

Natural Protected Areas under Change and Uncertainty



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Natural Protected Areas (NPAs) & Climate Change (CC)

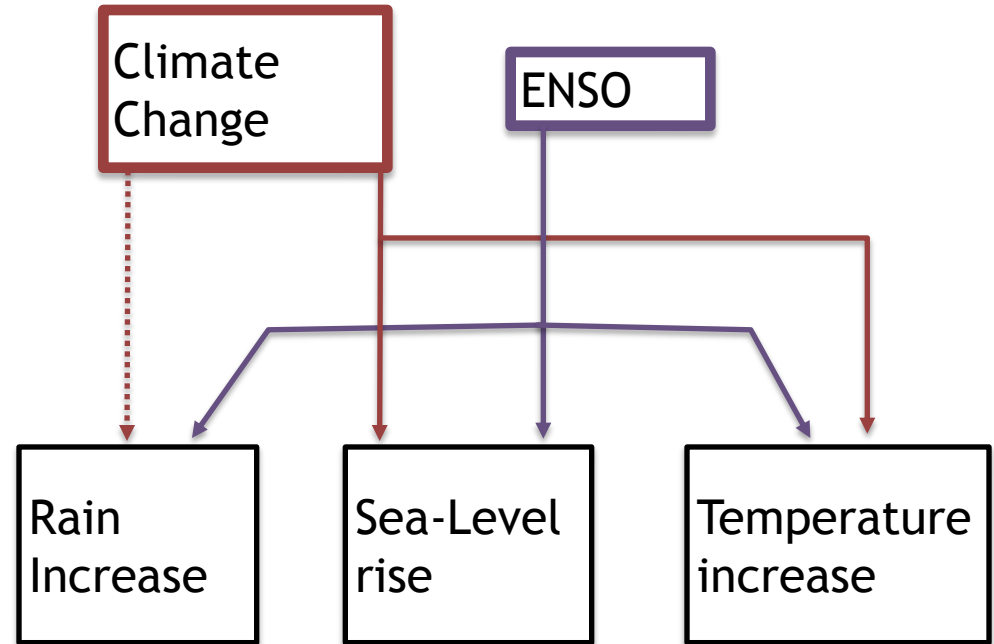
- ✧ Their defined functions are **threatened by Climate Change**
- ✧ **Species range shifts** outside the NPA boundaries
- ✧ **Geographically fixed & isolated** by habitat destruction
- ✧ They are “**close**” **Social-Ecological Systems (SES)**, political & economic boundaries

Tumbes Mangroves Sanctuary



1| INTRODUCTION

The Tumbes Mangrove dealing with ENSO & CC

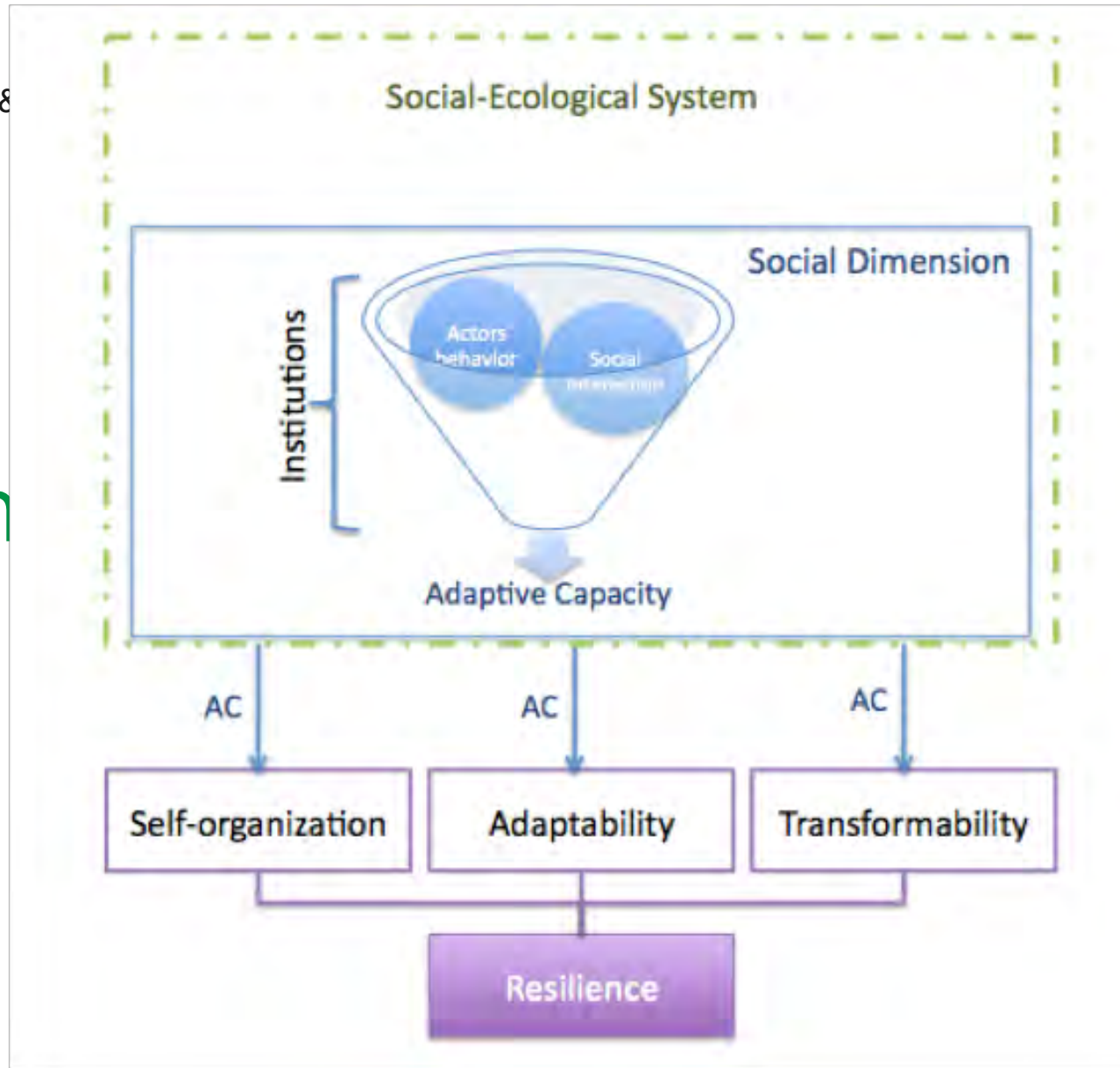


** Great uncertainty due to equatorial pacific cooling effect - sea temperature*

2 | Theoretical Framework & Methodology



Adaptive Capacity & Resilience in SES



3 | Case Study Results



Results Overview

System's Scale (S) S1 Temporal S2 Location S3 Sector S4 Boundaries S5 Hazards	<u>Knowledge Institutions</u> G6 Knowledge sources G7 Knowledge generation G8 Knowledge distribution
Resources (R) R1 Human-constructed facilities R2 Information on a SES R3 Natural resources R4 Interaction among natural resource units	<u>Learning Institutions</u> G9 Social Memory G10 Reflexive Learning
Attributes of Actors and Groups (A) A1 Number of actors A2 Actors groups	<u>Variety Institutions</u> G11 Redundancy G12 Variety
Governance System (G) <u>Multilevel Institutions</u> G1 Cross-level coordination and cooperation G2 Cross-sectoral coordination and cooperation G3 Balanced allocation of power G4 Predominance of local Interests* G5 Bridging organizations	<u>Management Institutions</u> G13 Prioritization* G14 Mainstreaming* G15 Time Framing* G16 Flexibility G17 Leadership G18 Implementation* <u>Conservation Institutions*</u> G19 Identity* G20 Protection* G21 Naturalness*

*New themes or second-level variables that were identified through the inductive coding.

Multilevel Institutions

- ✦ Networks between policy levels and sectors stimulate self-organisation by encouraging policy communities to work for the SES
 - ✦ Predominance of personal linkages hampers social memory of dealing with crisis and lessons learned from adaptation
 - ✦ Weak cross-level: Missing regional government is a barrier to landscape approach

Knowledge Institutions

✦ Combination of scientific knowledge and local experiences allows to immediately recognise changes in the ecosystem & assess the SES as a whole

✦ Broken link between researchers and policymakers

Learning Institutions

✧ Providing more information of CC has been a weak strategy to cause a rethink of the management paths of conservation

✧ Reflexive learning processes has assisted actors to deal with uncertainty

✧ E.g. Revising the global climatic models

Variety Institutions

CC Framing	Adaptation strategy
<i>Threats</i>	<i>Pursuing more research, how to appropriately deal with changes in the future</i>
<i>Impacts on mangrove trees</i>	<i>Mangrove restoration</i>
<i>Impacts on ecosystem services</i>	<i>Ecosystem based adaptation process</i>
<i>Impacts on natural resources</i>	<i>Market mechanisms / business strategies: green labeling, certifications</i>
<i>Dimension of future change</i>	<i>Protection mechanisms to CC and limit its effects</i>
<i>Timing of change</i>	<i>Prospective adaptation strategies</i>

Management Institutions

- ✧ Time framing practices resist integrating CC in the NPA governance
 - ✧ “Solution”: CC as current threats, ignores uncertainty of future changes
- ✧ Implementation of CC policies requires technical information but levels of uncertainty are too high for it: AC for uncertainty is not embraced

Conservation Institutions

✧ Conservation efforts of leaders fostered an ecosystem identity with common meaning:

✧ Values of biodiversity & the uniqueness of the ecosystem: triggers the self-organisation

✧ Protection aim to threats fosters adaptability but not transformability:

✧ Protection of current system state within its current boundaries, functions and structures

✧ Level of naturalness is matched with level of resilience hindering adaptability & transformability: the adaptation space is narrow as actors' actions are prescribed to possibly increase resilience

4 | Discussion



Systems' Interplay

The resilience governance dimensions do not have a unique effect on AC

✧ Learning and Variety themes did only have an enabling effect

✧ All other themes had both effects, depending on the specific second-level variable

Linkages between governance subsystem and the whole SES

✧ Governance subsystem responds to ENSO (hazard): fostering knowledge and ecosystem management of the Sanctuary

✧ Participation of variety of actors relates to the access to the NPA, that is by the location and human-constructed facilities

Actors & Structures

- ✧ **Institutions are dynamic**: protection meaning has evolved
- ✧ Actors have navigated to **change these meanings** by using different institutional logics developing new models
- ✧ **New models** mediate how actors take NPA management decisions
- ✧ **Reflexive agents** with broader networks and connected to different value systems are able to trigger changes
- ✧ Rational Choice Institutionalism: **Institutional change by agency and the institutional constraints on agency**
- ✧ **Deeper institutions** shape how actors conceive the Sanctuary and what they expect from it

Variety & Knowledge

- ✧ Variety & redundancy of actors, and their knowledge, enhance adaptation possibilities considered to navigate during crisis and transitions times
- ✧ But, diversity of social roles does not provide for reorganisation and innovation after crises
- ✧ Strict social roles may prevent the governance of SES to perform innovatively
- ✧ Findings did not prove if the variety institutions foster self-organisation that would support adaptation processes

Thank you!