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Assessing community resilience to climate-related disasters in Chennai, India

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ABSTRACT

This article compares the resilience of two communities in Chennai, India, to climate-related disasters. The selected communities have similar exposure to natural hazards (cyclones and river-based floods due to their close proximity to the sea. Both areas are predominantly residential. Results from a household survey, assessing the physical, social and economic resilience of individuals through a Climate-related Disaster Community Resilience Framework (CDCRF), reveal that people living in the vicinity of rivers and canals are at higher risk from impacts (damages on house, diseases) of floods compared to others. However, despite their experience to past flood-related disasters, they have not been able to enhance their coping capacity due to their limited adaptive capacity. Thus, their resilience is limited to absorb, manage and bounce back future climate-related disasters (particularly floods). In collaboration with other stakeholders, mainly the Corporation of Chennai (Municipality), community-driven participatory solutions are concluded to have beneficial effect in enhancing the resilience of communities to climate-related disasters.

1. Introduction

In recent years, terms such as 'building' or 'making' cities resilient (e.g. UN 2010–11 World Disaster Reduction Campaign: Making Cities Resilient) have gained wide attraction to denote amongst others, efforts taken by various stakeholders (authorities, communities, private sector, etc.) to address issues of urbanisation and climate change, prevalent in many cities in developing countries to avoid or minimise impacts from natural hazards [30]. Increasing the capacity of urban systems to manage disasters corresponds to ambitions stated in the Hyogo Framework for Action which was adopted by 168 UN nations in 2005 [36]. Taking decisive action by creating effective disaster management systems at national [37] and local levels [23] is crucial to generate the platform for ensuring communities are made disaster resilient.

In this paper, Chennai (India), in particular two communities (Adikesvapuram and South Kodambakkam), is presented as a case study location which experienced large population growth (urbanisation) rates (average 1.72% p.a.) over the past decades [9], and is directly exposed to various natural hazards (cyclones and intense rainfall) due to its coastal location. Following projections given by the IPCC, weather events are likely to become less predictable and also more intense and severe in the future [17]. This is expected to have serious consequences for Chennai as its low-lying surface and vicinity to the sea makes it susceptible to flooding and water-logging in many parts throughout the city already after sporadic rainfall events [28].

By adopting the concept of resilience [6,10] to describe the resilience of a community to climate-related disasters, the objective is to understand to what extent individuals

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are prepared and capable to respond to intense natural hazards. Communities are identified as key actors in shaping the resilience of an urban system [27,39] therefore, their ability to absorb, manage or bounce back following a disaster [35] is crucial for the functioning of a city. Based on a city-wide resilience matrix named Climate Disaster Resilience Index (CDRI) [19], the aspects of five dimensions (physical, social, economic, institutional and natural) were assessed. This paper, now proposes a modified Climate-related Disaster Community Resilience Framework (CDCRF) consisting of physical, social and economic aspects to disclose the resilience of communities at the household or micro-level in two selected areas, Adikesvapuram (Ward 79) and South Kodambakkam (Ward 131), of Chennai. The following research questions and specific hypotheses in italics are attempted to be answered in this article:

- Are households located in the vicinity of natural hazards (rivers, canals) less resilient?
  - *Households located in the vicinity of rivers and canals are less resilient.*
- Do affected households learn from climate-related disasters and enhance their resilience?
  - *Households learn from a climate-related disaster after having been affected and neither enhance their resilience.*
- How can community resilience to climate-related disasters be enhanced?

To answer these questions and hypotheses, a household survey and interviews with community leaders have been undertaken in the two before mentioned communities in Chennai.

2. Community resilience to climate-related disasters

Although the concept of resilience has its origin from the ecological field of science [16], works from various authors [1,2,7,13] have shown the linkage of resilience to explain socio-ecological systems in which communities respond to disturbances or disasters within a natural environment. Accordingly, concepts of community resilience to disasters were evolved and applied by various scholars [6,35,1,3,22,26,29,34,38] who further include political and economic aspects in the conceptualisation of community resilience, apart from the social and natural context in which communities are embedded in. The technical understanding of community resilience is described as the community's ability to absorb, manage and bounce back after a disaster. Similarly, community resilience is explained [10] in form of a life-cycle where the post-disaster phase is characterised by the ability of a community to strengthen its coping through adaptive capacity following a disaster [31]. This allows communities to enhance their responsive (coping and recovery) capacity (resilience) to manage future disasters (Fig. 1).

However, all these theoretical aspects of resilience depend on the actual context in which a community is located. For an individual person, in particular, physical, social and economic aspects may decide to what extent he/she can respond to a disaster [18]. For example, the extent defining how well an individual person is integrated (social capital) into his/her community and can count on support from neighbours during a disaster [21] is one of many aspects of social resilience. Thus, enhancing resilience of communities requires them to be better prepared to disasters [10,5]. In this context, the term adaptive capacity [14] describes the ability of socio-ecological systems, including communities, to learn and/or improve their capacity to manage a disturbance (disaster) either through reaction following a disaster experience, or in a proactive manner where a future stress or change is anticipated before it occurs. This follows the argument that higher experience of disasters, mainly floods, enhances the preparedness of people based on a learning effect that would take place among people after they experience such events [25]. This notion shall be integrated into the CDCRF. Finally, to enhance community resilience, social learning helps a community to increase its awareness, skills and ability to confront a future disaster in a collective approach [1,24].

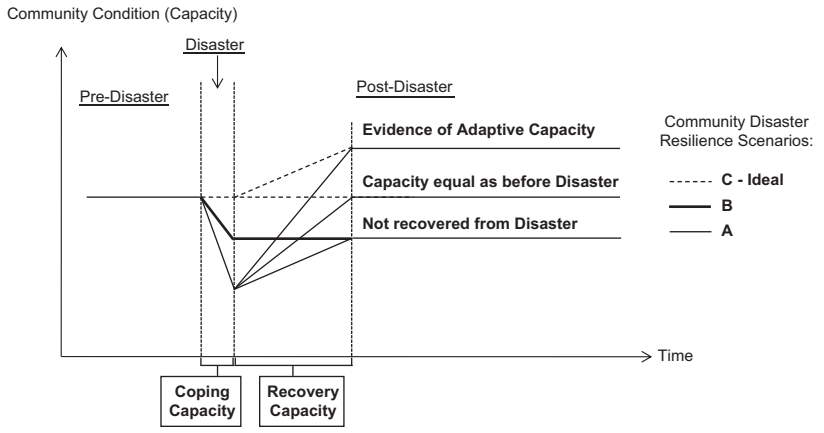

Fig. 1. Community disaster resilience framework (graphical).