft formulated in December 2010 in collaboration with the Corporation of Chennai and University of Madras.
Enhancing the Resilience of Chennai to Climate-related Disasters (2) – *Implications*

- **Safer Chennai Campaign**
  - Launched on 19th August 2010 to support Chennai’s participation at the 2010-11 World Disaster Reduction Campaign: Making Cities Resilient from the United Nations
  - Provides an opportunity to support and establish multi-stakeholder dialogues to decisively implement actions enhancing the resilience in Chennai
  - The CDRI is an example of a process-oriented research approach: from assessment to planning and implementation
Thank you for your attention!