

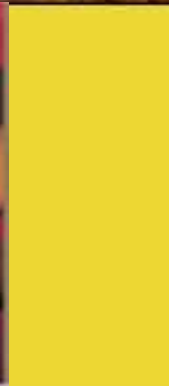
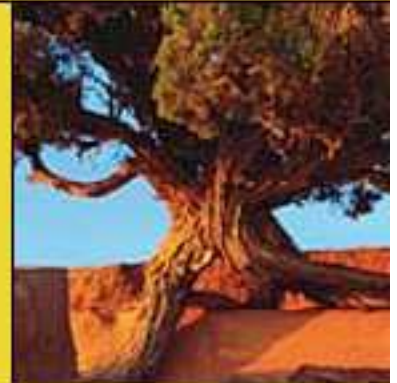
complex systems, resilience and collaborative planning

**sanda
kaufman**



**levin college
of
urban affairs**

**cleveland
state
university**



50th Anniversary ACSP Conference



**crystal city
10. 2009**



resilience:

④ capacity of a system to experience shocks while retaining essentially the same

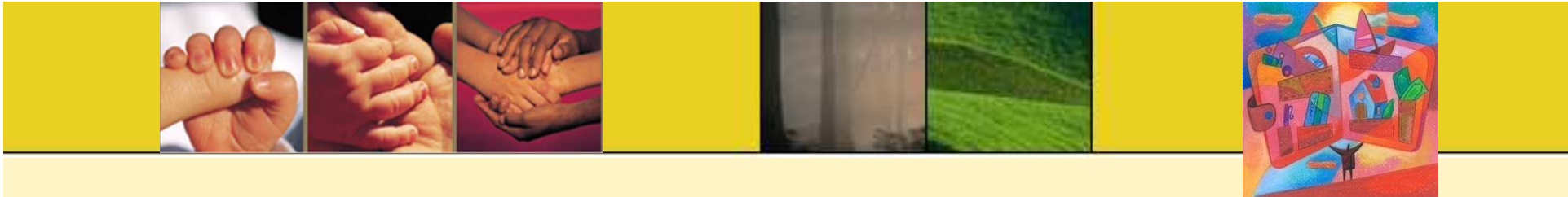
- ▣ function
- ▣ structure
- ▣ feedbacks
- ▣ identity

without shifting into a different regime.

◀ is it desirable?
◀ what enhances it?

◀ what threatens it?
▣ individual & joint decision mechanisms
• in a naturally/socially complex context

◀ what can collaboratives contribute?



(complex) social-ecological systems

front loop:

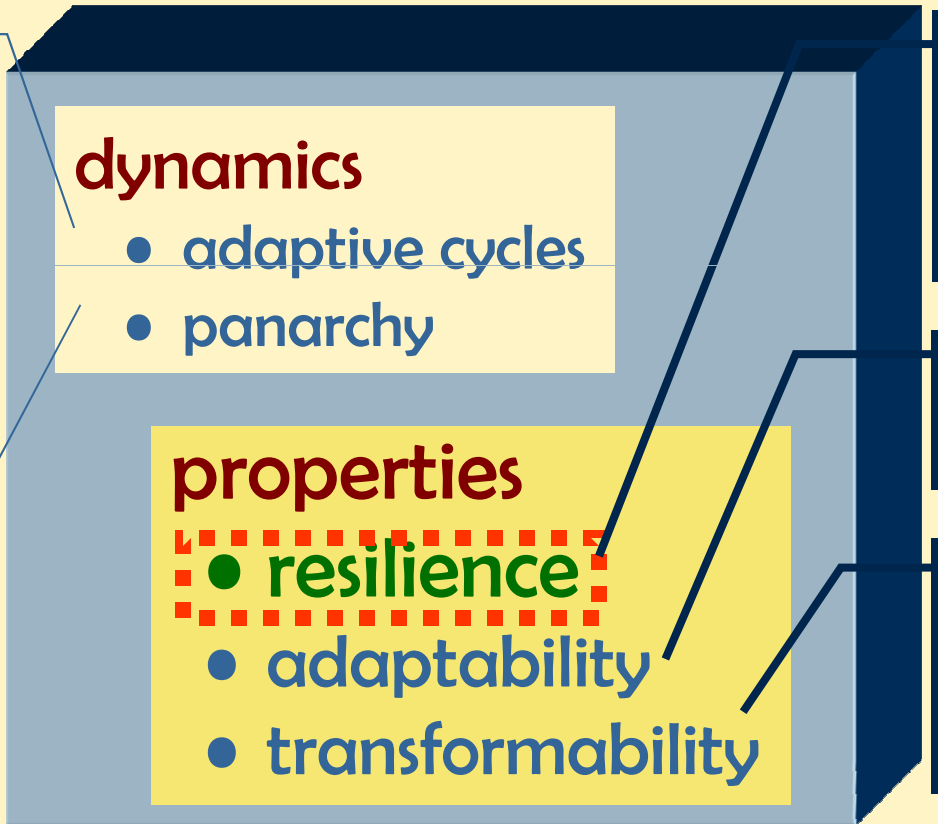
- growth
- conservation

back loop:

- collapse
- reorganization

interactions

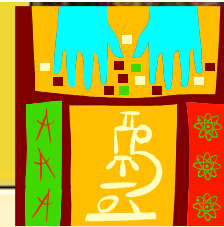
among structures at different scales



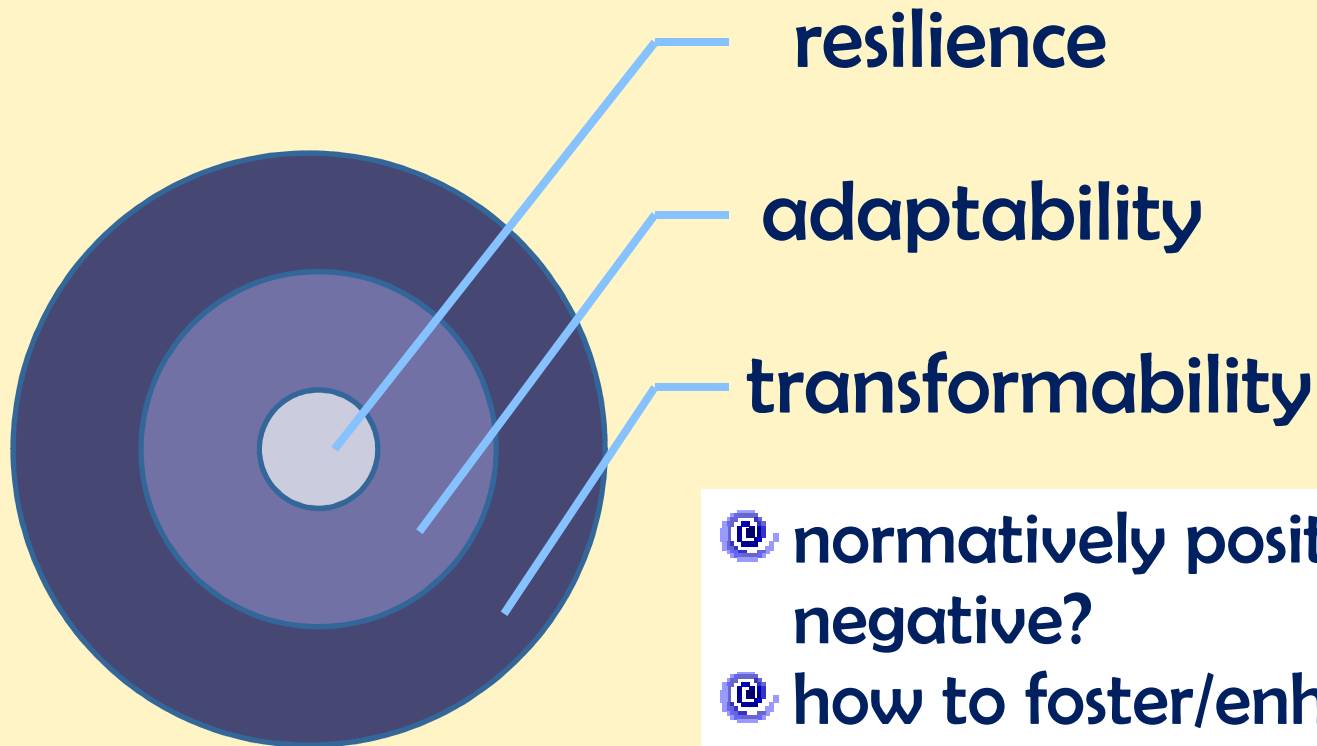
capacity to cope with shocks

capacity to manage

capacity to create new system



what should we wish for?



- @ normatively positive?
negative?
- @ how to foster/enhance them?
- @ can we learn
about social systems
from ecological systems?

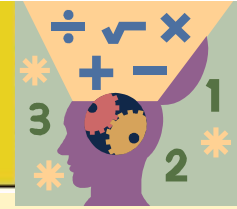


can we learn? some shared aspects

© walker et al.: propositions about

- # diversity of response
- # adaptability & resilience
- # mental models
- # thresholds
- # adaptability & transformability
- # learning

in social and ecological systems



walker et al. propositions

consilience

social & ecological systems share characteristics → allow transfer of insights

response diversity = redundancy (necessary for resilience)

counterintuitive

overlapping mental models enhance it

resilience works counter

- change
- adaptability

mental models play key role in resilience



walker et al. propositions (cont.)

consilience

Ⓢ thresholds: when crossed, drastic change →

◆ adaptability - crisis prevention

- prevents crossing thresholds
- requires same ingredients as collaborative processes:
 - capital in all forms – financial, social, natural
 - decision skills, leadership, social networks for cooperation
 - governance structure

◆ resilience

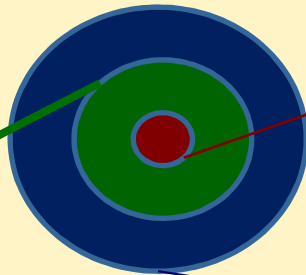
- ## ◆ transformability – recovery after crisis
- enables response to crossing thresholds
 - entails substantial change
 - resource-intensive



walker et al. propositions (cont.)

🌐 learning:

- ⌘ key ingredient of adaptability, transformability & resilience
- ⌘ proposing conceptual models, testing through observation
- ⌘ 3 types:



◀ **incremental:**
monitoring
implemented
policy

◀ **lurching:**
triggered by crises

◀ **transformational:**

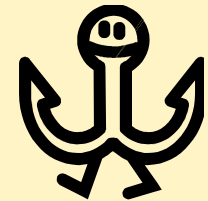
- akin to double-loop learning
- spanning levels of the panarchy
- including cross-scale surprises
- challenging assumptions, norms
objectives



what threatens resilience?
individual decision shortcomings
judgmental biases



- # sensitivity to framing
- # mishandling probabilities
- # estimating through anchoring & adjustment
- # overconfidence in estimates
- # seeking/preferring confirming evidence





what threatens resilience?
individual & joint decision shortcomings
logic of failure

dörner

- ⓐ favoring one-factor explanations & solutions
- ⓐ solving interdependent problems one by one
- ⓐ tendency to simplify complex relationships
- ⓐ switching from understanding to trust frames
- ⓐ rigid understanding of technical facts
- ⓐ faulty mental models of reality
- ⓐ commons dilemma





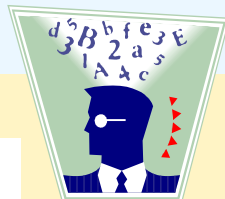
what threatens resilience? individual & joint decision shortcomings failure to anticipate

@ resilience is controlled mostly by slow-changing variables →

individuals:

- positive illusions
- omission bias
- status quo bias
- inattention to dull data

hard to fix



- ◆ predictable surprises, e.g.:
 - ▣ effects of gender selection
 - ▣ flu pandemic
 - ▣ economic crisis



institutions:

- lack of resources for data collection about emergent threats
- lack of information dissemination
- diffuse responsibilities
- failure to learn from past



fixable



anticipation & resilience

Ⓢ anticipatory responses are more effective than reactive responses, but

◆ surprises are inherent in social/ecological systems

◆ judgmental & institutional biases

⊘ work against anticipatory responses

⊘ mental models resistant to change before crisis

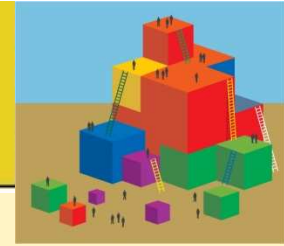
✗ e.g.

y2k, gender selection, homeland security, mortgage crisis

■ modeled on “justice after the fact”

■ rooted in 20/20 hindsight





what threatens resilience? context characteristics complexity

- ⓐ impairs judgment
- ⓐ makes responses difficult
 - ⚡ unforeseen consequences
 - ⚡ scale mismatches & misperceptions
- ⓐ pits self-organization against intervention
- ⓐ increases efficiency at expense of redundancy

e.g.
• financial crisis
• world hunger

collapse

prone to crisis
percolation



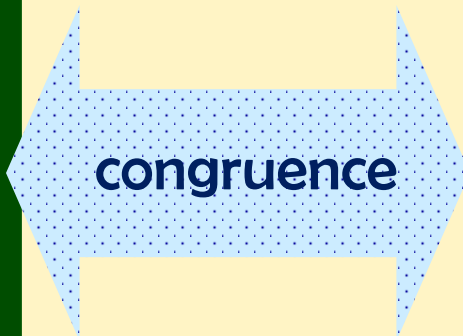
resilience & collaboratives



resilience

requires:

- diversity
- redundancy
- match to scale
- anticipation
- beating the commons



collaboratives

are:

- diverse
- distributed
- leaning local
- generating trust





collaborative decision making

🌐 can enhance resilience through:

- # diverse participation
- # development of relationships/trust
- # co-construction of information base
- # inclusionary decision rules
- # redundancies

- interests
- values
- skills
- knowledge
- position
- networking

- decision & governance structures

■ advantage
diminishing
w. scale

- requires support
 - science
 - governance
 - adaptation (to make up for anticipation failures)



what next?

◀ research:

- # characterize
 - over-efficient (sensitive) networks and their failure risks
- # document for learning
 - best practices in successful collaboratives
 - pitfalls in failed collaboratives
- # ...

◀ action:

- # identify
 - warning signs for network failure
 - opportunities to build redundancies through collaboratives
- # develop assistance for emerging collaboratives
- # teach
 - need for, means of collaborative action at local levels