Can Hyper-localized Information be used to Motivate Climate Mitigation and Adaptation “Behaviors”?

John Petersen
Cynthia McPherson Frantz
Peyton Sinnet

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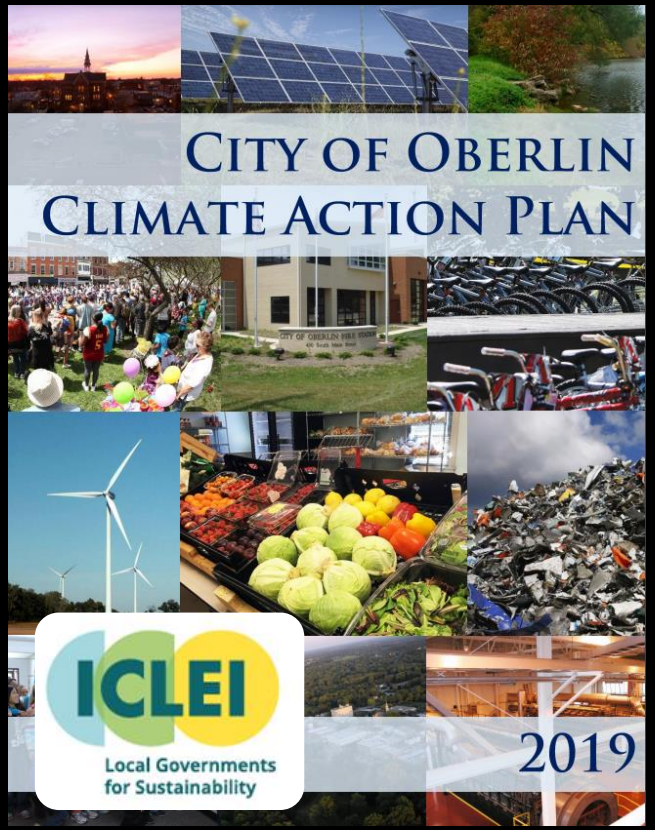
Your Community In a Changing Climate?

Where we are headed

1. Oberlin's climate vulnerability assessment & adaptation planning process
   - The participant experience
2. Psychology of climate action behavior
   - Why it's challenging
3. The impact of hyper-local data & participation
   - Hypotheses & Oberlin assessment
4. Testing the generality of these hypotheses
   - Experimental design

Oberlin Context

- First CAP completed in 2011, 3rd
- Emphasis on *mitigation*
  - 113 specific action items
  - “Climate positive” by 2050
- Recognition of importance of *adaptation & resilience*



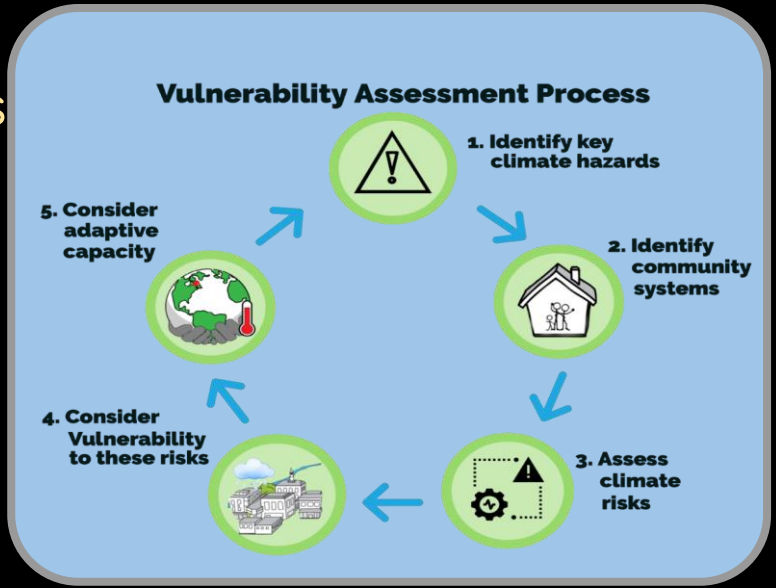
ICLEI climate *adaptation* planning process

1. Conduct a vulnerability assessment
2. Set adaptation goals
3. Develop an adaptation plan (incorporate into Climate Action Plan)
4. Implement plan
5. Measure progress and reassess

ICLEI
Local Governments for Sustainability

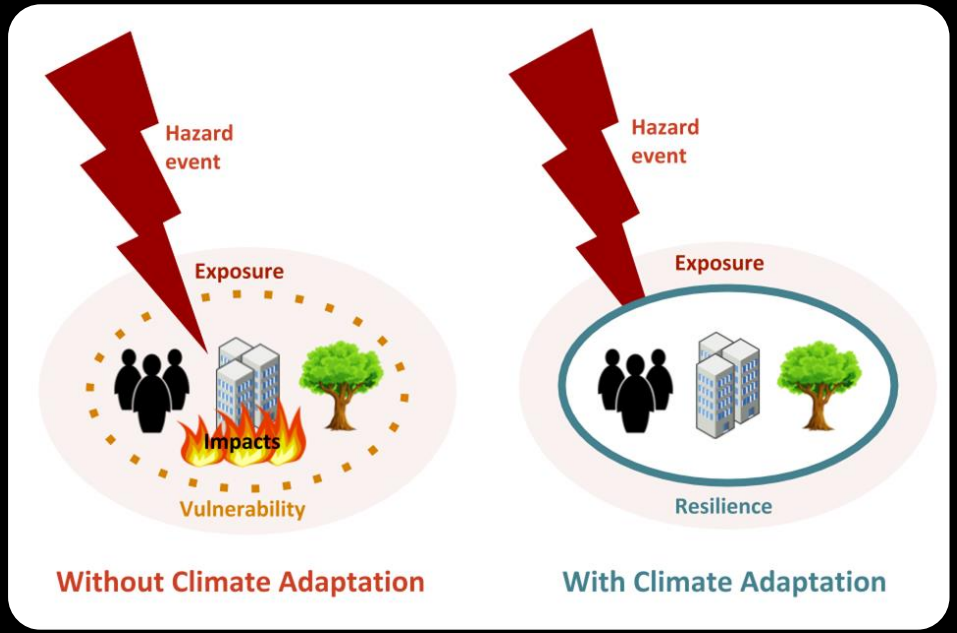
ICLEI climate vulnerability assessment process

1. Identify key *climate hazards* likely to affect a community
2. Identify *community systems* likely to be impacted
3. Assess *climate risks* - impacts of particular hazards on particular systems
4. Consider *vulnerability* to these risks
5. Consider *adaptive capacity*



Goals of adaptation planning

- Reduce *climate risks* and *vulnerability*
- Enhance *adaptive capacity* and *resilience*



City of Oberlin's 2021 Climate Vulnerability Assessment Process

Convenors:

- City of Oberlin Sustainability Coordinator
- Chief of Oberlin Fire Department
- Oberlin College Faculty Member

Community Participants:

- 53 community leaders
- Knowledge and expertise in seven systems:
  (Energy, Water, Emergency Services, Health, Food, Jobs, Culture)

15 College Student Researchers & Facilitators

Assessment and planning process

1. Convenors selected hazards and systems for Oberlin
2. Students and faculty compiled scientific information related to hazards
3. Community participants assessed risks and adaptive opportunities associated with these hazards
4. Key community insights were summarized in a report for climate adaptation planning

7 Climate hazards for Oberlin

1. Changed seasonal patterns
2. Extreme hot days
3. Extreme winter conditions
4. Flash/surface flooding
5. Disease & other health impacts
6. Severe wind
7. Drought

7 Community Systems for Oberlin

1. **Food:** Food supply, food access, and local agriculture
2. **Health:** Public health including exercise and recreation
3. **Water:** Wastewater, stormwater, and drinking water
4. **Energy:** Energy delivery, and production
5. **Jobs:** Employment, job access, and business
6. **Emergency:** Emergency services
7. **Culture:** Community and culture including greenspace

Community engagement process

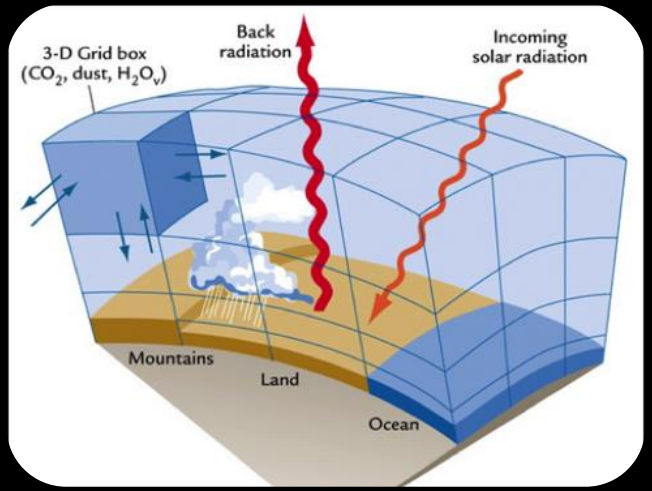
Goal: Gather insights from community participants about vulnerabilities and opportunities for the systems they know best

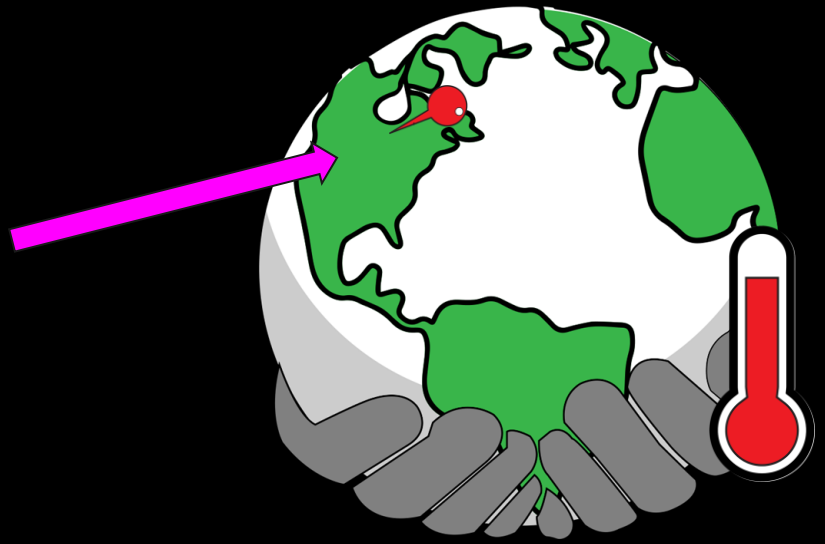
Participant schedule:

Date	Event
2/18/21	1) Introduction workshop
2/9 & 3/11	2) Community system groups
3/15-3/29	3) Participant interview
4/22	4) Participant presentation & discussion
6/21/21	5) Public presentation & discussion

Localizing climate model data

- *Downscaling:* process of using large-scale climate models to predict local level changes (i.e. for 44074)





Climate hazard fact sheet for Oberlin

Goal:

- Summarize the best available scientific predictions of local climate hazards for participants

Key sources:

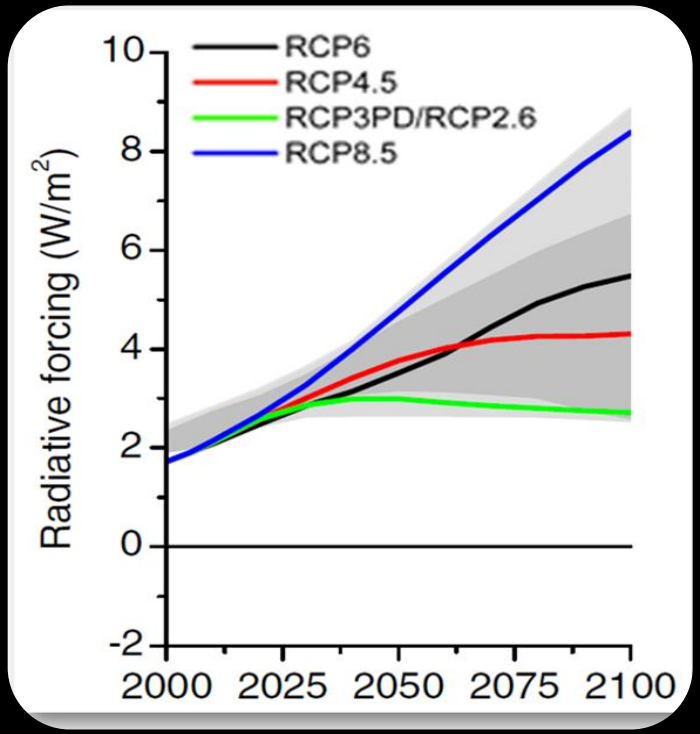
- 4th National Climate Assessment (U.S. Gov)
- *Temperate* modeling tool (ICLEI)
- *U.S. Climate Explorer* modeling tool (US. Gov)

Model emissions scenarios

- *Lower emissions* Assumptions: global emissions of stabilized by 2040 and then dramatically reduced

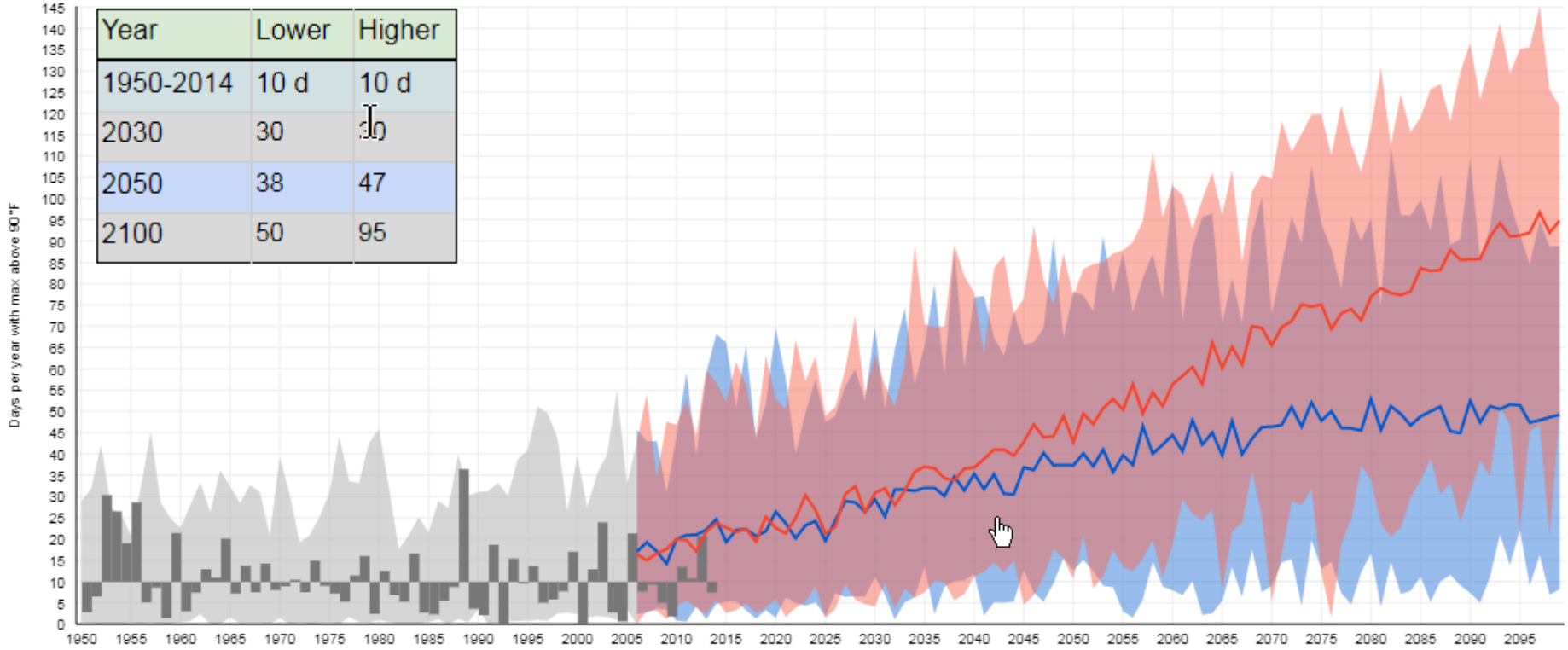
- *High emissions* Assumptions: global emissions continue to increase through 2100.

Representative Concentration Pathways



Elyria, OH in Lorain County - Days w/ max > 90°F

Year	Lower	Higher
1950-2014	10 d	10 d
2030	30	50
2050	38	47
2100	50	95



1950 2099

Historical Observed | Historical Modeled | Lower Emissions | Higher Emissions

Oberlin Present & Future

Year		1950-2014	2030	2050	2100
Average Daily High Temp (°F)					
	Low	60.5°F	63.5	64.5	66.5
	High	60.5	64	66	72.5
Number of days per year with Maximum Temp > 90°F					
	Low	10 d	30	38	50
	High	10	30	47	95
Number of days per year with minimum temp < 32°F					
	Low	132 d	110	105	91
	High	132	110	98	62
Total annual precipitation					
	Low	35.5 in	36	37	37.5
	High	35.5	36.5	37	38
Number of days per year with > 1 inch precipitation					
	Low	2 d	2.5	3	3
	High	2	2.5	3	3.5
Total number of cooling degree days per year					
	Low	755	1,020	1,200	1,410
	High	765	1,070	1,350	2,450
Total number of heating degree days per year					
	Low	6,200 d	5,500	5,300	4,600
	High	6,200 d	5,400	4,900	3,700

2021

Oberlin is already experiencing a changing climate

Average annual temperatures in the midwest have already increased by 1.3 °F since the first half of the 20th century. Extreme precipitation events in the midwest are already disrupting transportation and damaging infrastructure.

Heatwave incidents are set to triple

From 1950-2014 Oberlin averaged 10 extreme heat days per year — days with maximum temperature exceeded 90 °F. By 2030, we will see 30 extreme heat days per year.

Extreme rainfall events will double

The number of days in Oberlin with extreme precipitation (greater than 1 inch of rainfall) are expected to increase by 25% from baseline conditions by 2030.

Negative health impacts will occur

Increases in extreme precipitation and heat events, along with increased summer and winter temperatures, will enhance the spread of vector-borne diseases.

2030

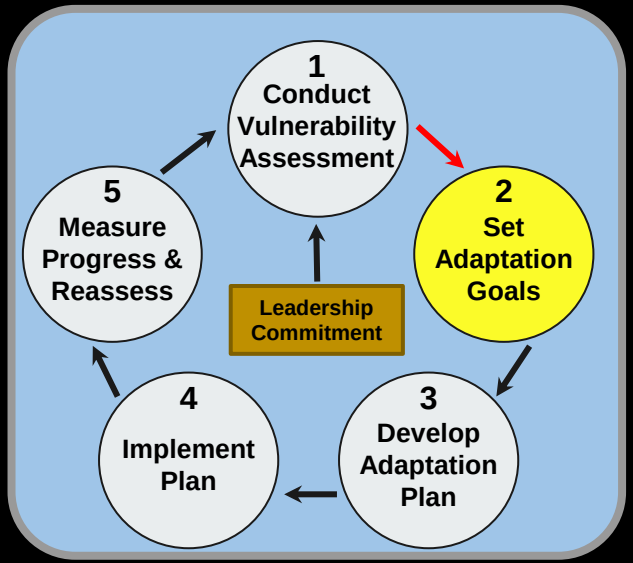
"Oberlin in a changing climate"

Introduction Workshop 2/18/21

Final Discussion 4/22/21

The ICLEI process

1. Conduct a vulnerability assessment
2. Set adaptation goals
3. Develop climate adaptation plan
4. Implement plan
5. Measure progress and reassess
6. Iterate on the process



Outcomes → Plans & Actions

1. Food: → Strategic plans revised for local food pantry & CSA
2. Health: → 3 cooling stations established
3. Water: → Extreme events in stormwater master plan
4. Energy: → New focus on cooling in weatherization & heat pumps
5. Jobs: → Green industrial part
6. Emergency: → Tree management, regional collaboration
7. Culture: → Climate migration receptivity

Psychology embodied in report

"As this report makes clear, participants in the process are quite concerned about the local impacts of climate change on key community systems that support our community. However, they are likewise hopeful and, indeed, enthusiastic about pro-actively responding; members of this community see opportunities to collectively roll up our sleeves and better prepare to adapt and to be resilient in the face of the changes now underway"

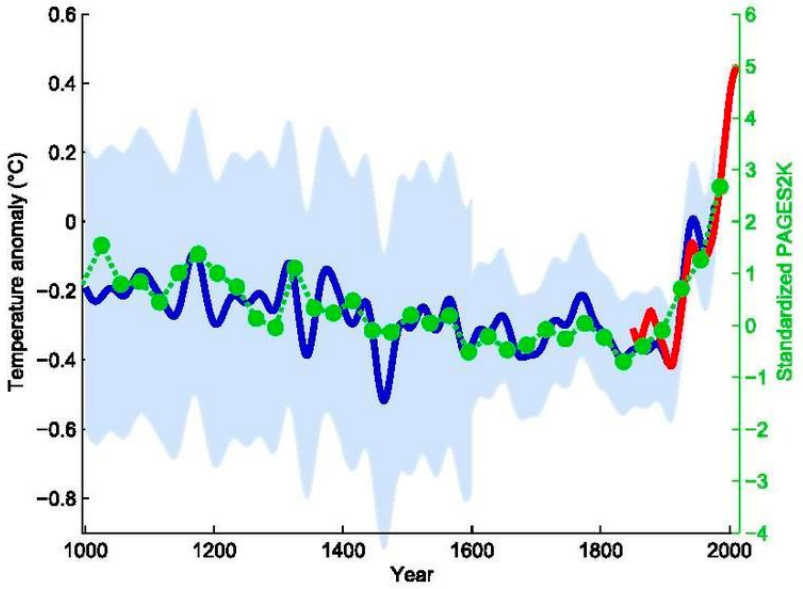
We think something really cool happened in this process!

City of Oberlin Climate Vulnerability Assessment Report 2021

A report on prepared for the City of Oberlin by:
Robert Hanmer, Chief of Oberlin Fire Department
Linda Arbogast, Sustainability Coordinator, City of Oberlin
John Petersen, Professor of Environmental Studies and Biology, Oberlin College
15 Student Coordinators
53 Community Participants

Psychology of Climate Change Inaction

Climate change is a psychologically difficult challenge for humans



Psychology of Climate Change Inaction

Climate change is a psychologically difficult challenge for humans

Abstract
Huge
Terrifying

Psychology of Climate Change Inaction

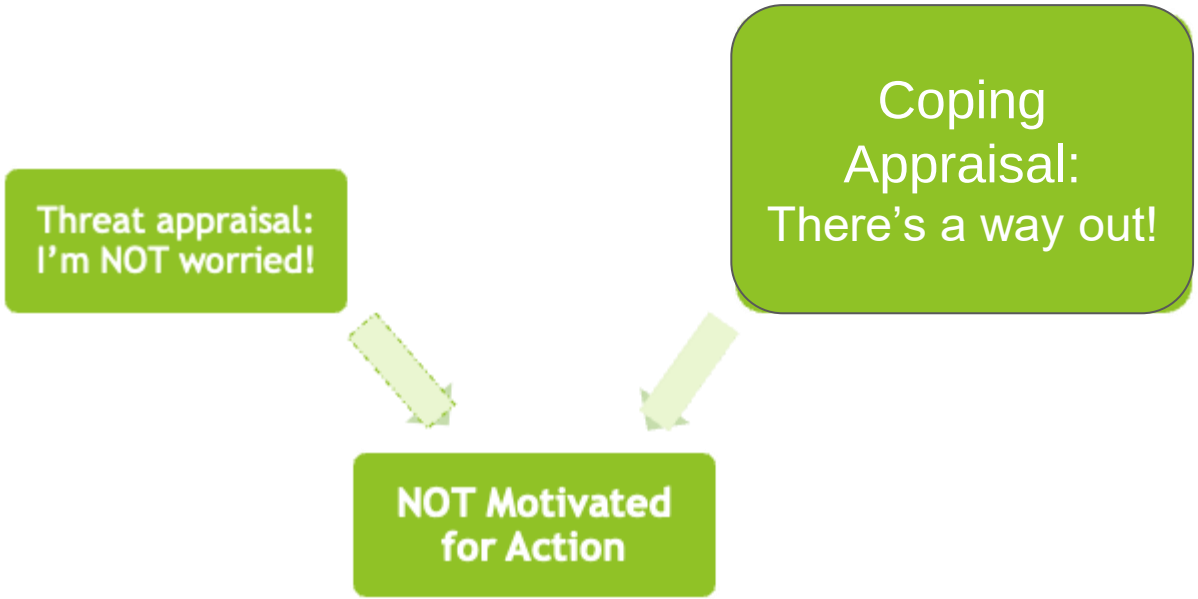
Protection Motivation Theory (Rogers)

Psychology of Climate Change Inaction

Protection Motivation Theory (Rogers): Threat and coping must be in balance

Psychology of Climate Change Inaction

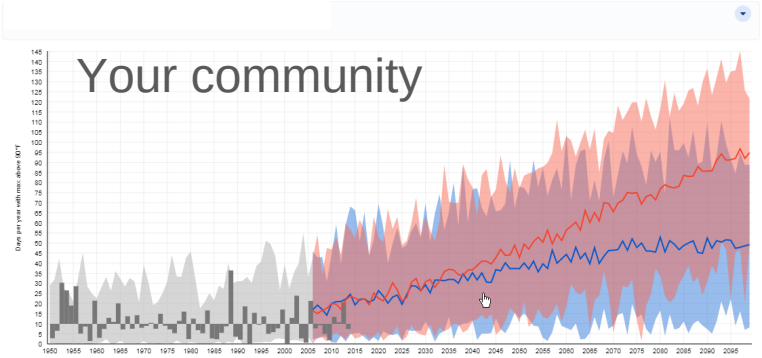
Protection Motivation Theory (Rogers): Threat and coping must be in balance



How Might Resilience Planning Drive Transformation?

Three important ingredients:

1. Hyper-local climate data



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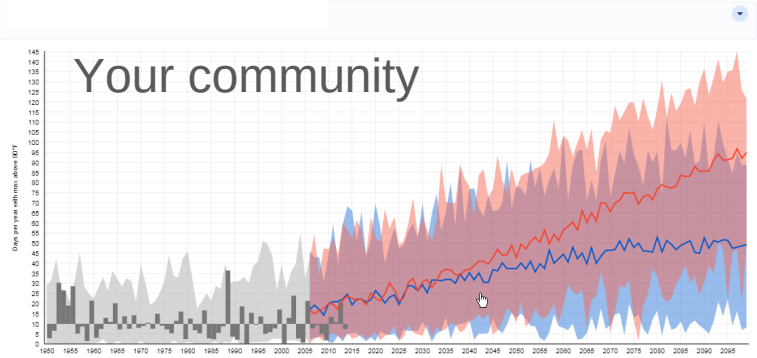


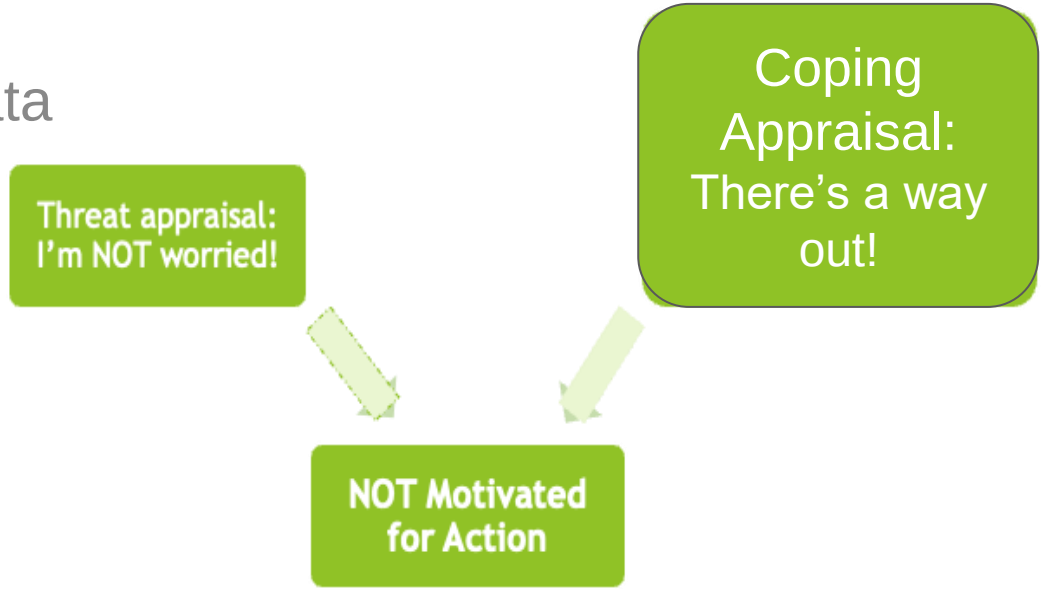
There's a monster under the bed… but now we know how it threatens us and how to battle it

How Might Resilience Planning Drive Transformation?

Three important ingredients:

1. Hyper-local climate data

1. Identifying concrete action steps



How Might Resilience Planning Drive Transformation?

Three important ingredients:

1. Hyper-local climate data

1. Identifying concrete action steps

1. Building community
   Efficacy, norms, prosocial concerns, belonging!

Hypotheses

1. Hyperlocal climate data will increase threat perceptions
2. Hyperlocal adaptation activities will increase efficacy
3. Planning in a community context will increase collective efficacy, norms, prosocial concerns, belonging
4. The combination of high threat, high efficacy, and high belonging has the power to drive community-wide transformation

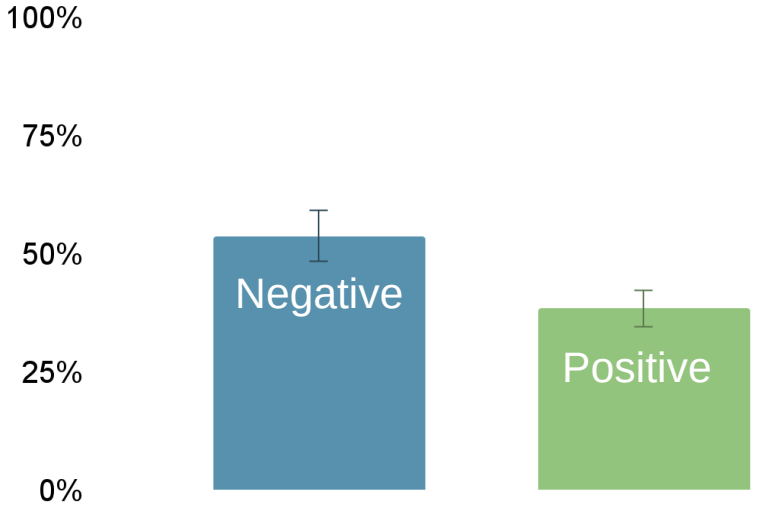
Interviews with Participants: Methods

- Recruited 26 community and student participants for 30 minute zoom interview (38% of original participants)
- Specified themes *a priori* based on hypotheses, noted unanticipated themes
- Coded for presence/absence of each theme

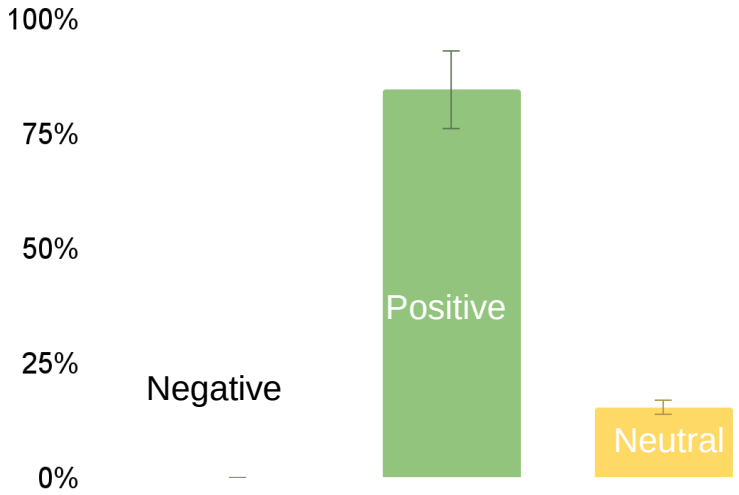
Results: Emotions

Participants more likely to report negative than positive emotions during the process

BUT, overwhelming majority reported a positive experience.



Emotions Mentioned



Overall Experience

Results: Emotions

Participants more likely to report negative than positive emotions

BUT, overwhelming majority reported a positive experience.

"This experience made me feel **vulnerable and concerned**… but it also created a sense of **hope**."

– Executive Director of Local CSA

Relevant Hypotheses

1. **Increase in threat perceptions.**
2. **Increase in efficacy perceptions.**
3. Increase in belonging.
4. Increased engagement and action.

Results: Emotions

Participants more likely to report negative than positive emotions

BUT, overwhelming majority reported a positive experience.

"It changed what were **vague feelings** about climate change to more **specific facts** that I could actually get a handle around. …to **help me to plan** for the future."

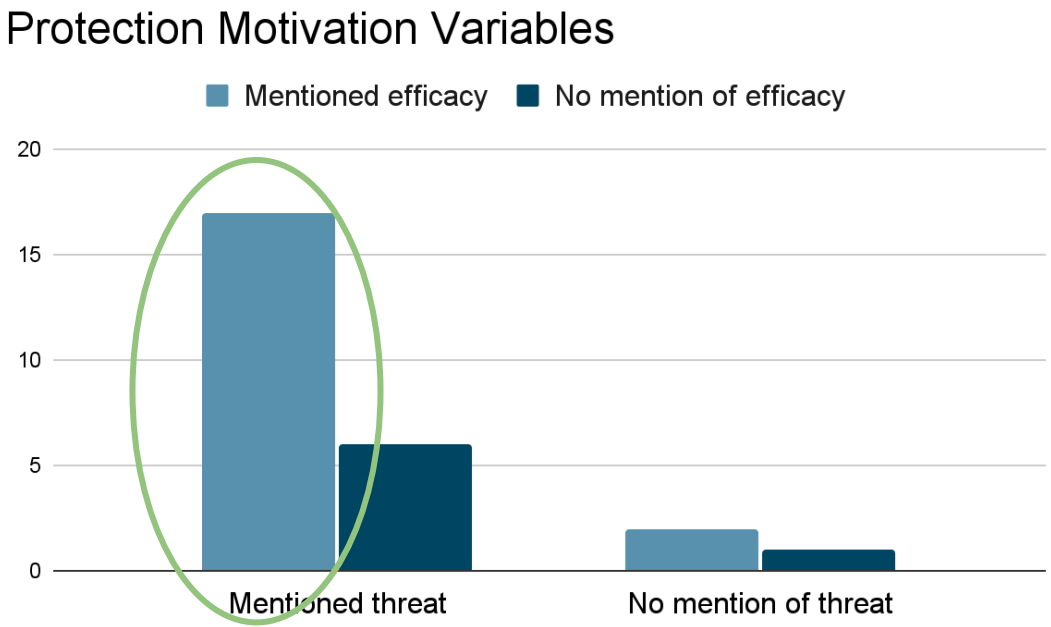
– Community Garden Director

Relevant Hypotheses

1. **Increase in threat perceptions.**
2. **Increase in efficacy perceptions.**
3. Increase in belonging.
4. **Increased engagement and action.**

Results: Threat and Efficacy

Most people talked about BOTH threat and efficacy



Results: Threat and Efficacy

Most people talked about BOTH threat and efficacy

"I had a mindset of climate doom... but having a **concrete step-by-step approach** that I could talk to other people about was a comforting thing."

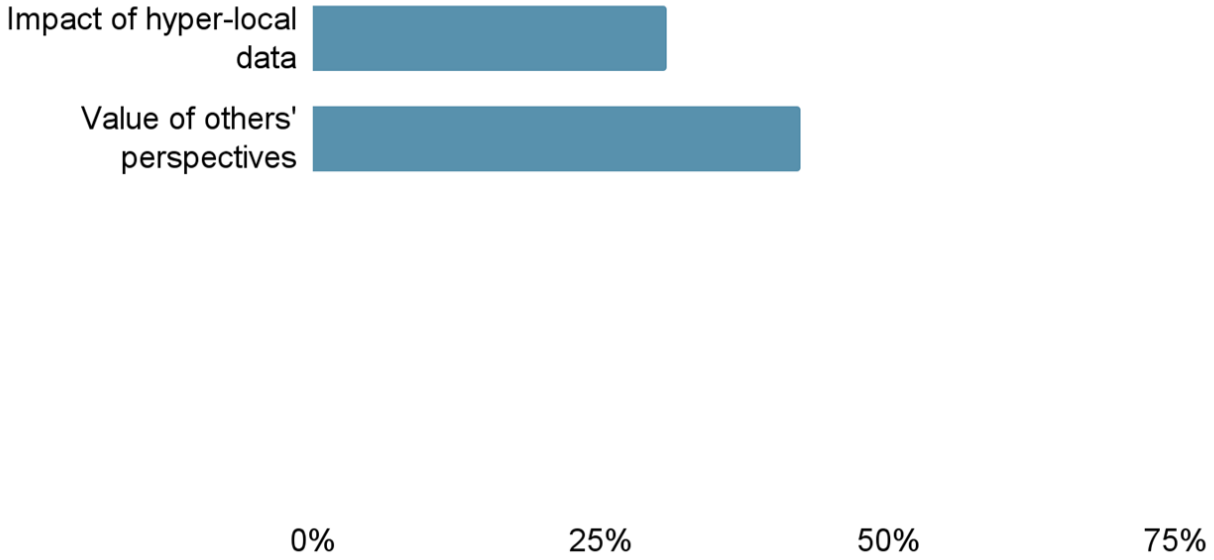
– Student Facilitator

Relevant Hypotheses

1. Increase in threat perceptions.
2. **Increase in efficacy perceptions.**
3. **Increase in belonging.**
4. Increased engagement and action.

Results: What was most impactful?

Supermajority mentioned community. “We” are stronger together.



Results: What was most impactful?

Supermajority mentioned community. “We” are stronger together.

“I felt really inspired … like I was **working with a community** of other people…. We're all in this together.”

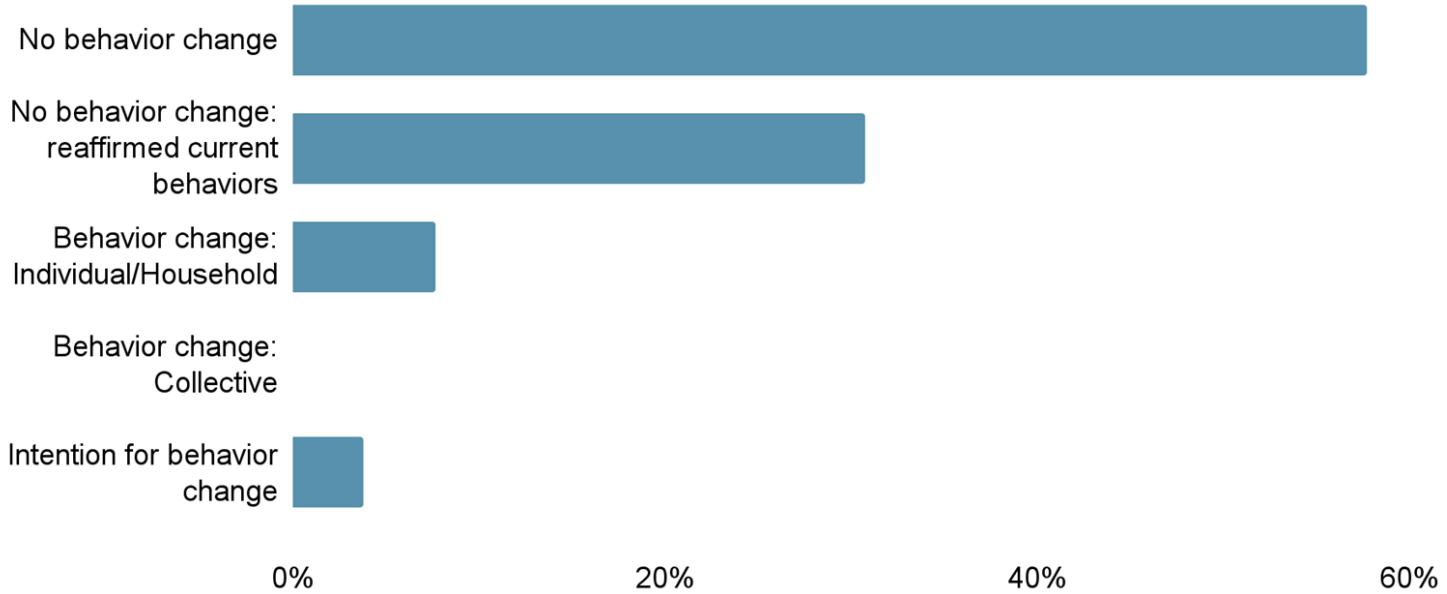
– Nonprofit board member

Relevant Hypotheses

1. Increase in threat perceptions.
2. **Increase in efficacy perceptions.**
3. **Increase in belonging.**
4. Increased engagement and action.

Results: Resulting Behavior Change

Not much individual behavior change up to 18 months later



Results: Resulting Behavior Change

Not much behavior change reported by individuals up to 18 months later

- The process was focused on collective, institutional change, **which happened.**
- Many participants were invited *because* they were ***already*** **highly engaged**
- Many risks identified **require action by institutions** not individuals

Maybe that’s OK – we need system change!

Next Steps

Use experiments to compare

- Exposure to hyper-local vs general climate projections
- Exposure to data from your city vs a different city
- Impact of data only vs data + adaptation strategies vs data + adaptation strategies + community building
- Think carefully about what behaviors might truly drive transformation

Systematically evaluate impacts of resilience planning in other communities.

Take home message

Can we maximize these three important ingredients of resilience planning…

1. **Hyper-local climate data → understanding of threat**
2. **Identifying action steps → increased efficacy**
3. **Building community → unleash our evolutionary potential!**

…to drive transformations in the face of climate change?

Thank you!

John Petersen
petersen@oberlin.edu

Cindy Frantz
Cindy.frantz@oberlin.edu

Peyton Sinnet
psinnet@oberlin.edu

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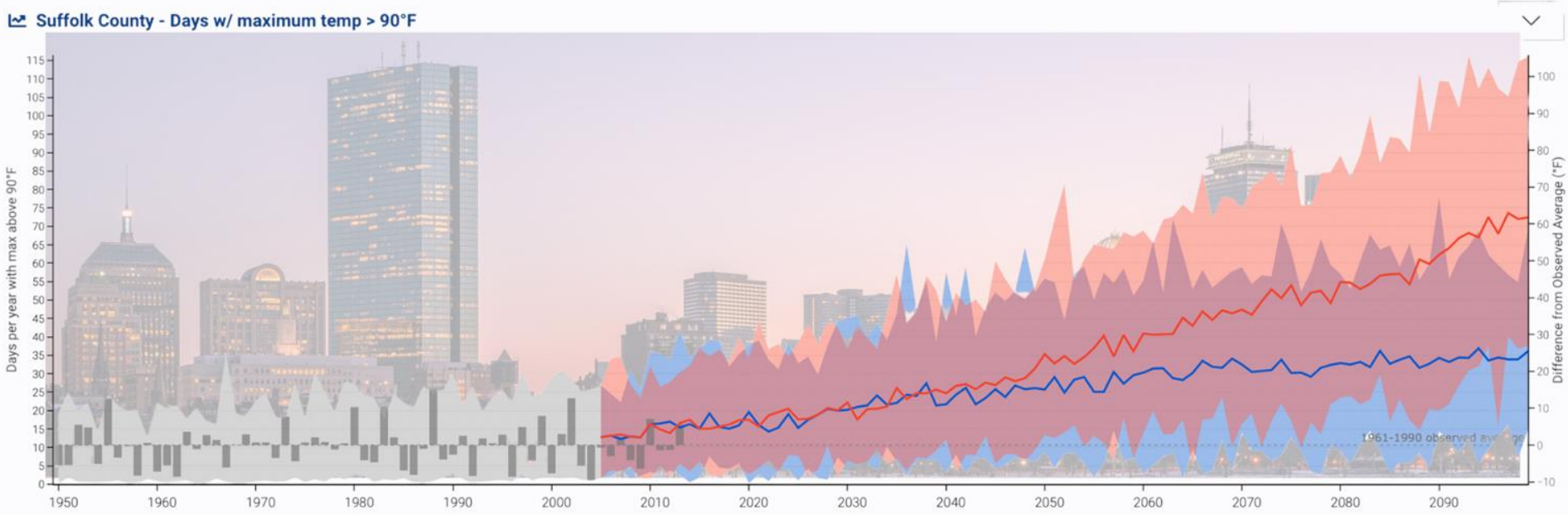
Advice wanted!

How can we maximize the power of a local experience in an experiment?



Advice wanted!

What behaviors do we WANT people to engage in after an experience like this?

- Individual household behaviors (e.g. home weatherization)
- Individual behaviors aimed at collective change (e.g. voting)
- Engagement in local collective efforts
- Engagement in regional or national efforts

This slide feels dumb as is – the answer is all of the above
So

How Might Resilience Planning Drive Transformation?

Three important ingredients:

1. Hyper-local climate data

1. Identifying concrete action steps

1. Building community

Working together is our most potent evolutionary strategy!