2015 Connecticut Association of Flood Plain Managers
Annual Conference & Meeting, Westbrook, CT

Lessons Learned and a Framework for Wastewater Vulnerability and Resilience Assessment

Dr. Christine Kirchhoff, P.E.

Asst. Prof., UConn Dept. of Civil & Env. Engineering

Peter Watson

Master's Student, UConn Dept. of Civil & Env. Eng.

UCONN

CIRCA
Connecticut Institute for Resilience and Climate Adaptation

CONNECTICUT ENERGY ENVIRONMENT

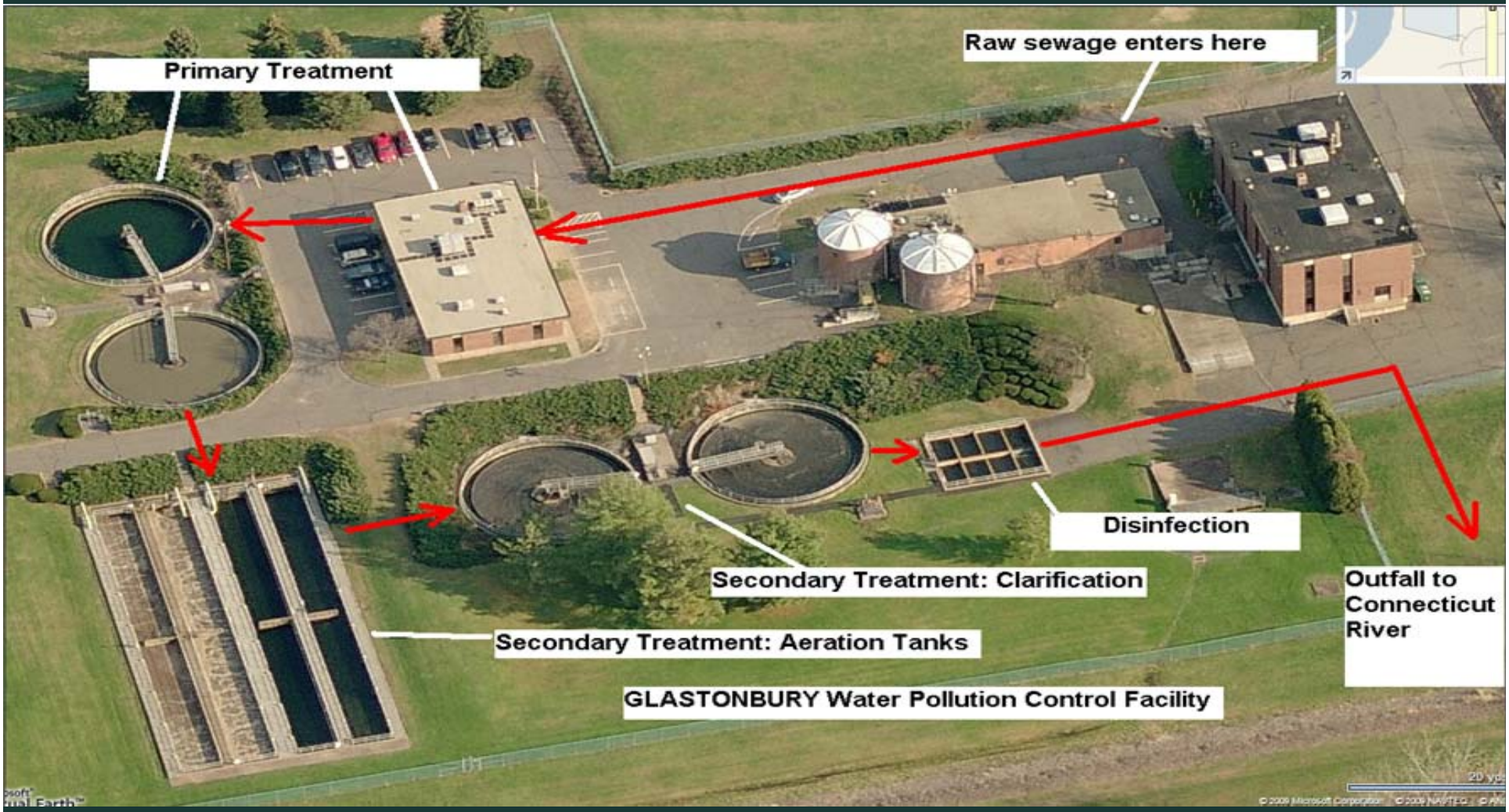


Figure: S. Pappano, CT DEEP Municipal Facilities Section

UCONN

CIRCA
Connecticut Institute for Resilience and Climate Adaptation

CONNECTICUT ENERGY ENVIRONMENT

UCONN

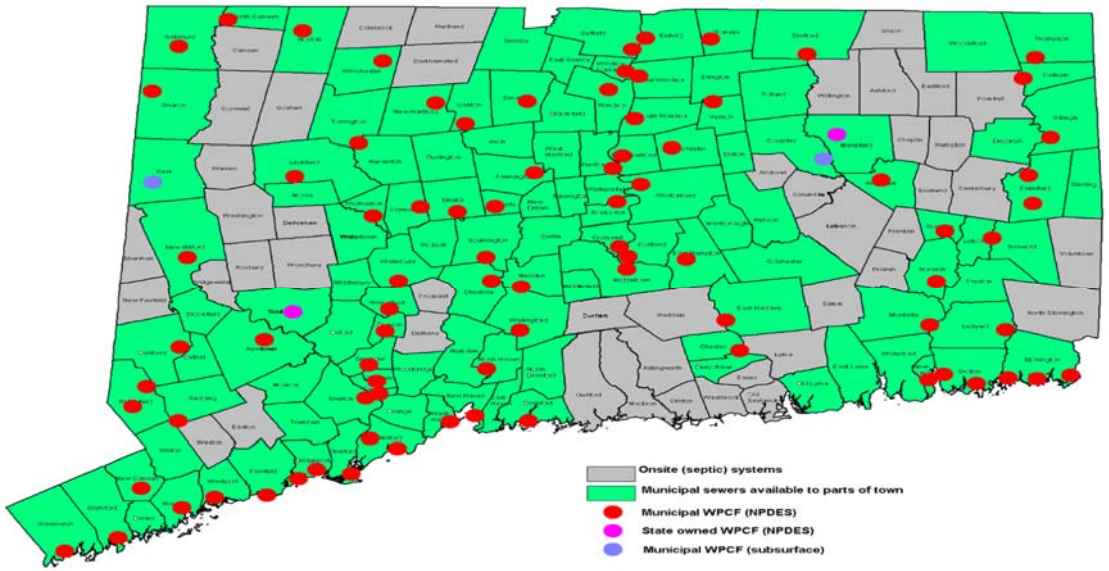
CIRCA
Connecticut Institute for Resilience and Climate Adaptation

CONNECTICUT ENERGY ENVIRONMENT

Past Storm Impacts

- Milford WWTP within 12 inches of *flooding* and Bridgeport to within 2 inches of *power loss*
  - Regionally 5 WWTP flooded
- Norwalk a pump station was *submerged* by salt water requiring complete rebuilding.
  - Regionally 17 PS submerged
- WWTPs were *inaccessible* in Greenwich and Stratford.
  - Regionally 5 inaccesible

How much is vulnerable?

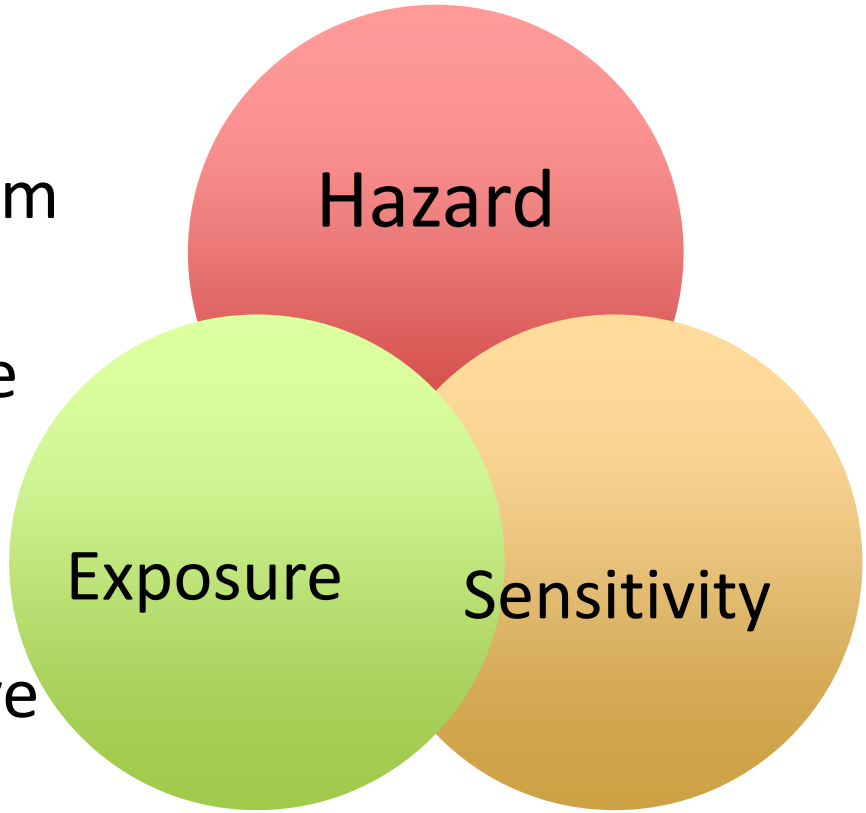


- 1,000+ pump stations
- 10,000 miles of sewers

Figure: S. Pappano, CT DEEP Municipal Facilities Section

Vulnerability is a function of…

- The hazard itself
  - E.g., Sea level rise, storm surge, wave action, extreme events, climate change
- The physical system
  - E.g., Location, protective measures, back-up systems



Typically vulnerability assessment…

- F[Haz, Exp]

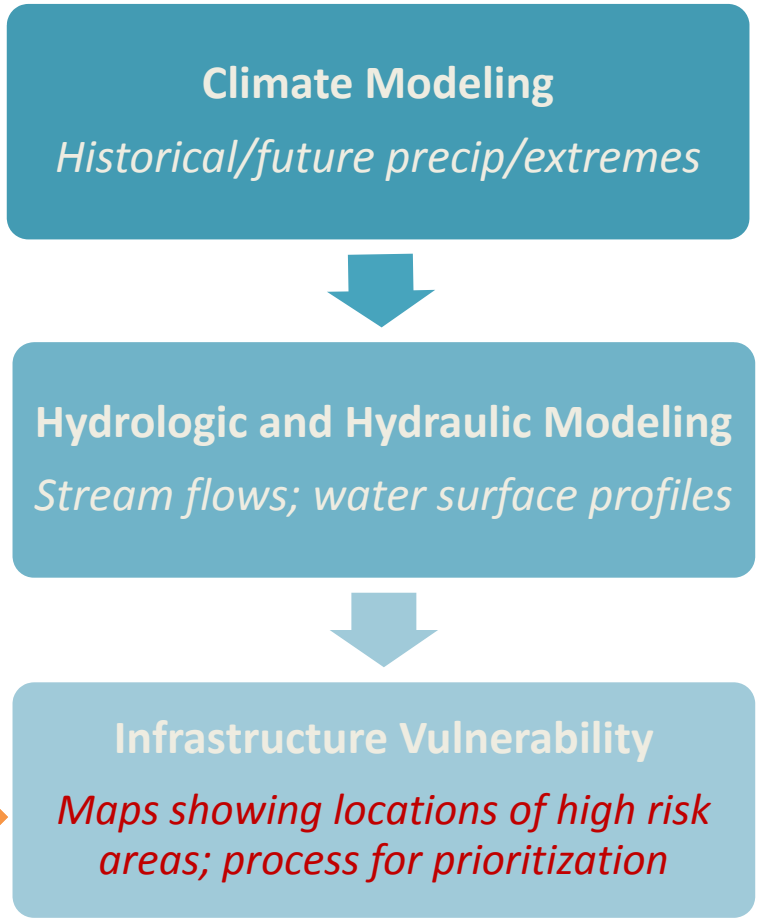


Figure: Bowering et al. 2013. Flood risk assessment for municipal infrastructure…

This approach largely ignores the broader social system (e.g., policy, political, management)

Why is this problematic?

- No or limited buy-in = no or limited implementation
- Little attention to policy/management = limited opportunity to integrate new information
- Little opportunity for long-term change
- Ignores other social/policy/management factors that can mitigate vulnerability

Resilience

"Resilience is the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a potentially hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or *improvement of its essential basic structures*." IPCC 2012

Resilience Approach to Vulnerability

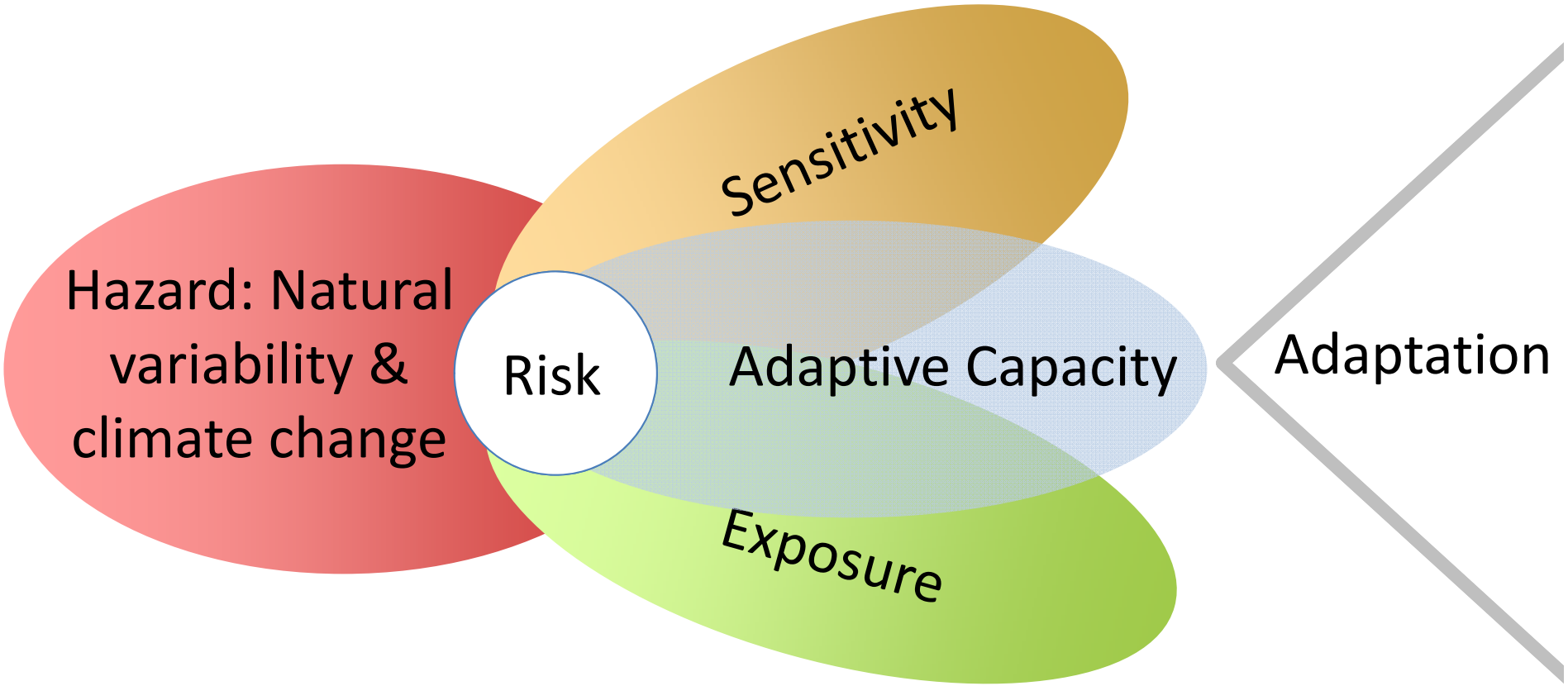


Figure: adapted from IPCC SREX Report

Resilience Approaches Promote Learning

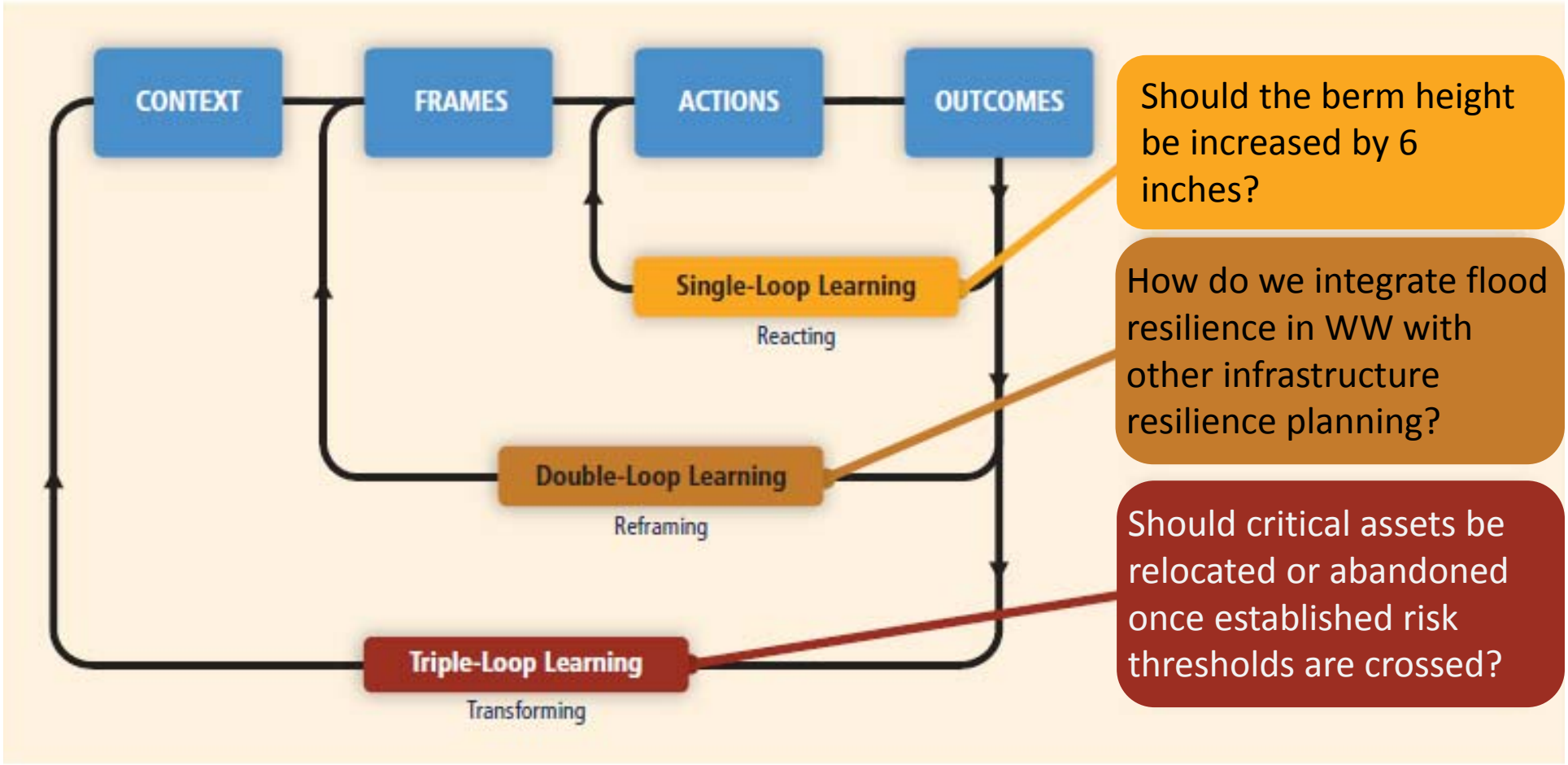
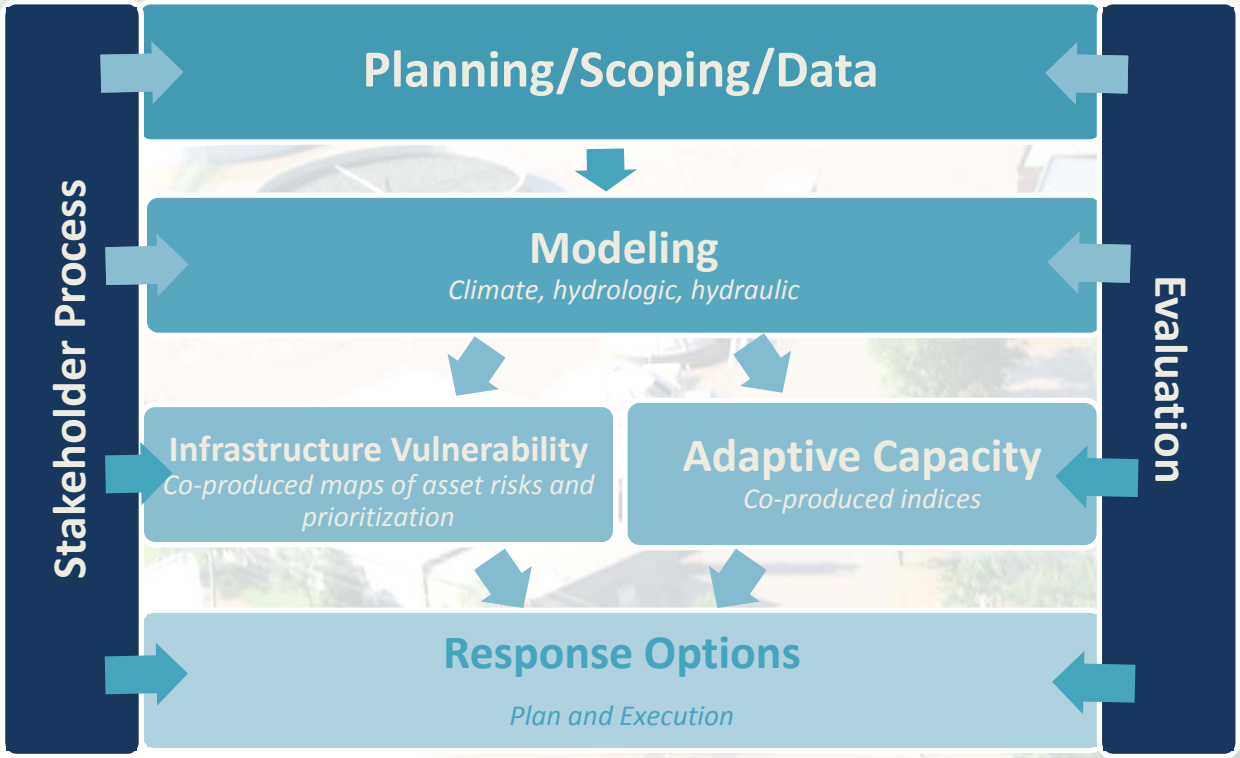


Figure: Lavell et al. 2012. Climate change: New dimensions…

Resilience Framework



UCONN

CIRCA
Connecticut Institute for Resilience and Climate Adaptation

CONNECTICUT ENERGY ENVIRONMENT

Thank You

Contact:

Christine.Kirchhoff@uconn.edu

UCONN

CIRCA
Connecticut Institute for Resilience and Climate Adaptation

CONNECTICUT ENERGY ENVIRONMENT