

## Introduction

- In Sri Lanka
  - Large scale shrimp farming survived only from early 1980s to mid 1990s
  - Small-scale shrimp farming has been persisting since the early 1990s
- Climate change impacts and shrimp disease
  - Droughts or flood
  - Unusual monsoon patterns
  - Unexpected temperature fluctuations
- In the hands of small-scale producers, can shrimp aquaculture be made more resilient and thus sustainable?

## Theory

- Resilience: “The ability of a system to absorb or rebound from disturbance without shifting to another fundamentally different system configuration.”  
(Armitage et al. 2007, *Adaptive Co-management*)
- Adaptation: the act of making something fit for a new situation or use.  
(Orlove 2009, in: *Adapting to Climate Change: Thresholds, Values, Governance*)
- We analyzed adaptation using social-ecological resilience approach with a four-part framework  
(Folke et al. 2003, in: *Navigating Social-Ecological Systems*)

## Purpose

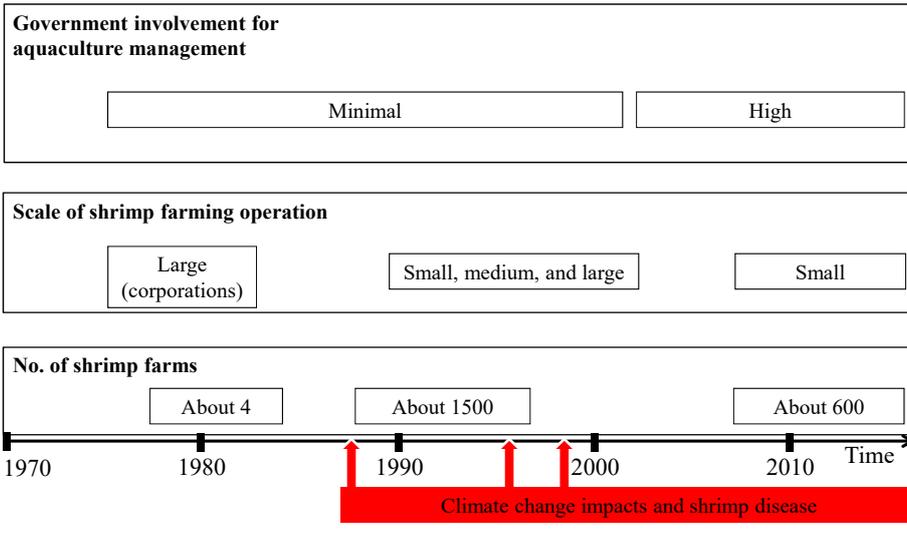
- How small-scale shrimp farmers adapt to climate change impacts by collectively managing shrimp disease?
- What are the sources of resilience?

## Methods

- Research design: Qualitative
- Research strategy: Case study
- Sampling technique: Snowball sampling
- Data collection methods:
  - Participant observation
  - Semi-directive interviews (38)
  - Focus group discussions (3)
  - Key informant interviews (7)

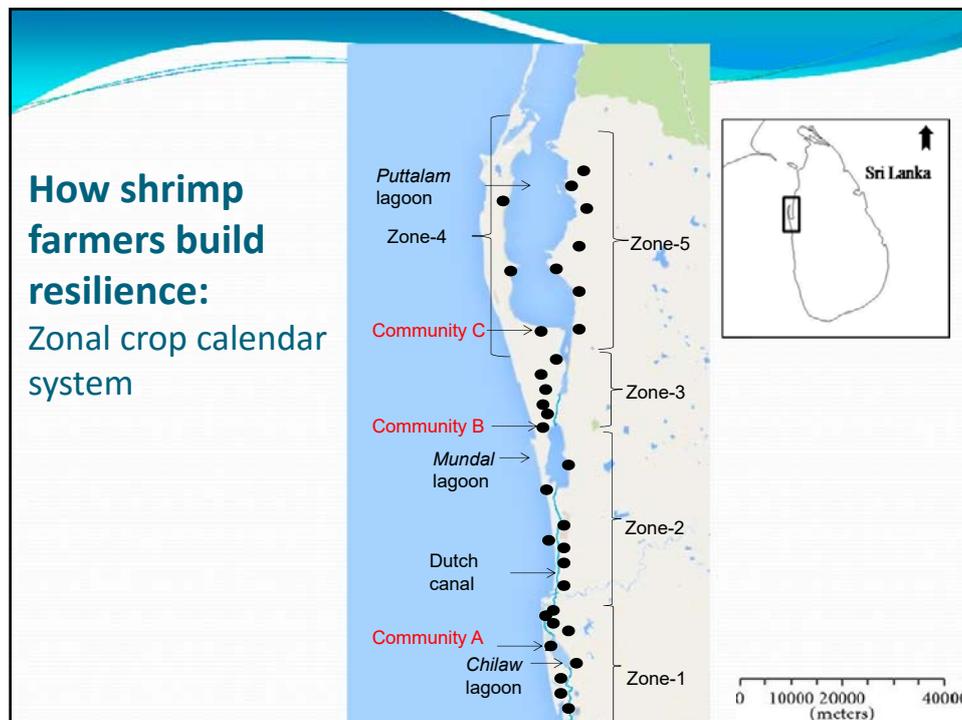


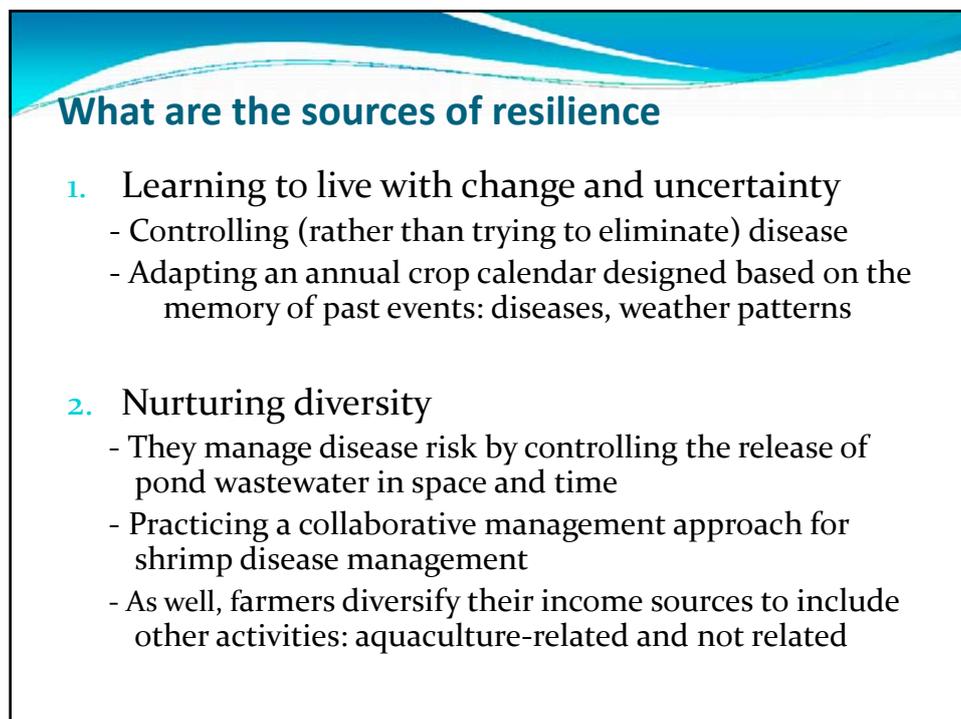
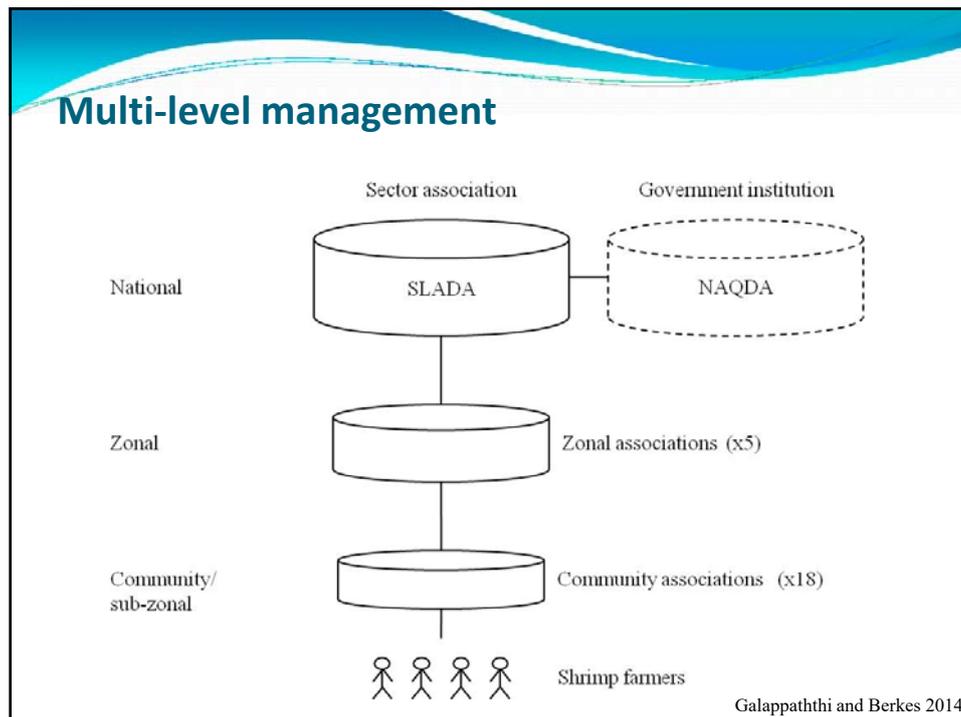
## Changes in Sri Lanka shrimp social-ecological systems



## Key issue: disease spread by shared water resources

- Key solution, therefore, is to control discharge and withdrawal dates from the common water body
- This serves to control (not 'eradicate') shrimp disease
- It requires 'collective action' by all small producers
- Achieved through their community association (*samithi*), collaborating with other *samithi*
- Through a system known as 'zonal crop calendar system'







## Sources of resilience...Cont.

3. Combining different kinds of knowledge
  - Farmers combine their experience with large-scale (failed) companies, their own experience, government-sponsored workshops on technical knowledge, and new knowledge from adaptive management (the zonal crop calendar system)
  
4. Fostering learning
  - Farmers have built on their experiences with producer cooperatives (*samithi*) to self-organize into a multi-level community-based management structure
  - Learning at multiple levels of governance
  - The zonal crop calendar system is revised yearly

## Conclusions

- Collaboratively developing and managing the zonal crop calendar system (disease control) is the key to building resilience in this social-ecological system
- Sources of resilience
  - Learning to live with change and uncertainty
  - Nurturing diversity
  - Combining different kinds of knowledge
  - Fostering learning
- Collaboration and collective action are central features of this adaptation mechanism
- Small-scale shrimp aquaculture is persisting (sustainable) and resilient because it is adapting

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