

# Municipal Infrastructure: Moving from Vulnerable to Resilient

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Figure: S. Pappano, CT DEEP Municipal Facilities Section



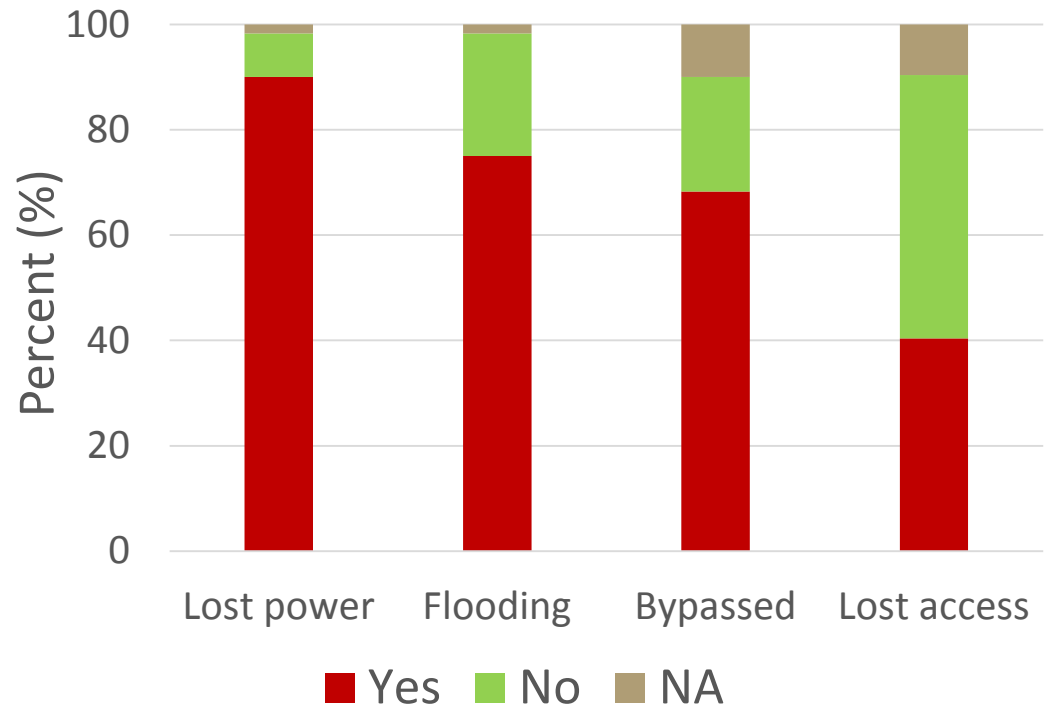
**UConn**



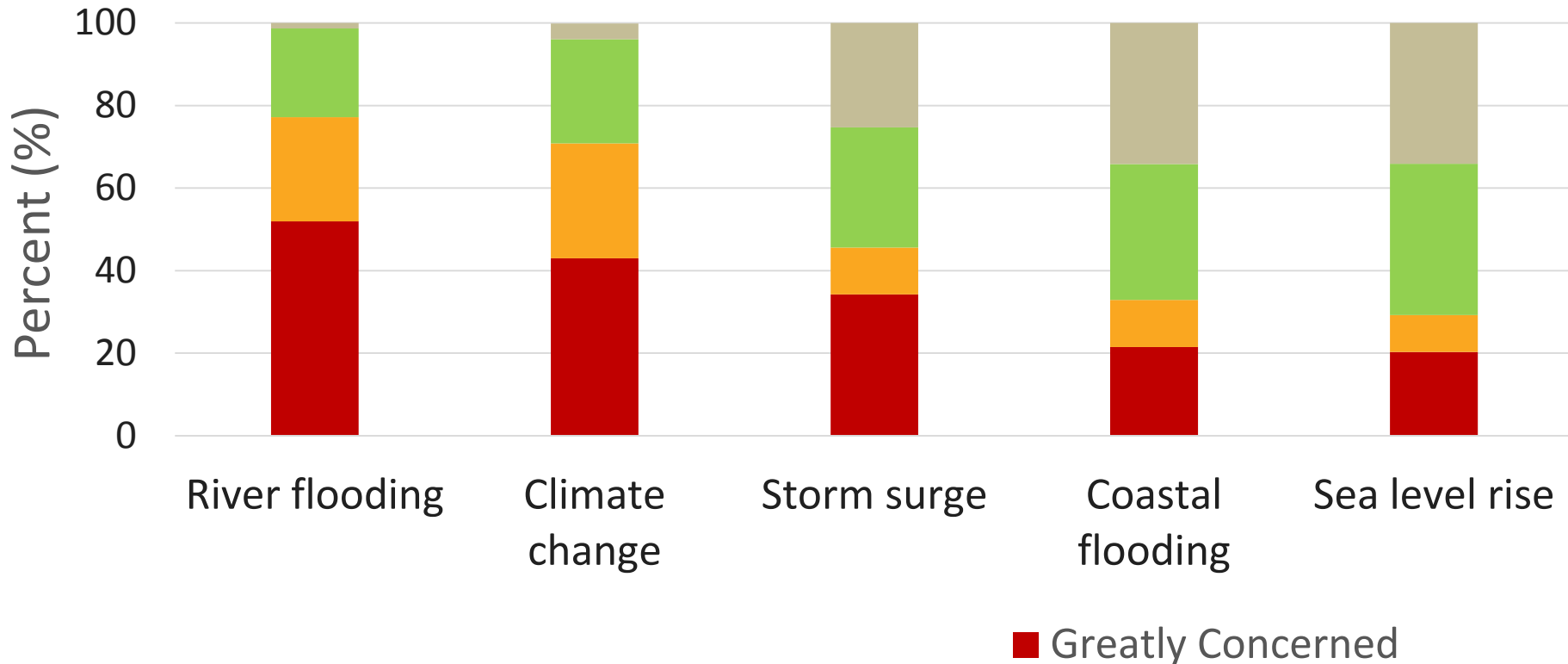
# Past Storm Impacts

Preliminary findings from survey of CT WW systems  
(n=85)

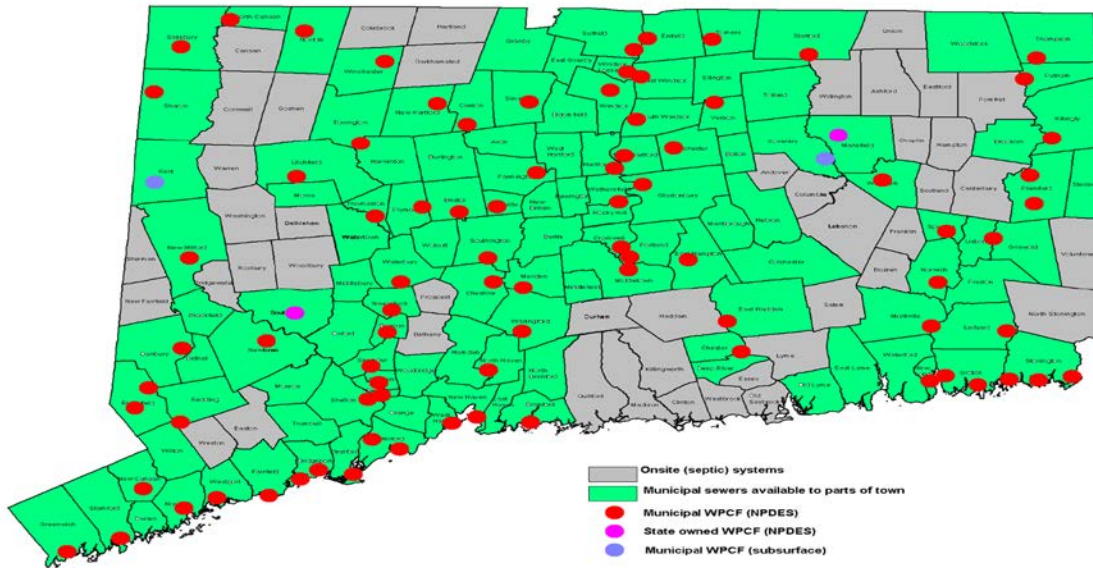
**73 % of WW  
systems  
experienced  
issues from past  
storms**



# Past Impacts have Managers at WWTPs Concerned about the Future



# How much is vulnerable?

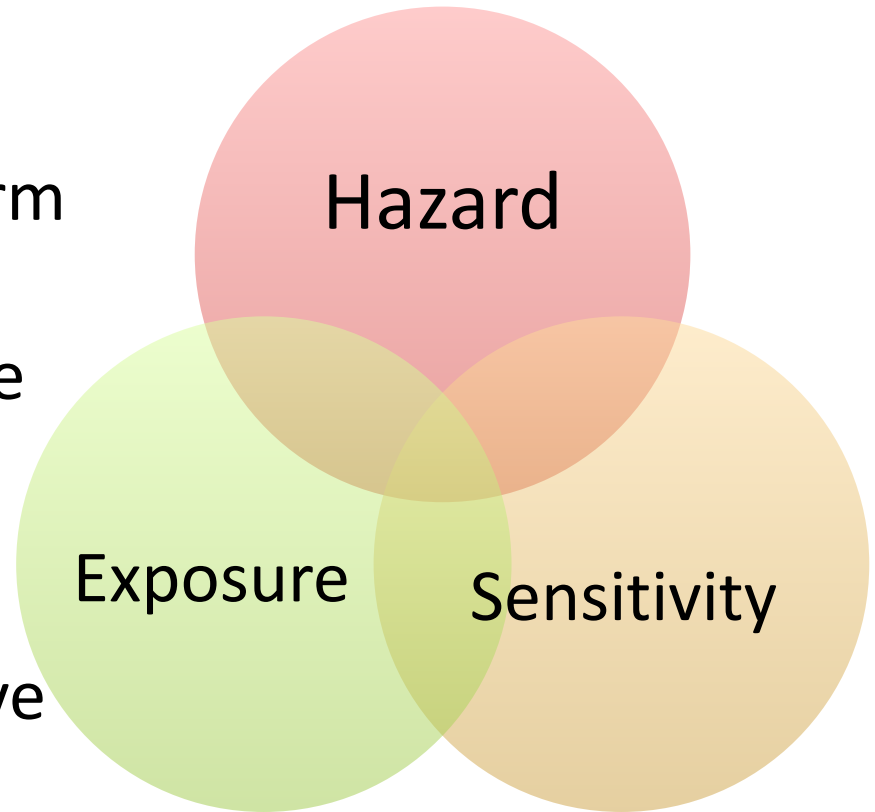


- 10s of WWTPs
- 1,000+ pump stations
- 10,000 miles of sewers

Fig. 1. Map of CT WW systems (S. Pappano CT DEEP)

# 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., Sen.)

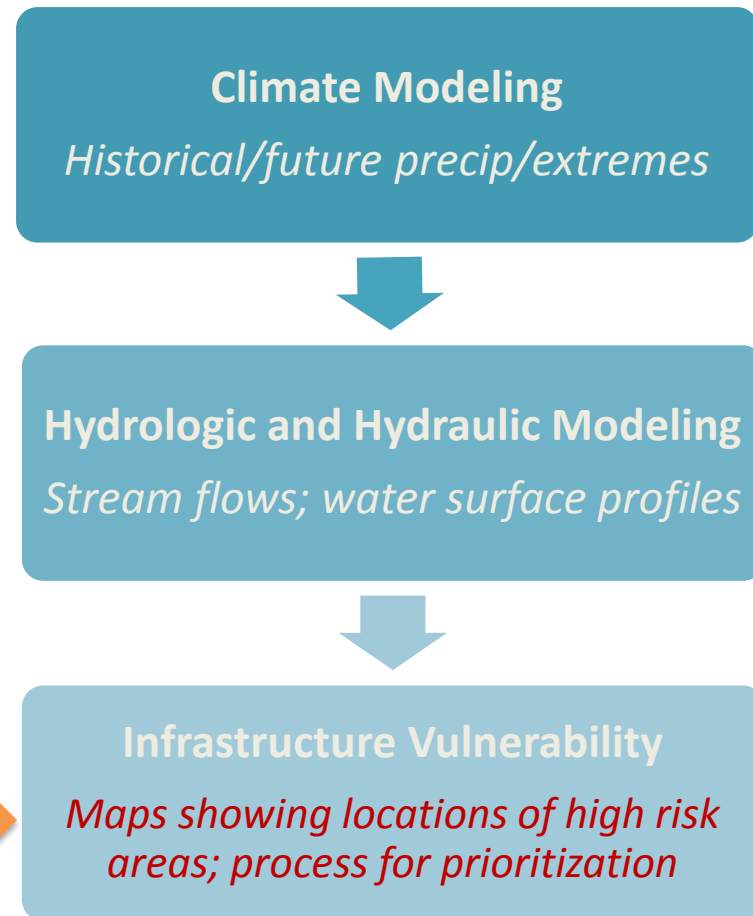


Figure: Bowering et al. 2013. Flood risk assessment for municipal infrastructure...

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



# Why is this problematic?

- Not a full accounting of vulnerabilities
- 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

# 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

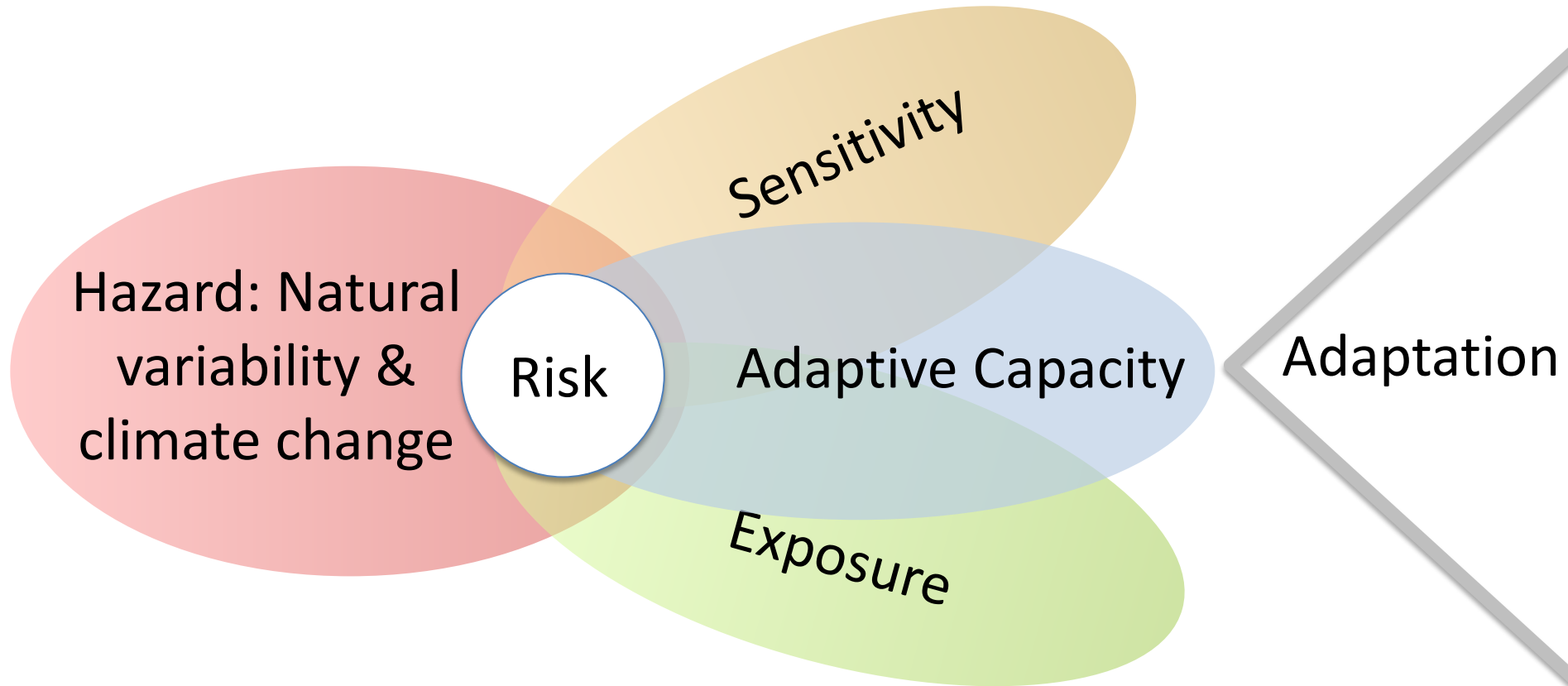


Figure: adapted from IPCC SREX Report

# Resilience Approaches Promote Learning

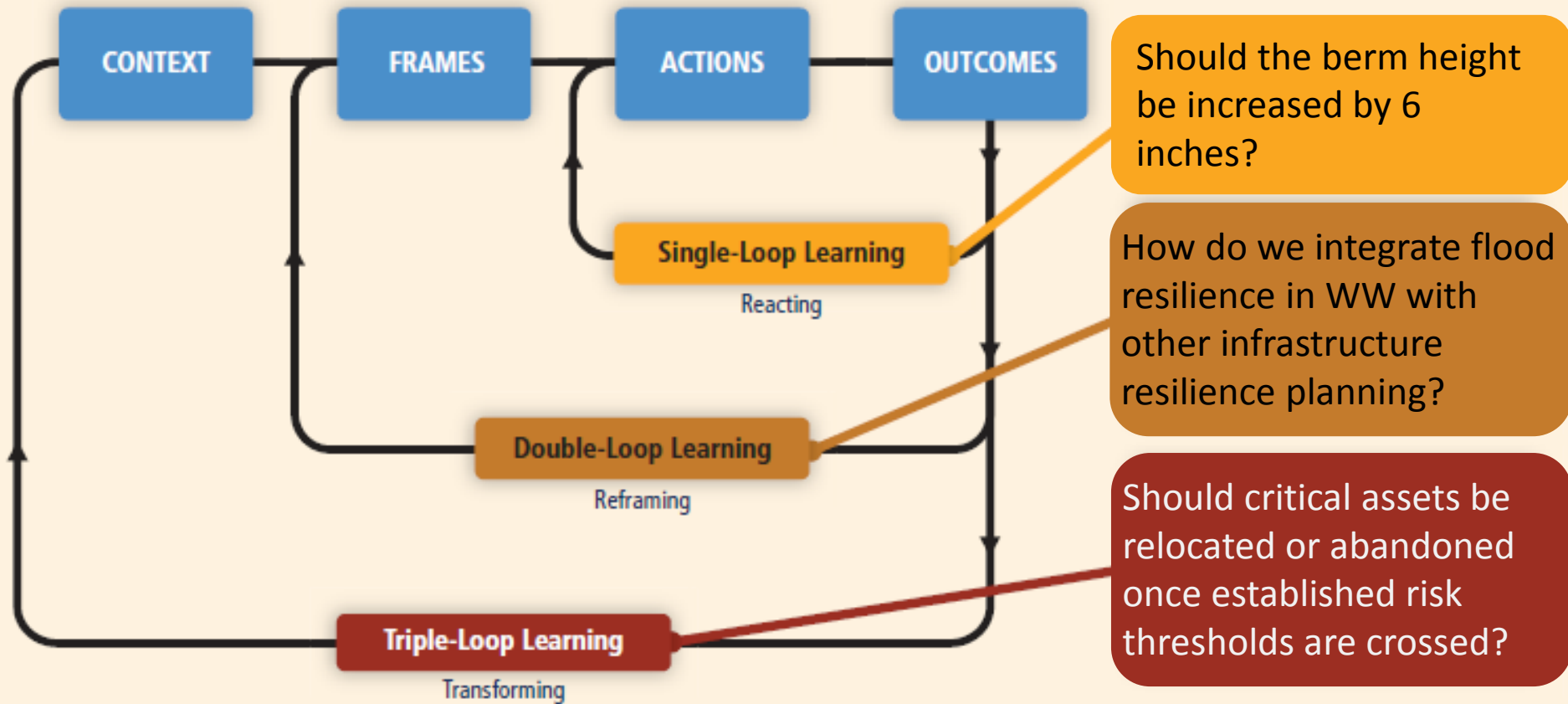
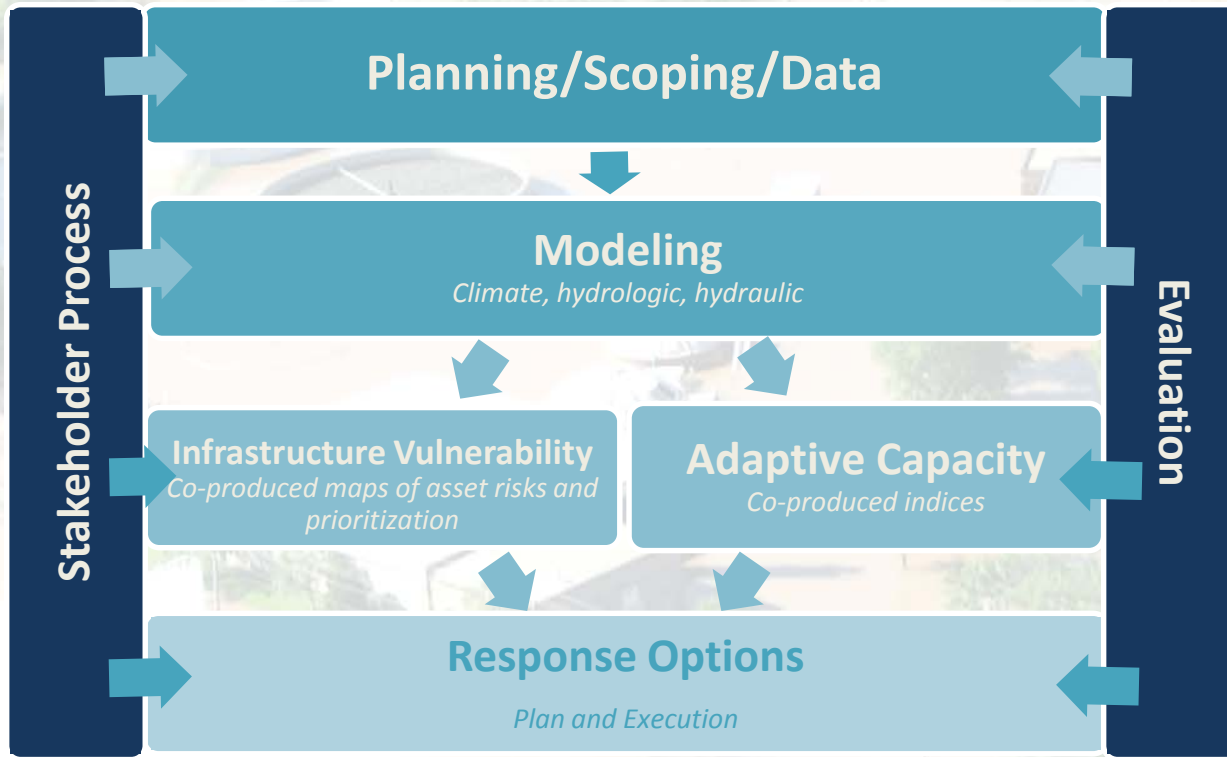


Figure: Lavell et al. 2012. Climate change: New dimensions...

# Resilience Framework



# Thank You

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