



# Assessing resilience in the livestock sector - of what, to what, and for whom?

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# Social-ecological resilience

Capacity of a system to respond to change through adaptation or transformation while maintaining structure, function, and identity and support positive and proactive change

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1973 – Buzz Holling “Resilience and Stability of Ecological Systems”

1990s - Beijer Institute for Ecological Economics began biodiversity workshops incorporating resilience theory and Resilience Alliance led the development of resilience theory

2000s – boom in publishing resilience theory from RA

Late 2000s – questions about operationalization, critique by social sciences

2013 onwards – exploded in use (and abuse?)

## RESILIENCE AS A **RATE**

How long it takes for a system to recover after a disturbance, i.e., ‘bounce back’.



## RESILIENCE AS A SYSTEMS **PROPERTY**

A systems perspective that blends ideas from complexity theory, ecology, and social sciences to understand dynamics of change and alternate regimes in social-ecological systems



RESILIENCE AS A **PROPERTY** THAT IS EXPERIENCED DIFFERENTLY BY ACTORS IN A SYSTEM  
Integrating ideas of power and equity



## RESILIENCE AS A **PROCESS**

Often normative sense (resilience is always good), buzzword interchangeable with sustainability



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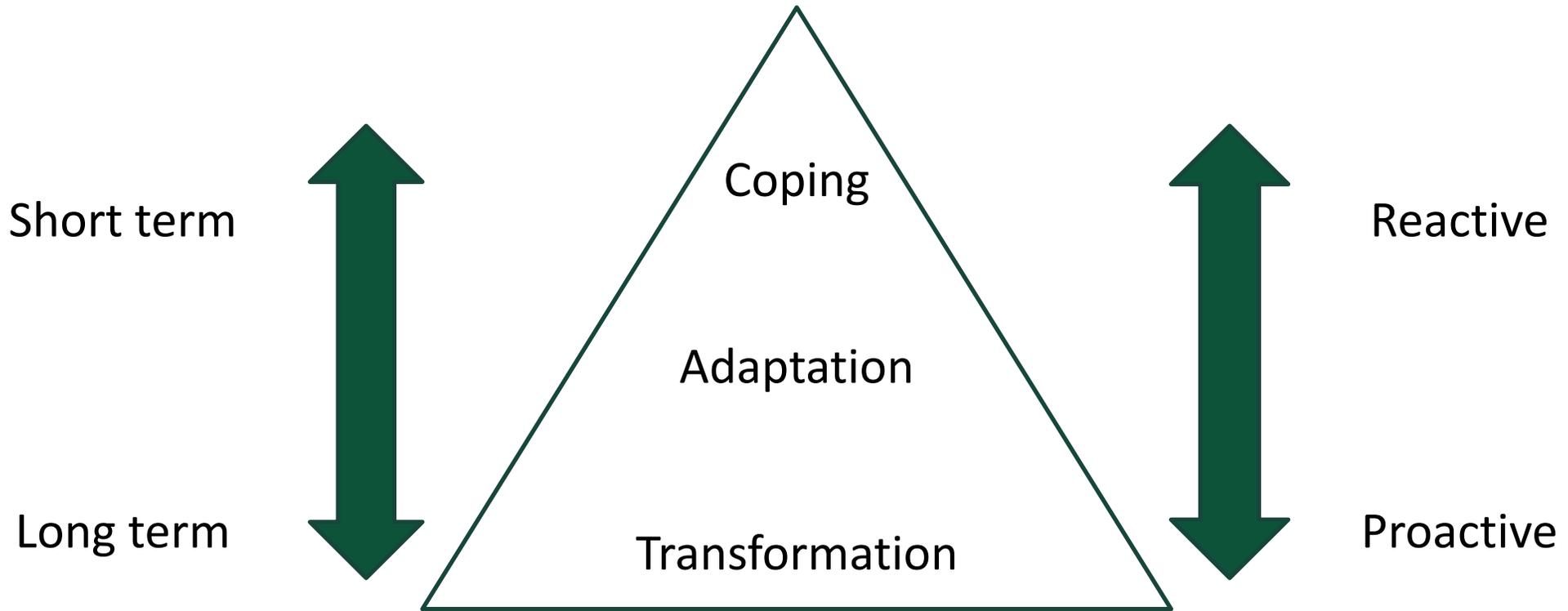
- Adaptation and transformation are mutually non-exclusive aspects of system change and unify resilience as a rate, process and emergent phenomenon (Allen et al. 2019) .

‘Bounce back better’ → “resilience is the capacity to deal with change and continue to develop”

- Brings in normative and process perspective
- Cope, adapt, transform

Resilience can contribute to sustainability

- How can SES best be managed to ensure a **sustainable and resilient** supply of ecosystem services on which we depend?

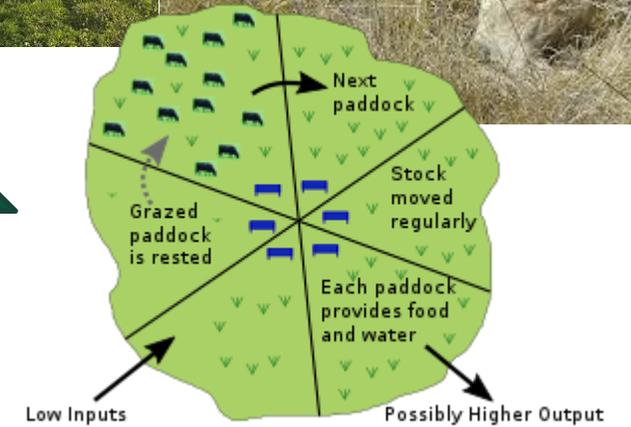
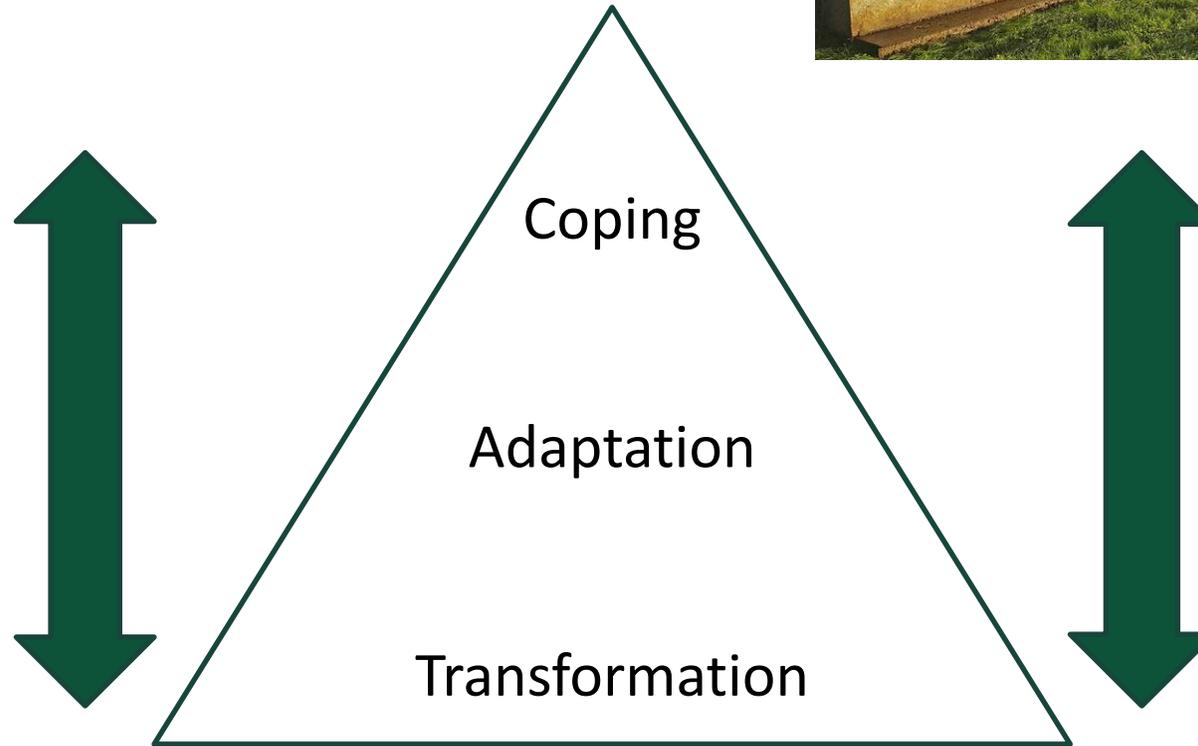


SES is resilient if it can adapt to maintain desired identity

Unintentional change in structure/function indicates lack of resilience

Short term

Long term



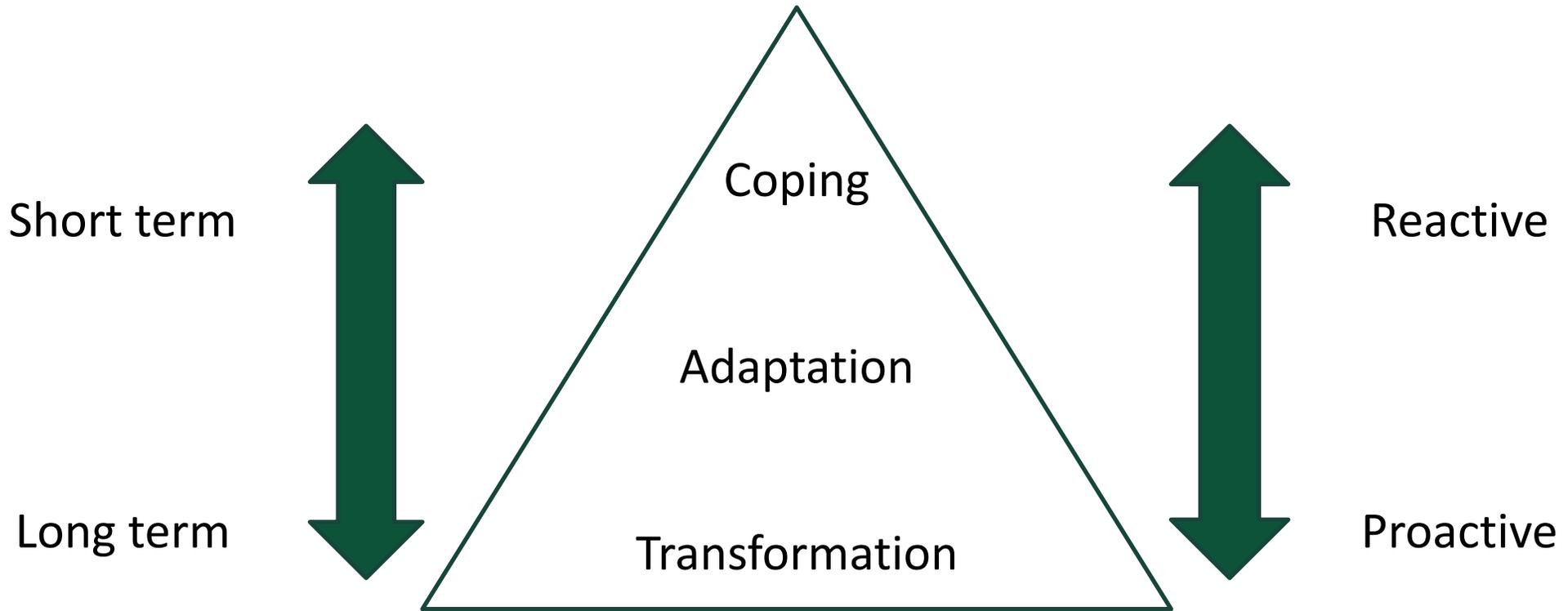
**FOR SALE**



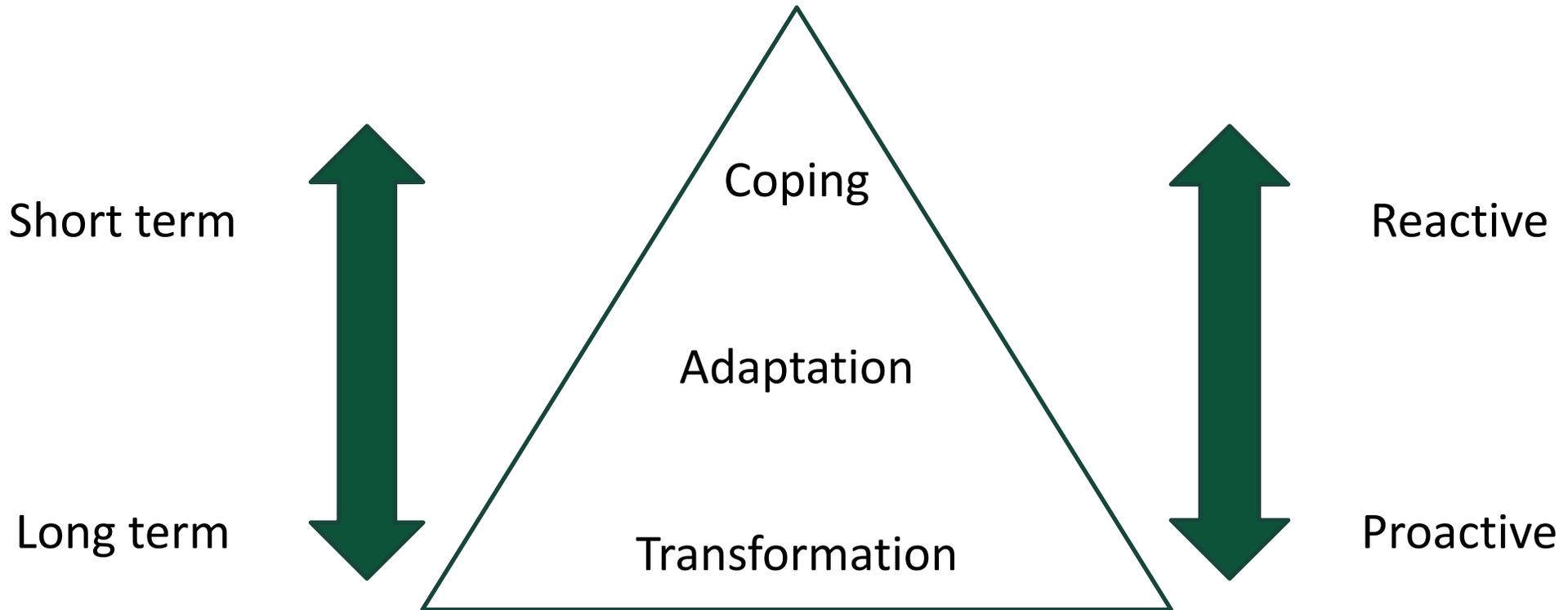
## 7 principles for building resilience

- Maintain diversity - insurance
  - Manage connectivity - access to new ideas and resources
  - Learning - continuous experimentation helps adaptation
- Foster complex adaptive systems thinking - everything's connected
  - Managing slow variables
- Participation - builds trust and integrates diverse perspectives in decision making
  - Polycentric governance

All support self-organization



How to operationalize this?



**‘Resilience of what, to what, for whom?’**

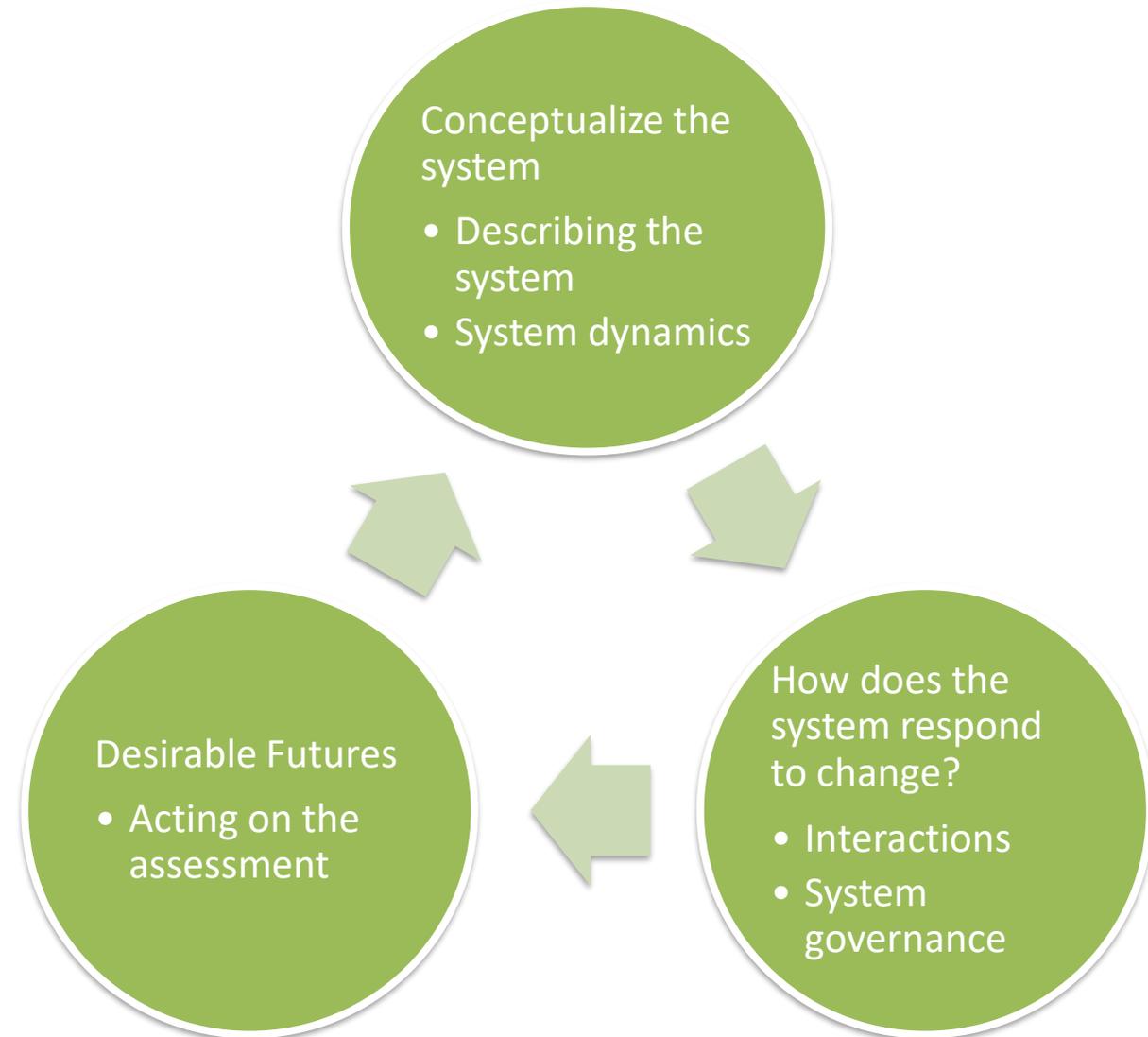
## Resilience assessment

Resilience Alliance workbooks suggest five broad steps to an assessment, I've condensed to three

**Not looking to quantify resilience but to understand system dynamics**

From a social-ecological resilience perspective, there isn't an explicit methodology for a resilience assessment. Instead:

- Context specific – case study
- Interdisciplinary
- Participatory



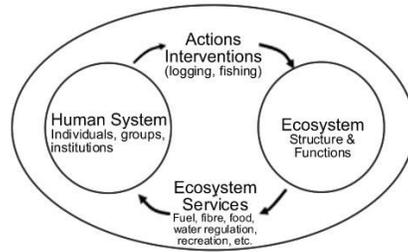
## RESILIENCE OF WHAT:

1. What social-ecological system are you interested in? Use this to bound the system:

- Identify focal spatial, temporal, and governance scales

2. What are the core components of that social-ecological system? Use this to identify current structure, function, and identity

- Key ecosystems
- Key ecosystem services
- Key actors
- Key actions



Also need to identify scale above and below the one you're interested in because of cross-scale dynamics

Conceptualize the system

Desirable futures

How does the system respond to change?

# Ethiopia

Gambela  
ጋምቤላ

Metu

Jimma  
ጅማ

Awassa  
አዋሳ

Rainfed agriculture



Flood-recession agriculture

Finchawa

Fishing

Pastoralism

Boma  
National Park

Kaku

Baidoa  
بيدوة

Marsabit

jeji

Gulu

S



## Example - River basin development in Ethiopia

1. What social-ecological system are you interested in? Omo-Turkana Basin → Lower Omo Valley → Nyangatom communities
2. What are the core components of that social-ecological system?

Ecosystem: arid drylands with large river and riverine forest

Ecosystem services: provision of food and water, biodiversity, sense of place, water regulation (many supported by grazing)

Communities (gender, herd size), local and federal governance, international investors

Actions: flood recession agriculture, grazing, collection of wild foods, irrigated agriculture

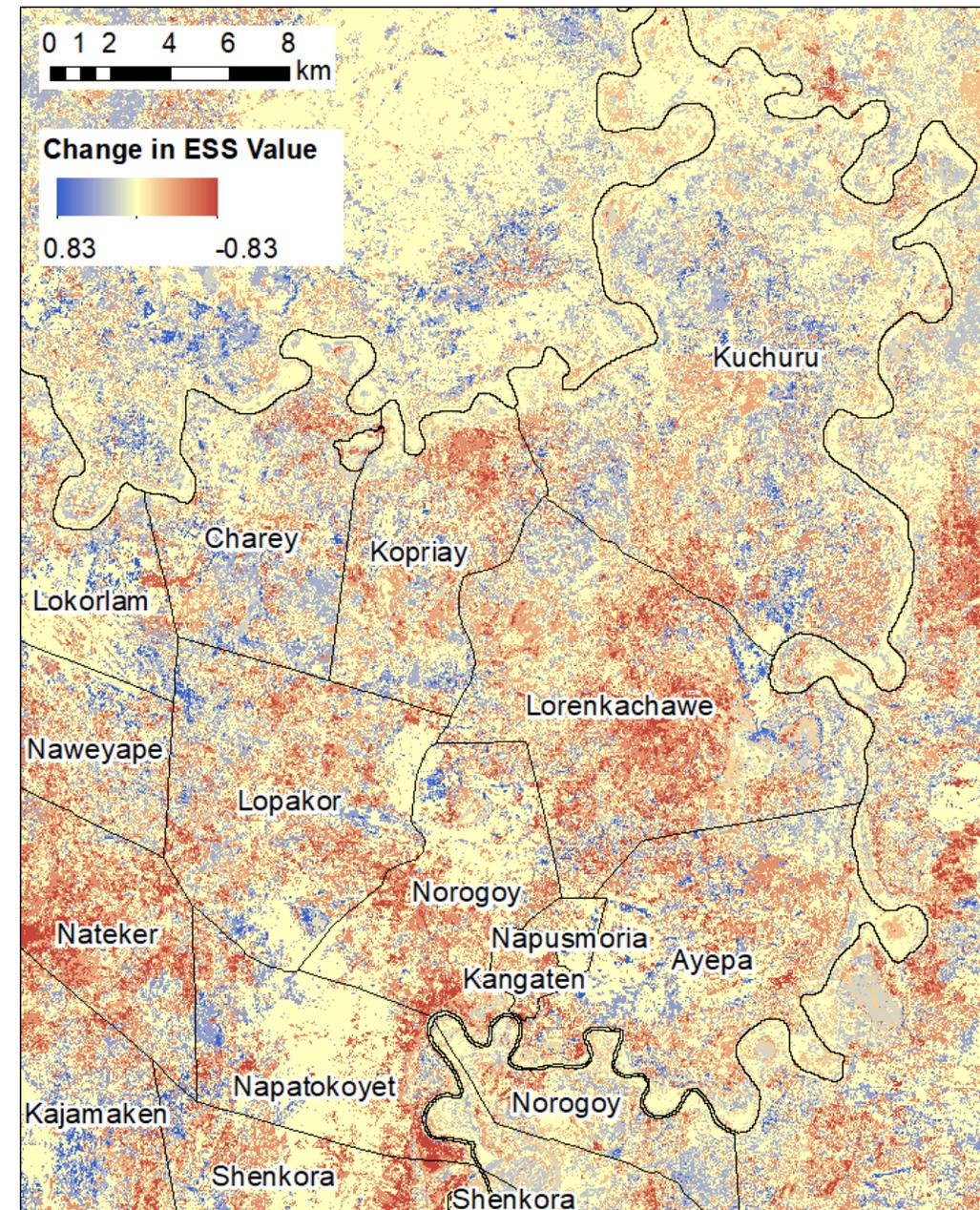
Structure/Function/Identity: agro-pastoralist livelihoods

Indicators

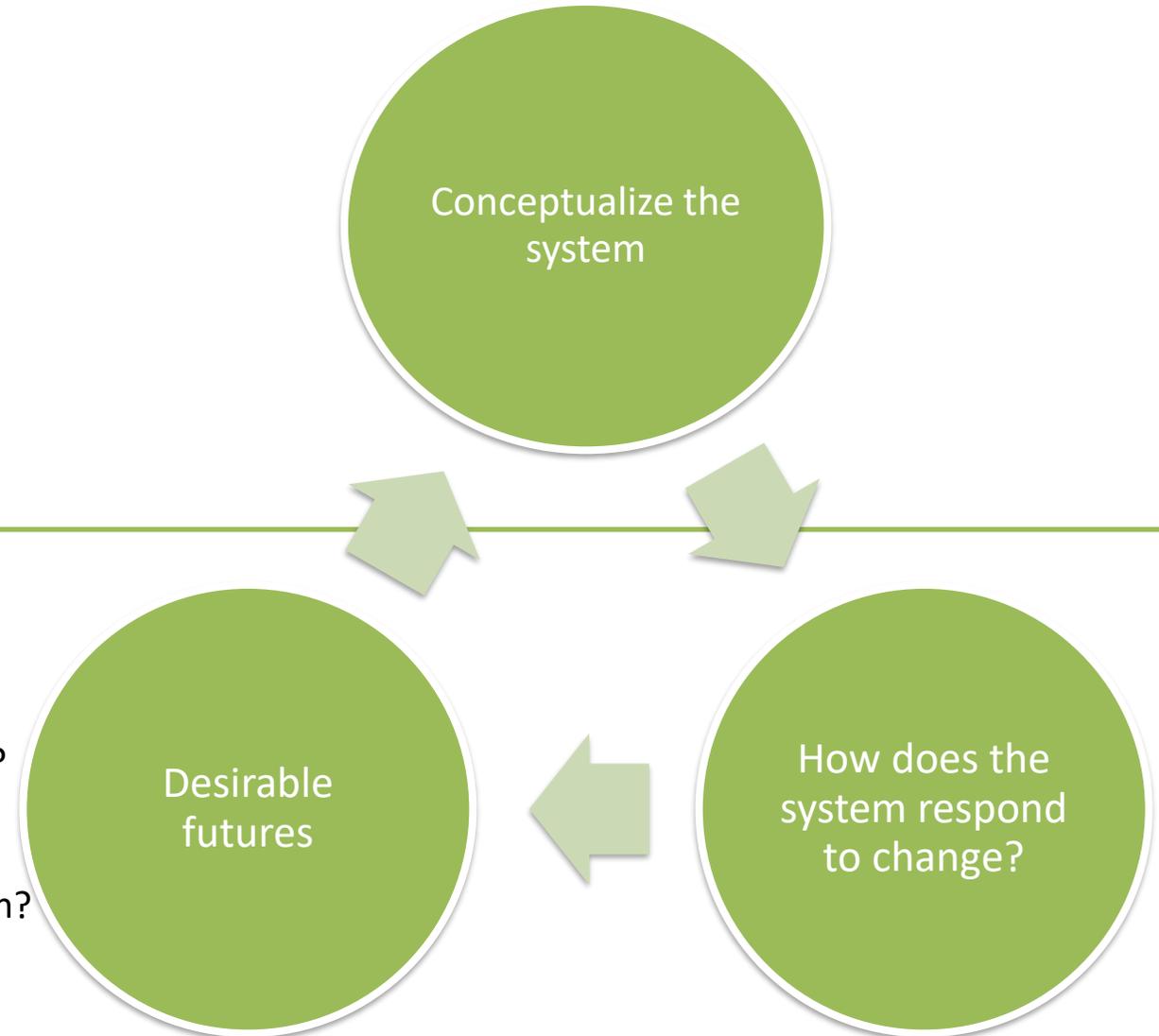
Helps us to identify indicators to understand Resilience of What?  
**Indicators will adapt for the context under study.**

## Key indicators in the Nyangatom case study - change in ecosystem service value over time

- Indicators = ES, food security, wealth
- Participatory mapping and remote sensing to identify ES of most use → ranked → ES value (Hodbod et al. 2019)
- Analysis showed negative change in ES value → decreased food security → decreased wealth
- Decrease resilience of communities to maintain livelihoods within current structure/function



# Resilience assessment



## RESILIENCE TO WHAT, FOR WHOM:

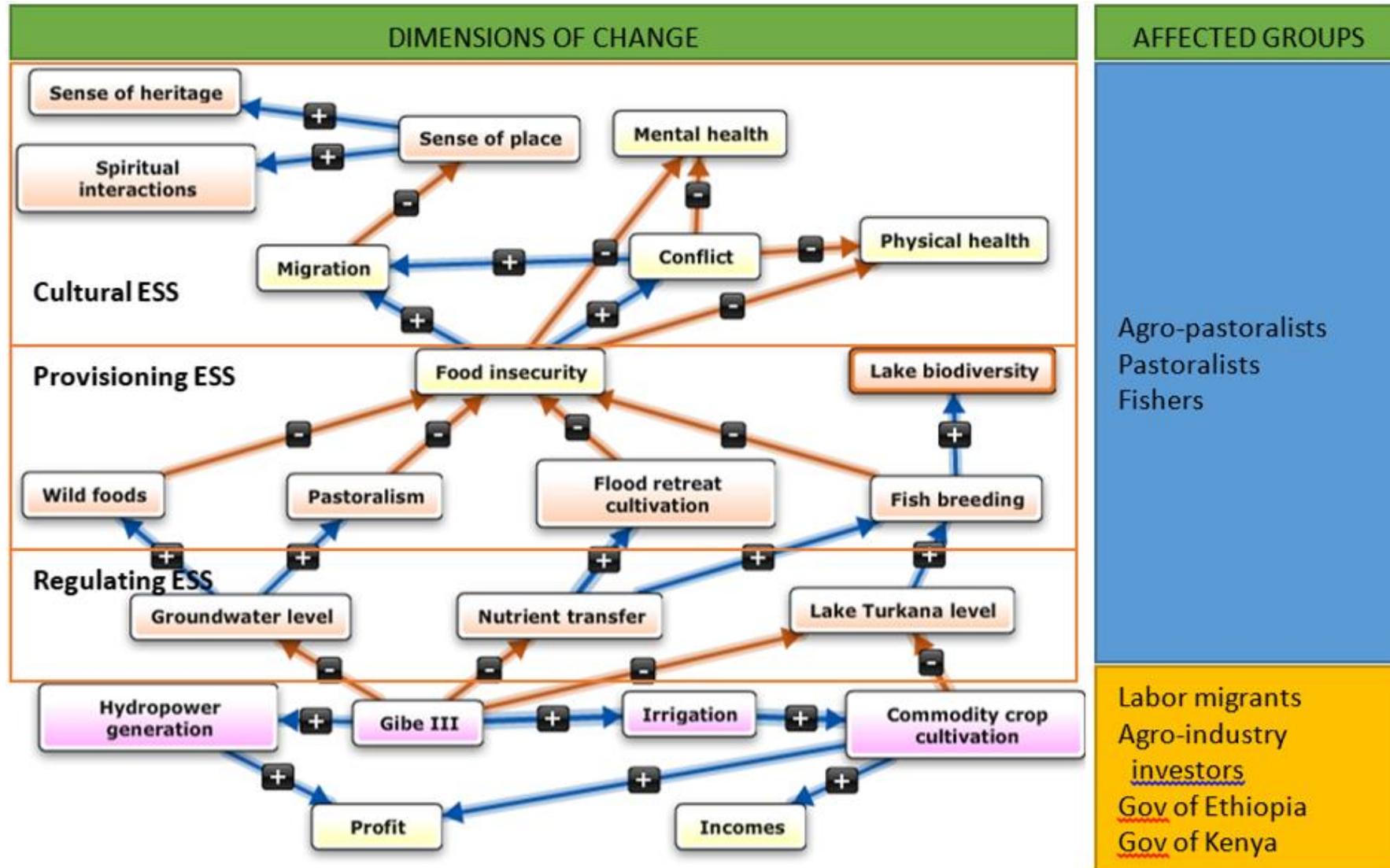
3. Are you interested in a specific shock or the pattern of shocks?
  - Timeline to identify shocks and patterns
  - Cross-scale interactions – bottom-up and/or top-down
4. How have your system components been affected by the shock/s?
  - Impacts on key indicators from previous stage
  - Equity analysis – differentiation of impacts for actors
5. Has the system responded with coping/adaptation/transformation?
  - Different for different actors?
  - Which principles were supporting these?
6. Are you trying to intentionally create change?
  - Whose perspectives are you including?



## Example - River basin development in Ethiopia

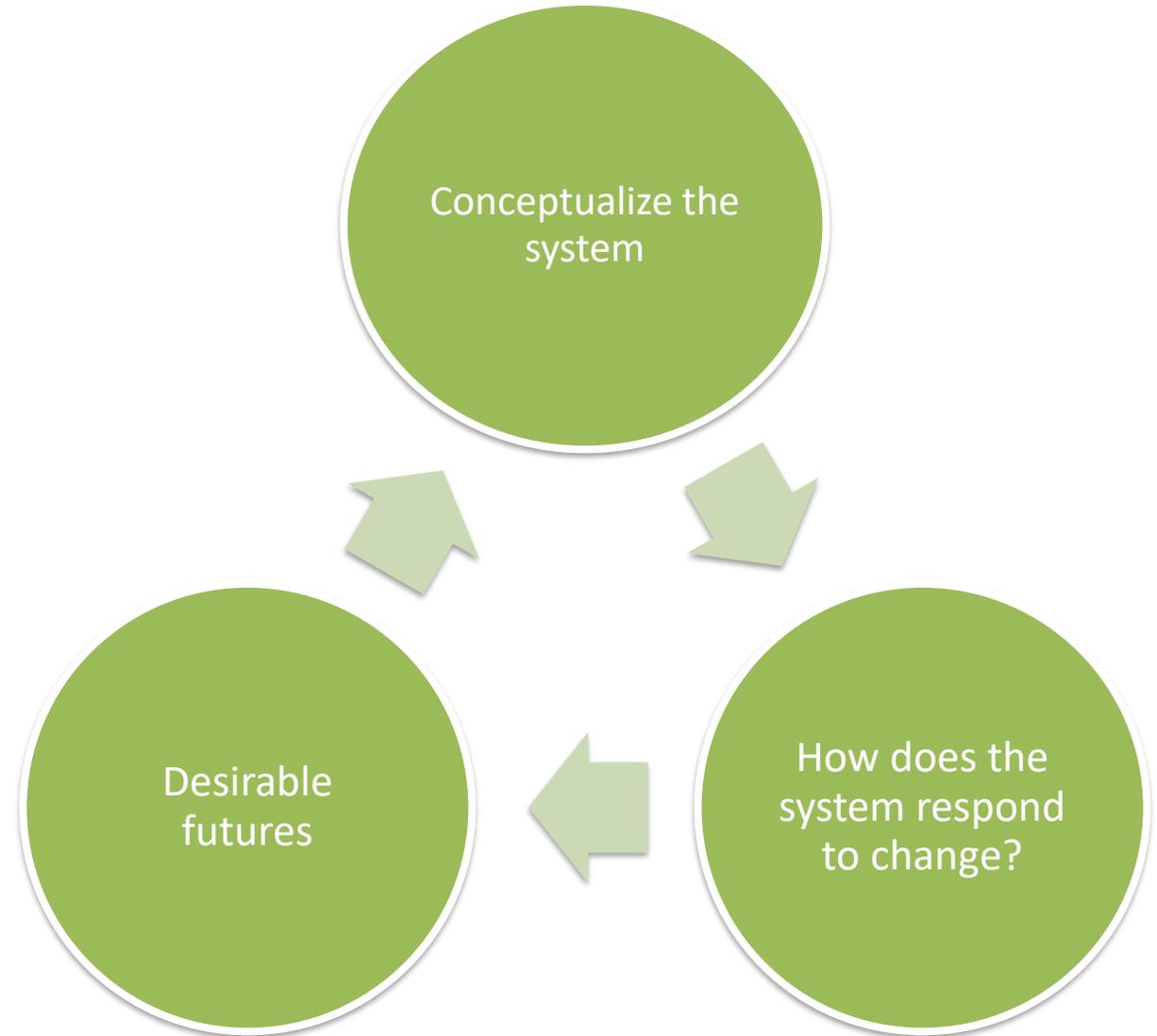
3. Fast and top-down shocks - Impact of the Gibe III dam and associated large-scale cultivation.
  - Slow and bottom-up shocks – land degradation and population change.
4. Significant change in **actions** (collapse in flood recession agriculture, grazing dry season areas earlier) and **ecosystem services** (increase in commercial crops, decrease in food crops, fodder, and cultural ES).
  - Costs borne by communities, benefits to external actors.
  - Costs borne differently within community depending on herd and family size.
5. Transformation at the landscape-scale directed by external actors. Communities within the system demonstrating coping and adaptation (diversity, connectivity) but at limits to resilience (indicated by food security, dependence on aid).
  - Further shock may force communities out of agro-pastoralist livelihoods (lack of polycentric governance).
6. Working with stakeholders to co-develop priorities for future gov/NGO programs.

# Synthesis of how the Lower Omo responded to change



# Reflections

- Resilience assessments aren't fixed processes (toolbox approach)
  - Need to be interdisciplinary and adapted to local context
  - Also, should be participatory if you're trying to intentionally create change.
- An analysis tool to embed in management of systems
- Not quantifying/measuring doesn't mean you can't assess resilience – about identifying key indicators to track over time, understanding why they change/don't change.



Thank you!  
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