Collaborative Research: NSF R2I2:

Identifying Community Need Based Adaptation and Resilience Priorities in the US Northeast

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NSF U.S. National Science Foundation

Agenda

10:00 – 10:20: NSF R2I2 Overview Presentation - John Truscinski

10:20 – 10:35: Presentation on Grant Themes - Yaprak Onat

10:35 – 10:50: Discussion of Grant Themes

11:30 - 12:00: Lunch

12:00 – 12:55: Policy Presentation & Facilitated Discussion – Louanne Cooley and Nicole Govert

12:55 – 1:00: Wrap up and next steps

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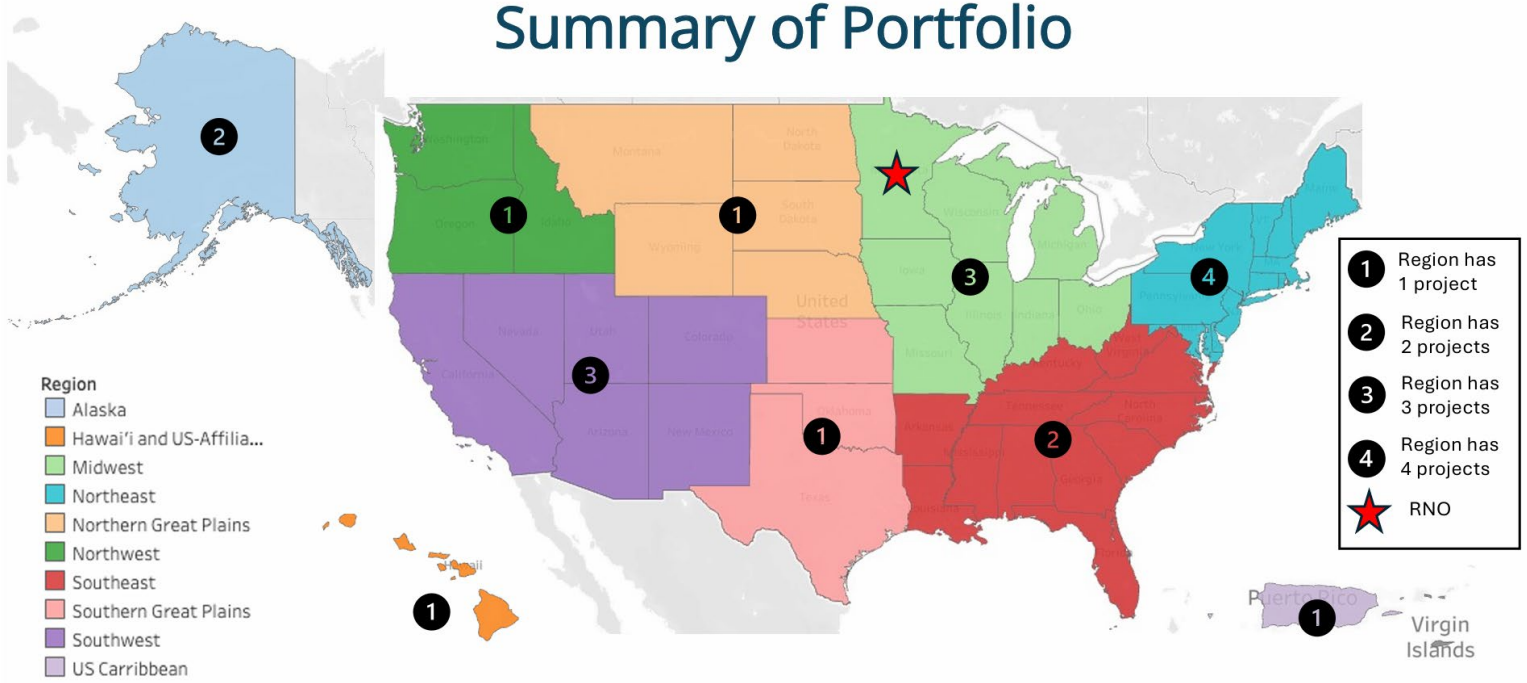
Regional Resilience Innovation Incubator

R2I2

"Support translation of research into practical, scalable solutions to regional resilience problems through innovative collaborations."

- NSF envisions the R2I2 program to enable translation of Earth Systems Science Knowledge to address resilience challenges in the real-world setting.
- Roadmap solutions that are practical, socially and environmentally responsible, have techno-economic viability and can demonstrate a scalable, adoption ready solution within a 3-5-year timeframe.

Summary of Portfolio



NSF GEO & TIP Program Officers

Shree Mishra
Program Director (GEO)

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Program Director (GEO)

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Program Director (GEO)

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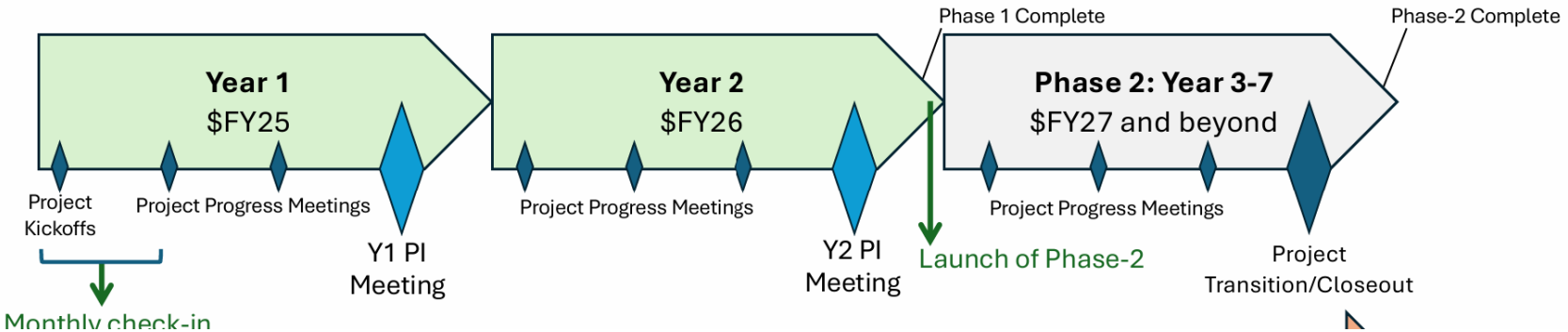
Danielle Sumy
Program Director (TIP)



Deliverables

(1) a prioritized list of climate challenges facing regional municipalities

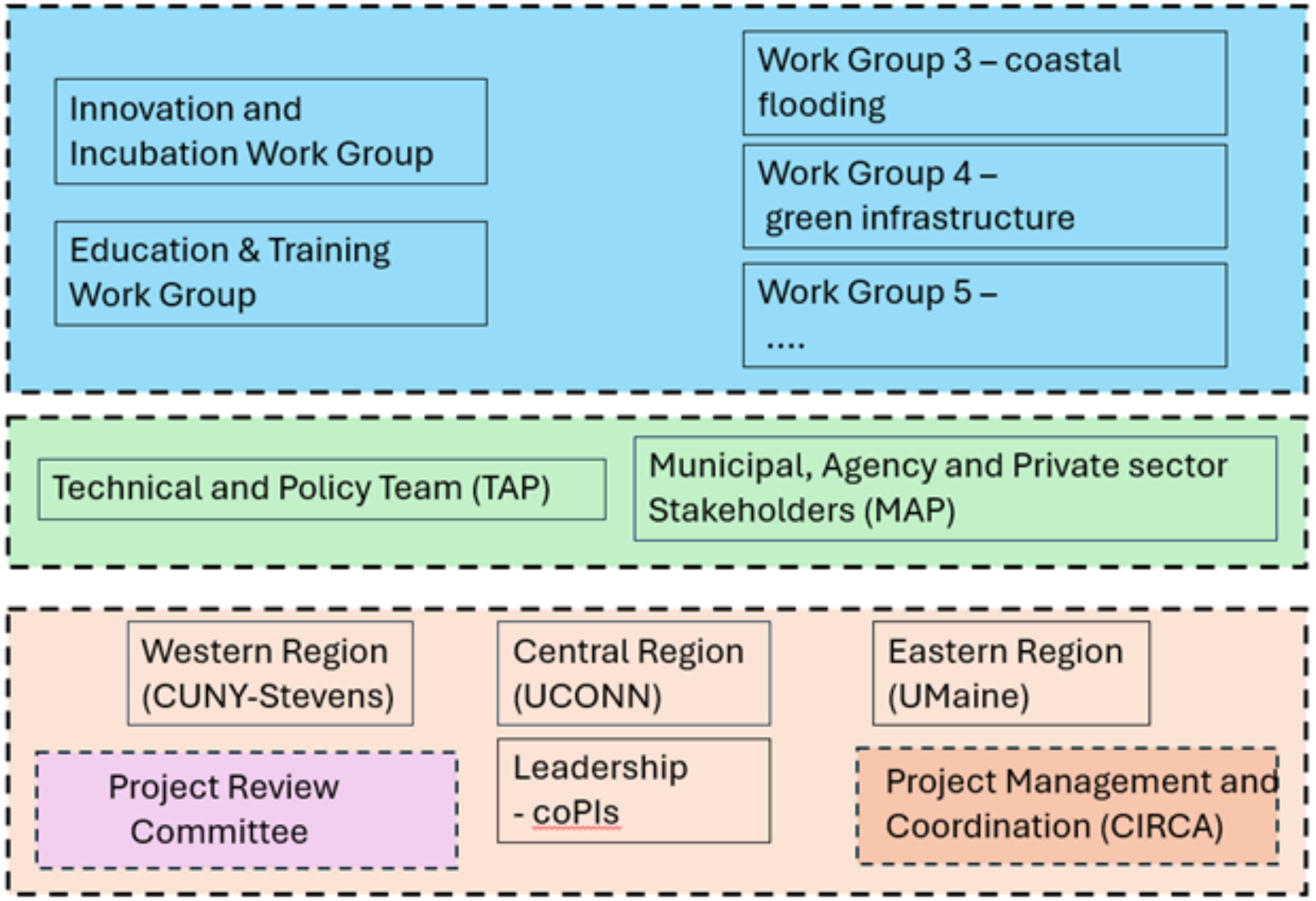
(2) solutions and a strategy to develop and demonstrate the effectiveness

(3) an assessment of the regional needs for education and training

(4) a sustainable plan to meet regional needs

(5) a plan to sustain (organize staff and fund) the regional collaboration

(6) report



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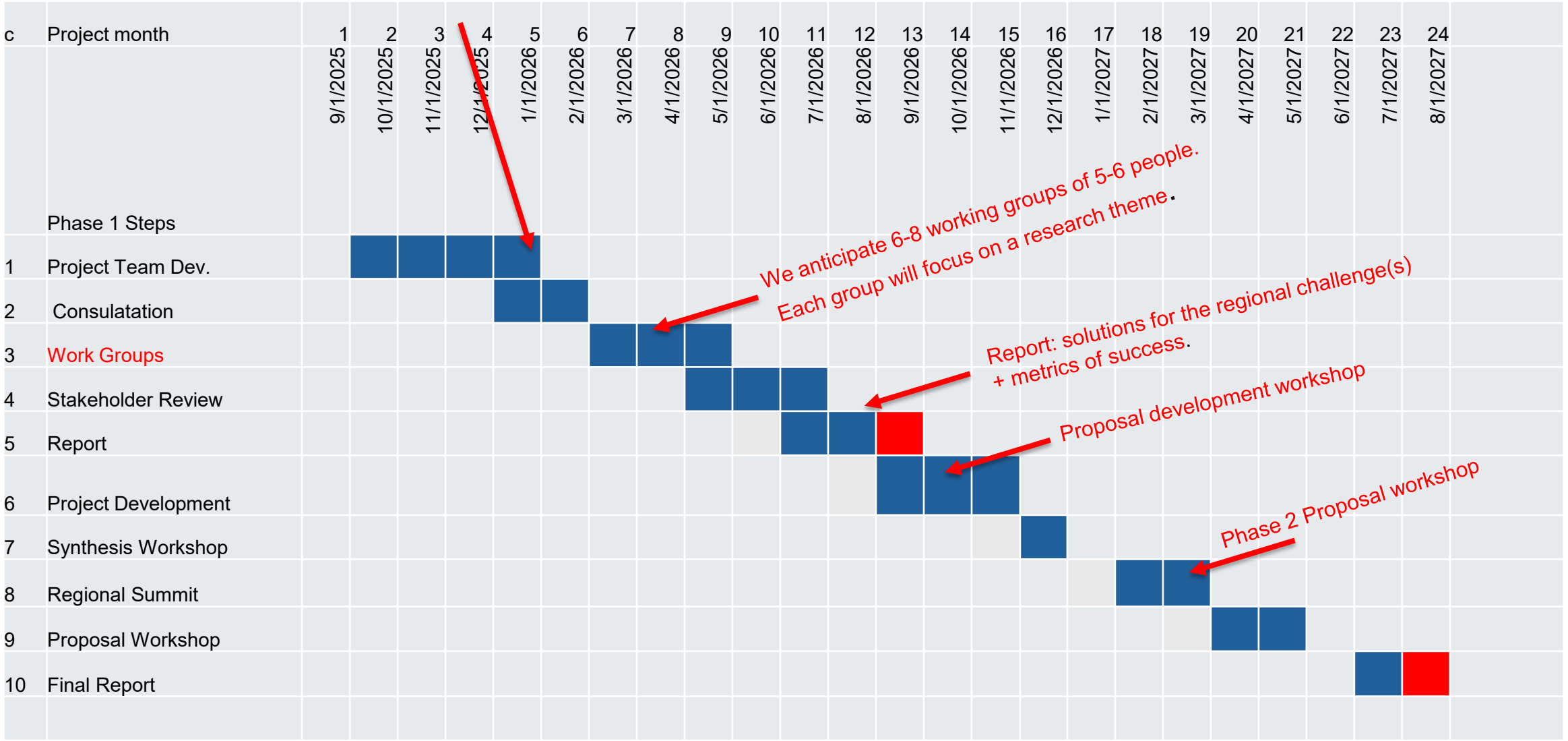
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Project month
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Phase 1 Steps
1 Project Team Dev.
2 Consulatation
3 Work Groups
4 Stakeholder Review
5 Report
6 Project Development
7 Synthesis Workshop
8 Regional Summit
9 Proposal Workshop
10 Final Report
We anticipate 6-8 working groups of 5-6 people.
Each group will focus on a research theme.
Report: solutions for the regional challenge(s)
+ metrics of success.
Proposal development workshop
Phase 2 Proposal workshop

Collaborative Research: NSF R2I2: Identifying Community Need Based Adaptation and Resilience Priorities in the US Northeast

Lead: UConn
PI: James O'Donnell

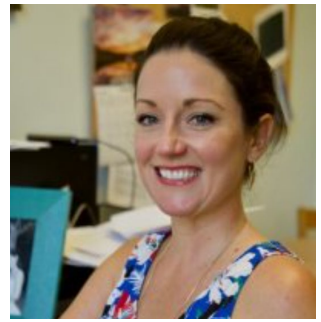
Lead: UConn
PI: Emmanouil Anagnostou

Lead: UConn
PI: John Truscinski

Lead: UConn
PI: Joseph Macdougald

Collaborator:
Stevens Institute of Technology
PI: Phillip Orton

Collaborator:
Brooklyn College
PI: Brett Branco



Collaborator:
University of Maine
PI: Kim Huguenard

Collaborator:
University of Maine
PI: Lauren Ross

Key Partners: Technical and Policy experts across UConn, U. Maine, Brooklyn College, Steven Inst., Yale, URI, WPI, Fairfield U., and Cornell U.

State agency, municipal government, and private sector partners across 4 states (CT, NY, NJ, and ME).

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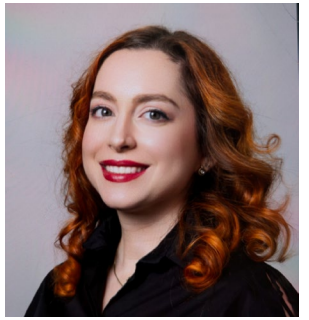
Mary Buchanan, Community Resilience Planner

Alejandro Cifuentes-Lorenzen, Associate Research Scientist

Louanne Cooley, Legal Fellow

Libbie Duskin, Data Analyst

Nicole Govert, Community Resilience Planner



Yaprak Onat, Associate Director of Research

Executive Director and Professor of Marine Science

John Truscinski, Director of Resilience Planning

Kayla Vargas, Legal Fellow

Lauren Yaworsky, Administrative Assistant

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Connecticut Institute for Resilience and Climate Adaptation

Grant Themes

Grant Themes

01

Flood Hazard Mapping

Existing, future & mitigated flood risk

02

Flood Modeling & Decisions

Turning models into adaptation choices

03

Flood Predictions & Alerts

Real time-local warnings

04

Coastal Nature-Based Features

Living shorelines

05

Wind Hazards

Grid resilience against severe wind

06

Heat & Health Risk

Local heat exposure

01

Flood Hazard Mapping

Existing, future & mitigated flood risk

WHY IT MATTERS

FEMA flood maps are backward-looking
→ underrepresent true and future flood exposure
Flooding today comes from tides, surge, rain and rivers acting together
→ local features like culverts and roads decide what actually floods.

WHAT WE'RE SEEING

- Regional flood maps miss the street-level detail towns need for zoning, permits & capital planning
- Large-scale flood models exist
  → insufficient for planning and regulatory decisions

Make flood maps usable for zoning, ordinances, and capital planning, not just emergency response
Link state and regional flood models → actionable municipal-scale flood products

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02

Flood Modeling & Decisions

Turning models into adaptation choices

WHY IT MATTERS

Planners need project-scale models to justify adaptation spending with confidence.
Flooding compound drivers→ risk not captured by single-hazard maps

WHAT WE'RE SEEING

- New sensor networks + machine learning can validate models in near real time
- Inconsistent tools & formats across towns make standardization hard

Reduce barriers to consistent modeling practices → standardization

Implementation of observation system instrumentation → improved QA/QC processes

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03

Flood Predictions & Alerts

Real time-local warnings

WHY IT MATTERS

Street-level flood forecasts → from rain, tide, surge and waves
Extensive historical development in coastal floodplains has left us with high exposure.

WHAT WE'RE SEEING

- Nowcasting + ensemble forecasts can flag risk from minutes to days out
- Legal & coordination questions: who is the trusted source?

Co-design: Work with emergency management forecast system
Create forecast and alert systems that have greater localization

04

Coastal Nature-Based Features

Living shorelines

WHY IT MATTERS

Erosion and sea level rise impact → but nature-based features can absorb hazard while adding real community benefits.

WHAT WE'RE SEEING

- Performance depends heavily on local site conditions
- Lack of long-term performance data slows permitting & regulation

Science-based NBF design guidelines for current and future conditions

Evidence base for NBF performance

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05

Wind Hazards

Grid resilience against severe wind

WHY IT MATTERS

Power grid sensitivity → storm-related outages caused by tree failures.

Compound hazards → increased wind-gust intensity during cold snaps, or storms following heatwaves

WHAT WE'RE SEEING

- Aging grid infrastructure meets new tech and slow hardening timelines
- Opportunity: circuit-level risk dashboards & community microgrids

Climate-induced outage risk assessment

Pilot new technologies: provide technical assistance to support evidence-based scalability of grid enhancement technologies and microgrid solutions

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06

Heat & Health Risk

Localized heat exposure

WHY IT MATTERS

Heat risk changes block to block → driven by land cover, buildings and vegetation
Satellites miss what's actually happening at street level.

WHAT WE'RE SEEING

- Highest risk on vulnerable households
- Need: turn heat maps into action → cooling centers, shade, reflective surfaces

Quantify/evaluate cooling centers, shade/trees, reflective surfaces, and design changes.

Low-burden workflows for municipal staff + consultants; clear metrics.

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What is shaping the next stage?

1. Prioritize
2. Suggest
3. Pilot

Policy Presentation

Research Theme Snapshot: Policy

Developing policy recommendations from science-based evidence

Why it matters (Northeast perspective)

- Existing law trails behind observable and predicted conditions.
- Lags in updating standards to address new conditions put people and infrastructure at risk.
- Science→ policy→ changes in legal authority→ adaptation and resilience to climate change impacts.

What's changed / what we know

- Northeast experiencing rapid changes in measurable conditions like sea level rise, increased precipitation, heat. Cost/ benefit calculations for adaptation may not fully capture increasing climate change risk and vulnerabilities
- Incorporating adjustable evidence-based metrics in statutes makes policymaking more robust.

R2I2 opportunity (Phase 1 → Phase 2 project outcomes)

- Following determination of research priorities, evaluate existing state level policy and determine legal gaps. Survey states outside the grant area for relevant policy initiatives.
- Survey practitioners and stakeholders to identify problems and roadblocks in existing legal frameworks that may not be apparent to policy makers.

THEME Policy: Key Challenges

What must be solved to develop adaptation policy implementable at municipal scale?

Challenges (science → usable evidence → policy)

- Policy must be based on measurable science, including modeling of future climate impacts.
- How to justify “lines on a map” for different policies w/r/t risk so legally robust.
- Policy makers at local level must be knowledgeable and aware of climate risks and tools available for addressing vulnerabilities.

Challenges (translation → action)

- Policy makers should be informed by the real-world needs of communities experiencing climate impacts.
- Policy implementation should be tied to both funding and capacity building.
- When possible, climate policy initiatives should support other policy action, for example, in CT, housing and affordability concerns.

Example of flexible, evidence based policy

P.A.18-82 charged the University of Connecticut to publish a sea level change scenario for Connecticut updated not less than every 10 years which is then published by CT DEEP.

Codified as C.G.S. 25-68o, this scenario has been incorporated into numerous statutes including the Coastal Management Act, both state and local plans of conservation and development, state hazard mitigation plans, and local ordinances and regulations

Policy Discussion

Discussion Questions

1. What policy area or legal change do you think would make an impact in adapting communities to climate change in CT?

    - What science is needed to enable that change?

2. Do you see state or local policies that HINDER climate adaptation?

    - Are there structural or behavioral barriers keeping these policies in place?

    - What persuasive science/engagement would be needed to see change?

Facilitated Discussion

Discussion Questions

1. What are 1–2 barriers that are preventing your community from becoming more resilient?
2. Think about a current resilience project or resilience issue in your community—where did it stall or become difficult?
3. What do we need to know that we currently don't? What types of analyses or tools do you wish you had access to—but currently don't?
    - Examples: Flood modeling at neighborhood scale, Evaluating adaptation alternatives, Nature-based solution design, Cost estimation / benefit analysis
4. If you had to pick one pilot project that would be most useful to develop and test new approaches in your community, what would it be and where?
5. Thinking about workforce development, what positions or skills do you need more of/are difficult to hire?
6. Anything else?

Next Steps