

# Community Resiliency in the Face of Coastal Hazards and the Renewable Energy Transition

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# Question for the Day

- How can society **improve collaborations** between the research (science) community and small coastal towns and rural communities, including those that are underserved, so that scientific research and data can be more effectively leveraged to
  - (i) support local capacity to implement resiliency projects and adapt to coastal change, and
  - (ii) define and leverage potential benefits of development and adaptation, particularly for those communities that are already in transition?

# National Academies Recommendations for the “Global Change Research Needs and Opportunities for 2022-2031”

An integrated, systems-based **risk management** approach—that is, one that considers the **multidirectional interactions among the physical climate system, ecosystems, and human systems**— would benefit from the pursuit of several crosscutting priorities that can provide for the examination of challenges within and across the integrated systems.

Crosscutting areas that will contribute to addressing climate change risks:

1. extremes, thresholds, and tipping points;
2. simulation of regional and local-scale climate;
3. a scenarios-based approach to project and manage climate change and associated risks;
4. equity and social justice; and
5. augmentation of existing analysis frameworks and supporting data



Tell me what matters, I will work on that . . .

- System interactions
- Extremes and thresholds
- Tipping points
- Equity and social justice



# From the community perspective,

## Deep uncertainty

- parties to a decision do not know, or cannot agree on, the system model that relates action to consequences,
- how likely various possible future states of the world are
- how important the various outcomes of interest are
- decisions are made in dynamic interaction with the climate and other natural systems

## Wicked problem

- incomplete or contradictory knowledge
- the number of people and opinions involved
- the large economic burden
- the interconnected nature of these problems with other problems
  - Underserved communities
  - Historic and current marginalization within communities

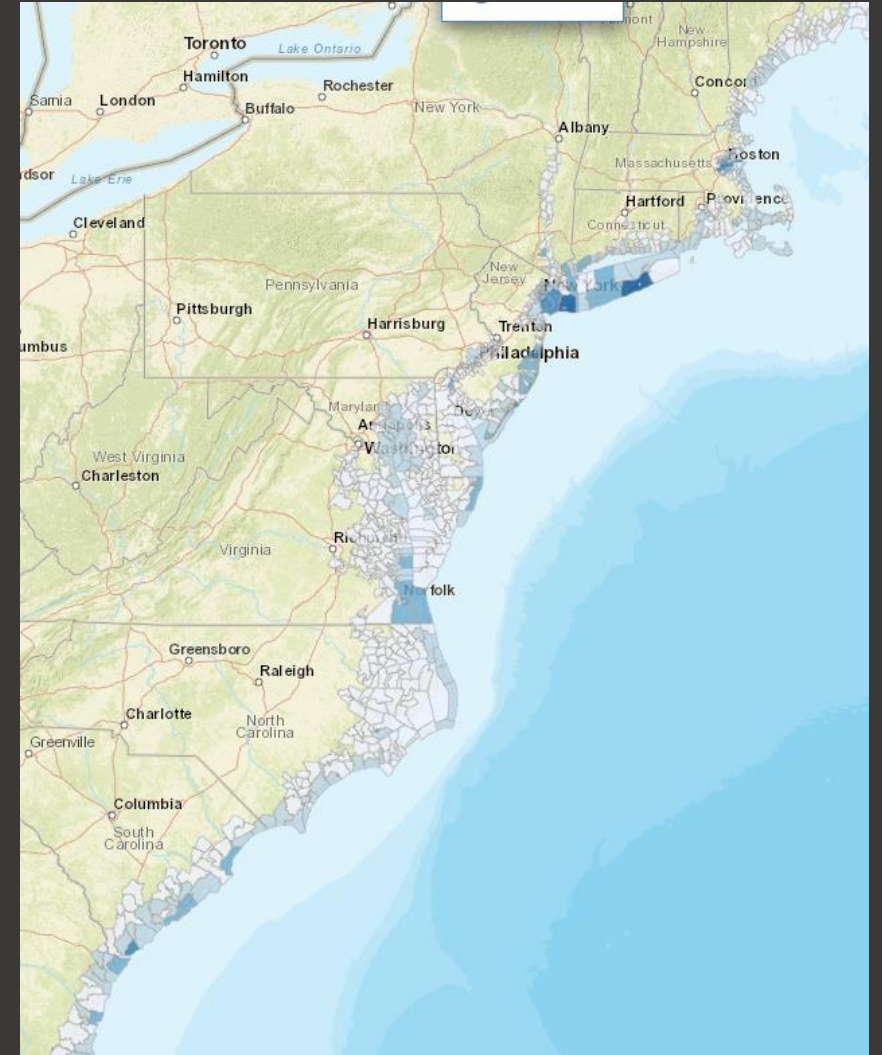
# Sea level rise



NOAA SLR viewer 2 ft.

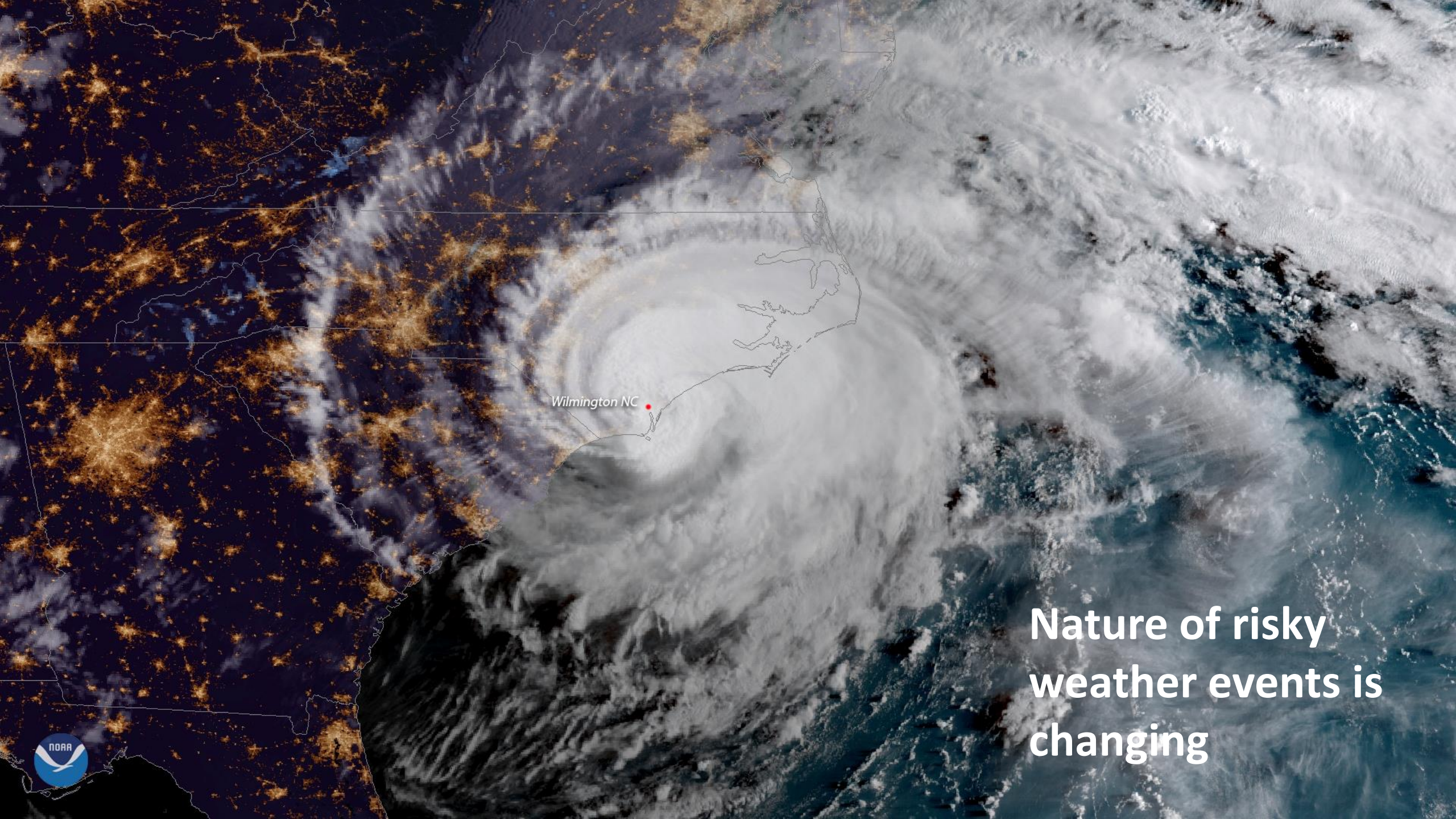


NOAA SLR high tide flooding



UCS 4ft SLR tax base





Wilmington NC

**Nature of risky  
weather events is  
changing**





# New awareness of the complexity of supply chains





Unimagined system  
connections leading to  
unexpected risks

A fire hydrant swallowed up by  
sinking ground

“a fundamental, emergency-based infrastructure  
that’s made out of a material that’s potentially  
corrosive from saltwater”



Photo by Caitlyn Kennedy, NOAA Climate.gov

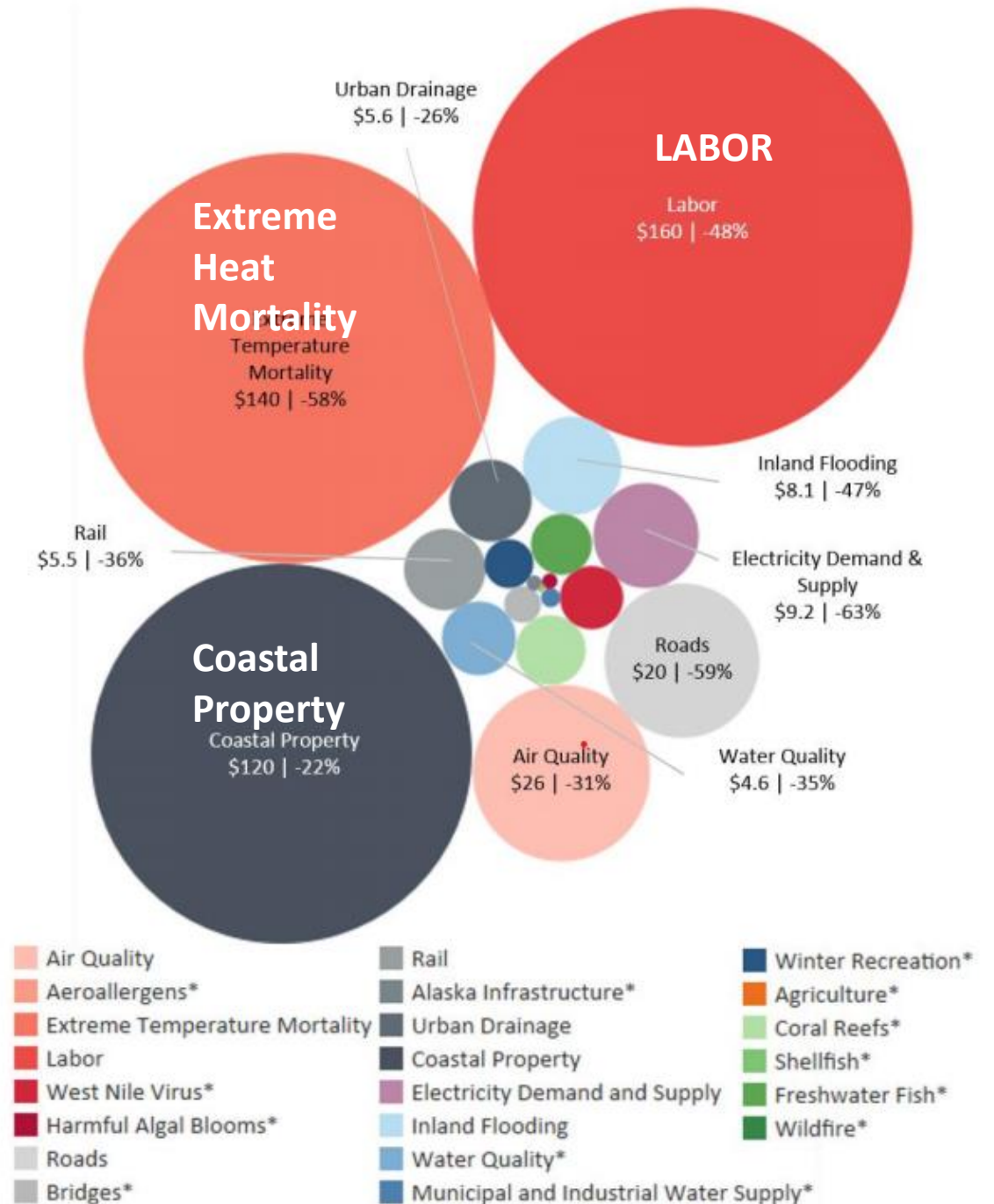
Bayou Lefourche, LA

# Annual Economic Damages from Climate Change

Higher emissions (RCP 8.5) 2090s

- What are the priorities?
- Who supports them?
- How are benefits and impacts of decisions distributed?

EPA, 2017: Multi-model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment. EPA 430-R-17-001. U.S. Environmental Protection Agency (EPA), Washington, DC, 271 pp.





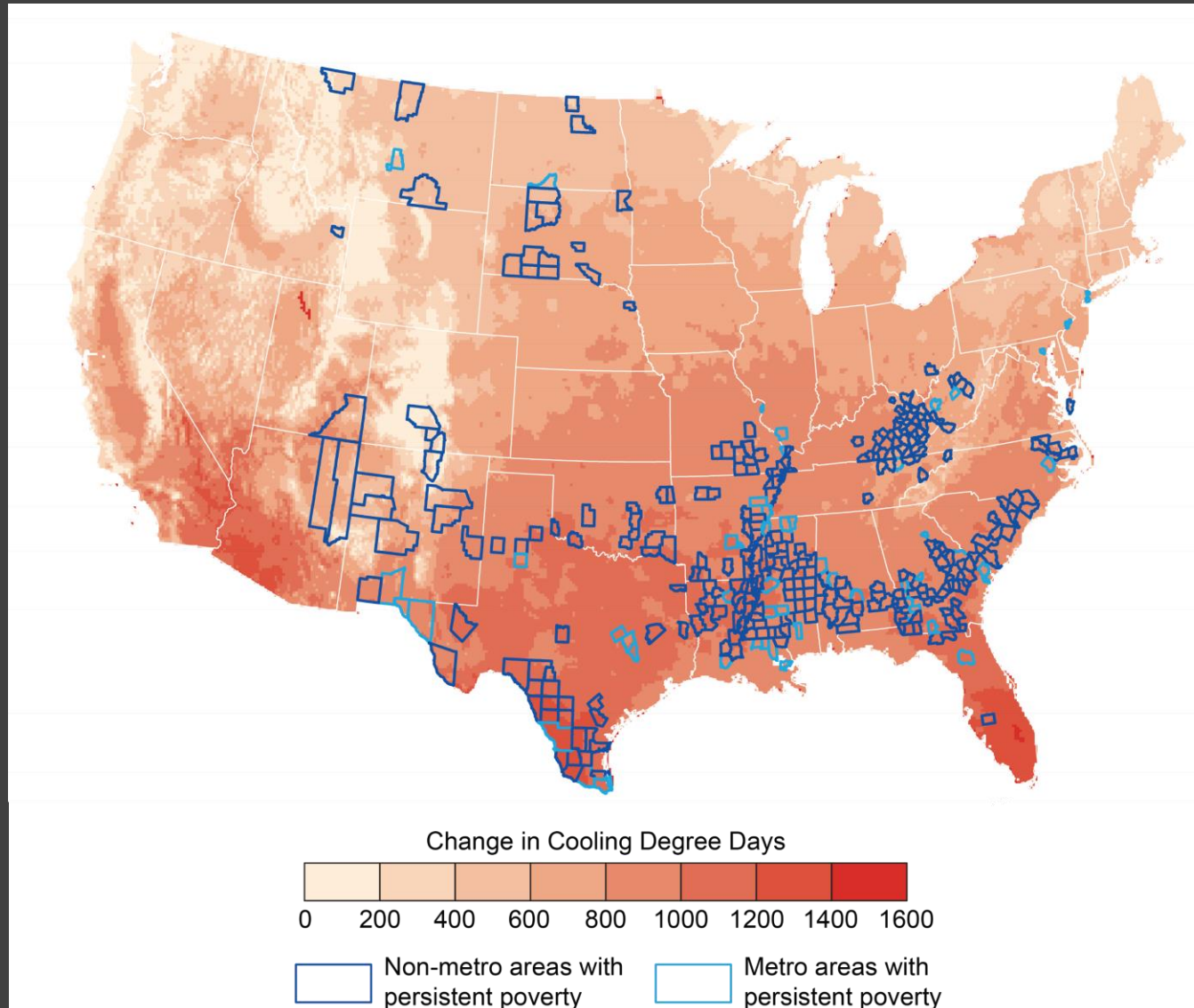
# Increasing risks from heat and heat waves

- Moms, babies, and children
- Elderly
- Those with heart disease, diabetes, respiratory diseases
- Some medications
- People active outdoors – athletes, farmworkers, construction, manufacturing
- Unacclimated people (e.g., tourists)
- Racial disparities exist in these health risks



Photo: Ludwig Simbajon -  
[creativecommons.org/licenses/by-nc-nd/2.0/](https://creativecommons.org/licenses/by-nc-nd/2.0/)

# Projected Increases in Cooling Degree Days and Energy Poverty



In North and South Carolina

- 400,000 people live at less than 50% of the Federal Poverty Line
- Spent 30% and 37% of their income on energy, respectively

Source:  
<https://convergence.unc.edu/vulnerabilities/energy-poverty/>



# Three topics to consider

Improving collaboration between research (science) community, small coastal towns, and rural communities will require advancing:

1. practices of researcher-decisionmaker-community interactions
2. Design and evaluation of multi-dimensional social learning
3. fostering visions of dynamic adaptive pathways



Researcher-decisionmaker-  
community interactions

1. The loading dock

Photo Robert Yarnall Richie





Researcher-decisionmaker-  
community interactions

2. Co- production





Researcher-decisionmaker-  
community interactions

3. Actionable  
knowledge and  
engagement



# How interaction and engagement fosters learning

- What types of learning do we focus on in creating engagement?
- Which forms of learning do we evaluate?



# HISTORY · OF CIVIC · SERVICES IN THE · CITY · OF · NEW · YORK

WATER SUPPLY No. 4



An Average of 930000000 Gallons is Consumed Daily

What researchers and communities can learn about in engagements

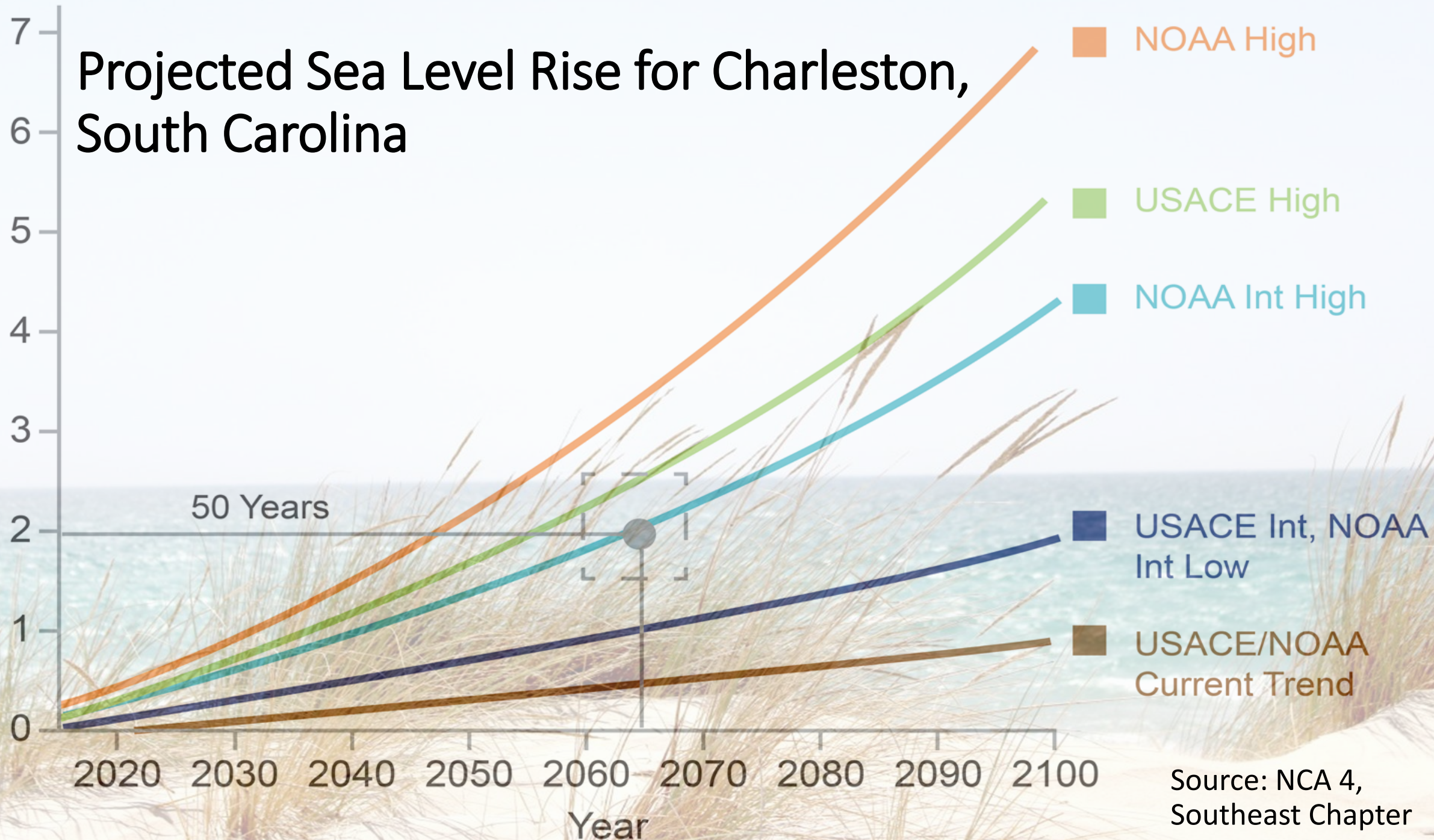
1. Knowledge of the changing natural-socio-technical interconnected system in which the risk problem is embedded

- Facts and social elements of the risk landscape
- History
- Cascades, compound, and complex events and impacts



# Projected Sea Level Rise for Charleston, South Carolina

Relative Sea Level Change (feet)



Source: NCA 4, Southeast Chapter

# 1. Knowledge of the changing natural-socio-technical interconnected system

Includes the social risk landscape

The beliefs and values of the participating parties, as well as institutional structures and processes





# What researchers and communities can learn about through engagement

*2. Normative knowledge about the appropriate roles and relationships among risk managers, experts, and interested and affected parties*





What researchers and communities can learn about through engagement

*3. Communicative competencies*  
making claims  
marshaling evidence and justifications  
listening and reflecting  
practicing empathy and perspective-taking  
negotiating and reaching closure







What researchers and communities can learn about

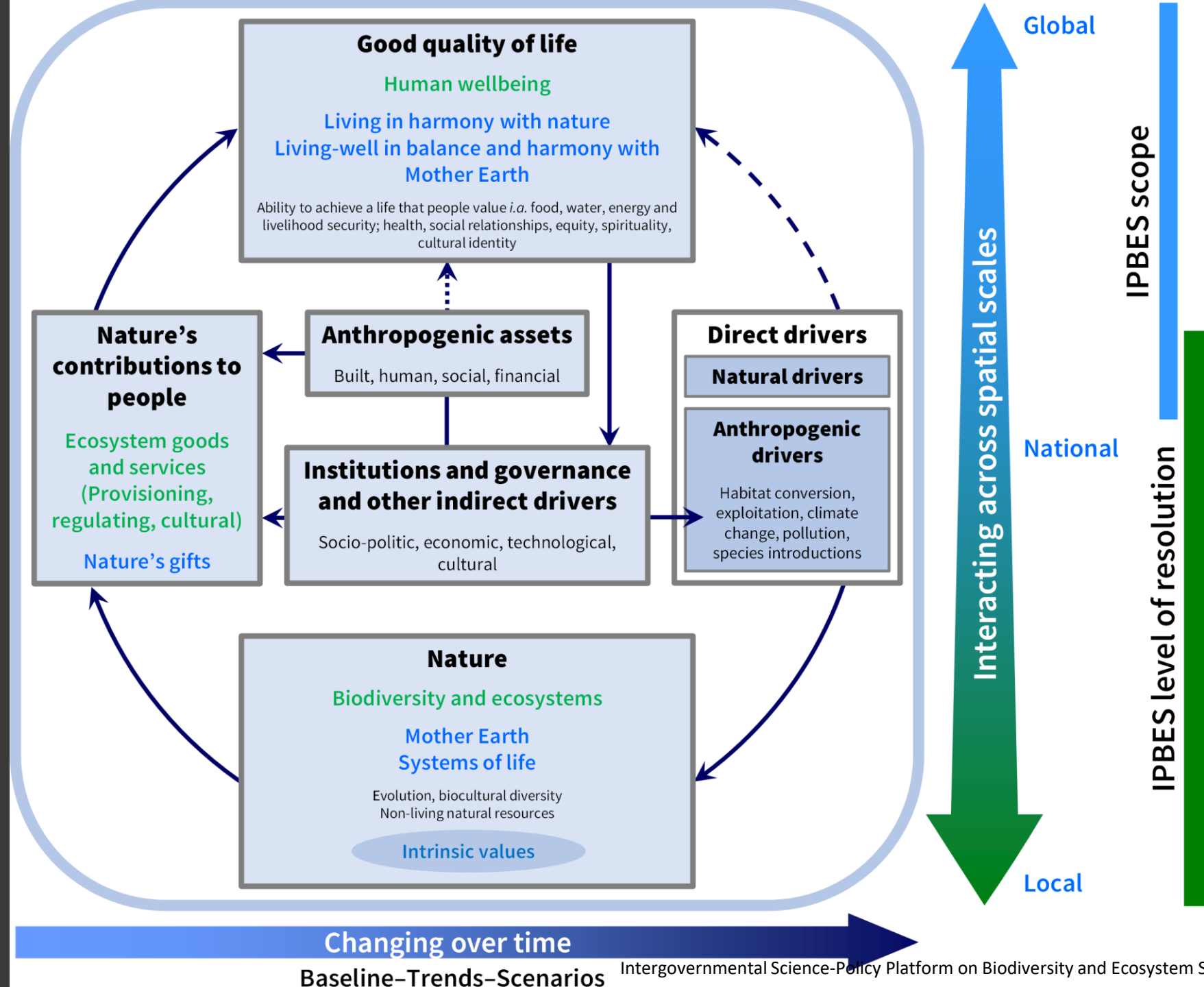
*5. Self and identity*

*Collective norms*

*Other people's identities*

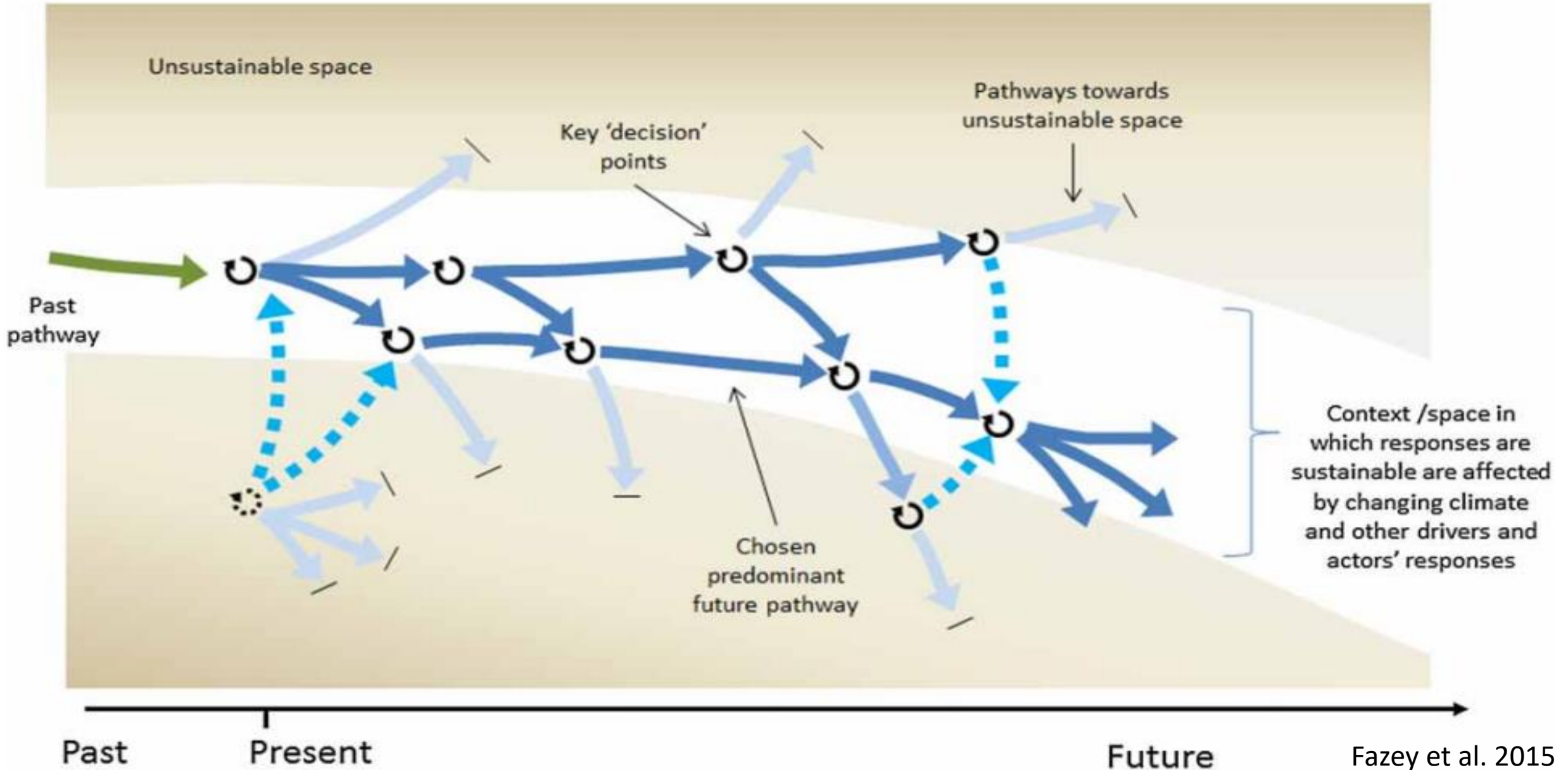
What researchers and communities can learn about through engagement

4. Methods of sense making

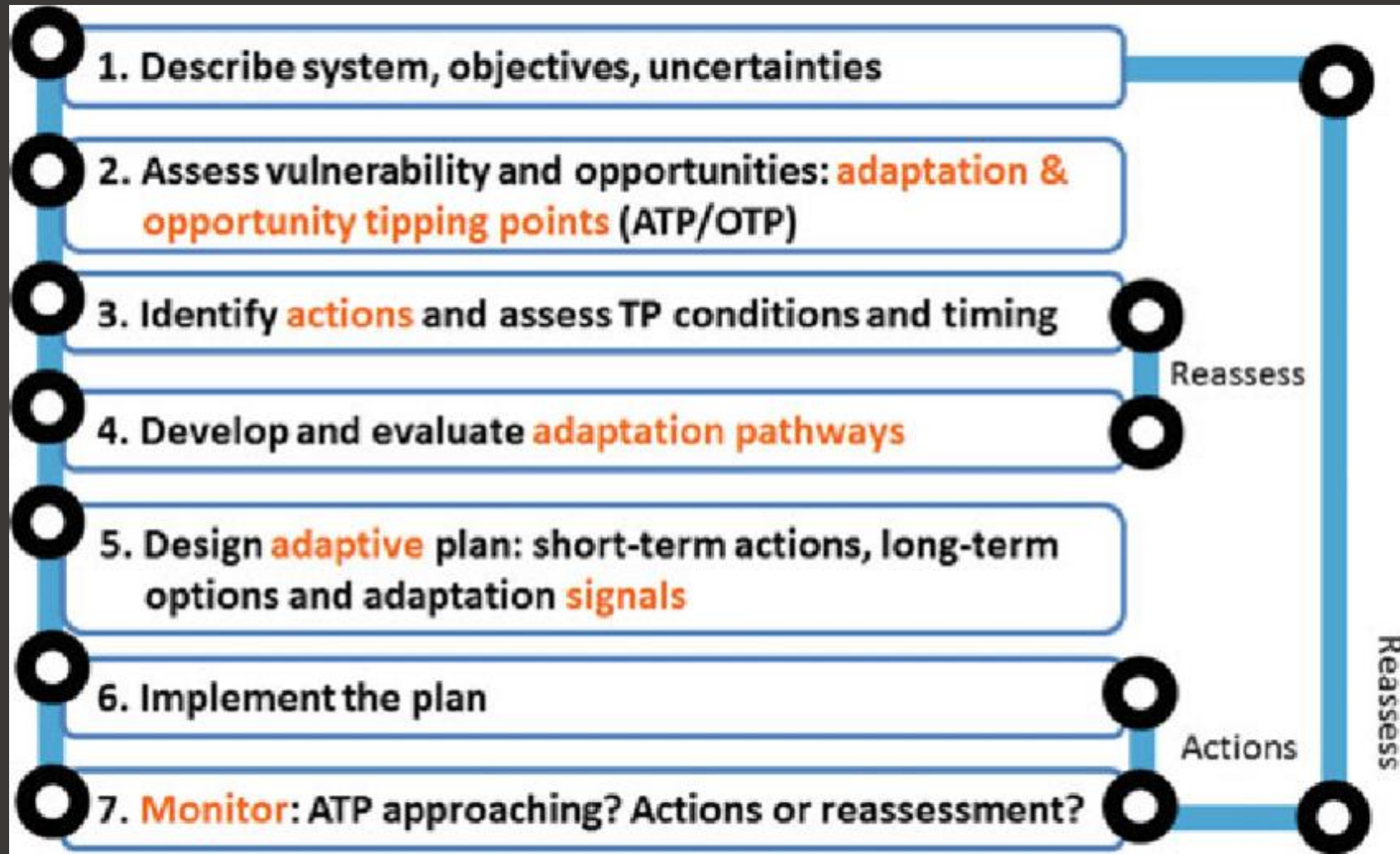




# Dynamic Adaptive Pathways



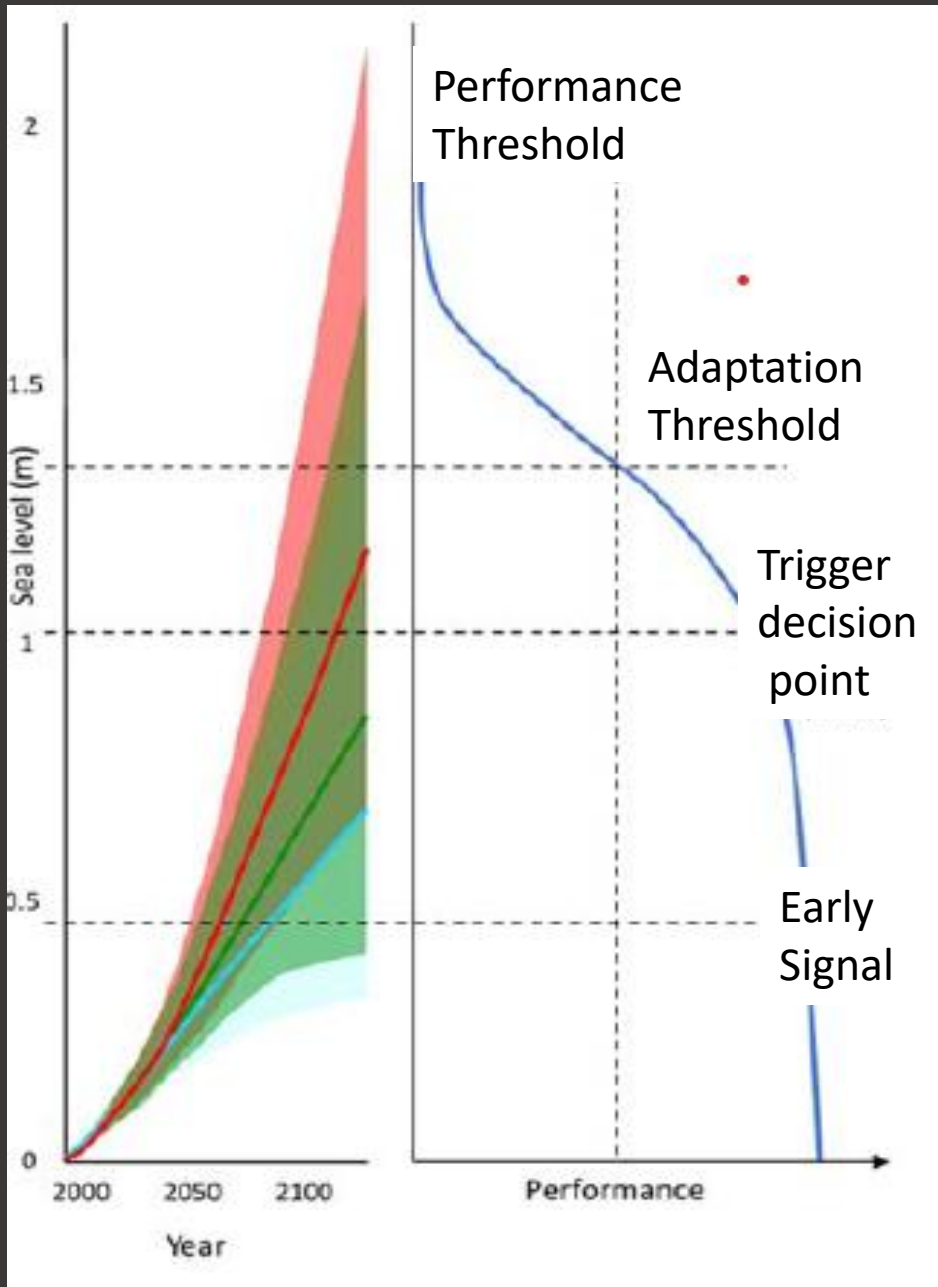
# Dynamic Adaptive Pathways Planning Steps





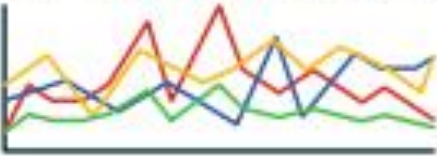
# Signals (warnings) and triggers (decision points)

- Political, social, cultural, and economic as well as physical
- Probabilistic
- Changes in values and capacities over time



# Ongoing dialogues for dynamic adaptive pathways

Ensemble (transient) scenarios or sensitivity analysis



Set of actions and pathways

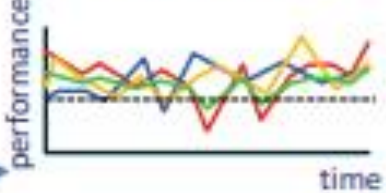


Collaborative model-based development

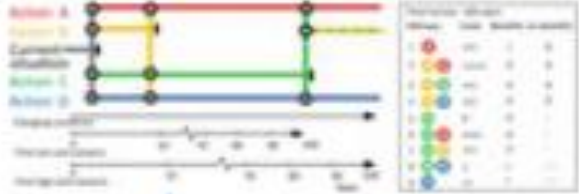


Participatory/qualitative Workshop & storylines

Adaptation Tipping Points



Adaptation pathways





# Coming back to three topics to consider

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- Design and evaluation of multi-dimensional social learning
- fostering visions of dynamic adaptive pathways

Thank you



Credit: kolikzuz