Modelling community resilience to tropical cyclones in the Mahanadi delta, India

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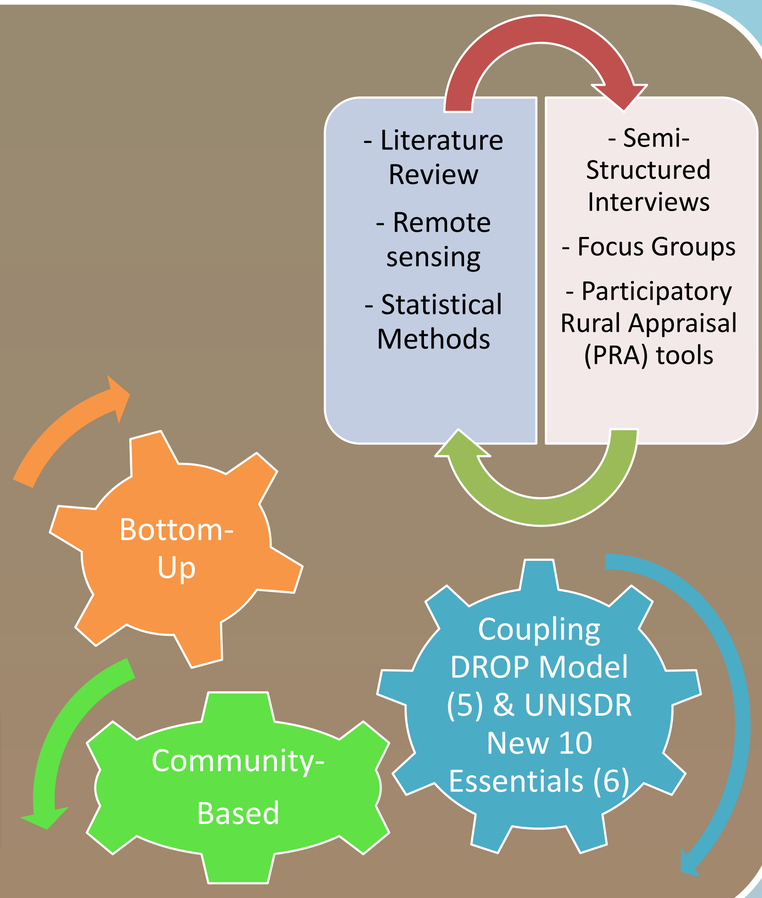
Introduction

The concept of **disaster resilience** has gained momentum in recent decades and the need for its enhancement has achieved global recognition (1). However, relatively few studies, predominantly qualitative and urban-focused, have been conducted so far to measure it and more research is needed to develop effective tools for its quantification, especially in developing countries (2).

This research aims to evaluate coastal community resilience to tropical cyclones in selected communities in the Mahanadi delta, India under different spatial and temporal scenarios, in relation to existing and proposed coastal infrastructure. The study site was selected due to its significant exposure to tropical cyclones, whose overall impact on livelihoods is very high (3;4).

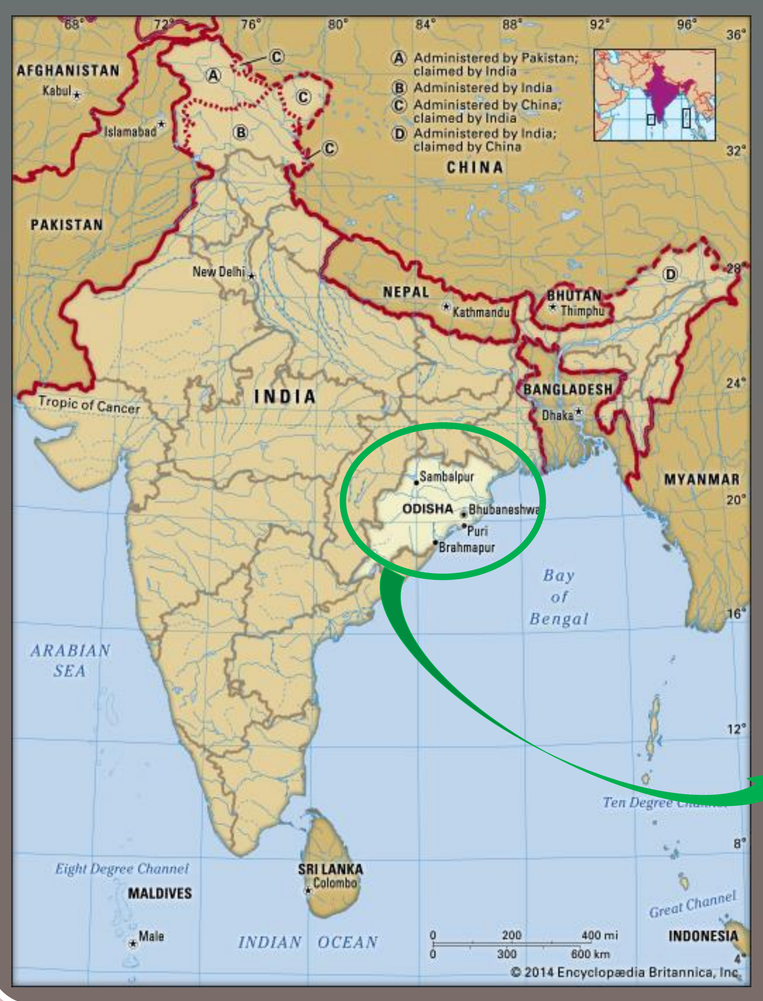
Methods

1. Preliminary State-of-the-Art Review
2. Stakeholders Consultations & Indicator-Based Resilience Framework Design
3. Validation of the Resilience Framework through an Independently Assessed Variable
4. Data Collection & Resilience Evaluation



Results

A one-month preliminary fieldwork has been conducted to validate the selection of indicators for the resilience framework based on stakeholders' perceptions.



50+ Cyclones since 1900 (3)

Development of an Integrated Disaster Management System after Super Cyclone 1999 (~10,000 fatalities)

Decreased disaster mortality; impact on livelihoods still high

Social Resilience	
Age	% non-elderly population (< 59 years)
Educational equity	% population with primary school education
Economic Resilience	
Housing capital	% homeownership
Employment	% employed
Institutional Resilience	
Safety nets	% population with social protection cards
Mitigation	% population part of disaster management teams
Infrastructure Resilience	
Housing type	% concrete houses
Distance to shelter	Km
Environmental Resilience	
Forest	% land that is non-developed forest
Natural barriers	% land that is a natural barrier (e.g. mangroves)
Community Capital	
Civic engagement	N. of community organisations per capita
Place attachment	% population born there that still resides there

3 Pilot Communities: Kaitha, Kathuaganda and Pentha, in the Kendrapara District of Odisha

32 Focus Groups using PRA tools

10 Semi-Structured Interviews

42 Candidate Indicators for Resilience

(Above: Indicators of resilience based on the DROP model - sample from a larger set)

Conclusions

Disasters caused by natural hazards already cause many fatalities and significant economic damages every year worldwide and exposure to these hazards is increasing under climate change and rising urbanisation (4). In light of this, disaster risk reduction has emerged as a global challenge and enhancing resilience has become a global priority, as highlighted in the Sendai Framework for Disaster Risk Reduction 2015-2030 (1). In order for any resilience building initiative to be successful, it becomes essential to preliminarily understand, identify and assess all sets of conditions that contribute to resilience. This calls for an holistic and multidisciplinary approach that integrates the social, economic, environmental and technical aspects of resilience while at the same time ensuring stakeholders involvement and participation during the whole process. This research attempts to understand the drivers of community resilience to natural hazards in the study area and the ability of selected communities to recover from specific events, so as to investigate which communities are most resilient and why. The main outcome of this study will be a modelling tool for a quantitative assessment of resilience over space and time in the study site, which can be used to evaluate resilience of alternative options, with the ultimate goal of informing policy and aiding decision making for planning. In doing so, a review of existing frameworks for resilience assessment, most notably the DROP model (5) and UNISDR New 10 Essentials (6), and of the current state of the art in the study site is promoted, to develop an ad-hoc framework that takes into account local features and needs, from the bottom-up.

References

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