Water Resilient Cities Conference

Climate Change, Infrastructure, Economies, and Governance in the Great Lakes Basin

April 21-22, 2016

scenarios for robust watershed decisions under high uncertainty

sanda kaufman
levin college, csu

some  to our region

- **Environmental:**
  - climate change effects on Lake Erie & watersheds
  - air, water & soil pollution
  - open, agricultural land & wetlands shrinking
  - ecosystem fragmentation
  - invasive species
  - …

- Socio-economic:
  - foreclosures
  - poverty
  - poor education
  - mismatch between demand & supply of skills
  - segregation
  - lack of public funds

- Political/administrative
  - fragmentation
  - competition for development
  - lack of coordination across administrative borders

water-resilient communities

- can we achieve (water) systems' resilience through collective decisions, in contexts of:
  - complexity
  - emerging threats & opportunities
  - high uncertainty

physical

?

social

- distributed decision loci, increasing "voice"
- different goals, needs, knowledge and values
- differential stakeholder access to
  - resources
  - information
  - skills
  - a place at the decision table

collective decision challenges

within complex systems,

- ❑ specifics matter:
  - ○ **context** – places require tailored solutions
  - ○ **scale** where stakeholders feel interdependent & willing to collaborate
  - ○ **the initial state** where action begins

- ❑ resilience, adaptation and transformation are choices
- ❑ long-term predictions are unreliable

arbitrary target years & visions have no real meaning

what then ?

systems resilience

- means different things;
  one is: *desirable* systems' reactions to shocks or to long-trending changes

Social-ecological systems
need help to respond
to change
pro-socially/ecologically

to promote resilience,
we need to choose
what it means
in each context

Decisions for resilience
should be:
- adaptive to emergent threats/opportunities
- collaborative
- implementable

we propose to Un-plan

- to foster systems resilience, switch to a different decision mode:

from

- plans
  - to (if-then) strategies
- (unimplementable) big plans for long horizons
  - to (implementable) initiatives with short- to mid-range horizons
- predicted (fixed) futures
  - to plumbing the range of futures & making robust decisions
- expert-driven plans
  - to collaborative initiatives

anticipate

Un-plan - decision making for resilience

- **Logic:**
  - incremental - allows testing & adjusting in time
  - consistent with a range of anticipatory scenarios
  - can be collaborative

- **Advantages:** can
  - operate under uncertainty
  - produce robust decisions
  - lessen the likelihood of heavy investment in an unlikely scenario
  - happen in a fragmented context

collaborative um-plan

- addresses systems' long-trending changes with current means

- is best conducted at scales allowing:
  - meaningful stakeholder involvement
  - interaction among all sectors & government levels

- requires communication tools for:
  - conveying complexity & uncertainty
  - linking representatives with constituents
  - building decision networks

e.g. watershed

- what should we do to foster a watershed's resilience to climate change threats?

1. act now, with current resources/means

attend to current and near-future problems

2. turn goals into criteria: pick the solutions that

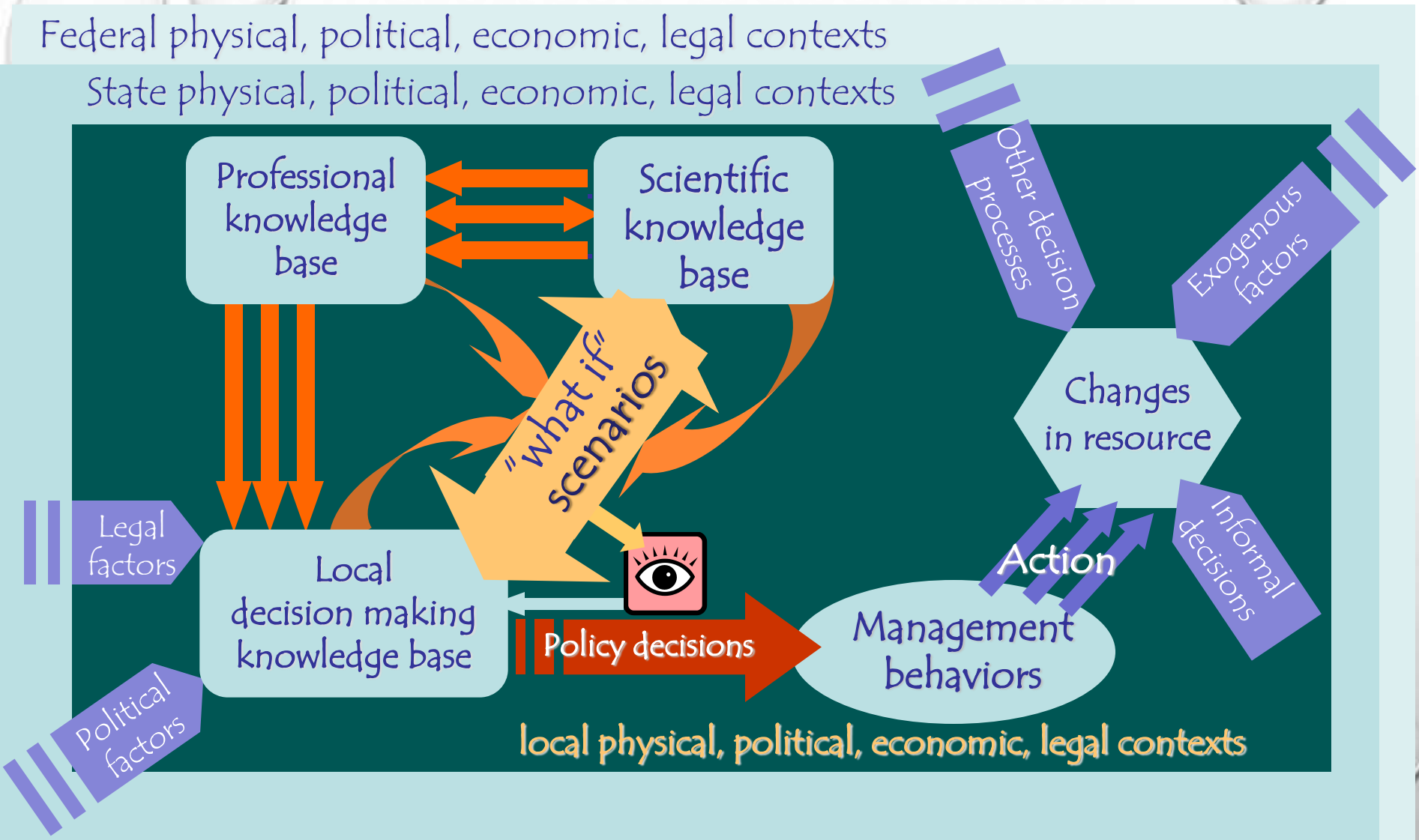
- have short-run benefits
- do not pay now for unknown results in the far future
- do not contribute to climate change
- do not reduce the space of alternatives for unknown people in an unknown future

Un-plan - decision tools for resilience

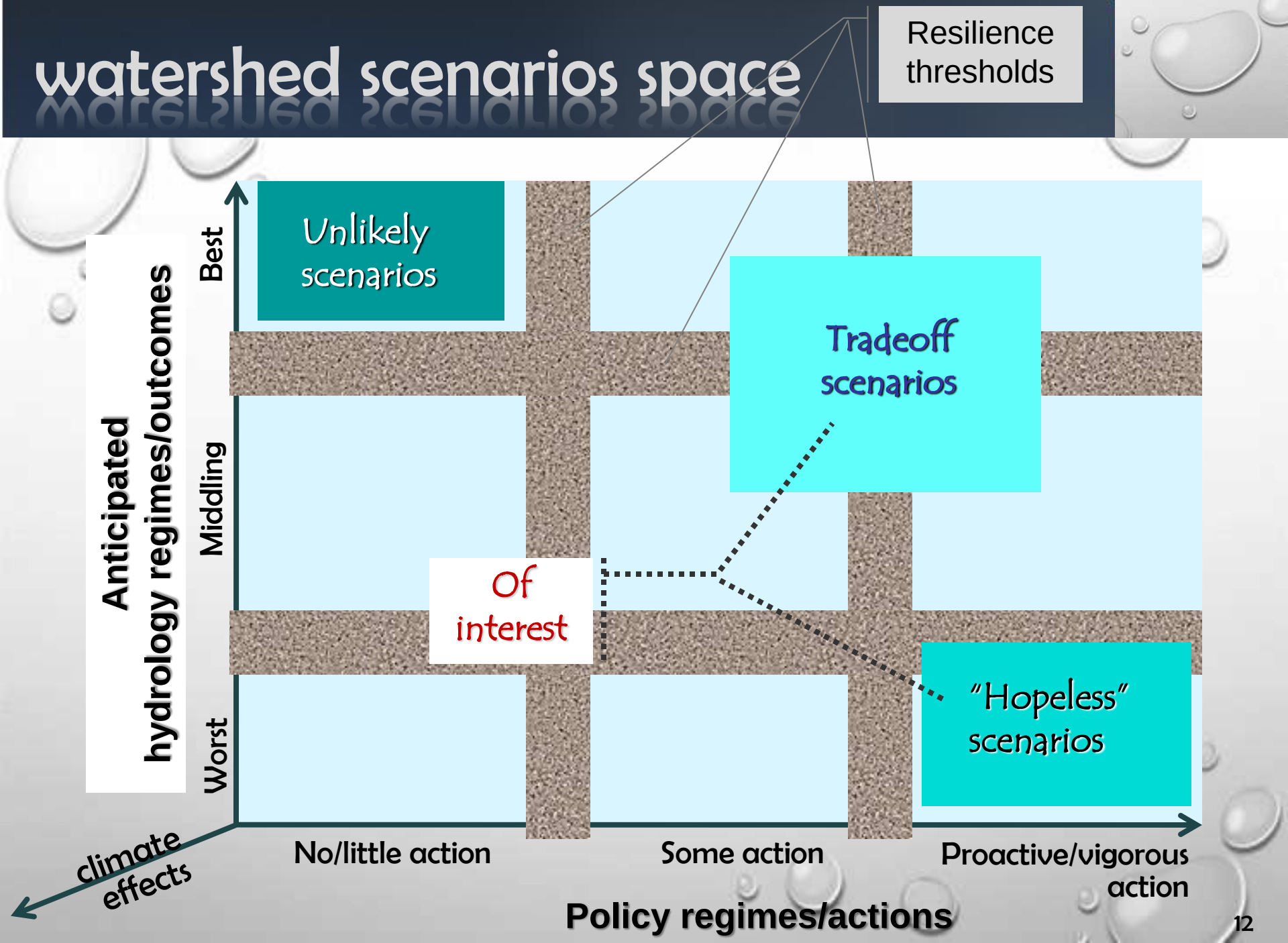
- what tools help with anticipatory "unplanning" for (water) resilience?

  - focus on scenarios
  - proposed approach: matches the collaborative context of water-resilient decisions

shared knowledge bases for watershed management



watershed scenarios space



um-plan with scenarios

for water resilient cities:

"make no big plans"

create boundaries for distributed decisions:

- convert long-term goals into *criteria* for current decisions for short-term adaptive actions
- make shorter-range, robust, implementable decisions
- pilot-test small and assess, instead of implementing big

work *at collaborative scale*