



www.csiro.au

Conceptualising Social Resilience to Water Quality Change in the Great Barrier Reef Region

Erin Bohensky, Tim Lynam, Samantha Stone-Jovicich & Kostas Alexandridis
CSIRO Sustainable Ecosystems, Townsville

Riversymposium, 3-6 September 2007, Brisbane



What is the problem?

- “Unacceptable” water quality changes in the Great Barrier Reef (GBR) region resulting from the use of land and water systems
- Policy imperative to improve GBR-wide water quality
- What will be the impacts on social resilience of the GBR region to a) water quality changes and b) the market based or regulatory mechanisms used to achieve water quality improvements?

Social resilience

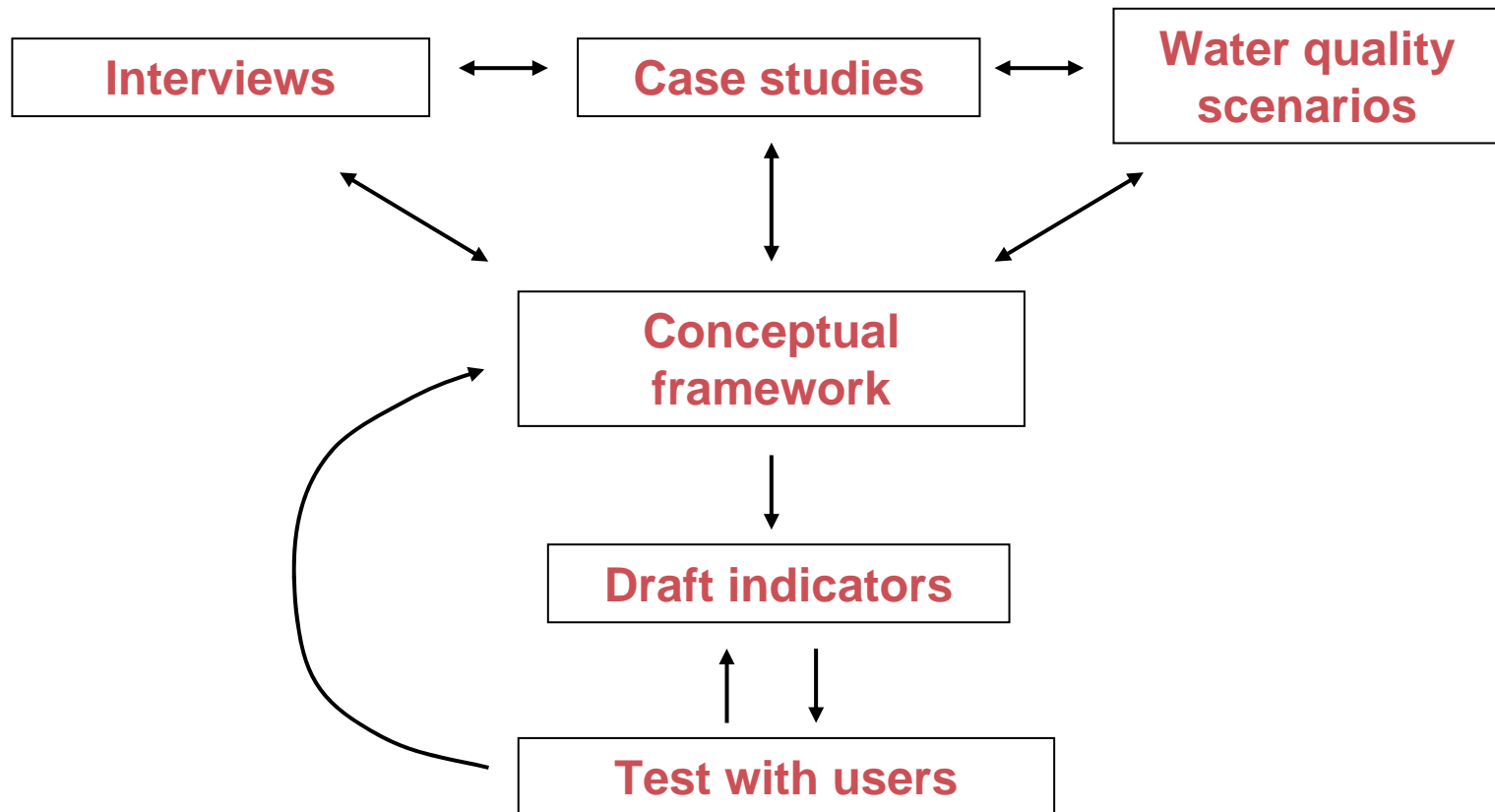
- Resilience: ability of a system to withstand or absorb change while maintaining its structure, function and identity, and feedbacks (Walker et al. 2004)
- What does existing theory tell us about measuring social resilience?
 - Much is in an ecological context and may not apply to social systems
 - Little empirical research
- What makes social resilience hard to measure?
 - Often more value-laden and subjective
 - Difficult to identify when a change in a social system makes it a different social system

Our conceptualisation and approach

- Purpose: develop indicators of regional-scale social resilience to monitor water quality impacts in the GBR
- Approach combines theory, end user knowledge and data in several components:
 - A user-appropriate and theoretically rigorous conceptualisation of social resilience;
 - Testing and improving this conceptualisation with 1) interviews with regional end users; 2) case study data; 3) water quality change scenarios with which to explore social resilience;
 - Testing and refining of resulting indicators

Linking the Parts

- Components are used to confront the draft conceptual framework – how well do theory and empirical data (case studies + interviews + water quality scenarios) agree?



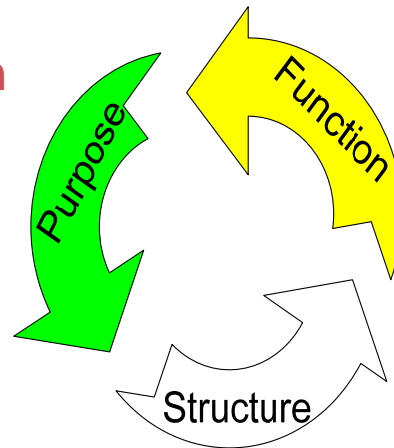
1. Conceptual framework

A. Classic resilience – of what to what?

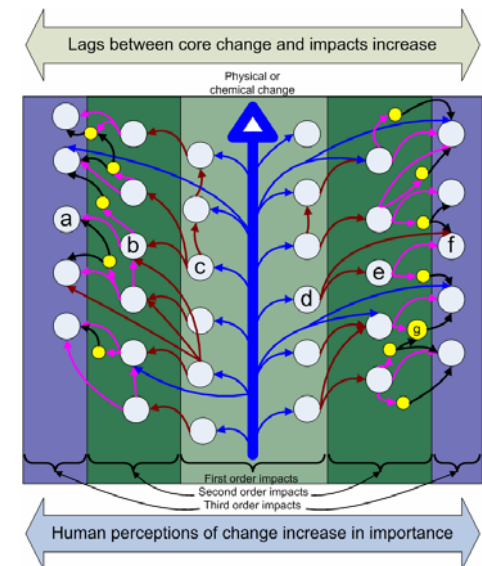
Requires:

- Definition of the social system (of what) and the water quality impacts (to what) (e.g. Carpenter et al. 2001)
- Definition of system state before and after the change
- Determination of whether these are different

Of what?
Social system
(structure,
function,
purpose,
feedbacks)



To what?
Water quality
change
(1st, 2nd, 3rd
order impacts)



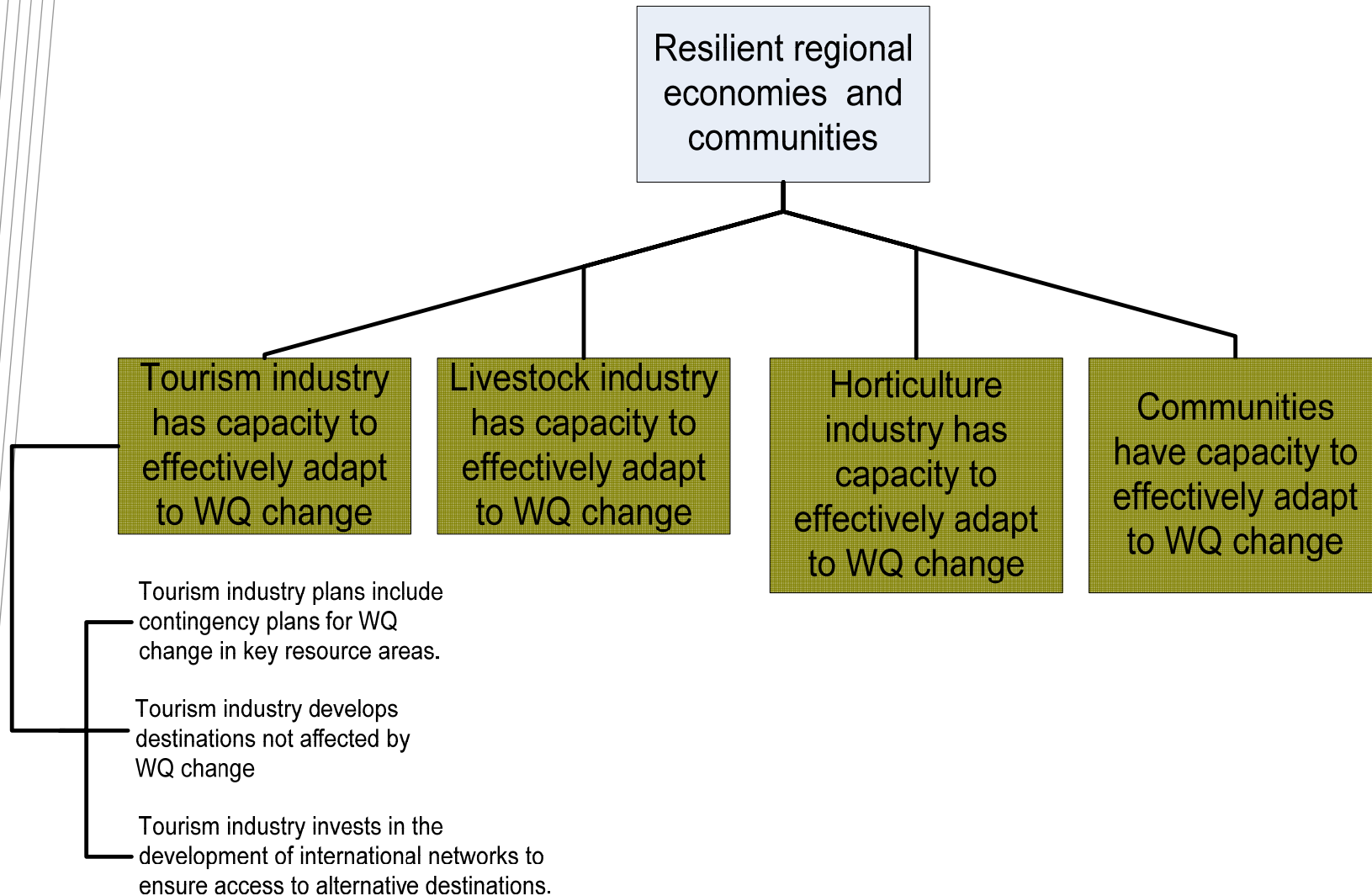
1. Conceptual framework

B. Threshold-based resilience

- Define key social system components which are expected to underlie system resilience
- Based on a resilience objectives hierarchy developed with end users
- Set upper and lower limits of acceptable change – Thresholds of Potential Concern (TPCs)
- Develop and implement monitoring systems
- Adapt TPCs and objectives as needed

Thresholds of potential concern

Example objectives hierarchy



2. Interviews: approach

- To understand how end users conceive social resilience
- To ensure that the indicators developed are appropriate, meaningful, and useful for potential end users

DATA COLLECTION	OBJECTIVES	OUTPUT
<u>Interviews</u> Open ended questions + Structured questions (ratings)	Capture end users' experiential knowledge & perceptions AND Opinions of relevance of previous research findings to GBR scale	List of draft indicators/ TPCs

End users interviewed: NRM regional bodies, GBRMPA, WTMA, ARC, Reef Partnership, AMPTO

2. Interviews: emerging results

What is social resilience?

Selected quotes:

“Ability to cope, to adapt...the resilience of social aspects of communities [depends on] having jobs and being able to live well”

“Ability of a community or individual to recover if things go wrong; to cope with things which are being imposed on them”

“A community that is aware, adapting, interpreting, and assimilating information and continually changing in a mature way”

2. Interviews: emerging results

- What **enhances** social resilience to water quality change (WQC)?
 - Collective willingness to better manage GBR natural resources
 - Leadership
 - Social networks (to exchange information, share skills, etc.)
 - Financial and technical support
 - Capacity-building
 - Economic stability
- What **erodes** social resilience to WQC?
 - Lack of, or multiple/conflicting, information
 - Domination of powerful groups in NRM planning processes
 - Top-down government policy
 - Finger pointing among different stakeholders

3. Case studies: approach

- Can we identify common factors related to social resilience among other water quality change situations?
- Criteria: regional water management systems in Australia where change has occurred and data exists e.g.:

Elsewhere

- Murray-Darling
- WA Wheatbelt
- Ord

GBR

- Burdekin



3. Case studies: emerging results

BELIEFS/BEHAVIOUR

- Demographic factors (e.g. age)
- Attitudes to change

SYSTEM UNDERSTANDING

- Biophysical
 - Social
- Links between the 2

GOVERNANCE DYNAMICS

- Number of institutions
- Power relations
- Coordination

VULNERABILITY TO EXTERNAL SHOCKS

- “Lock-in” caused by economic optimization
 - Cross-scale connectedness

TEMPORAL DISCONNECTS

- Short-term nature and expediency of decision making
- Lags between cause and effect (e.g. slow variables)

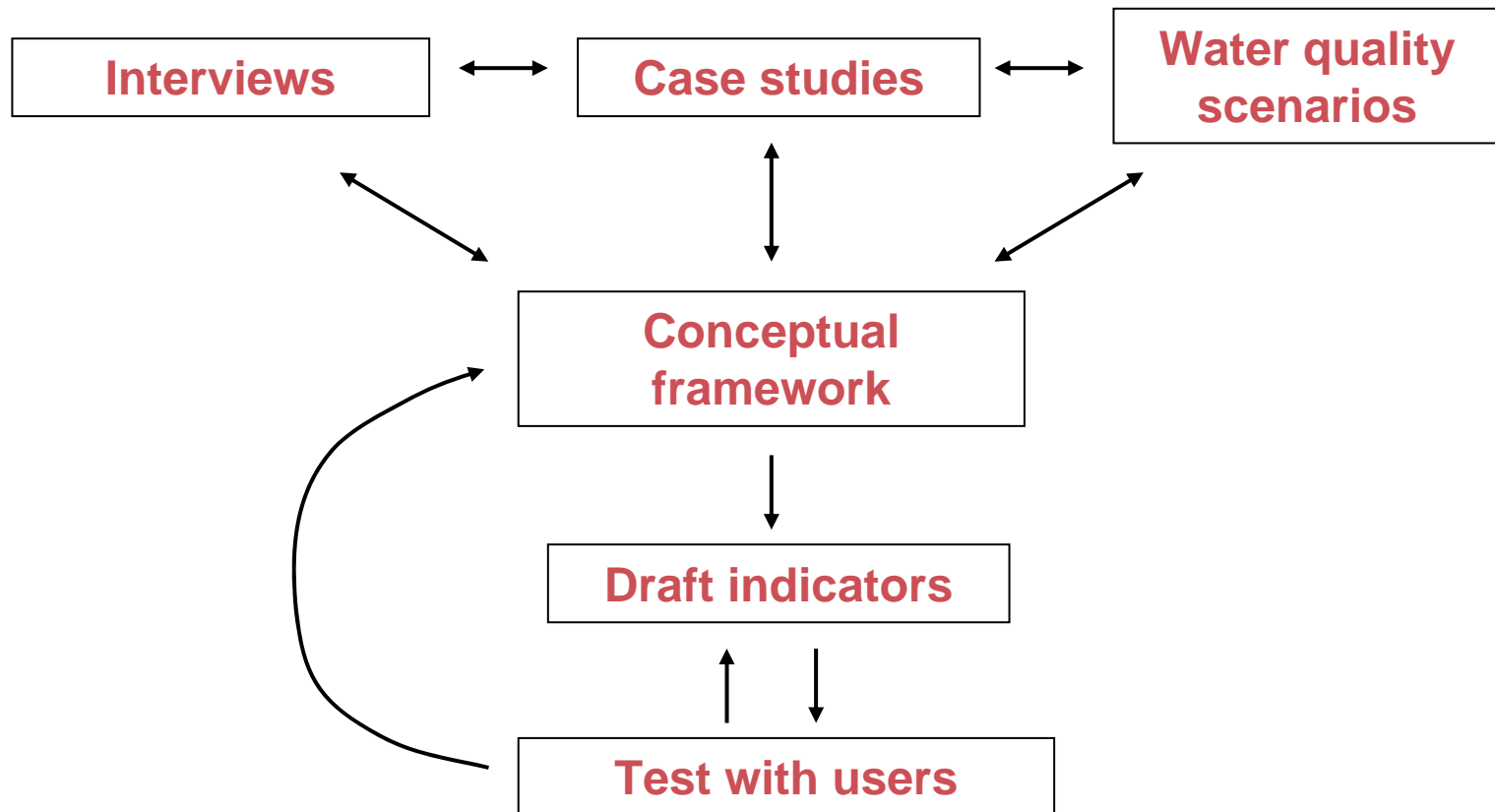
4. Water quality scenarios: approach

- To clarify what water quality change means *in the GBR* and the characteristics of water quality change events
- Will be informed by interviews & case studies along with existing scenario exercises



Linking the Parts

- Components are used to confront the draft conceptual framework – how well do theory and empirical data (case studies + interviews + water quality scenarios) agree?



In Closing

- **Challenges & Opportunities**

- To provide end users with a more tangible, integral way to measure regional-scale social resilience in GBR
- As part of multi-scale effort, to investigate social resilience at 3 different scales (i.e. is a more resilient GBR achieved only by undermining resilience of some catchments or communities?)

- **Future direction of our work**

- In-depth analysis (interviews and case studies)
- Engage key end users in testing and use of indicators
- Refine conceptual framework

Acknowledgements

- Marine and Tropical Sciences Research Facility (MTSRF)
- CSIRO
- Helen Ross and team, University of Queensland (catchment scale)
- Margaret Gooch and team, James Cook University (community-scale)
- Interviewees (NRM regional bodies, GBRMPA, WTMA, ARC, Reef Partnership, AMPTO)
- Allan Dale, Terrain (FNQNRM)