Appendixes

Appendix A: Participants

Participant Name	Affiliation
Amber Stilwell	Pennsylvania Sea Grant
Andrea Harder	University at Buffalo/New York Sea Grant
Anna Haines	University of Wisconsin - Stevens Point and Extension
Annabelle Wilkinson	City of Grand Rapids
Beth Gibbons	American Society of Adaptation Professionals
Bhaskar Subramanian	NOAA Climate Program Office
Brady Fergusson	Climate Solutions Accelerator of the Genessee-Finger Lakes Region
Chiara Zuccarino-Crowe	Michigan Sea Grant
Dan Walsh	Teacher of Refugee and Migrant students
Debra Javeline	University of Notre Dame
Denise Abdul Abdul-Rahman	The Chishoolm Legacy Project
Greg Czarnecki	Pennsylvania Dept. of Conservation and Natural Resources
Isaac Gendler	California Public Utilities Commission
Jerel Ezell	Cornell University
Joyce Chen	The Ohio State University
Julia Peterson	Michigan Tech University
Kathy Bunting-Howarth	New York Sea Grant
Kelley St. John	City of Buffalo
Kelly Leilani Main	Buy-In Community Planning
Kristin Hall	Cuyahoga Soil & Water Conservation District
Lisa Vahapoglu	Renew Institute of University at Buffalo
Kristen Fussell	Ohio Sea Grant
Mary Austerman	New York Sea Grant
Mindy Granley	City of Duluth
Missy Stults	City of Ann Arbor
Mona Behl	University of Georgia Sea Grant
Natalie Chin	Wisconsin Sea Grant
Nate Drag	New York Sea Grant
Nick Rajkovich	University at Buffalo
Oliver Buechse	Futures of Choice

Rachel Havrelock	UIC Freshwater Lab
Richard Norton	University of Michigan
Ross Plattel	University of Calgary
Russell Weaver	Cornell University ILR Buffalo Co-Lab
Sean Rafferty	Pennsylvania Sea Grant
Shannon Dougherty	New York State Dept of Environmental Conservation
Sherri Brokopp Binder	BrokoppBinder Research & Consulting
Stuart Carlton	Illinois-Indiana Sea Grant
Susan Clark	University at Buffalo
Suzanna Clark	University of Minnesota
Terry Schwarz	Cleveland Urban Design Collaborative, Kent State University
Ty Warner	Northwestern Indiana Regional Planning Commission
Veronica Fall	Illinois-Indiana Sea Grant
Jennifer Hinojosa	The Center for Puerto Rican Studies at CUNY Hunter College
Davin Holen	Alaska Sea Grant, University of Alaska Fairbanks
Kristen Olsen	Wisconsin Department of Children and Families
Megan Kocher	New York Sea Grant
Don Zelazny	New York State Dept of Environmental Conservation

Appendix B: Agenda

Great Lakes People on the Move in a Changing Climate Workshop

June 1-3, 2022
Hilton Garden Inn Buffalo Downtown
10 Lafayette Square, Buffalo, NY

Meeting Purpose and Objectives

The goals of regional workshops are to feature:

- the current state of knowledge on climate-induced human mobility,
- local, regional and international case studies, and
- unique needs of the underserved and underrepresented coastal communities.

In order to create:

- data and research gap analyses,
- framework (possibly developing scenarios) for conducting use-inspired research,
- education and engagement for building community resilience and climate adaptation, and
- networks of interdisciplinary and diverse researchers engaged in the study of climate induced human mobility.

Agenda

Time	Activity
June 1	
1:00	Welcome
1:30	Introduction to the Project
1:45	Setting the Stage Rachel Havrelock, UIC/Freshwater Lab Q&A

2:15	Case Studies of Migration in the Great Lakes Region ● Isaac Gendler, Utilities Engineer at the California Public Utilities Commission ● Ross Plattel, University of Calgary ● Sherri Brokopp Binder, BrokoppBinder Research & Consulting, LLC ● Jennifer Hinojosa, Hunter College, City University of New York
2:55	Networking Break
3:10	Breakout Groups
3:50	In what ways are these climate risks exacerbating the impacts on underserved and marginalized communities, including low-income communities, black and brown communities, and indigenous communities? ● Jerel Ezell, Cornell University ● Susan Clark, University at Buffalo ● Kelly Main, Buy-in Community Planning, Inc.
4:30	Breakout Groups
5:05	Report outs from two previous breakout sessions
5:30	Adjourn with ideas for dinner, after dinner networking, etc. in your own groups or on your own.
June 2	
7:30	Networking Breakfast
8:30	Welcome and Recap
8:45	What do receiving communities need to do to prepare for an influx of people who move due to climate change? ● Mindy Granley, Sustainability Officer, City of Duluth ● Missy Stults, City of Ann Arbor ● Ty Warner, Northwestern Indiana Regional Planning Commission
9:25	Breakout Groups
10:15	Networking Break
10:30	Report Outs
10:45	Notes from the Field: Experiences of Planners, Policy Makers, Teachers, Social Workers and Others Engaged in Assisting Migrants ● Beth Gibbons, American Society of Adaptation Professionals ● Dan Walsh, Pennsylvania Teacher ● Kristen Olsen, Wisconsin Department of Children and Families ● Annabelle Wilkinson, City of Grand Rapids ● Don Zelazny, New York Department of Environmental Conservation
Noon	Networking Lunch
1:30	Introduction to the exercise

1:45	Breakout Groups to address questions from the perspective of communities on the move: ● Research ● Policy ● Outreach & Education
3:00	Networking Break
3:30	Breakout Groups (continued) ● Research ● Policy ● Outreach & Education
4:50	Reconvene, reflect, foreshadow
5:10	Announcements; Adjourn with ideas for dinner, after dinner networking, etc. in your own groups or on your own.
June 3	
7:30	Networking Breakfast
8:30	Introduction and Process
8:45	Breakouts Groups to identify next steps and what resources are needed for communities on the move ● Research ● Policy ● Outreach & Education
9:45	Networking Break
10:00	Group Synthesis of notes for each Research, Policy and Education
11:00	Reconvene and Report out
Noon	Adjourn

Appendix C: PowerPoint Presentations

Ability & Responsibility

This model doesn't work for climate change

But it could work in pieces

Research Coordination *Network*: People on the Move in a Changing Climate

Facilitated by the Sea Grant *Network*

A series of regional *work*shops


Northwest and
International
Great Lakes
Northeast/
Mid-atlantic
Southwest
South Atlantic & GoM


YOU CAN REWRITE DNA ON THE FLY, AND YOU'RE USING IT TO TURN PEOPLE INTO DINOSAURS? BUT WITH TECH LIKE THAT, YOU COULD CURE CANCER!
BUT I DON'T WANT TO CURE CANCER. I WANT TO TURN PEOPLE INTO DINOSAURS.

This model doesn't work for climate change

But it could work if we join together

Leveraging the power of a group of Saurons

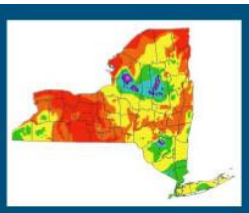
Setting the scene:
Dr. Rachel Havrelock

COVID Pull Factor Analysis

The Impacts on Climate Migration

Isaac Gendler and Ross Plattel

Project Background



Project created in partnership with ASAP and NYSERDA.

Guiding Statement and Questions:

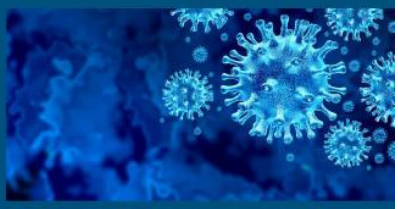
- People in New York State will have to move with the advent of climate change.
- Where will they go?
- How will the receiving communities be selected?
- How will they have to change to accommodate the new climate migrants?

Image Credit: nyskiblog.com

COVID Impacts On Climate Migration

- COVID has acted as a shock to human migration flows
- Changing where people look to move and the decisions they make

Project aims to:



- Takes lessons from COVID
- Analyse the shocks in migration patterns
- Map the significant migration flows to cities/towns
- Analyse trends toward increasing population
- Focus on towns and urban regions that are low climate risk
- Analyze social and economic factors
- Showcase receiver regions for migration

Image Credit: www.servicemasterbycomplete.com, www.istockphoto.com

Methodology

- Methodology inspired by the work of Kelly Leilani Main and Anna Marandi
  - Research Paper: "Vulnerable City, Recipient City, or Climate Destination? Towards a Typology of Domestic Climate Migration Impacts in US Cities"
- Goal: Analyse and anticipate regions becoming receiving communities through data driven analysis
  - Utilize ZIP Code Data from USPS
  - Analyze their current socio-economic conditions
  - Assessed the climate risks using ClimateCheck.com as a guide
  - Illustrate what appears to be working for them
  - Consider how they can further adapt and become welcoming for migrants

Image Credit:

Climate Destination Factors

- Each town has been analyzed for its ready access to:
  - Freshwater
  - High vacancy rates or abundance of affordable housing
  - Amount of infrastructure to support more residents
  - Expressed desire to grow and be welcoming
  - History of, or interest in, improving adaptive capacity through sustainability and/or resilience efforts

Image Credit: www.pinclipart.com

Types of Cities

Type I: Vulnerable Cities

- Cities/Towns at risk for climate disasters

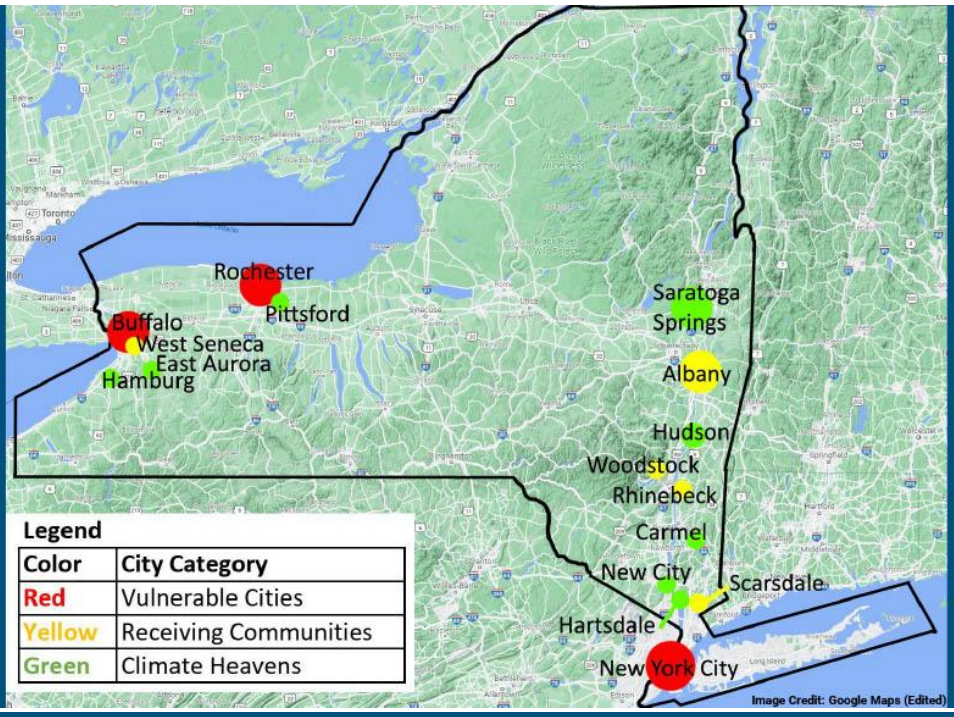
Type II: Recipient Cities

- Cities/Towns receiving migrants and under pressures due to the migration
  - For the case of our study we also classified cities with a higher future climate risk in this category

Type III: Climate Destinations

- Cities/Towns with potential to accept more migrants and adapt

New York State Map



Legend	
Color	City Category
Red	Vulnerable Cities
Yellow	Receiving Communities
Green	Climate Heavens

Buffalo Region

- All selected towns have focus on digital services
  - Town apps/websites
  - Easy access to town services through a central town website
- West Seneca
  - Gaining population
  - Close proximity to Buffalo related amenities and easier transit access
  - Lacks elements of walkability as well as diversity in the population
- Hamburg and East Aurora
  - Increasing population
  - Some of the highest walkability and bikeability scores
  - Sidewalks along quiet streets

Image Credit: greatruns.com

New York & Hudson Valley Region

- People locating near the rail access
- Existing resources and services
  - High end shopping and amenities
  - Arts and culture interests
- Surrounding towns and cities around major centers seeing increased migration overflow, such as Hudson
- Variety in the design and makeup of receiving towns
  - Catering to specific demographics, industures, and lifestyles
- Towns with historically preserved look and feel

Image Credit: www.travelblissnow.com

Other Regions

- Saratoga Springs in the Albany Region
- Pittsford in the Rochester Region

- Both towns similarly have seen a spike in population after COVID
- All other surrounding cities and towns are losing population
- Both have had projects in recent years that have focused on projects that have been enhancing public spaces and amenities
  - Urban Reinvention
  - Walkability
  - Downtown mainstreet investment
  - Local community initiatives
  - Ecological and sustainable investments

What We Learned

- A variety of cities/towns throughout New York State will be able to serve as recipient cities and climate destinations for migrants in the future
- These locations mostly share a few common factors
  - Close proximity to useful services, amenities, and transit
  - Focus on walkability and bikeability
  - Digital service capabilities
- Small-to-medium sized cities/towns attracting more of the population

Image Credit: www.stockvault.net

Future Work

- Integrate demographic modeling methods
- Focus on the potential to create community partnerships along with realising the potential migration channels that exist
- Looking at more welcoming and affordable towns with potential for receiving migrants that are more at risk and/or low income
- Do interviews on why people move to specific regions to help anticipate and facilitate movement of migrants
- Assess effectiveness of zoning and development

Image Credit: https://www.istockphoto.com

Thank You!

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SHERRI BROKOPP BINDER, PHD

Home buyouts and climate-induced mobility

Lessons from New York after Hurricane Sandy

Looking below the surface of buyouts

- Reduce risk from future hazards via permanent relocation
- Straightforward on paper, tricky in real life
- Do they "work"? It depends.

Case Study: Post-Sandy Home Buyout in New York

- Longitudinal mixed-method study of 3 communities over 5 years
- Comparable communities, different recovery paths
- Comparable on key recovery outcomes – place attachment and social capital
- Experiences and impacts of the buyout through mid-term recovery

Time 1 (2012-13): Why did one community relocate while the other rebuilt?

Highlighted the role of:

- Local hazard history
- Local cultural norms & attachment to place

Heterogeneity in priorities and decision-making

Time 2 & 3 (2013-14): Living through and with a buyout

In the buyout zone:

- Decision to participate is just the beginning
- Voluntary?
- Compromise: Inability to find a comparable home in a comparable neighborhood, even with financial incentives

In buyout and peripheral communities:

- Significant, unrecovered losses in place attachment and social capital

Adjusted Between-Neighborhood Differences in Place Identity, Place Dependence, and Bonding Social Capital

Community	Marginal Mean	S.E.	95% Confidence Interval	
			Lower Bound	Upper Bound
Place Identity				
Rockaway Park	4.34	0.13	4.09	4.59
Adjacent Neighborhood	3.78	0.12	3.53	4.02
Oakwood Beach	3.25	0.15	2.95	3.55
Place Dependence				
Rockaway Park	4.06	.09	3.89	4.24
Adjacent Neighborhood	3.64	.09	3.46	3.81
Oakwood Beach	3.51	.11	3.29	3.72
Bonding Social Capital				
Rockaway Park	4.50	.10	4.30	4.70
Adjacent Neighborhood	4.06	.10	3.86	4.26
Oakwood Beach	3.72	.12	3.48	3.97

Note. All analyses controlled for whether or not participants reported having children, were married, age in years, race (White or non-White), gender (female or not female), and changes in income since Hurricane Sandy.

Time 1 - 6 (2012-18): Mid-term recovery for buyout participants

I worked 2 jobs over 20 years, and every extra dollar I made, I put into that house to finish it.

We were in shock and we panicked.

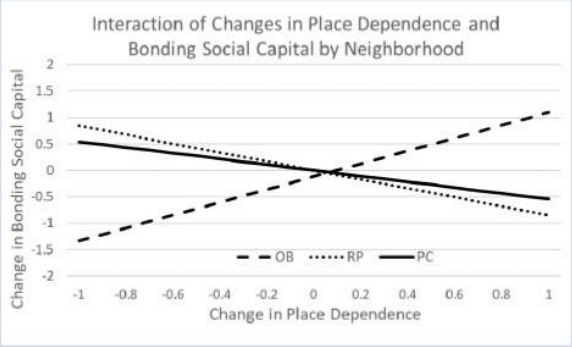
And then we were told about the buyout, okay? So now it's like either we go for it or we end up with nothing. Basically, a lot of us, the old ones we were more or less forced.

The house feels like a home, but the neighborhood doesn't.

That house was supposed to be our forever home. My children came every weekend. My grandkids came every weekend. That's the hardest part, too. We don't get to see them now… We used to babysit for them. So, it's sorta like, after the storm, we didn't have that job anymore. It's like your children being taken from you.

It's like it made me just pick up, 'cause I didn't want my kids to look at the warzone that it looked like. I thought I would bring my kids to a nice, clean area with nice, good schools. And then, you know what happened. My kid met the wrong kids out here. He got into trouble. Me and my wife got divorced. So, it had a very big impact and, I guess, because it forced us to move.

Time 3 - 6 (2014-18): Place attachment and social capital



Oakwood Beach

- Increases in place dependence associated with increases in bonding social capital
- Residents who relocated either regained both or lost (and did not regain) both, depending on whether their new home and community met their needs

Peripheral community & Rockaway

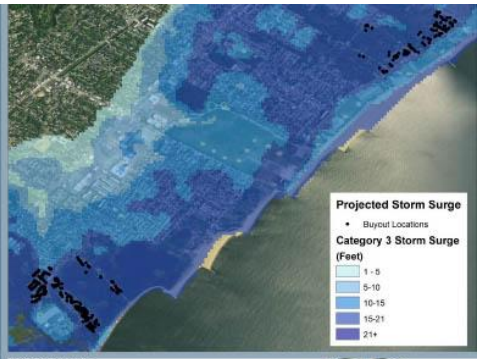
- Slightly negative associations between changes in place dependence and changes in bonding
- For residents who remained in place, higher levels of place dependence associated with losses in bonding social capital (though the reasons for staying may have differed by community).

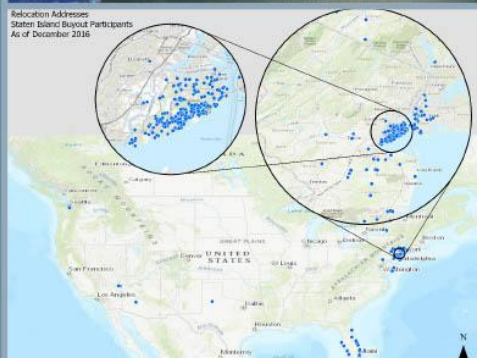
What about reduced risk?

(McGee et al 2020)

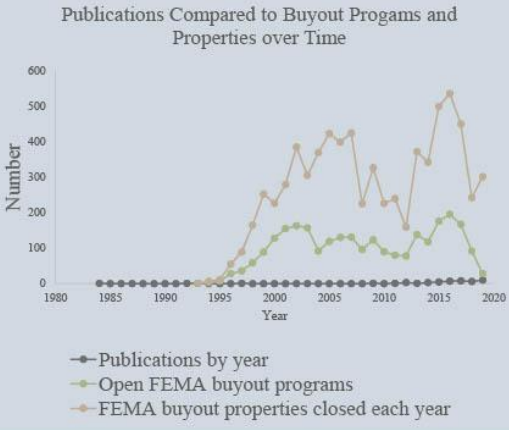
1 in 5 buyout participants moved to an area of equal or greater flood risk

99% moved to an area of greater social vulnerability



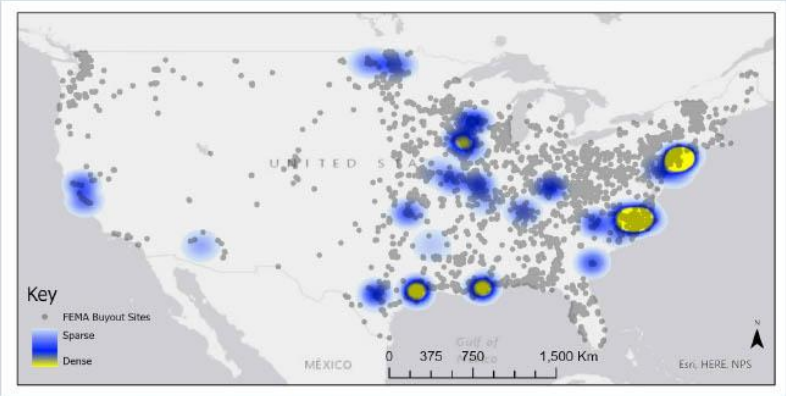


What do we know about buyouts?



Greer, A., Zavar, E., and Binder, S.B. "From Hazard Mitigation to Climate Adaptation: A Review of Home Buyout Program Literature." Under Review at *Housing Policy Debate*.

What do we know about buyouts?



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Thank you!

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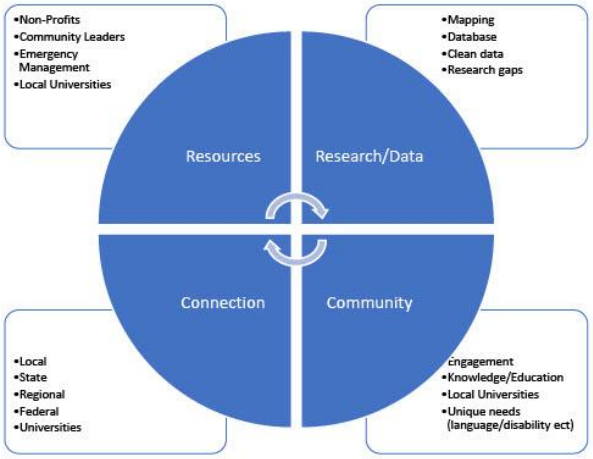
Case Study of Post-Hurricane Maria Migration to the Great Lakes Region

Jennifer Hinojosa
Research Director

CENTRO CENTER FOR PUERTO RICAN STUDIES HUNTER CUNY

Outline

- Puerto Rican communities in NYS → Great Lake Regions
- Hurricane Maria
  - Damage
  - Crisis
  - Exodus
- Data Collection
- Lessons Learn

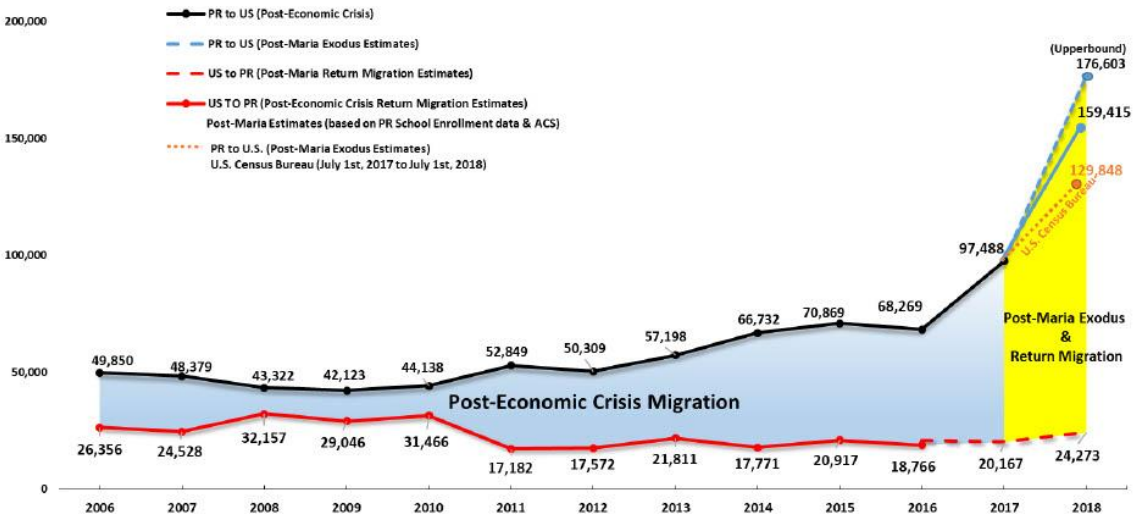


Puerto Rican communities in NYS → Great Lake Regions

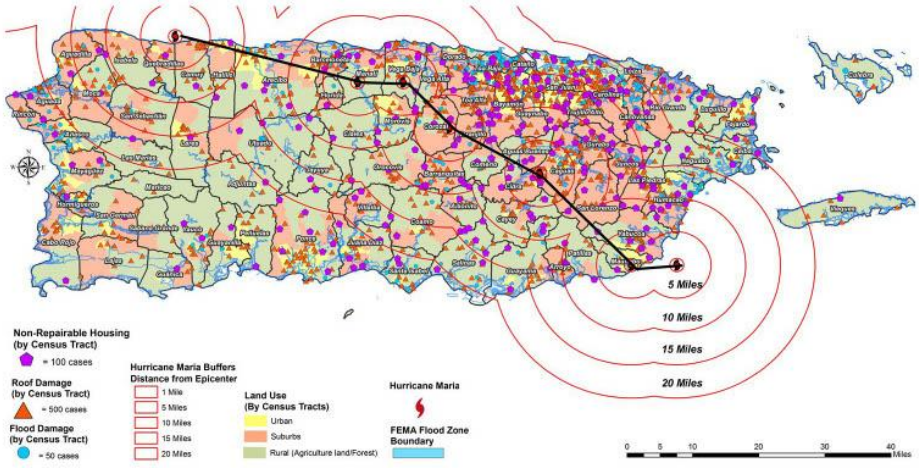
- Puerto Rican communities in NYS
  - Pre-Maria → NYC region to be a major destination for evacuees **Wrong**
  - Post-Maria → Upstate New York → Great Lake Regions = major destination **Surprised**
  - Major receiving communities:
    - Buffalo, Rochester,
  - Chain migration
    - Staying with friends and family

Puerto Rican communities in NYS → Great Lake Regions

County Name	Hispanic or Latino Population	% of Hispanic of Total Population	Puerto Rican	% of Puerto Rican from total pop.
Bronx County	799,765	56.0%	265,226	18.6%
Kings County	486,272	18.9%	147,084	5.7%
Queens County	631,657	27.8%	111,255	4.9%
New York County	418,442	25.7%	102,798	6.3%
Suffolk County	290,261	19.6%	73,713	5.0%
Westchester County	241,442	24.9%	49,568	5.1%
Monroe County	67,590	9.1%	46,161	6.2%
Richmond County	87,733	18.4%	43,130	9.1%
Nassau County	230,740	17.0%	37,195	2.7%
Erie County	52,435	5.7%	34,266	3.7%
Orange County	80,256	21.0%	33,468	8.8%
Rockland County	58,036	17.8%	13,595	4.2%
Dutchess County	36,957	12.6%	13,101	4.5%
Onondaga County	23,602	5.1%	11,110	2.4%
Albany County	18,980	6.2%	8,366	2.7%
Oneida County	13,883	6.1%	7,588	3.3%
Ulster County	18,800	10.5%	7,328	4.1%
Chautauqua County	9,817	7.7%	6,786	5.3%
Schenectady County	11,351	7.3%	5,297	3.4%
Sullivan County	12,321	16.4%	5,284	7.0%
Montgomery County	7,225	14.7%	5,194	10.5%



Hurricane Maria Damage



Crises

After 18 Months

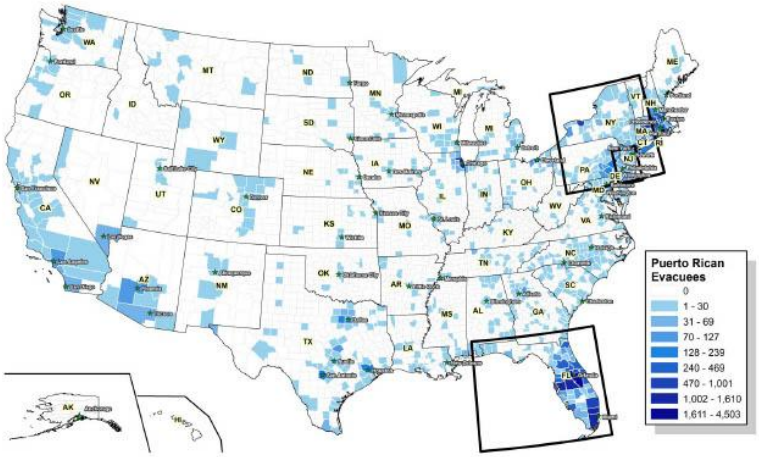
- 3,000 deaths
- Suicides spiked
- Intermittent energy
- Running water spotty in country-side
- Up to 10,000 homes destroyed, and 250,000 homes with damages
- Thousands of homeless who moved in with family
- 80% percent of crops destroyed
- Over $100 billion in damages

Data Collection

- FEMA
- NYS Dept of Education

Post-Hurricane Maria Evacuees by Households as of February 2018 (Change of Mailing Address)

CENTRO



Post-Hurricane Maria Evacuees by Households as of February 2018 (Change of Mailing Address)

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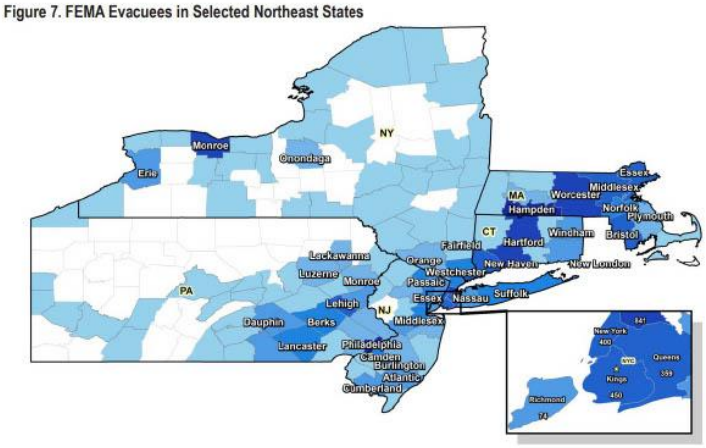
Figure 7. FEMA Evacuees in Selected Northeast States



Post-Maria Relocation Distributions

	Total Puerto Rican Population 2016	% of Puerto Rican Population	Total FEMA Evacuees	% FEMA Evacuees
All States	5,450,472	100%	40,013	100%
Selected States				
Florida	1,067,747	20%	18,013	45%
Pennsylvania	444,263	8%	2,954	7%
Texas	196,460	4%	1,361	3%
New York	1,081,110	20%	3,683	9%
New Jersey	470,143	9%	1,690	4%
Massachusetts	319,042	6%	3,399	8%
Connecticut	298,245	5%	2,281	6%
Ohio	122,204	2%	460	1%
California	214,255	4%	419	1%
Illinois	209,638	4%	1,324	3%

NYS Dept of Education Data

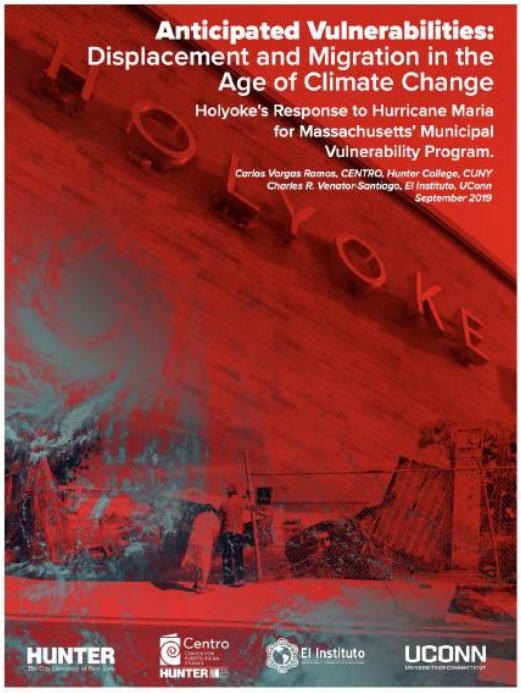
Table 5. Puerto Rican Student Enrollment in New York School Districts

	K-12 Puerto Rican Student Enrollment (2015)	School Enrollment as of 1/4/2018	School Enrollment as of 1/29/2018	% Increase Over School Enrollment Level in 2015
Statewide Total	231,384	2,052	2,218	1%
Selected Counties Total	164,019	1,594	1,757	-
Rochester City	8,118	512	547	7%
Buffalo City	6,247	374	455	7%
New York City	138,678	411	411	0%
Yonkers Public Schools	4,437	98	98	2%
Syracuse City	2,495	53	81	3%
Amsterdam City	1,189	45	45	4%
Dunkirk City	662	26	40	6%
Binghamton City	640	27	27	4%
* Mount Morris Central, Victor Central, East Ramapo, and Rensselaer City	-	27	27	-
Utica City	1,553	21	26	2%

Source: U.S. Census Bureau, 2015 American Community Survey 5-Year Estimates and New York Department of Education

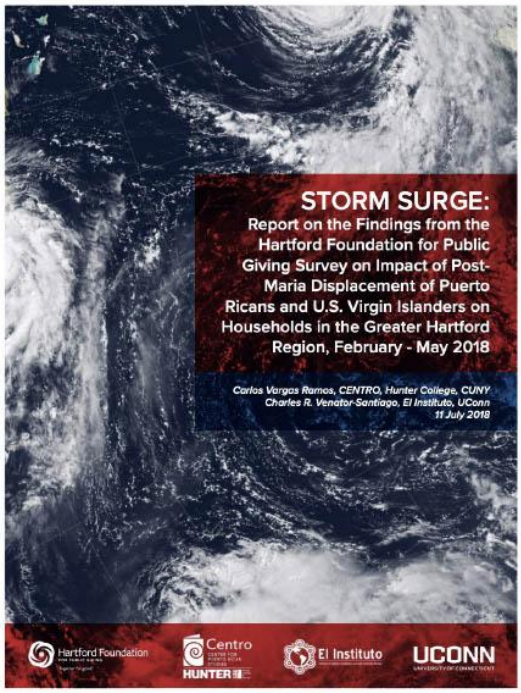
- Overall, the proportion of displaced students from Puerto Rico who enrolled in upstate region school districts located in upstate regions of the state exceeded to students who enrolled in New York City school districts. Among the top 5 school districts, at least 21% of students from Puerto Rico enrolled in Rochester City schools (547 students) followed by 19% in Buffalo (455), 4% in New York City (411), 4% in Yonkers (98), and 2% in Syracuse (81).

Resources



Case Study: Holyoke, Massachusetts

- The majority of displaced Puerto Ricans arriving to the City of Holyoke relied on kin networks, that is family and friends who provided support in addressing their needs.
- Given the socio-economic standing of Puerto Ricans residing in Holyoke, we conclude that working-class and Puerto Ricans living in or near poverty assumed a disproportionate burden in support of displaced Puerto Ricans migrating to the city of Holyoke.
- Access to affordable housing became the key to stabilizing displaced Puerto Ricans. Displaced Puerto Ricans overwhelmingly indicated that Holyoke's Family Resource Center—Enlace de Familias—provided the most effective support to their address their needs.



Case Study: Hartford, Connecticut

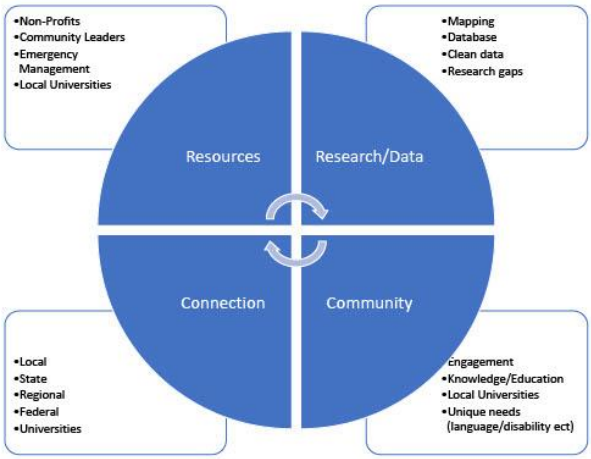
- The majority of survey respondents expect more relatives or friends to travel to and remain in Connecticut for months or years.
- The influx of displaced Puerto Ricans has resulted in pressing needs for Puerto Rican households in Connecticut.
- Survey respondents identify housing issues and insufficient food as the most critical needs they are facing in Connecticut, along with healthcare, in the aftermath of the crisis.
- Nonprofit organizations and groups have assumed a disproportionate burden in support of displaced/ migrants in the Greater Hartford Region

Challenges

CEN TRO

Language	Cost of living	Housing	Transportation
• Applications (housing, food, transportation) • Student transfer – overwhelmed local school districts (Spanish speaking teachers/social workers)	• Elderly population • Little to no income • Access to food • Medical needs • Access to jobs	• Shelters • Overstaying their welcome with friends and family • Rental assistance • Hotels (TSA)	• License (IDs) • Expensive – Metro Card

Lessons Learn



Recommendations

1. Create a "one-stop-shop" location, with well-publicized and ongoing availability for a determined period of time, is a central feature of any successful response to address large migrations caused by a climate change displacement. This location should provide access to the key federal, state, and local agencies as well as to local civic organizations that will enable migrants to incorporate or join the community;
2. Local city officials and civic leaders charged with responding to the influx of migrants should have clear and unconstrained access to information and relevant data about the needs of displaced or arriving migrants;

Recommendations

3. Federal and inter-agency agreements provide key resources to address the challenges posed by displaced migrants arriving to any community;
4. More attention needs to be paid to the ability and flexibility of social services agencies response
5. The creation of a fungible and shareable form and case management follow up services that may allow a coordinating governmental entity the ability to track case management across several service agencies and services rendered. to an influx of new residents and arrivals;

Summer 2022 Study

- Post-Hurricane Maria evacuees who stayed in Buffalo & Rochester
  - Why they decide to stay?
  - Challenges

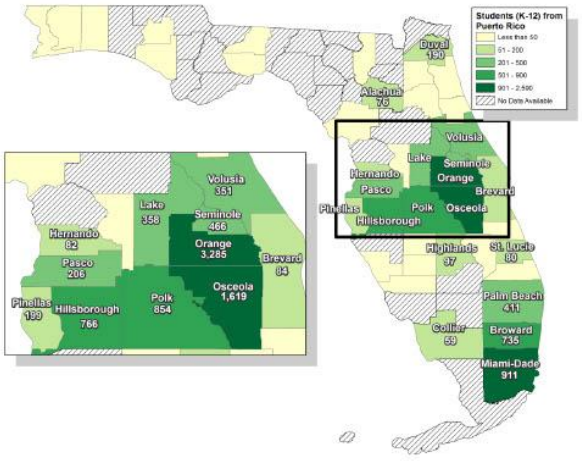
CENTRO CENTER FOR PUERTO RICAN STUDIES HUNTER CUNY

WEST SIDE PROMISE NEIGHBORHOOD

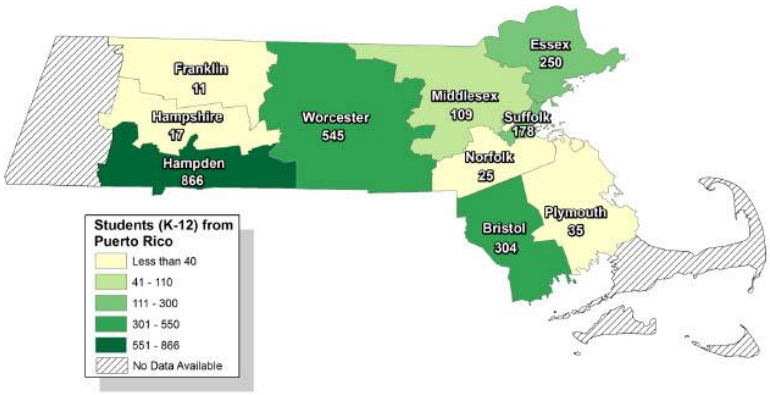
Thank you!

Email: Jhinojos@hunter.cuny.edu
Twitter: @JennHinojosa

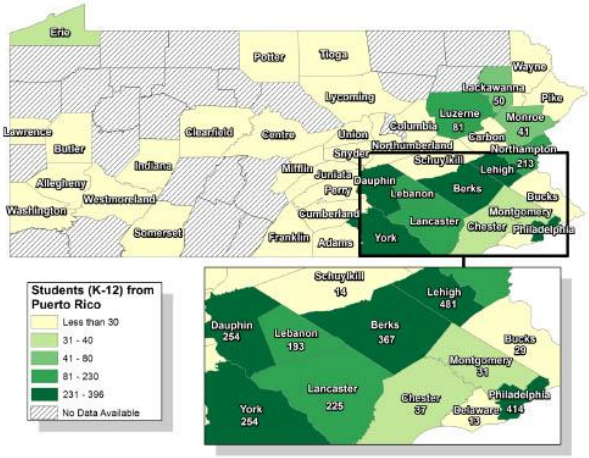
FLORIDA



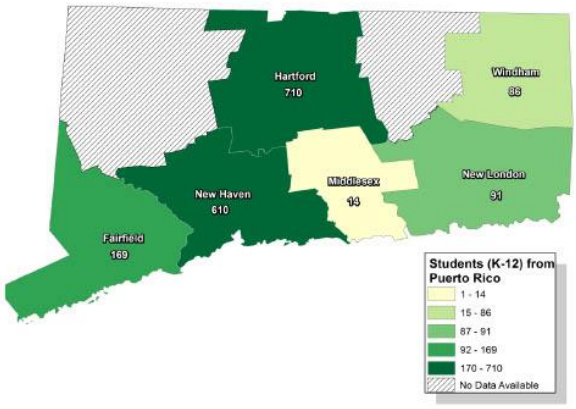
Massachusetts



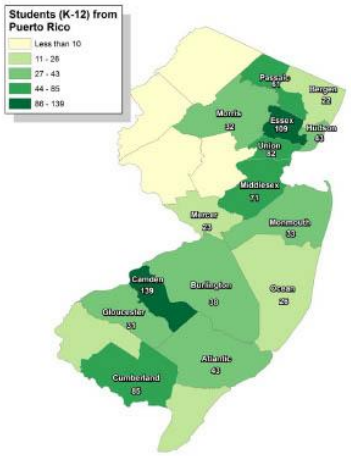
Pennsylvania



Connecticut



New Jersey



Flint as The (Incredible) Shrinking City

- Home to Ojibwe tribe; incorporated in 1855
- Birthplace of General Motors
- Flint currently has ~83,000 residents (US Census, 2020)
  - *Down from 196,460 residents circa 1960*
- Automation/globalization in late 20th century
  - *Dramatic staff/production cutbacks from G.M.*
  - *White flight + community disinvestment*

1

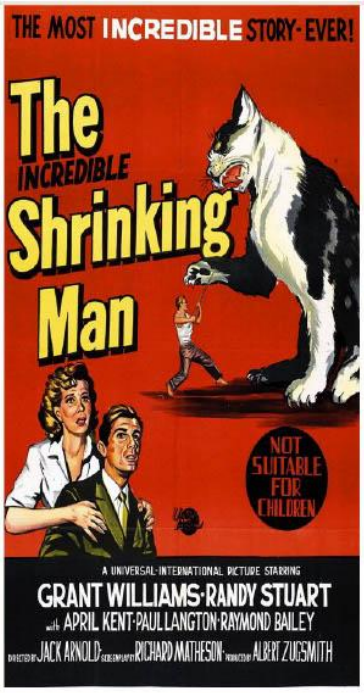
Flint's annual median household income is ~$25,342, half state median ($51,084) (US Census, 2017).

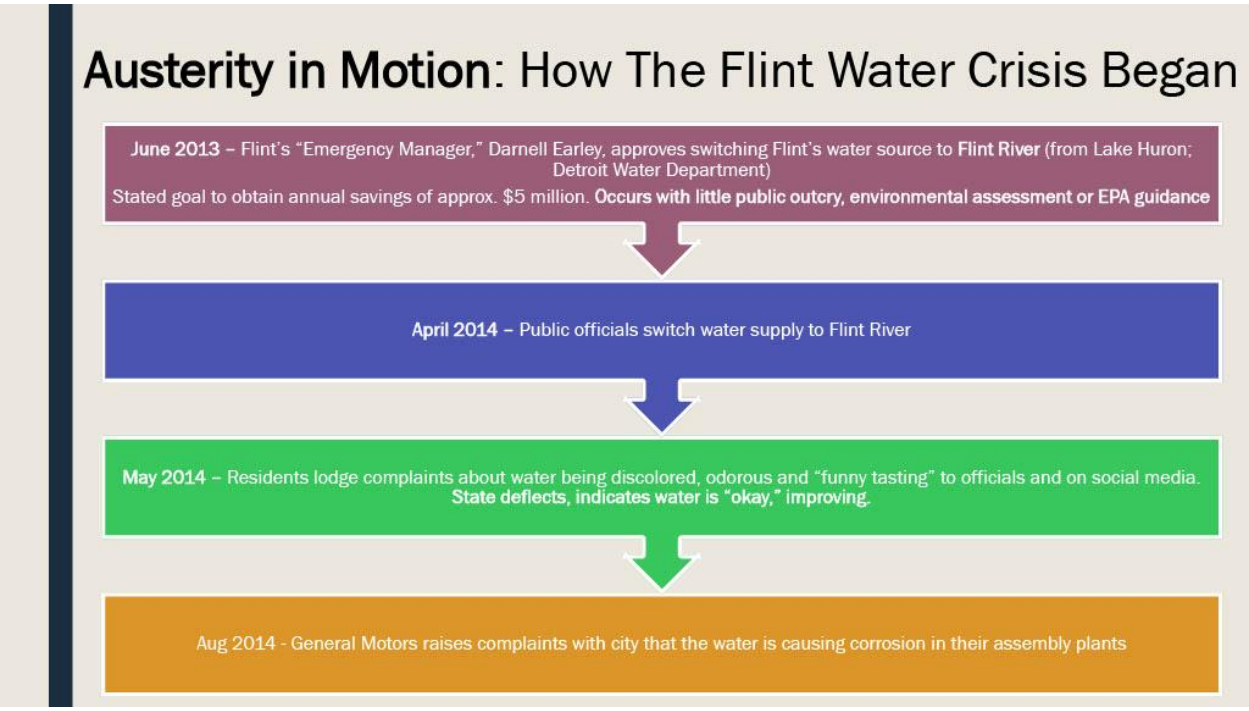
- High unemployment and low academic attainment (Waldron et al, 2018)

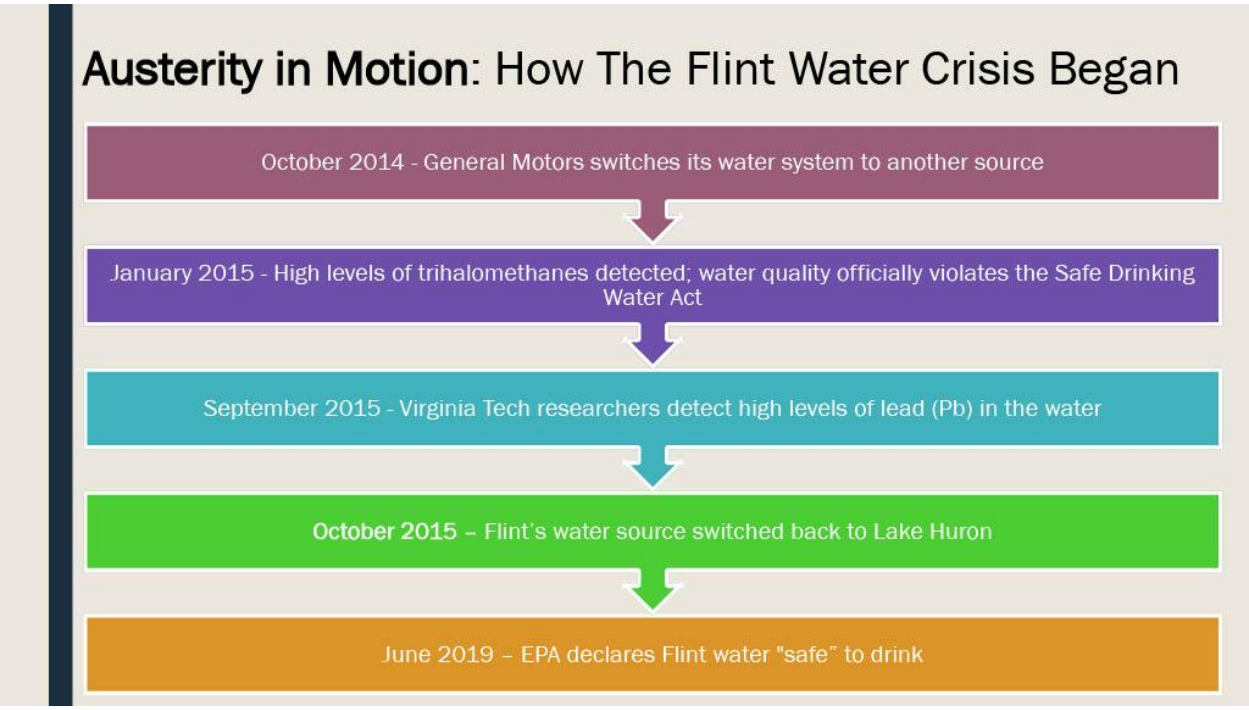
2

Approx. 54% of the Flint pop. is Black, many whom live below FPL (US Census, 2017).

- Whites comprise roughly 40% of the population | Latinos represent 4.5% of the population... **each also have high poverty rates**




Austerity in Motion: How The Flint Water Crisis Began
June 2013 – Flint's "Emergency Manager," Darnell Earley, approves switching Flint's water source to Flint River (from Lake Huron; Detroit Water Department)
Stated goal to obtain annual savings of approx. $5 million. Occurs with little public outcry, environmental assessment or EPA guidance
April 2014 – Public officials switch water supply to Flint River
May 2014 – Residents lodge complaints about water being discolored, odorous and "funny tasting" to officials and on social media.
State deflects, indicates water is "okay," improving.
Aug 2014 - General Motors raises complaints with city that the water is causing corrosion in their assembly plants


Austerity in Motion: How The Flint Water Crisis Began
October 2014 - General Motors switches its water system to another source
January 2015 - High levels of trihalomethanes detected; water quality officially violates the Safe Drinking Water Act
September 2015 - Virginia Tech researchers detect high levels of lead (Pb) in the water
October 2015 – Flint's water source switched back to Lake Huron
June 2019 – EPA declares Flint water "safe" to drink

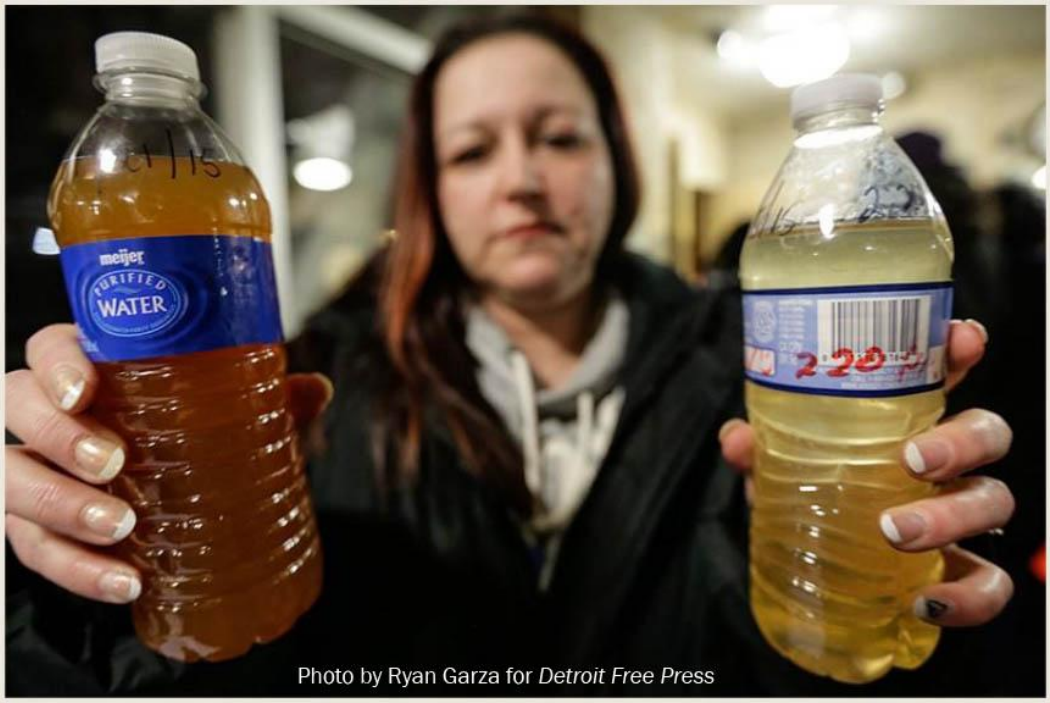


Photo by Ryan Garza for *Detroit Free Press*

RESEARCH FRAMEWORK

- **Scope**
  - A mixed methods (331 surveys + 75 interviews) project started in 2017 assessing health outcomes and beliefs, attitudes and experiences of those living in Flint during water crisis and those involved in response efforts (i.e., "professionals").
- **Thematic Framework:**
  - Social determinants of health
  - Community capacity and self-efficacy
  - Environmental health capital

Environmental health capital: A model for climate justice?

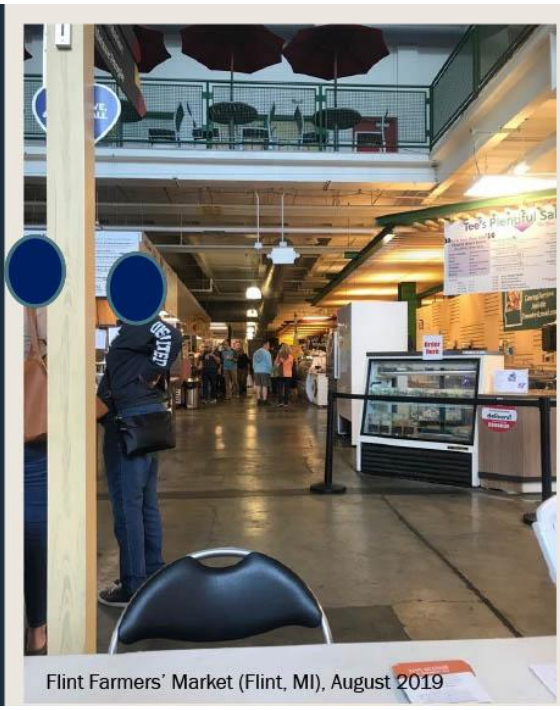
- Premise: We know "why" certain communities are vulnerable to climate/environmental injustices… but don't have strong upstream/downstream approaches to addressing this vulnerability
- So, environmental health capital focuses on…
  - *The **knowledge** (technical, scientific, climate-related, health literacy, etc.), **resources** (infrastructure upgrades, microgrants, etc.), and **political visibility** (democratic, inclusive policymaking, oversight ability, etc.) communities need to prevent or mitigate environmental hazards*

LOCAL ENVIRONMENT
https://doi.org/10.1080/13549839.2021.2006166
Routledge Taylor & Francis Group
VIEWPOINT
Check for updates

Environmental health capital: a paradigm for environmental injustice prevention and truth and reconciliation

Jerel M. Ezell [a,b]

[a]Africana Studies and Research Center, Cornell University, Ithaca, NY, USA; [b]Cornell Center for Health Equity, Cornell University, Ithaca, NY, USA



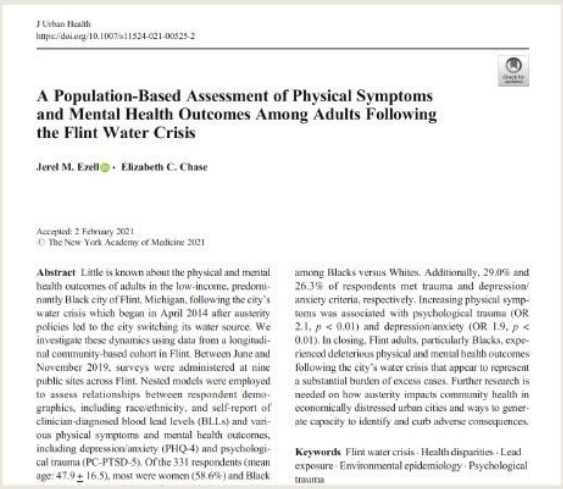
Flint Farmers' Market (Flint, MI), August 2019

Salvation Army Family Store (Flint, MI), August 2019

Photo by Eric Seals for the *Detroit Free Press*

Artwork by Michelle Garcia

IT'S COMPLICATED



J Urban Health
https://doi.org/10.1007/s11524-021-00525-2

A Population-Based Assessment of Physical Symptoms and Mental Health Outcomes Among Adults Following the Flint Water Crisis

Jerel M. Ezell · Elizabeth C. Chase

Accepted: 2 February 2021

Abstract Little is known about the physical and mental health outcomes of adults in the low-income, predominantly Black city of Flint, Michigan, following the city's water crisis which began in April 2014 after austerity policies led to the city switching its water source. We investigate these dynamics using data from a longitudinal community-based cohort in Flint. Between June and November 2019, surveys were administered at nine public sites across Flint. Nested models were employed to assess relationships between respondent demographics, including race/ethnicity, and self-report of clinician-diagnosed blood lead levels (BLLs) and various physical symptoms and mental health outcomes, including depression/anxiety (PHQ-4) and psychological trauma (PC-PTSD-5). Of the 331 respondents (mean age: 47.9 ± 16.5), most were women (58.6%) and Black among Blacks versus Whites. Additionally, 29.0% and 26.3% of respondents met trauma and depression/anxiety criteria, respectively. Increasing physical symptoms was associated with psychological trauma (OR 2.1, $p < 0.01$) and depression/anxiety (OR 1.9, $p < 0.01$). In closing, Flint adults, particularly Blacks, experienced deleterious physical and mental health outcomes following the city's water crisis that appear to represent a substantial burden of excess cases. Further research is needed on how austerity impacts community health in economically distressed urban cities and ways to generate capacity to identify and curb adverse consequences.

Keywords Flint water crisis · Health disparities · Lead exposure · Environmental epidemiology · Psychological trauma

Journal of Racial and Ethnic Health Disparities
https://doi.org/10.1007/s40615-022-01233-6

Child Lead Screening Behaviors and Health Outcomes Following the Flint Water Crisis

Jerel M. Ezell[1,2] · Sanvi Bhardwaj[2,3] · Elizabeth C. Chase[4]

Received: 11 October 2021 / Revised: 5 January 2022 / Accepted: 6 January 2022

Abstract
Background There is little research on lead (Pb) screening behaviors and outcomes and possible health sequelae of children in Flint, Michigan in the years following the city's 2014 water crisis, which included widespread tap water contamination with elevated levels of heavy metals and other environmental contaminants.
Methods Between June and November 2019, we collected and analyzed cross-sectional data on Flint children's demographics and self-report of screenings of blood lead levels (BLLs) and results and various potential water contamination-related health symptoms and outcomes. We calculated descriptive statistics to summarize the prevalence of health outcomes and screenings in children, and fit multivariable models using generalized estimating equations to characterize the association between baseline traits and health symptoms and outcomes in children.
Results A total of 244 children (mean age 8.6 ± 4.8) were included in the analysis. Overall, 76.6% of the children were reported to have been screened for elevated BLLs after the water source switch. In total, after the water source switch, 25.0% of children were reported as having clinician-diagnosed elevated BLLs. Overall, 43.9% of children experienced hyperactivity, 39.3% had emotional agitation, 29.1% had comprehension issues/learning delays, while 38.9% of children had skin rashes and 10.7% experienced hair loss. A child having elevated BLLs also significantly increased the odds of experiencing adverse cognitive/behavioral outcomes (comprehension issues/learning delays OR = 4.0, hyperactivity OR = 6.6, emotional agitation OR = 3.5).
Conclusion Child BLL screening following the crisis initiation was moderate, and BLLs and potential water contamination-related morbidity outcomes appeared heightened. Further research is needed to contextualize epidemiologic factors contributing to BLL screening patterns and results and the potential water contamination-associated sequelae observed here.

Keywords Child health · Class · Environmental health · Lead · Flint Water Crisis

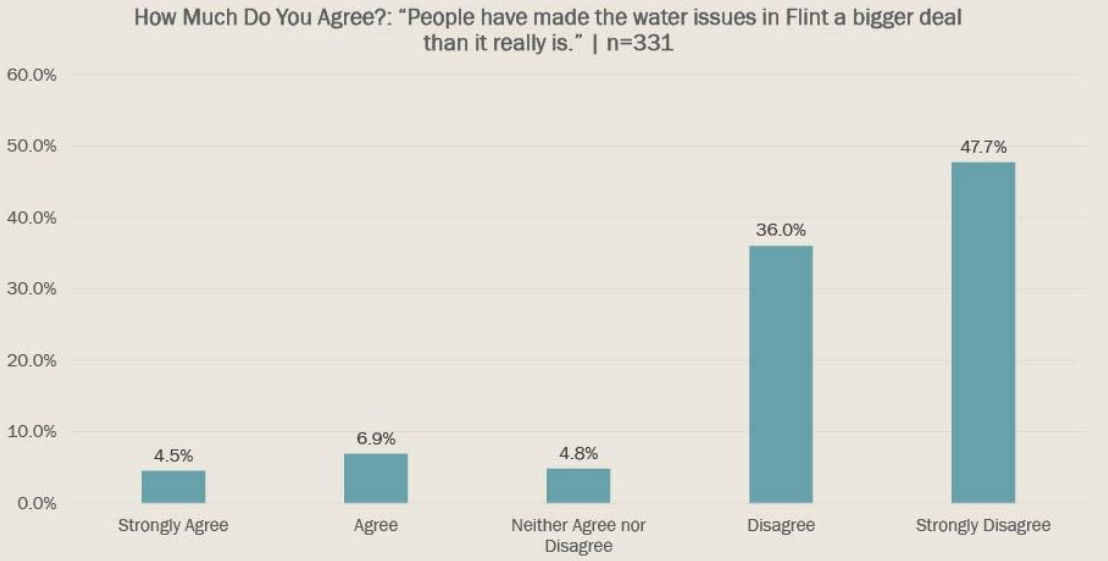
Was it even an environmental crisis?

Most residents, irrespective of race, believed the Flint Water Crisis was, in fact, a crisis... because *the associated event(s)* :

A. Were believed to be adverse to residents' general health and/or natural/built environment
- Vis-a-vis lead (Pb) impacts, ecosystem destruction, property value dilution, etc.

B. Were believed to be of unusual ambiguity, scope, or recurrence
- **In contrast, clinicians and gov. officials often dubious about "crisis" *scope / meaningful* population health impacts**

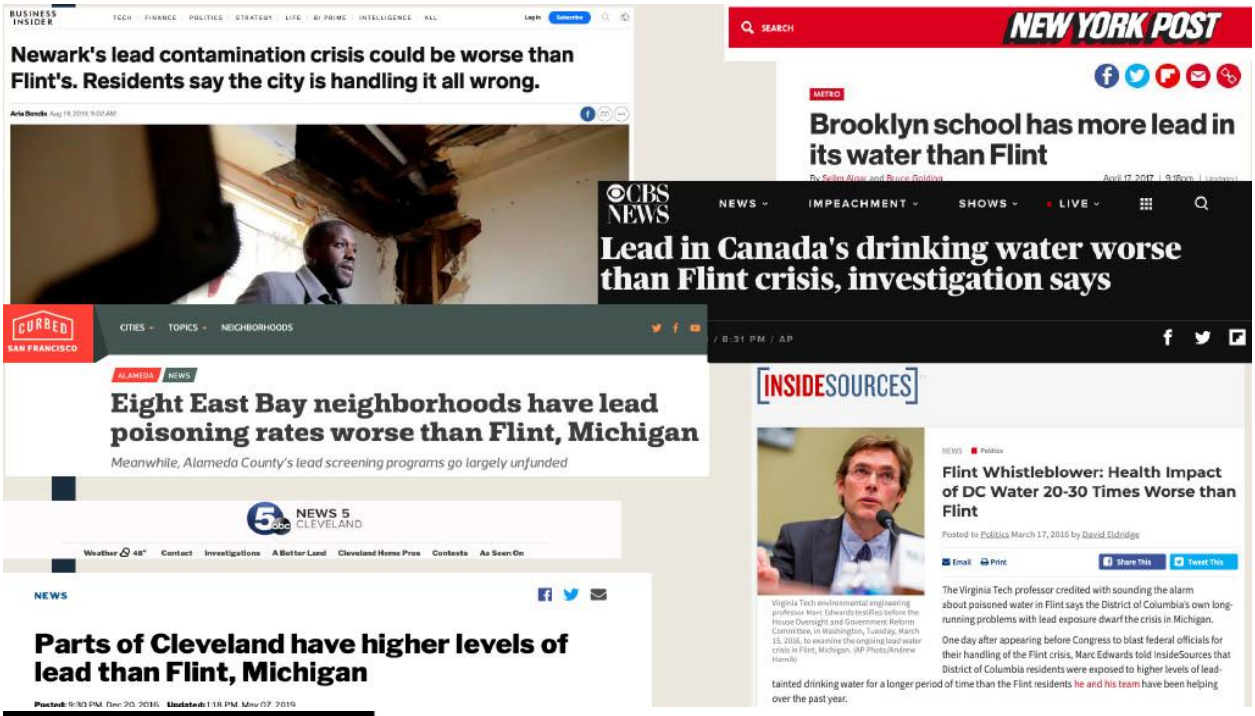
C. Were believed to be objectively controllable/preventable
- Vis-à-vis initiation of the water crisis and the delayed + inadequate government response

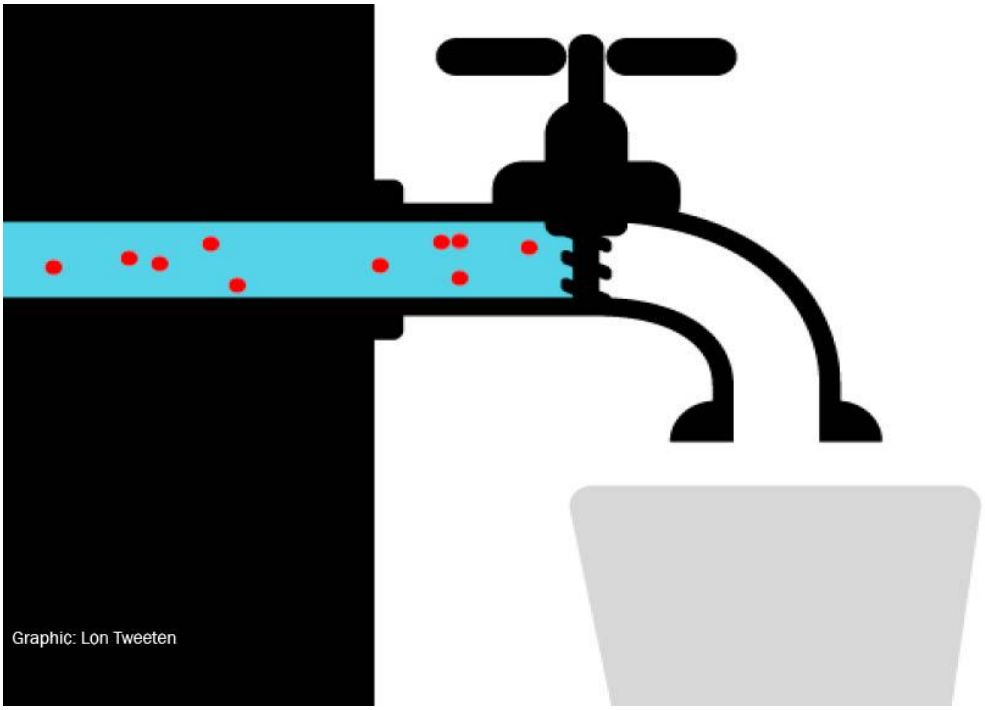


After adjusting for age, gender, income (public assistance), and education, **race (Black) was associated with greater tendency to *Strongly Disagree/Disagree* (p=0.024)**

Marcus, a 30-year-old Black man on Northside

"I hate it. It's terrible. It's terrible. [Attention to the crisis] is definitely as big as it should be, and **it should be bigger.** [And] *because there's poor black people and there's poor white people here, you can't call it a race issue…* **And it's not just Flint.** It's [...] majority poor areas that have water that they cannot drink. Flint's not the first one. We're just the first one to get national attention… "


BUSINESS INSIDER
Newark's lead contamination crisis could be worse than Flint's. Residents say the city is handling it all wrong.
NEW YORK POST
Brooklyn school has more lead in its water than Flint
CBS NEWS
Lead in Canada's drinking water worse than Flint crisis, investigation says
CURBED SAN FRANCISCO
Eight East Bay neighborhoods have lead poisoning rates worse than Flint, Michigan
Meanwhile, Alameda County's lead screening programs go largely unfunded
INSIDESOURCES
Flint Whistleblower: Health Impact of DC Water 20-30 Times Worse than Flint
NEWS 5 CLEVELAND
Parts of Cleveland have higher levels of lead than Flint, Michigan


Graphic: Lon Tweeten

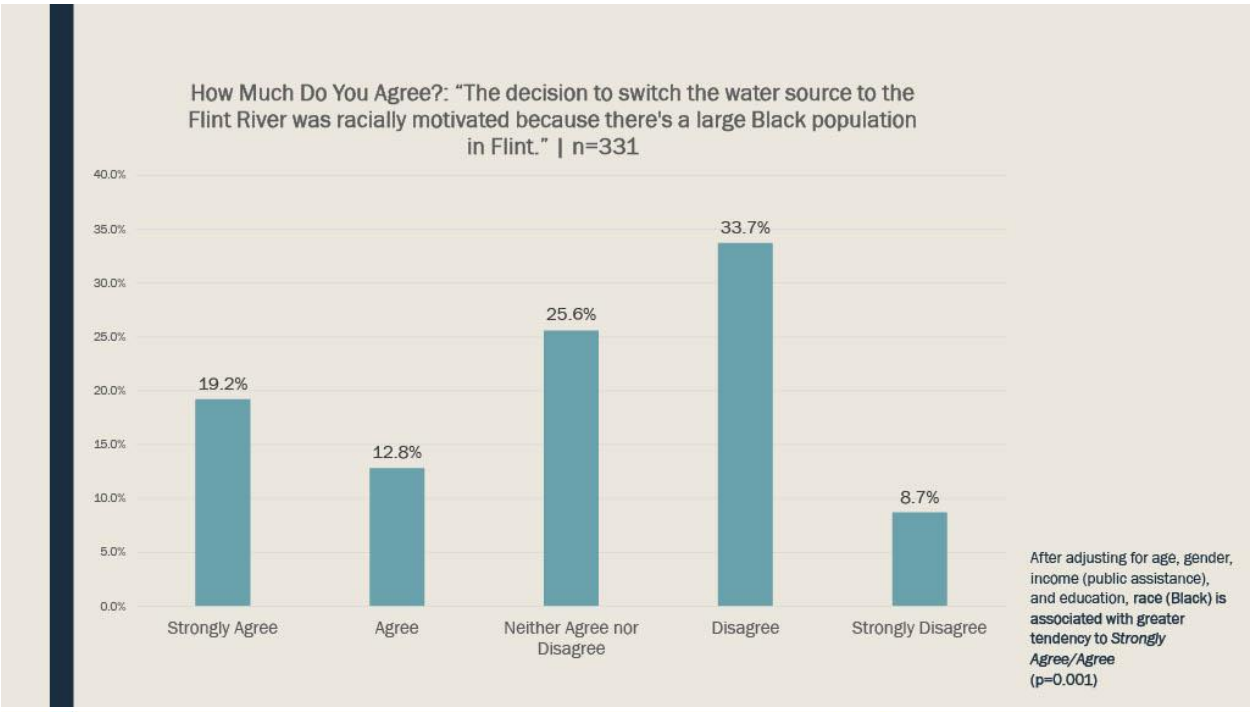
Nora, a Pakistani Pediatrician practicing on Westside

"They're coming in with A.D.H.D., bipolar disorder; being 'mean to their parents'; being defiant. But does this really come under the umbrella of lead exposure? *I don't think so.* **We're just giving people an opportunity to say, 'Because we were exposed to lead, that's why they're having these bipolar issues.' No!** "**...if you talked with any of my patients, they will look at you like, 'Okay... I just know that I'm a victim here**.'" [...] I grew up in Pakistan, it's a very poor country. So, I was exposed to all kinds of toxins in the water there. I think I turned out pretty okay if I went to med school, right?"

Adam Zyglis for *The Buffalo News*, 2016

Joshua, a Black Pastor on Northside

"This is bigger than I thought. [...]. Not to be like a conspiracy theorist, but **if you see the people buying around [Flint], they're wealthy people:** they're wealthy developers and the land is cheap. [...] **All the people that are homeowners, sell their homes off, and are leaving**. [And] if people are displaced and gone... we'll never be able to get back."



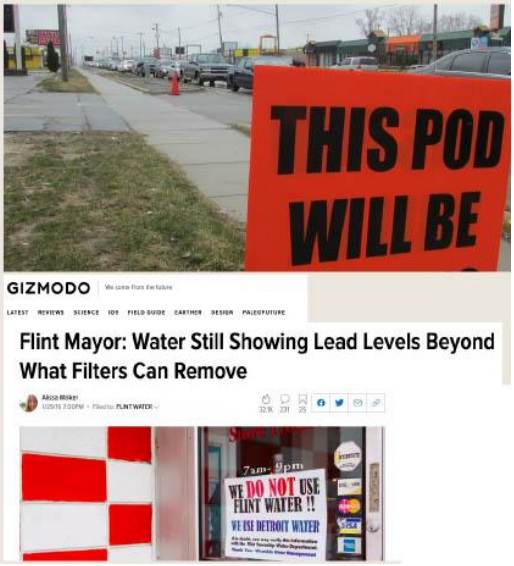
Kerri, a White urban planner in Flint

*"You switched to the river water and that was what sort of started everything, **but it wasn't the river!** It was, as we all now know, the complete lack of proper treatment of the water, our horribly old infrastructure that never had any maintenance to it ever. The fact that we've got whole stretches of the city where there's one or two people living in an area, so the water gets stagnant in the pipes, and blah, blah, blah, blah, blah....and any news article that came out that sort of put the blame on the river, we'd try...* ***to reinforce the message that this was a manmade disaster.***

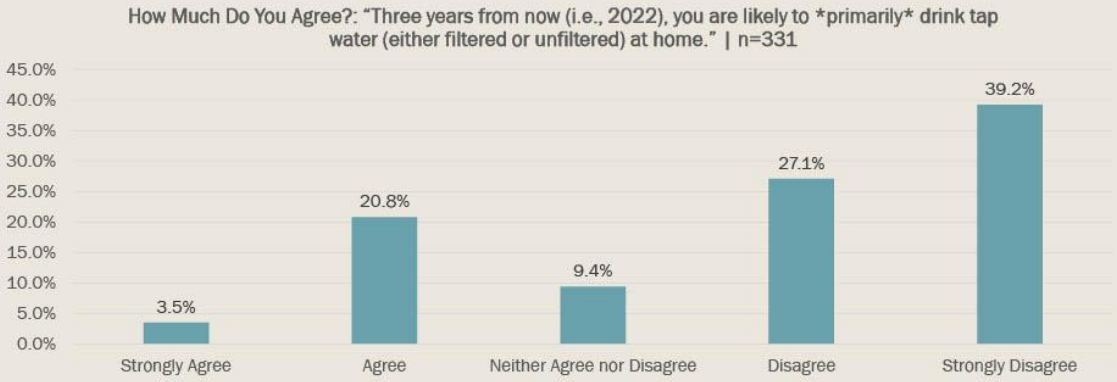
Dina, 43-year-old Black woman on Northside

"**When I hear the E.P.A. or those representatives saying, 'Drink the water,' I'm like, 'You come drink it!** Don't tell me that it's okay to drink the water with a filter: that means the water ain't right.' Because you should be able to drink tap water [without a filter] and be fine."

Photo: Michigan Radio NPR



Water Usage Context

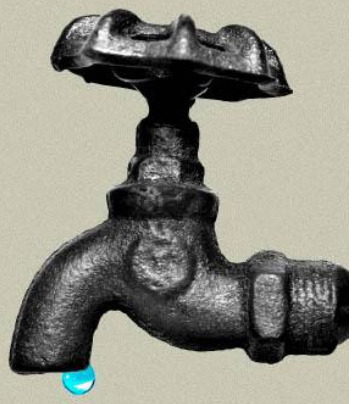


After adjusting for age, gender, income (public assistance), and education, **race (Black) is not associated with greater tendency to *Strongly Disagree/Disagree* (p=0.149)**

Climate Intersections

- Growing distrust in science/institutions
- Displacement/de-population
- Increase in bottled water usage (unrecycled plastics?)
- Increase in health morbidities associated with water contamination (cancer, CVD, neurological and behavioral issues, etc.)

Questions?



Graphic: Aida Amer

Jerel Ezell PhD, MPH

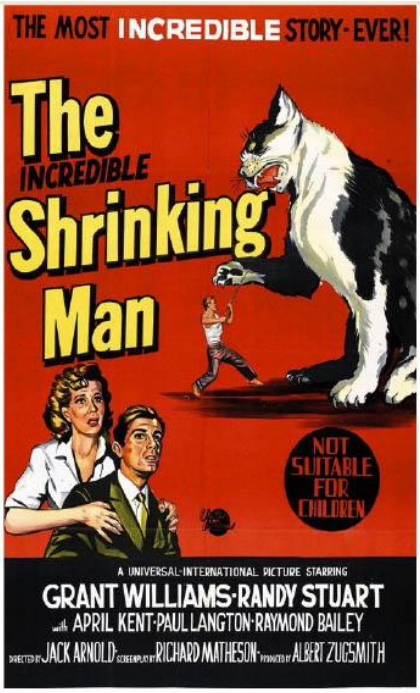
Assistant Professor, Africana Studies and Research Center

Director, Cornell Center for Humility + ReLateral Lab

Cornell University

jme246@cornell.edu

THANK YOU!



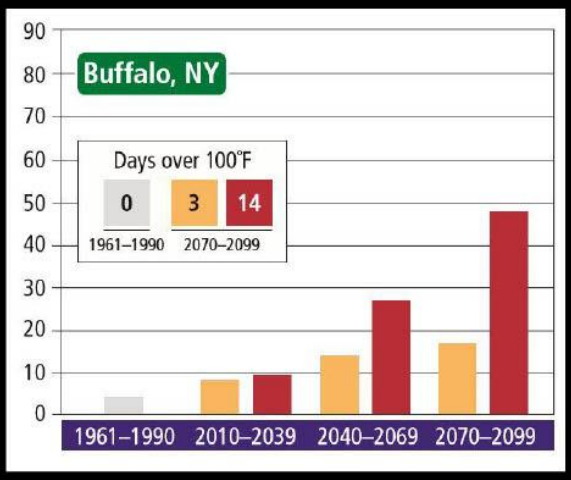
Inequities of Climate Change Impacts:
Examples from my Research

Susan Spierre Clark, PhD
Assistant Professor,
Department of Environment & Sustainability
Director, Master's in Sustainability Leadership
University at Buffalo

"In what ways are these climate risks exacerbating the impacts on underserved and marginalized communities"

1. Climate Vulnerability in Erie County – Extreme Heat
2. Impacts of Infrastructure Disruptions – Natural Disasters

Extreme Heat in Western NY



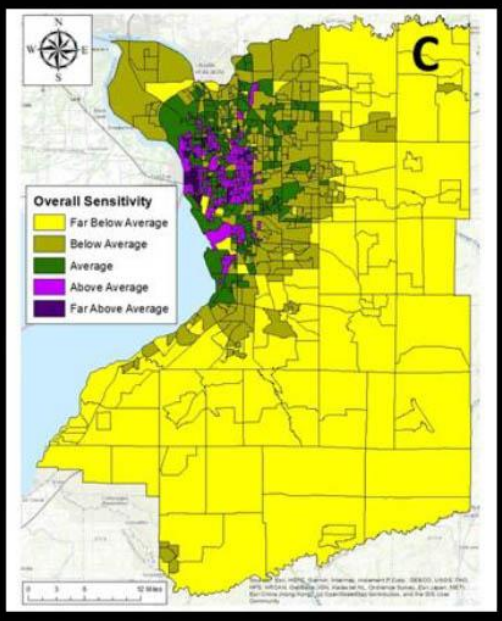
The number of days over 90°F in large northeastern cities is projected to increase in the coming decades until, by late-century, some cities could experience nearly an entire summer of such days under the higher-emissions scenario. Projections under this scenario also show a dramatic increase in the currently small number of days over 100°F (as depicted in the inset boxes).

lower emissions higher emissions

Frumhoff et al, 2007

Sensitivity – Extreme Heat Erie County, NY

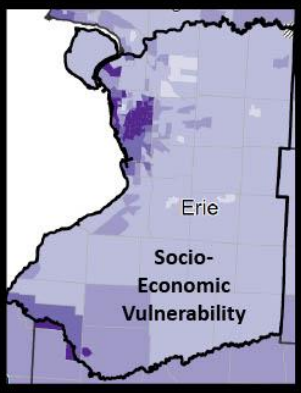
Factors	Sub-Factors
Socio-Economic Sensitivity	
Economic Sensitivity	% under poverty line
	% over 25 without a high school diploma
	% unemployed
Physiological Sensitivity	% 5 years old and under
	% 65 years old and over
Social Isolation	% foreign born
	% aged 20-65 with disability status
Mobility-based Sensitivity	% active commuters
Residential + Housing Sensitivity	Median year built
	Population density
	% Multi-family dwellings
	% Affordable housing



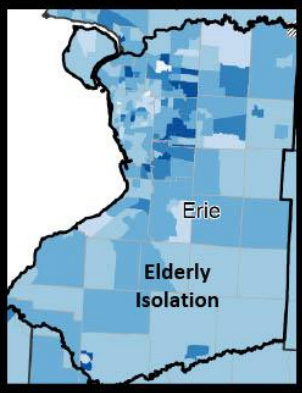
Landscape Sensitivity factors:
- COOLING: tree canopy cover, proximity to water sources and the prevalence of pervious (or non-paved) surfaces.
- WARMING: industrial parcels and truck terminals

NYS – Heat Vulnerability Index – Erie County, NY

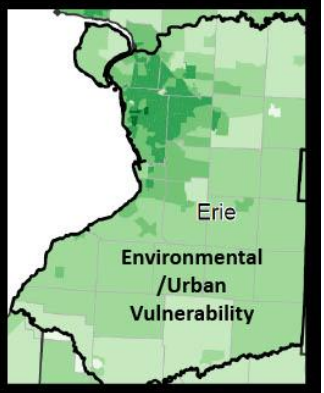
Populations with limited understanding of English



-Low-income households
-lack of access to a vehicle



-physically vulnerable to heat
-socially isolated



-Urban Het Island

Vulnerability of Household Types:

- Households reporting a disability reported more household disruption types and experienced more severe mental health impacts
- Households with young children were more likely to report physical and mental health impacts of outages
- Households living below the poverty line spent more money and time coping with household disruptions
- Households experiencing longer-duration outages experienced more health and well-being challenges
- Rural households reported more severe health and well-being impacts

Thank you!

sclark1@buffalo.edu

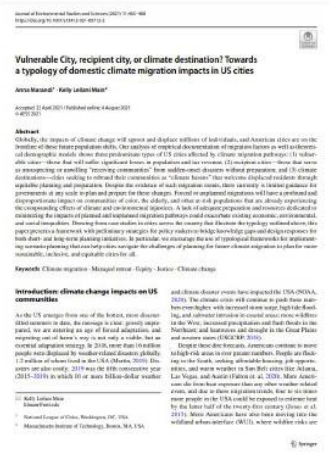
Migration at the Margins

Compounding vulnerabilities for climate migrants and how cities might respond

Kelly Leilani Main
Executive Director, Buy-In Community Planning
PhD Student at UC Berkeley Department of Landscape Architecture & Environmental Planning

Plus, Better Buyout Programs!

Things I will try to cover



Vulnerable City, recipient city, or climate destination? Towards a typology of domestic climate migration impacts in US cities

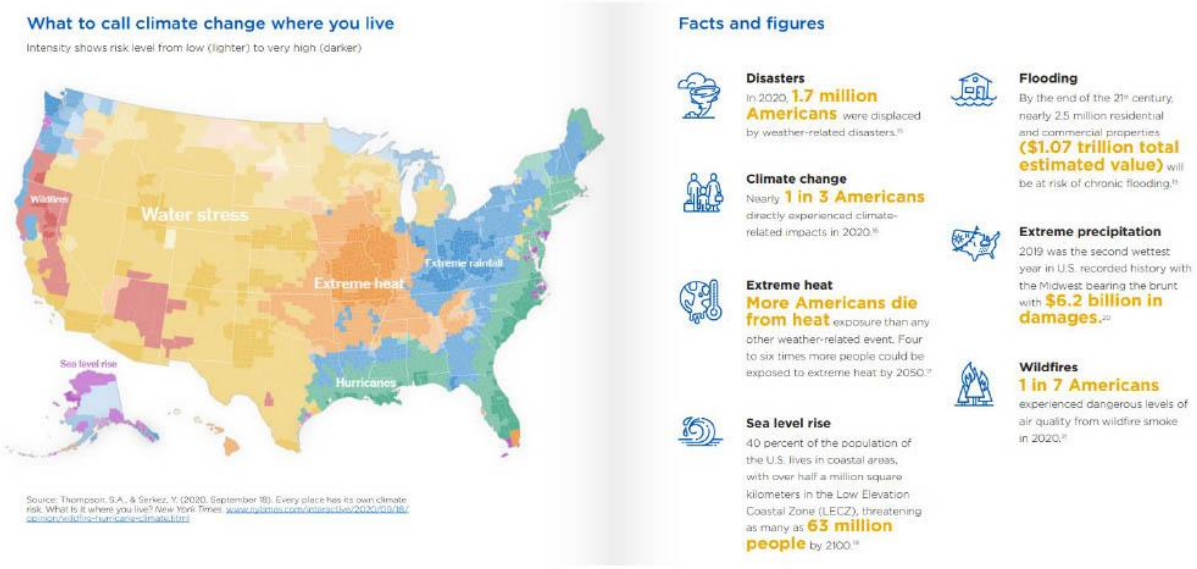
Introduction: climate change impacts on US communities

Marandi and Main, 2021

National League of Cities, 2022

Better Buyout Programs

Climate Change Impacts Are Already Happening



The News Says: Climate Migration Is Already Happening

- **...but not all kinds of migration are the same**
- **Sudden onset events (shocks)** such as wildfires, hurricanes, or extreme precipitation events with flooding, can result in immediate displacement which may be temporary (migrants are evacuees, seeking to return home as soon as possible), or permanent (especially if no resources for return are made available).
- **Slow onset events (stressors)** include droughts, extreme heat (particularly in regions that already experience high temperatures), and sea level rise that typically do not incite sudden relocation but will likely lead to long term shifts in economic and real estate trends by changing employment opportunities, investments, and home prices.

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.ktvu.com%2Fnews%2Funcertainty-for-fire-evacuees-camping-at-walmart-in-chico&psig=AOvVaw0WhRMjlVMZ4uv2aNsKf6RP&ust=1654186571179000&source=images&cd=vfe&ved=0CA0QjhxqFwoTCPDJw7HTJPgCFQAAAAAdAAAAABAD

Migration Studies Literature: [Climate] Migration Does Not Exist in a Vacuum

- Climate Change is likely to **exacerbate existing trends of inequality** rather than replace them until large-scale systems adjustments occur.
- **Push factors** drive people and business away from a place (lack of employment or decline of industries, unfavorable weather conditions, high taxes, insurance costs, lack of place attachment, annual exposure to wildfire smoke or pollution, etc)
- **Pull factors** drive people and businesses towards a place (job opportunities, affordable housing, families and social ties, weather, strong anchor institutions such as universities and hospitals, walkability, parks, etc.)
- Choice-Limiting factors
    - **Redlining:** Formerly Redlined Areas Have $107 Billion Worth of Homes Facing High Flood Risk—25% More Than Non-Redlined Areas; but 52% less in wealth.
    - **Renters** located in areas increasingly vulnerable to extreme weather events are more likely to be non-white, live in homes that may be less resilient to climate events, have less access to post-disaster support, and have less access to pre- or post-disaster resources to enable a permanent move away from the at-risk area (Dundon & Camp, 2021)
    - **Low-Income Residents, People with Disabilities, and the Elderly** have lower mobility when considering relocation
    - **Place attachment** makes many communities reluctant to leave, especially indigenous communities and those with intergenerational ties to land.

Results from Literature Review and News Articles

Table 1 Climate migration typologies for US cities

Type	Characteristics	Examples (non-definitive)	Challenges and opportunities
1. Vulnerable cities	• Under threat or projected to experience frequent coastal or inland flooding, storms, sea level rise, extreme/sustained heat, and humidity, and/or wildfire risk. • Much of the community is exposed. [New bullet point] - Smaller cities may lack capacity, resources, or political will to address climate challenges. [New bullet point] - Some larger cities may still be experiencing growth.	Lake Charles, LA Tyrell County, NC Warren, RI Norfolk, VA	• Population loss may impact tax base or other revenue. • Proactive planning is possible but will rely on significant resources from state and federal players • Lower Income, BIPOC, and vulnerable populations are disproportionately impacted when city services are strained.
2. Recipient cities	• May be an Urban center in a region with climate risks • Marginally to significantly less vulnerable to climate risks than neighboring communities (e.g., located at a higher elevation, inland, or away from the WUI) • Has its own share of socio-economic or environmental stressors which limit adaptive capacity, such as a lack of affordable housing	Orlando, FL Chico, CA	• Limited or no state or federal funding available for pre-disaster mitigation • Existing stressors can quickly become a crisis when faced with sudden or unexpected influx of new residents • Receiving migrants presents more challenges for small and medium cities • Lower Income, BIPOC, and vulnerable populations are disproportionately impacted when city services are strained • Improving resilience for existing residents can help prepare for future shocks and/or population influx
3. Climate Destinations	• Climate shocks or stressors may be relatively less severe, less acute, or More manageable (e.g., no exposure to sea level rise, less risk of wildfires) • Ready access to fresh water supply • High vacancy rates or abundance of affordable housing • Post-industrial, legacy cities with high infrastructural capacity (e.g., originally designed to support several thousand more residents than currently live there) and a demonstrated desire to grow • History of or interest in improving adaptive capacity and addressing equity through sustainability or resilience efforts	Duluth, MN Buffalo, NY Cincinnati, OH	• Legacy cities have good foundations to become climate destinations • Protecting existing or creating new affordable housing stock can limit climate gentrification and prevent displacement • Community-driven strategies that empower existing residents and CBOs can improve community cohesion and inclusivity • • Leverage existing sustainability and resilience programs • Build on/improve existing relationships with immigrant and refugee CBOs

Climate Migration Case Studies

Slow-Onset Loss: Charleston, SC

Is your city experiencing climate migration?

"The big question now is the next level of adaptation. Do you construct seawalls, do you raise homes, do you raise roads, or do you abandon areas over time? That's kind of our next chapter.

– **Mark Wilbert**
Chief Resilience Officer, City of Charleston (retired)

Sudden-Onset Gain: Orlando, FL

Is your city experiencing climate migration?

"It happens after big events like hurricanes, but I wouldn't say it's a consistent influx of people due to climate—yet. But we may start to see people moving away from the coasts, especially where saltwater intrusion is a big challenge. I do see a future, maybe 20 to 30 years from now, where that may become a consistent influx of people, whereas right now it's based on certain events.

– **Chris Castro**
Director of Sustainability and Resilience, City of Orlando

Impacts on Housing and Infrastructure

Sudden-Onset Gain: Chico, CA

Is your city experiencing climate migration?

"Yes. An interesting reality is you've got a lot of people who relocated from after the fire in Paradise. Now, those people who lived through such a tragedy are getting their checks from PG&E and are able to pay for homes with cash in hand. Our housing market is hot, and that is part of the reason why people who live and work in the community can't afford it. It's disastrous all around.

– **Alex Brown**
Councilmember and former Vice Mayor, City of Chico

Variable Gain: Flagstaff, AZ

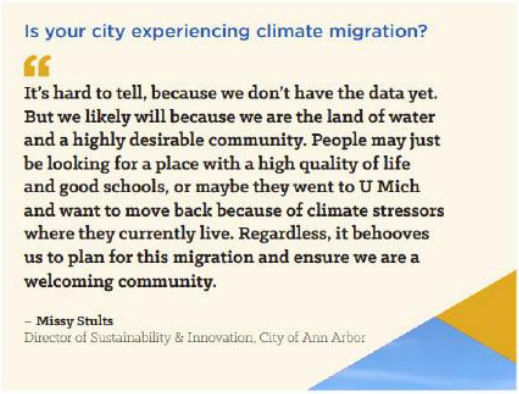
Is your city experiencing climate migration?

"We have limited data to validate the climate migration phenomenon. But we are seeing a shift as the number of days over 100 degrees is increasing in the Phoenix area; we're experiencing associated impacts. We have 'weekend refugees', second-or-third homeowners, and remote workers, so it's expanded beyond just weekend visitation. When you couple that influx with university events and holidays, it puts a tremendous pressure on the city's infrastructure. We have a difficult time planning for and reducing peak demand in energy and water.

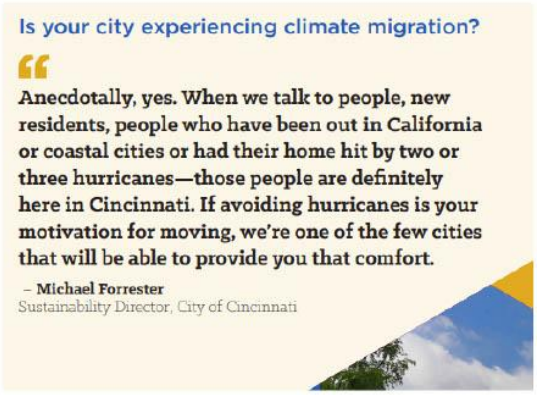
– **Nicole Antonopoulos**
Sustainability Director, City of Flagstaff

Positioning and Preparing for the Future

Ann Arbor, MI



Cincinnati, OH



Climate Migration Categories for Cities?

Climate Migration Categories for Cities?

Don't forget about your current residents!

"Centering equity at the front of the strategy will be critical so that long-term residents can enjoy the benefits of redevelopment. "We want Cincinnati to be for everyone, but we want Cincinnati to be for Cincinnatians too." - Michael Forrester, City of Cincinnati

Climate Migration Categories for Cities?

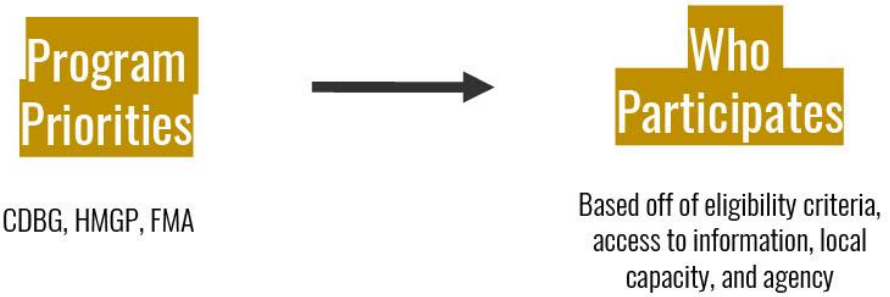
A Just and Equitable Climate Migration cannot be addressed without addressing housing injustice and access

"For more than a century, urban housing development has relied on large-scale, often controversial public investments in hard infrastructure (and, more recently, national insurance programs) to harness and repel the challenges of water. **Urban housing has also been the space and symbol of racial segregation,** which continues to drive enduring inequities in homeownership, wealth, environmental exposure, and neighborhood social conditions (McCabe, 2016; Pattillo, 2007; Sharkey, 2013). These entangled trajectories mean that **any climate policy that intervenes into the environmental ecologies of U.S. cities will also and inevitably intervene into racially segregated housing** long in the making."

-Unequal Retreats: How Racial Segregation Shapes Climate Adaptation, Kevin Loughran and James R. Elliott (2021)

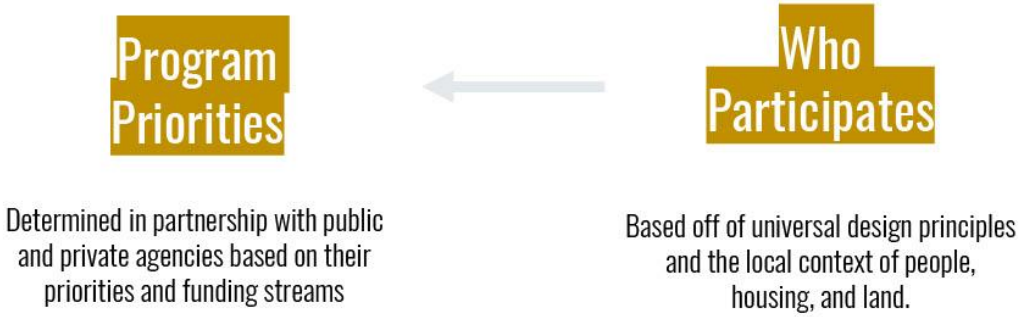
Eligibility Determinations for Existing Programs

The structure, funding cycle, and federal legal guidelines for existing programs limit participation



Designing A Better Buyout

Buyout programs are designed to fit the unique needs and local context of people who need relocation assistance.



A holistic home buyout process asks:

PEOPLE

Who wants to move?

And under what conditions?

HOUSING

Where will they go?

And is there safe, secure, and affordable housing available?

LAND

What happens to the land that gets left behind?

And who will care for it?

Accessible Intake Forms

Community Partners

Trained and compensated for their time - in charge of the conversation and narrative

Multi-modal intake processes

Door to door surveying, paper mailers, and phone calls with trusted community leaders.

Identify Conditions, Limitations, & Priorities

Buyout and Relocation Interest

This section asks about your interest in having your home bought by the government or a non-profit in order to enable you to relocate to a new home.

Are you interested in participating in a buyout of your property if funding becomes available?*

Local governments and non-profit organizations can use public funding to buy properties that have flooded or are highly at risk of flooding in the future. This is referred to as a buyout, home buyout, or property acquisition. Participation in these programs are a voluntary decision made by the homeowner.

- ○ Yes, I am ready to be bought out as soon as funding becomes available.
- ○ I am interested, but I am not ready to commit to being bought out at this time.
- ○ No, I am not interested.

Which of the following considerations is MOST important to you in making a decision about participating in a buyout?

Please answer this question even if you are NOT interested in a buyout at this time.

- ○ The amount of money that I'm offered
- ○ Staying connected to my friends or family
- ○ Safety and well-being of myself and my family
- ○ Access to economic or educational opportunities
- ○ Preference for my current home's location or features
- ○ Other

Understanding Participants' Needs

Level of Interest	Survey Responses	Next Steps
Yes, I'm ready to be bought out as soon as funding becomes available.	"Right now our biggest concern is not dying from a flood."	Priority Assistance
I am interested in a buyout, but not ready to commit to being bought out at this time.	"I have a mortgage loan and would need enough to pay off the loan and a down payment for another home."	Financial Counseling
No, I am not interested in a buyout at this time.	"I am not concerned with a buyout for myself, but many other houses need it in order to better themselves and our town."	Community Outreach

Re-Housing Case Management

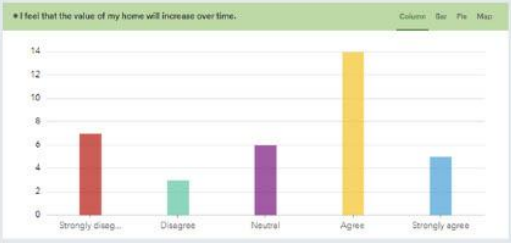
I am interested in a buyout, but not ready to commit to being bought out at this time.

"I have a mortgage loan and would need enough to pay off the loan and a down payment for another home."

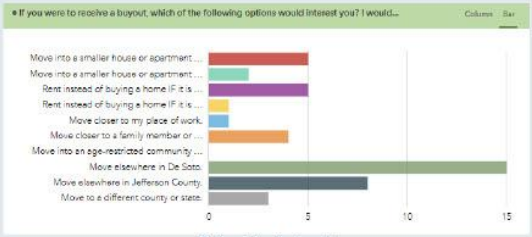
What are other barriers to re-housing that participants face?

- Financial Constraints / Strandedness
- Legal complications (i.e. No Clear Title)
- Bankruptcy/Underwater Mortgages
- Availability of Flood-Free Affordable Housing
- Lack of Mandatory Flood Disclosures for Resale
- Protecting Renters
- Structural Relocation

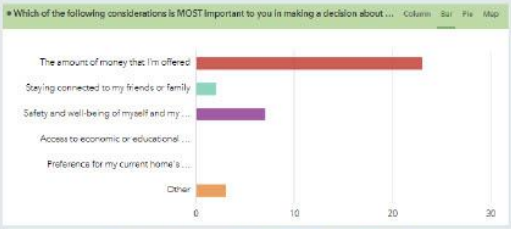
Re-Housing Case Management



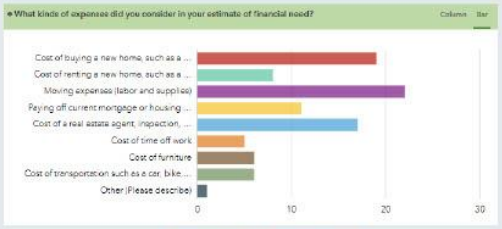
Home Appreciation



Relocation Interest



Decision-making for Buyout Participation



Financial needs assessments

Developing Prioritization

Yes, I'm ready to be bought out as soon as funding becomes available.

- **Disability**: Will people be able to safely evacuate?
- **Health**: What physical and mental impacts are survivors experiencing?
- **Exposure**: What is the relative flood risk of each parcel?

"We do not feel safe in our home due to flooding. We have had to evacuate in swiftly moving water, my spouse is disabled & unsteady on their feet. We fear being trapped in flood water. We have high anxiety & unable to sleep when creek is rising."

"At the time we bought our home, we were not fully explained the possibility of flooding. We aren't spring chickens anymore, my husband is basically deaf without his hearing aids in, therefore it causes a lot of stress at night waiting to get that call."

Key Research Questions

- **Housing & Real Estate:** How will local and regional housing dynamics [in the Great Lakes] shape mobility patterns for residents of different socio-demographic backgrounds from inside and outside of the region?
- **Justice:** How does the climate migration conversation enable or challenge housing justice programs such as housing reparations for redlined communities? How will cities [in the Great Lakes Region] address historic housing discrimination for current residents when planning for future growth or new residents?
- **Policy:** What are the specific regional, state, or local policy levers that can be used to fund infrastructure improvements and investments in infrastructure upgrades, sustainable transportation, etc.?

Architectures of mis/managed retreat: Black land loss to green housing gains (Aidoo, 2021)

- "The reasons why Black people remain in, return to, and rebuild in places they know to endanger them can be as procedural, political, economic, and cultural as disaster scholarship presents for the American population at large.
- Relocation policies and plans that lack transparency and equity hinder vulnerable people from finding refuge for themselves and formulating retreat for others (Binder and Greer 2016; Siders 2019).
- Those who possess the will and the resources to relocate may not be able to identify or afford places suitable for resettlement (Bukvic and Owen 2017; de Vries and Fraser 2012).
- Housing and/or transportation costs, environmental and/or social risk, and access to employment, social services, intergenerational care, mutual aid, and even political enfranchisement explain place attachment and population immobility amidst precarity (Cresswell and Hoskins 2008; Slocum 2019; Roberts 2019).
- In short, situational factors and systemic dimensions of settlement in the USA influence buy-in to moving out in principle and buyouts in practice among Americans of color conscious of a climate crisis affecting their communities, cities, and country."

Gentrification in Receiving Communities

- The National Community Reinvestment Coalition (NCRC) studied the changing rate of socioeconomic status across census tracts of gentrifying US metropolitan areas from 2000 to 2010 and found that 110,935 black residents and 24,374 Hispanic residents were displaced (140). This cultural displacement of communities inflicts chronic stress on residents by increasing financial strain on families, forcing low-income residents to live in substandard housing owing to a loss of affordable housing, and reducing access to neighborhood resources such as employment, health services, and schools (12, 154).
- In urban settings, a significant number of case studies have illustrated why, how, and when local residents decide to move in, move out, or remain in a neighborhood (as examples, see 7, 46, 156, 162, 163). Neighborhoods have place utility for residents in that they provide basic services and resources that enable the reproduction of everyday life. Close-knit neighborhoods have been described as towns within cities and are defined by multiple interpersonal interactions and relationships (46). Neighborhoods by definition are always changing as one generation is replaced by the next, but other forms of change where significant directional demographic shifts take place are a more relevant analogy to coastal communities facing stresses of dynamic climate risk (112). Incremental unidirectional change, through investment, disinvestment, and demographic shifts, or situational changes, such as a reduction in access to the community via the construction of new infrastructure, bring an end to or lessen interactions while others

Home is where the safer ground is: the need to promote affordable housing laws and policies in receiving communities (Li & Spidalieri, 2021)

- Climate change and housing insecurity, whether caused by sudden disasters or gradual gentrification and displacement, is a symptom of environmental and economic injustice, and these complex and interrelated challenges cannot be meaningfully addressed without prioritizing the communities that are hardest hit. 17
- Receiving communities is the technical term used to refer to places where people may relocate to in response to coastal hazards and climate impacts.
- Recommendations:
    - Plan to become a receiving community through local comprehensive plans (general or master plans) by guiding future land use and zoning and leveraging funds for upzoning, infill, and densification.
    - Increase community participation in development processes through processes such as community benefit agreements (CBAs).
    - Adopt innovative funding sources such as CDBG-DR grant funds (with regulator changes), TDR programs, Infrastructure development, bond, and other local revenue streams
    - Develop public-private partnerships with communities such as community land trusts (CLTs) to ensure permanent affordability.

The Elderly

- Aging populations are known to be more vulnerable to some climate shock events like extreme heat and heatwaves.
- Older people are often inadequately prepared for disasters with a majority lacking an emergency plan, adequate information on preparedness, and sufficient backup supply of water, food, or medicine (Al-Rousan et. al, 2014)

Climate Migration Does Not Exist in a Vacuum

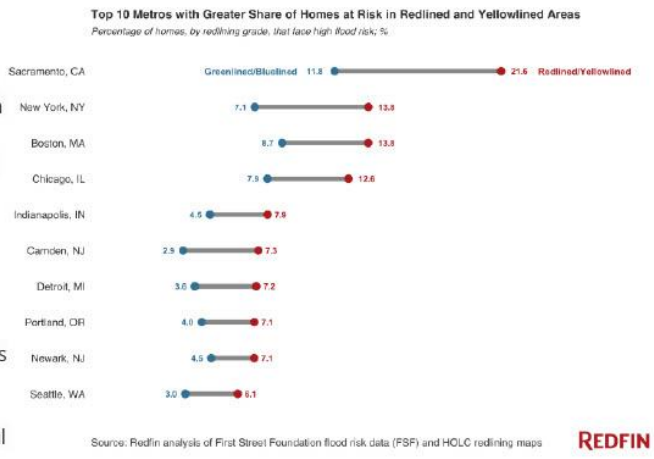
- Climate Change is likely to **exacerbate existing trends of inequality** rather than replace them until large-scale systems adjustments occur.
- **Push factors** drive people and business away from a place (lack of employment or decline of industries, unfavorable weather conditions, high taxes, annual exposure to wildfire smoke or pollution, etc)
- **Pull factors** drive people and businesses towards a place (skilled workforce, strong anchor institutions such as universities and hospitals, walkability, parks, etc.)
- Choice-Limiting factors
    - Low income households, Black communities, rural residents, immigrants and indigenous people are often located in high-risk areas due to decades of disinvestment and racist zoning policies such as redlining. Depressed home values make them less likely to find adequate resources they need to relocate.
    - Residents with disabilities, the elderly and other at-risk populations may be choice constrained when faced with higher risk.
    - Communities with high levels of place attachment may be less likely to desire to relocate to higher ground, leaving them exposed and vulnerable to yet another likely event.

Climate Migration Categories for Cities

Is every city is somewhere in the middle?

Redlined Neighborhoods Face Greater Flood Risk (Katz, 2021)

- Today, 58.1% of households in redlined neighborhoods are nonwhite, compared with 40.4% of households in greenlined areas.
- Formerly Redlined Areas Have $107 Billion Worth of Homes Facing High Flood Risk—25% More Than Non-Redlined Areas
- 8.4% of homes in red/yellow-lined areas face high flood risk, compared with 6.9% of homes in green/blue areas.
- Redlined homeowners have gained 52% less in personal wealth from property value increases than greenlined ones in the last 40 years.
- Redlined neighborhoods are also significantly hotter in the summer - up to as much as 5 degrees
- Flood mitigation resources systematically favor white and wealthy Americans over black, non-white, and poor communities due to CBA and local government capacity.



Renters

- Prior to the 2020 (COVID-19) pandemic, the USA faced a nationwide shortage of seven million affordable and available homes for the lowest income renters. 11 (From Li & Spidalieri, 2020)
- By September 2020…it was projected that an estimated 28 million renters would be evicted from their homes—nearly three times the number of individuals who lost their homes during the 2006–2014 housing foreclosure crisis (Levitz 2020; Murillo 2020) [with] Black and Hispanic renters will hit hardest (Merle 2020). (From Li & Spidalieri, 2020)
- Renters in the USA that are located in areas increasingly vulnerable to extreme weather events are more likely to be non-white, live in homes that may be less resilient to climate events, have less access to post-disaster support, and have less access to pre- or post-disaster resources to enable a permanent move away from the at-risk area in a way that does not also lower their quality of life or standard of living. (Dundon & Camp, 2021)

Mobile Home Parks

Unequal Retreats: How Racial Segregation Shapes Climate Adaptation
Kevin Loughran and James R. Elliott (2021)

"For more than a century, urban housing development has relied on large-scale, often controversial public investments in hard infrastructure (and, more recently, national insurance programs) to harness and repel the challenges of water.

Urban housing has also been the space and symbol of racial segregation, which continues to drive enduring inequities in homeownership, wealth, environmental exposure, and neighborhood social conditions (McCabe, 2016; Pattillo, 2007; Sharkey, 2013).

These entangled trajectories mean that any climate policy that intervenes into the environmental ecologies of U.S. cities will also and inevitably intervene into racially segregated housing long in the making."

https://www.npmews.org/story/2021/10/04/climateproof-duluth-why-the-city-is-attracting-climate-migrants
https://www.cnn.com/2021/04/12/opinions/climate-migration-in-america-california-duluth-sutter/index.html
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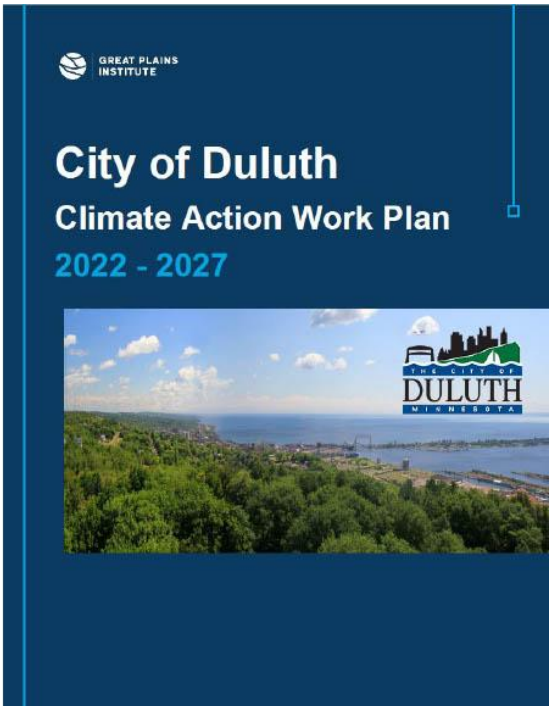
https://www.nytimes.com/2019/04/15/climate/climate-migration-duluth.html

Q: What should we do?
A: Create a resilient community!

Schitt's Creek - "Fold In the Cheese!"

- Adapt to expected climate changes
- Mitigate contributions to climate change
- Repair and improve infrastructure
- Advance equity to reduce disparities
- Protect natural resources/systems

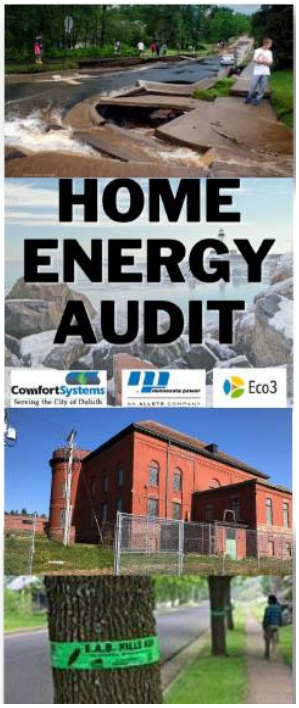


Drive down emissions from City operations

		Actions	Action Leads	Resources Needed
Strategies	S1	**1.1 Achieve energy reduction targets for city buildings and facilities to meet 10% emissions reduction goal, per mayoral term (80% by 2050).** ❑ Complete and implement the City of Duluth Energy Plan and share progress with the Energy Plan Commission ❑ Institutionalize regular benchmarking for all city buildings and facilities ❑ Continue energy audits and assessments and prioritize improving the performance of buildings with the greatest savings opportunities ❑ Track and publicly share energy use and greenhouse gas emissions for City Operations, annually ❑ Communicate successes and benefits of climate action to further community support for more action	Property and Facilities Management, Sustainability, and Communications	Energy Analyst
	S2	**1.2 Continue to improve the fuel emissions factor and efficiency for Duluth Energy System** ❑ Identify clean energy resources to replace fossil fuel inputs; eliminate coal in the next 5 years ❑ Encourage a transition to more efficient hot-water loop for new and existing customers of Duluth Energy Systems **1.3 Improve the efficiency of the water plant and distribution system** ❑ Set targets and identify opportunities to improve the energy use intensity at the water plant and distribution system	Duluth Energy Systems, Public Works and Utilities	Infrastructure for transition away from coal
		1.4 Reduce emissions from city fleet vehicles and employee commute ❑ Complete an assessment of city fleet to identify	Fleet, Property and Facilities Management,	Resources for initial fleet planning are in place

Strengthen community resilience

		Actions	Action Leads	Resources Needed
Strategies	S2	**2.1 Improve the resiliency of the water plant and distribution system** Seek opportunities to improve resiliency of the water plant, including transformer upgrades, burying lines, back-up power, and clean energy procurement options. **2.2 Complete a citywide assessment of vulnerable built (sidewalks, roads, pipes, etc.) and natural (trees, soil, water, etc.) infrastructure** ❑ Manage Emerald Ash Borer, implement strategic planting plan ❑ Develop a plan to minimize risk to infrastructure, prioritizing highest risk and infrastructure located in vulnerable communities **2.3 Expand current CIP offerings from Comfort Systems for residential and commercial customers**	Public Works and Utilities, Stormwater, Property Parks and Libraries, Sustainability	Funding request is pending for water plant Funds required for citywide assessment Staff resources are available for CIP expansion
	S5	**2.4 Develop a stormwater management plan that integrates resilience and identifies financing opportunities and includes these elements:** • Identification of priority parcels for preservation, vegetation quality mapping and repair, inventory natural resource and flood protection opportunities • Prioritization of improvements in high-risk neighborhoods with vulnerable populations • Reduced stormwater runoff flow and volume through green infrastructure and on-site stormwater management • Demonstration of green infrastructure on City property • Recommendations to incorporate green infrastructure into the unified development chapter • Continued collaboration with the Regional Stormwater	Public Works and Utilities, Engineering, Property Parks and Libraries, Parks Maintenance, Stormwater, Sustainability	Funds needed for stormwater planning and installation of stormwater practices



Eliminate barriers, enable action

Strategies	Actions	Action Leads	Resources Needed
S1	**3.1 Accelerate sustainable building design for new and substantially renovated buildings** ❑ Adopt sustainable building guidelines for all new or substantially renovated public buildings and private development that receives public funding or incentives. ❑ Require clean energy and energy efficiency improvements for housing projects that receive City funding assistance to reduce emissions and address high energy burden **3.2 Adopt a building benchmarking policy for public buildings with a voluntary phase-in for private-sector commercial buildings** **3.3 Support state policy and regulatory changes that enable the city to meet its climate and energy goals** **3.4 Incorporate climate mitigation, resilience, and justice considerations into city budget planning process** **3.5 Incorporate climate and energy actions into TIF district requirements**	Planning and Economic Development, Sustainability, Finance, Community Partners	Part-time Benchmarking or Energy Analyst position would be required Utility partners need to prepare tracking and reporting avenues
S2	**3.6 Integrate resilience in the capital improvement plan and internal policy for all city infrastructure projects**	Finance, Sustainability	
S3	**3.7 Reduce per-person, single-occupancy driving citywide** ❑ Review city code and policy to remove barriers and enable more opportunities for biking, walking, transit, and low-emissions vehicles ❑ Enhance and institutionalize complete streets policy to include user experience and green infrastructure, prioritize connectivity for vulnerable communities ❑ Gather early input on street projects to increase bike, walk, and wheelchair access along highly-used routes ❑ Collaborate with DTA to expand first-mile and last-mile	Planning and Economic Development, Community Partners	Code review requires additional resources

Financing and workforce

Strategies	Actions	Action Leads
S1	**4.1 Find a sustainable mechanism to support internal energy funds for continued implementation of the City of Duluth Energy Plan**	Property and Facilities Management, Finance, Sustainability
S2	**4.2 Explore funding/financing mechanisms to reduce emissions from Duluth Energy Systems**	Public Works and Utilities, Duluth Energy Systems, Sustainability
S3	**4.3 Increase funding for non-motorized transportation and improved connectivity (Duluth-Superior Metropolitan Bikeways Plan)**	Planning and Economic Development, Community Partners
S4	**4.4 Seek resources and partnerships to catalyze renewable energy development and energy efficiency, especially in vulnerable communities**	Sustainability, Property and Facilities Management, Community Partners, Human Rights, Community Relations
S5	**4.5 Identify funding and financing opportunities to implement stormwater strategies**	Engineering, Public Works and Utilities, Property Parks and Libraries, Sustainability
S7	**4.6 Seek funding to engage vulnerable communities in city resilience planning initiatives and implementation**	Sustainability, Public Works and Utilities
	4.7 Collaborate with local partners to identify green job opportunities ❑ Increase the number of sustainability-related jobs in the community through workforce and economic development partnerships ❑ Work with local partners to identify and invest in business opportunities that will support sustainability and create new jobs, including those that can recycle waste streams to create new resource materials ❑ Support development and expansion of green-focused product and service lines among local businesses	Workforce Development, Sustainability, Human Rights, Community Relations, Community Partners

CareerForce™
Minnesota's Career Resource

5. Shovel-ready projects

Projects ready for funding opportunities

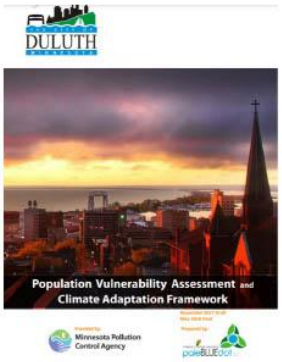
- Stormwater resiliency planning ($100k) – *secured, grant from MPCA*
- Strategic Facilities Plan to prioritize Capital Improvements ($150k) – *secured*
- Gap funding for electric/hybrid fleet vehicles ($200k) - *secured*
- Eliminate coal as a fuel source at Duluth Energy System ($1.5M) – *in planning*
- Accelerate Emerald Ash Borer/urban forestry – ($150,000) – *applied, in review*
- Resiliency improvements to the city's Water Plant ($7 - 30M) – *applied, in review*
- Energy bundle: 1.5 Megawatts of solar, City building efficiency ($4M) – *applied*
- Consolidated public works and maintenance facility for the City ($50M)

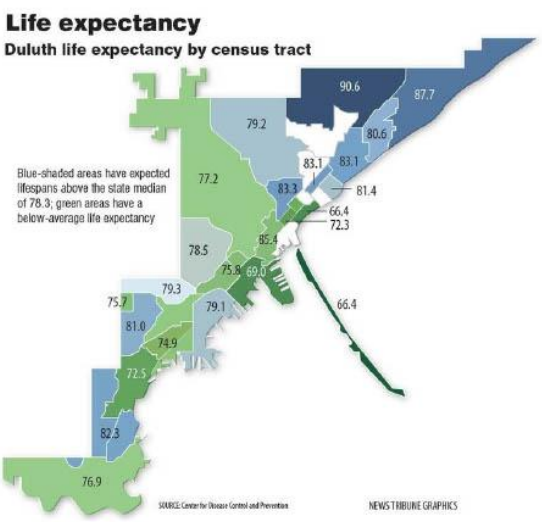
City Sustainability Advisory Team (C-SAT)

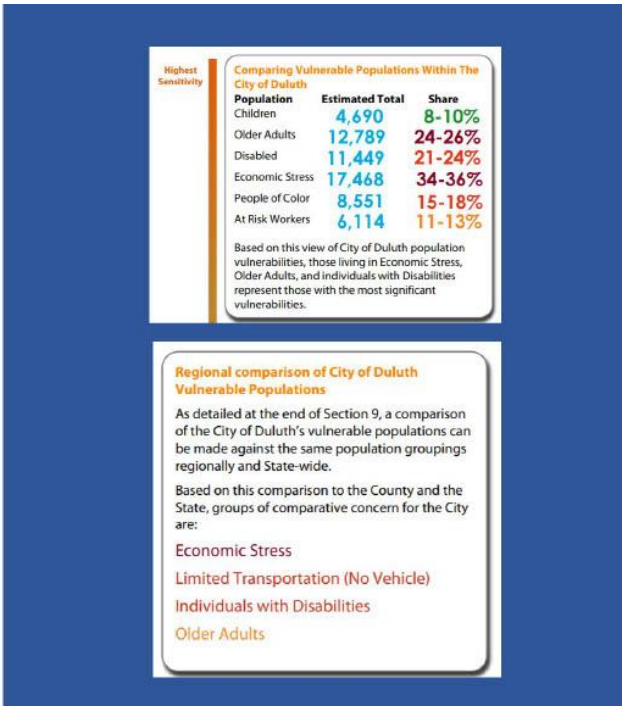
Equity

- Implementation of Climate Action Work Plan must be inclusive, and ensure equitable benefits, outcomes, and impacts

- Population groups with highest vulnerability include:
  - People who are economically stressed
  - People without access to a vehicle,
  - People with disabilities
  - People over 65, especially those living alone







Department of Energy

Blueprint for a cold climate environmental justice neighborhood

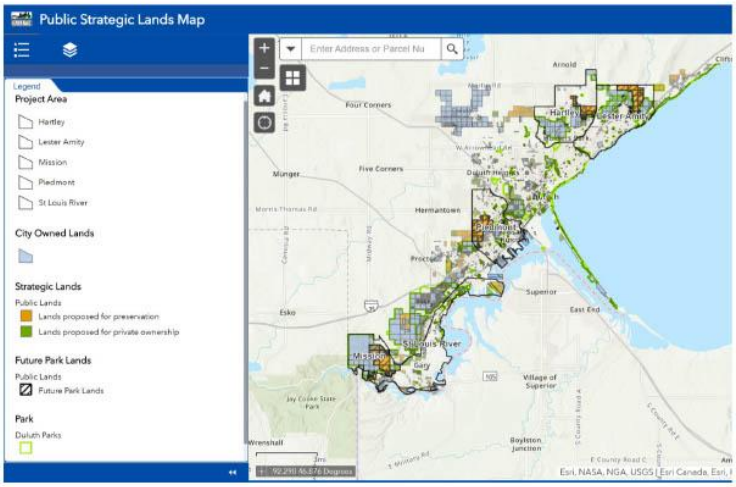
THE PLUM CATALYST LLC

Managing Waterfront

- **Acquire** waterfront land
- Strategically **configure** public waterfront
- **Restore** the waterfront environment
- Formally **protect** waterfront land
- Provide **access** to all
- Foster appropriate **development** on adjoining upland

Open space and natural resources protection

- Strategic Lands Realignment Project
  - Of the 15,000 acres of open public space, 1/3 are not protected from sale or development
  - In progress: acquisition of approx. 2,500 acres for permanent protection
- Natural Resources Management Program Plan
  - Protect high quality areas
  - Restoration and resources needed



What research is needed?

- Case studies, fiscal/technical analysis, storytelling that:
  - **De-risk** climate-informed decision making
  - **Prove** climate actions can:
    - Save money/lower taxes/avoid future costs
    - Improve quality of life, reduce disparities
    - Align with public sentiment
  - **Nourish** courage for administrative & elected officials' climate action

Common Barriers

Organizational Structure
(e.g., silos, board support, etc.)

Communication
(e.g., political will, ideological barriers, lack of public support, communicating uncertainty)

Technical Challenges
(e.g., limitation of climate models, insufficient data)

Resources & Capacity
(e.g., staff time, funding, staff understanding)

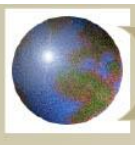
Policies
(e.g., lack of regulation/mandate, few implemented examples, no details in engineering design manual)

Roop & Keeley, 2019

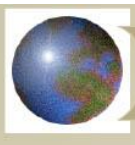
Things flying at me *that are on fire*

Communications and metrics	• GHG inventory, energy/solar metrics • Website, Instgram, PR • Reporting: CDP, Greenstep Cities, City Council
Grants for projects: mitigation, resilience	• FEMA – Water Plant • Stormwater resiliency • GLSNRP • LYB • ACEEE • HBBF • DOE LEAP • DOE RACER • UMN IonE
Internal work	• C-SAT, Climate Action Work Plan, Fund 257 • Fleet Work Group, UDC review • Building Owner Performance Requirements
Community engagement	• Water and Equity – MN Sea Grant • Great Lakes One Water/ReadyNorth • Love Your Block


Dan Walsh
EL Support Teacher
East Middle School
Erie, PA

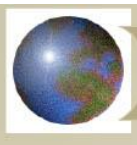


- Experiences
- Challenges
- Opportunities



Relevant Terms

- **English Learner (EL) –** A student who has been identified as not having enough English language ability to reach their full academic potential
- **Refugee** - a person forced to leave, due to war, persecution, or natural disaster
- **Immigrant** - a person living permanently in another country
- **Migrant** - a person that moves from one place to another for work or better living conditions.



Experiences

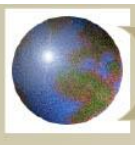
- **Erie School District**
  - Urban school district that serves 11,000 students
    - 2 High Schools
    - 3 Middle Schools
    - 10 Elementary School
  - **East Middle School** serves 583 students
    - 183 English Learners (EL)
    - 95% of students live at or below poverty rate

East's English Learners' Languages

Arabic
Bosnian
Dari
French
Judeo-Persian
Kashmiri
Kurdish
Mongolian
Nepali
Pashto
Somali
Spanish
Swahili
Turkish

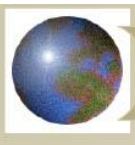
East's English Learners' Home Countries

Afghanistan
Burundi
Congo
Eritrea
Guatemala
India
Iraq
Jordan
Mongolia
Nepal
Rwanda
Somalia
Sudan
Syria
Tanzania
Uganda



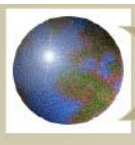
Modes of EL Service

- New Comer Academy
- Push-In Support
- Observe and Support
- Exit and Monitor



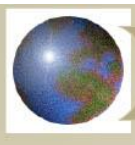
Supports and Partnerships

- Community Schools Model
  - https://www.unitedwayerie.org/our-impact/student-success/community-schools/
- U.S. Committee for Refugees and Immigrants (USCRI)
  - https://refugees.org/uscri-erie/
- Multicultural Resource Center (MCRC)
  - https://www.getconnectederie.org/agency/detail/?agency_id=4638



Challenges

- Trauma
  - Language and cultural barriers in response to trauma
  - https://www.nctsn.org/what-is-child-trauma/trauma-types/refugee-trauma
- Socioeconomic status of schools that receive refugees
  - Fear of authority
  - Areas of high violent crime
  - 16501 Poorest Zip Code in U.S.
  - https://medium.com/@joychurin/the-poorest-zip-codes-in-america-5276a080947f

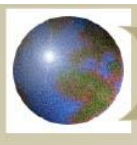


Challenges in School

- Lack of cultural awareness
  - Differentiation difficulties
  - Meeting normed expectations
  - Halal Food
- Bullying
  - Socioemotional curriculum
- Large numbers overwhelm already taxed systems
  - Busing
  - Food

Opportunities

- Inner City Reclamation
  - "They save their money; they pool their resources. They work hard, sometimes two or three jobs. They tend to buy houses in the inner city that others would stick their noses up at. But they see a vision, a house in bad repair, and they fix them up, right in the very parts of Erie we want to be more stable." – Ed Grode, Erie County Resident
    - https://www.goerie.com/story/news/local/erie-next/2020/02/16/they-chose-erie-for-family/1414684007/
- Population increase to bolster financial and political status



Opportunities

- Diverse inner city
  - Refugee and Immigrant Liaison
  - Bhutanese Elders Committee
  - Flag Ship City Food Hall
    - https://flagshipcityfoodhall.com/
- Blossoming culture in schools
  - Culture Nights
  - Culture Dress Days
- Wonderful parent/teacher interaction

Thank You

Questions or Comments

- Feel free to contact me
  - dwalsh@eriesd.org

Climate Migration Considerations for Grand Rapids, Michigan

Annabelle Wilkinson
Environmental and Climate Justice Specialist
Office of Sustainability and Performance Management
City of Grand Rapids

6.2.22

Diverse job market

Steelcase

Spectrum Health

Grand Valley State University

Amway

ENVIRONMENT

Will climate change turn Michigan into a 'climate haven'?

WOOD-TV 8

Published 3:00 p.m. ET July 7, 2021

View Comments

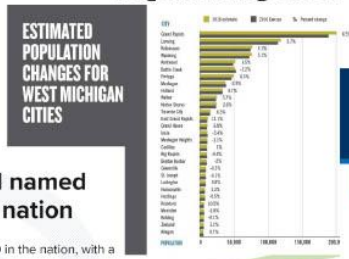
GRAND RAPIDS — Should Michigan be preparing for a mass migration of people in the future because of the effect of climate change on other parts of the country?

Experts behind one of the leading research projects are exploring the idea of "climate havens."

Cultural offerings

GRAND RAPIDS BALLET

Population growth



Good schools

EDUCATION

Grand Rapids high school named best in state, 18th best in nation

Three Michigan high schools ranked in the top 100 in the nation, with a Grand Rapids high school making it into the top 20.

Climate & Access to Water

2

Challenge: Affordable Housing

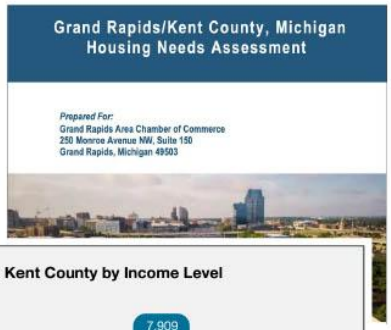
Not Enough Housing

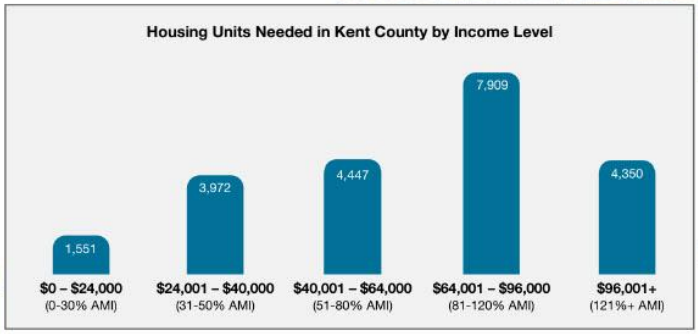
Kent County needs over 22,000 units of housing over the next five years to start to relieve some of the pressure on the housing market and provide more housing options at different price points

Grand Rapids specific - By 2025, at least 5,340 more rental units and 3,548 owner-occupied units are needed to satisfy housing demand and affordability, according to the assessment

Leading to Displacement & Gentrification

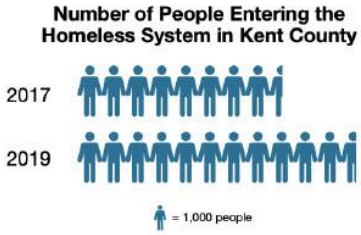
The vacancy rate of rental units across the city is currently around 2-3% and should be slightly higher at 5-6%

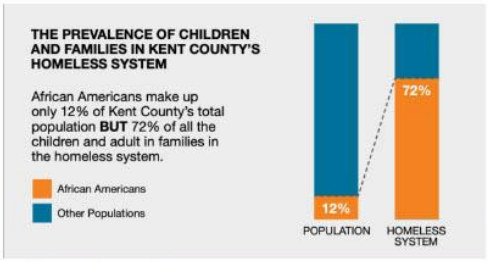


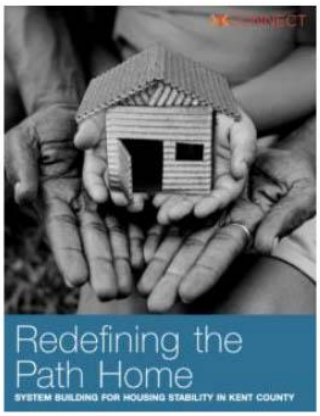


Challenge: Affordable Housing

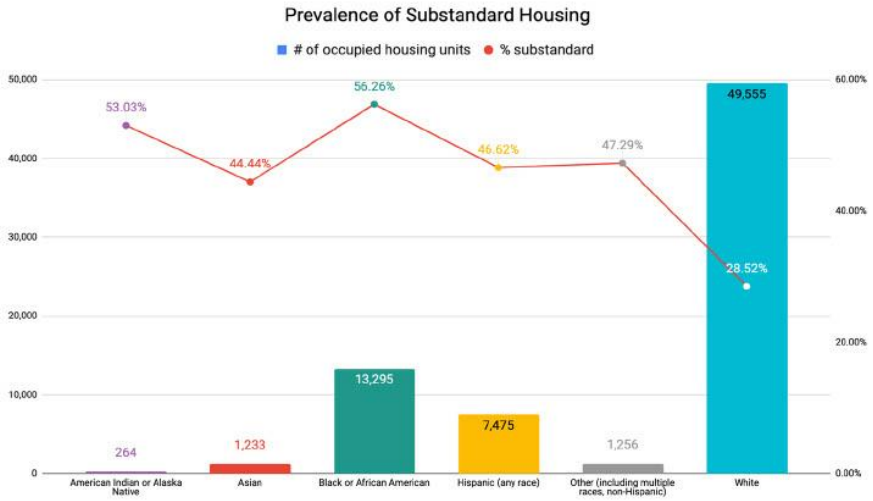
More than half of all of the renters in the city are cost burdened. When the data is broken down by race, Black residents are the most cost burdened population.







Challenge: Healthy Housing



Source: Department of Housing and Urban Development. (2019

Challenge: Transportation

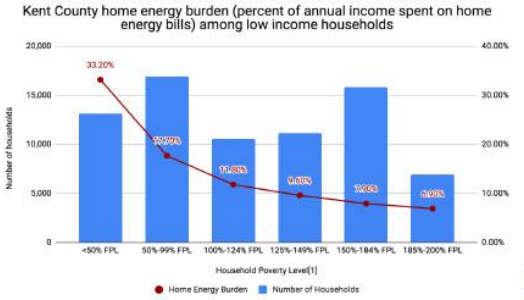
As low-income residents are displaced from neighborhoods in the City and pushed further out into the suburbs there is less accessibility to public transportation and a lower walkability score.

Challenge: Utility Infrastructure

Michigan has some of the most unreliable utilities, with some of the highest prices.

Widespread power outages spark new state website to hold utilities accountable

Published: Mar. 09, 2022, 2:00 p.m.



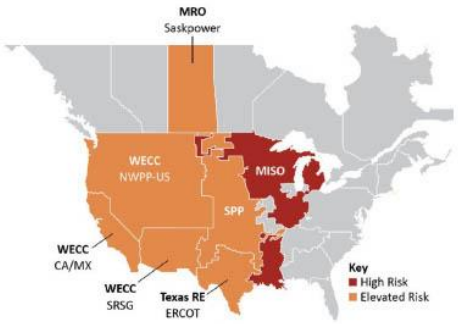


Figure 1: Summer Reliability Risk Area Summary

Seasonal Risk Assessment Summary	
High	Potential for insufficient operating reserves in normal peak conditions
Elevated	Potential for insufficient operating reserves in above-normal conditions
Low	Sufficient operating reserves expected

7

Challenge: Community Safety

The Killing of Patrick Lyoya

Lyoya belonged to a sprawling African diaspora in Grand Rapids who came to the United States seeking safety and a better life. In Lyoya's case, his family arrived as refugees from the Democratic Republic of Congo in 2014. They had escaped war and fear of persecution, and after more than a decade in a refugee camp, they seemed to have finally found a haven in Michigan. That future was taken from them when Lyoya was shot and killed by a Grand Rapids police officer after he was pulled over for allegedly driving with an unregistered license plate.

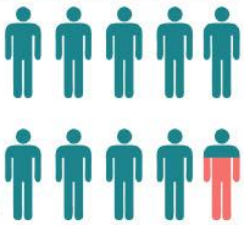
8

Opportunity: Kent County Welcome Plan

The City of Grand Rapids was one of 13 communities across America that received a Gateways for Growth (G4G) award to be more welcoming to both immigrants and refugees. G4G is a national initiative focused on helping communities develop multi-sector plans to be more welcoming to immigrants and refugees.

Welcome Plan is a multi-sector plan to create a more welcoming and inclusive environment for immigrants and refugees

The top five countries of origin for immigrants living in Kent County are Mexico, Guatemala, Vietnam, Bosnia and Canada.



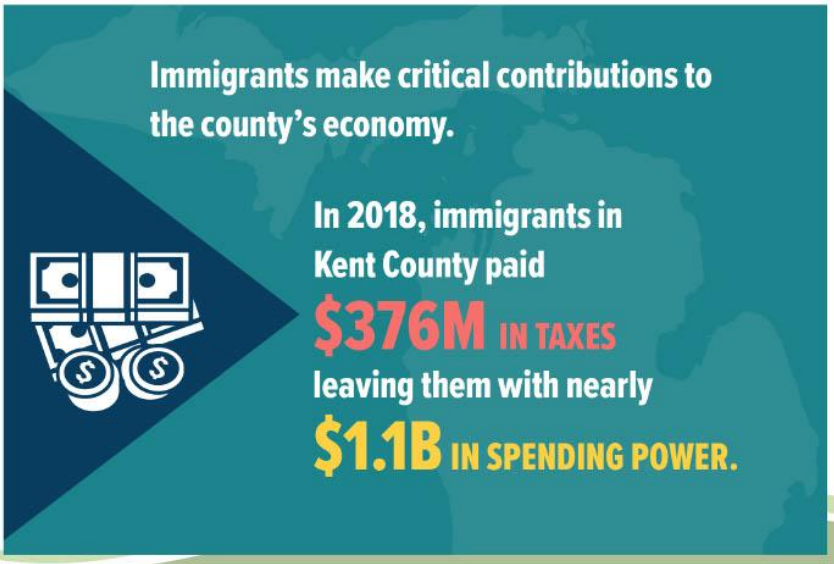
AS OF 2018, 55,595 IMMIGRANTS CALLED KENT COUNTY HOME. THEY MADE UP 8.6% OF THE COUNTY'S TOTAL POPULATION.

Opportunity: Kent County Welcome Plan

"The Welcome Plan is a critical component of the City of Grand Rapids' broader strategy to make our organization and city more inclusive and equitable. Being a welcoming community, both in culture and policy, is key to embracing immigrants and long-time residents."

- Stacy Stout, Director of Equity & Engagement, City of Grand Rapids

Opportunity: Boosting our Economy



11

Opportunity: Community Collaboration on Climate Change (C4)

Vision: Black, Indigenous and People of Color (BIPOC) and historically white environmental organizations will dismantle extractive systems and build new systems to address climate change - centered in human wellbeing, the interconnectedness of life, and access to shared leadership.

Priorities: Energy Justice, Housing, and Climate Change Education.

12

Current Focus: Equitable City Planning

Climate migration will exacerbate already existing inequities within our community – our focus for now is to address those inequities, and to increase quality of life and resilience of our current residents in the hopes that we will better be able to prepare for what's to come.

Affordable Housing

- Affordable Housing Fund
- Creation of Housing Kent and System-wide Housing Spectrum Plan
- Prioritize housing in our upcoming Community Master Plan to shape land use patterns to support housing
  - Greater diversity in types of housing (more multi-family)
  - Increase in mixed-use development

13

Current Focus: Equitable City Planning

Climate migration will exacerbate already existing inequities within our community – our focus for now is to address those inequities, and to increase quality of life and resilience of our current residents in the hopes that we will better be able to prepare for what's to come.

Transportation

- Multi-modal transportation

Bike and Scooter Share Pilot

Resilience Focused

- E.H.Zero Initiative
- Climate Vulnerability Assessment
- Climate Action & Adaptation Plan

E.H.Zero
EQUITABLE. HEALTHY. ZERO CARBON BUILDINGS.

14

Thank you!

Annabelle Wilkinson
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Appendix D: Case Studies Panel and Breakout Notes

Chronological Notes:

intros, icebreakers
clarifying questions
- What do we mean by mobility? other factors beyond climate mobility

question 1

- tool that uses city wide, neighborhood, regional scenarios
- ready to road test - outlines a process for how this might play out
- maybe cleveland will use it with their climate action plan?

- economic discussion focused on population increase and climate improvement
- not convinced this is the case
  - uneven growth within region
  - move past this concept of climate change as a economic boom

- used TPL climate smart cities tool
- used for 2018 cleveland plan
- help identify neighborhoods that need

- won APA plan for climate plan, required racial equity training for participation
- used template tool for great lakes climate adaptation network
- ann arbor, buffalo

- redevelopment ready communities initiatives - sustainable development community

- erie and PA SG doing vulnerability assessment - currently a destination for refugees
- Great Lakes Integrated Science something

- NYC dept of planning - check local agencies for demographic changes following diasters
- CDC social vulnerability index
- FEMA resiliency index - user friendly, not just social

- helps to overlay vulnerable communities with water related issues

- these applications are not always applicable everywhere - i.e., non-traditional models of family when single parent family is the standard; english as a second language is not necessarily a bad thing; what if the data isn't there

- are vulnerability models validity? who created them? are they rooted in the community?

- erie is doing outreach into communities with surveys to inform their vulnerability analysis

- people don't like the word vulnerable and don't like being labeled by that

- vulnerability is subjective

- took maps to communities and it wasn't received too well

  - farming example

- note on report
- justice 40 initiative - dedicate 40% of federal funding to disadvantaged communities
  - has a master project looking at GLRC and this
  - more is going to shovel ready, not into the planning that is required for this
  - a lot have gone to indigenous communities, but there are all small grants
- sea just? see just?
- historically disadvantaged coastal communities tool? State of Michigan?
- federal government can't use race as a factor because they will get sued - so how do they do it?

- NYS is developing criteria for what disadvantaged communities will be under NYS climate act

- not-vulnerability tools?
- more examples communities leaving the effort - uses PUSH Buffalo as an example
  - co production of knowledge

question 2

- will share two case studies

- how does all this research match to the scale of the problem
- studies communities that are doing absolutely nothing
- if we add up all the small plans, does it match the scale of problem

- direct reception with the community

- migration is not something new in this region - since 17th century - have to understand what the push in the past was

- when you are a climate refugee, you are going to go where you know people
- look at those of us here in the GL, do we have family in vulnerable regions?

- link research to where people shouldn't live

Chronological Notes:

What are the important elements of social networks needed to assist communities with mobility?

- dept manages 120 state parks, importance of state park and recreation, system became overwhelmed with influx of people, had to track fecal events due to overloaded restrooms - need to make sure that the system can handle
- What is a social network?
    - many studies and lit defining these things
    - relationships between people and organizations
    - engagement in meaningful connections
    - strong cultural connections (with family or extended family networks)
    - social services that are connected to those social networks that can support in migration
    - culture and language
- People are most driven to areas with family and established connections if they are being forced to leave their home
- What does the new place have to offer vs. what do you have to bring into the new place (formation of new sub-communities)
- Difficult to separate conversations about receiving communities and communities from where people are leaving
- Differences in local culture (ie. names of food)
- Need to be knowledgeable about where people are coming from
- Employment - not necessarily social but important
- Buffalo has systemic racial inequities - how will this change with influx of migrants? - could potentially exacerbate these inequities - don't want to have migrates come into these problems but also don't want the people already living there to be negatively affected
    - how do we weigh the differences in inequality between areas
- Middle Housing: affordable housing, mid-sized, range of options
- Infrastructure - how does this impact social networks?
    - Transportation will support social networks
    - Technology and communication can facilitate these social networks (flip side - takes away from in person)
    - Cities that already have these infrastructure options are the ones that are keeping migrants there longer
- 2 types of migrations: planned migration (have time to make choices and evaluate the social networks there) vs crisis migration (people without the luxury of making the decisions of where to relocate - causes them to move to only a slightly less vulnerable area, not much better than where they are leaving - more forced is more stressful and less decision making skills)
    - lack of resources that could help people choose where to relocate to (decision making tool vs force decisions in high stress situations)
- Need to prevent crisis migration

What research is needed in this area?

- More research on the HOW
    - How do we reduce the trauma associated with climate migration?
    - How do we design more people-centric relocation processes?
- Can we get people to migrate before it becomes a crisis? - need people to start thinking about moving before it becomes a crisis
- What are the thresholds that cause people to leave? What is the tipping point?
    - How does this connect to your economic resources?
    - Need more informed planned migration
- Incentives to be able to move before a crisis vs people who did move because of a crisis, how did they recognize the risk and were/how were they proactive
- How prepared are the policies in place to assist with climate migration?
- What are people losing in the migration? - realizations down the road after the migration
- More longitudinal research since climate migration is a long term process (case studies are great but need longer term research)
- How can we translate research findings into new policy?
- What can we learn from past migrations? (lessons, challenges, mistakes, remedies)
- Dispel the idea that migration is new, people have been migrating for most of history
    - We can look at what has already happened and not wait for something new to happen
- Gentrification and social inequities

Panel/Breakout Session Title: Case Studies Breakout, Group 3

Discussion questions:

What law and policy developments are needed to help communities plan for mobility?

What research is needed to inform these developments?

Chronological Notes:

- Introductions
- What law and policy developments are needed to help communities plan for mobility?
    - people with a lot of money move to places with a low cost of living
        - need policies to protect people that are already living there, against climate gentrification or also green gentrification (cost of living rising)
        - policies to protect affordable housing
    - planning for people who are lower income who are going to have to move
        - most people did not move into less vulnerable neighborhoods
        - need to build a lot more housing
            - overcrowding, gentrification, impacts on health could result
    - misery is profitable
        - speculators are buying up a ton of land assuming people will want to move in. this is driving up the cost of living
        - policy of land trust that can displace some of that speculative behavior
            - municipal land banks
            - public funding to allow people to buy up land
                - How do those investment mechanisms operate in theory

        - funding is the biggest concern
        - buffalo has hot housing market
- maryland has program called program open space
    - opposite of development
    - buys areas to prevent their development
- groups that remediate or respond to disaster have good intentions
    - community and environmental groups fragments
    - don't know developers
    - policies driven by handful of people
    - How do we get influence and work with developers?
        - connecting nonprofit, planning sectors with developers
- states have sovereignty
    - no one has figured out how to invest in a place and not have it from being gentrified
    - need to have conversations about single family zoning
        - many accumulate wealth in the home
    - send clear signals to developers and through the market and stay with those signals
- local governments, planners, just starting to realize these issues
    - planners need to do the hard work of planning for the future
    - need to be tuned and aware of these conversations
    - Can we get rid of zoning? Can we densify?
    - in many ways the state needs to force local governments to be proactive
    - need sustainability and resilience elements to our plans
    - state governments have a lot of power through the allocation of funds
- one challenge in rural areas
    - absorb a lot of migrants and refugees
    - local governments have little to no planners
    - communities vulnerable/ prone to bad policies
        - may not proactively plan
    - group thinking around sustainability are not present in rural communities
    - need more planners in these areas
        - may not be attracted to these communities
- How can we build intergenerational wealth in other ways? asides from home ownership
- healthy interdependencies, need regional planners
- low-income neighborhood becoming carbon neutral
    - Missy?
    - energy, safety, health, assessment
    - going to cost a lot of money to renovate these homes but market isn't going to do it
    - they go to the communities, they don't make the communities come to them
        - embedded planning
- Rochester minnesota
    - people lost sense of community
    - engaging people in the planning process
    - somali immigrant community
        - designed women's only fitness center
- those who have funding from the state were the lowest quality
    - they don't have the capacity

        - need to invest in continued engagement
- What research is needed to inform these developments?
    - applied research needed
        - staff research that is applied
        - work together
        - participatory research
            - that is driven by the community
    - lifelong shared research agendas between researchers, local officials, and the community
    - lack of research on how regional governments could benefit local governments
    - climate migration in u.s as a whole
        - lot of research is done at the international level
        - assumption is people will adapt, technology will keep up
    - lack of time to stay up to date on the research but time to implement and do projects
    - investment in communication channels
        - how do we disperse the findings more broadly?
        - disconnect between what is rigorous for policy and what is needed for research
    - storytelling, how do we get the research out
    - importance of zoning and land use

Austerity in Motion: How the Flint Water Crisis Began

- Trying to save the city money, switched from water from Lake Heron to Flint River
- Residents started getting sick and skin rashes
- Detecting high levels of contamination
- Switched water back to lake heron

Mixed Method Project

- How do people understand how the water crisis began?
- had a couple sites over the course of a couple summers, all day long (Salvation Army and Market)

Question for Flint residents: Was it even an environmental crisis?

- most people said it was
- people thought it was a very big issue and should be getting more attention
- Differences in beliefs from white and black communities (white communities tended to downplay the situation more, whereas the black community thought it was a big deal and needed to be addressed)

Research Question:

In what ways are these climate risks exacerbating the impacts on underserved and marginalized communities?

1. Climate vulnerability in Erie Co
2. impacts to households in Puerto Rico due to power outages

Western NY has been experiencing extreme heat

Compiled data about areas in WNY that would be more/less sensitive to extreme heat

- looked at socio-economic factors
- housing/landscape factors (pavement, vegetation)
- age, race of population

Case Study: Assessing the Health and healing Impacts of Infrastructure Disruption of communities in Puerto Rico

- More household disruptions from households that reported a disability - experienced more mental health impacts
- Households with young children more likely to report physical and mental impacts
- Lower income households have to spend more money and time to deal with outages to perform basic household tasks
- Rural households reported more severe health and well being impacts

- Climate change impacts are already happening and it is affecting everyone (every area in the country will be affected in one way or another), people are already being displaced
- What does the news/media say about this?
    - Lots of noise in the media
    - Two types of migration: Sudden onset of events (shocks) vs. slow onset of events (stressors)
    - Shocks: natural disaster, hurricane, extreme precipitation
    - Stressors: extreme heat, impacts to crops

- Climate change is likely to exacerbate existing trends of inequality
- Push factors (drive people away from a place) vs. pull factors (drive people and businesses towards a new place)
- Choice limiting factors: redlining, renters, low income residents, people with disability, elderly have limited mobility options, place attachment
- Is a typological framework useful for cities dealing with climate migration?
- Chico, CA - experiencing out migration and abandonment of properties
- Cincinnati, OH - current residents being pushed out by new migrants coming in to buy houses

Panel/Breakout Session Title: Underserved, Under-resourced and BIPOC Communities Breakout Group 1

Chronological Notes:
What additional social-cultural-economic factors are impacting relocation decisions by marginalized communities in the face of climate change?

- cost of living, especially in high cost regions, and in consideration of buyouts

- amenity migration - slow on set migration will be based on amenity - this mayl be to small and rural communities
- but how does this impact the current population, who are priced out - gentrification

- hard to quantify the different between climate migration and regular migration?
- one factor - sea level rise
- also, where you have family and friends

- conflict, disasters, and other big events
- also, how does this lead to conflict - resource scarcity, crop failure, leading to politica change

- access to jobs - example - anchorage, alaska drawing in people from pacific region - once an individual is established, other family members come

- availability/access to resources to relocate

- social infrastructure - support systems for arrival,

- policy implications - people are steered in places based on a variety of factors
- also, think about secondary migration

- the majority of people don't move, because it's expensive - most marganilized people will not be able to move and the impact may be by displacement from other coming in
- GL will not have disaster, will have more in migration by people who have means and connections to move in and displace

- ann arbor will be a destination for affluent, which will push out existing people - amenity migration is already happening

- merge streams with non-climate related disasters
- climate change is making everything more chaotic
- instead of climate migration, it is migration in the an era of climate change

- chicago - large african american migration out of city - moving to atlanta and southwest suburbs (flood prone areas)
- how does this relate to access to reproductive health and other political-cultural factors

How do you scale-up citizen science programs in minoritized communities to move it beyond its currently niche nature?

Panel/Breakout Session Title: Underserved, Under-resourced and BIPOC Communities Breakout group 2

Chronological Notes:

- Impacts -
  - worse urban heat island effect
  - urban flooding
  - impacts are exacerbated by existing inequities
  - lack of access to mitigation resources (e.g. air conditioning)
  - shocks and stressors - more extreme

What are some strategies to reduce the impacts of climate change on BIPOC communities?

- Engaging with those communities
- Increasing jobs in Green Infrastructure from more diverse communities (e.g., Duluth targeting black youth for GI jobs) - could replicate that elsewhere
- Address inequity in infrastructure services
  - decentralization around energy or water systems?
- Outreach and education is a key part of it - especially with "frontline" communities
- Do outreach at the beginning of outreach process so community members can provide input at outstart (especially important for indigenous communities)
- Outreach needs to include listening to communities
- Humility is important
- Improving capacity to seek resources (e.g., assistance in grant writing, staff to implement work before waiting for funding to come along, etc.)
- Build awareness of the impact of terminology (some have negative connotations, or are not well received)
- use thoughtful terminology with the appropriate groups
- do climate action planning through a equity lens
  - identify communities in responsible ways
- How to go about doing targeted work in vulnerable communities?
  - Note associated tension with doing that
  - should also do outreach in non-vulnerable communities to support larger effort
- Build capacity by working with the organizations that are already trusted partners

What role does education and awareness specifically play in mitigating impacts?

- it plays a BIG role
- context-specific and timing matters
- can make solutions that are more sustainable that work for those specific communities; instead of imposing something on them; can create plans that have long lasting impact
- importance of co-production
- Increases buy-in
- SHould be reciprocal relationship; academic approach can and has been harmful
- Intersectionality is important - people self identify in many different ways; note that an organization might not be representative of a whole community
- Strategic education about awareness; note that communication of anticipated climate impacts has different levels of effectiveness for different groups; terminology resonates differently with different groups
- Should also target non-BIPOC communities so they can be part of the regional solution; "we don't rise to the level of our goals, we fall to the level of our systems"

Panel/Breakout Session Title: Underserved, Under-resourced and BIPOC Communities Breakout Group 3

Chronological Notes:

Q: What additional social-cultural-economic factors are impacting relocation decisions by marginalized communities? How did those factors come about?

one of contradictions in research and work, you have strandedness (inability to move) and forced-relocation to move because they don't have access resources to stay in place; as costs increase (due to building codes, etc.) and quality of life is declining -> situation is not straightforward; investment decisions of local jurisdictions matter

need to distinguish between low-income renters and homeowners; for Puerto Rican population, renters were often ones to move vs. homeowners b/c not tied down to the house; area for future work

what if climate impacts increase share of population considered marginalized? At the same time number of places that are not vulnerable is shrinking; competition increases (threat multiplier)

housing affordability could apply to both renters and homeowners; also affects relocation and affordability of current community; housing is becoming too expensive within areas (e.g. Miami)

economic services (extent to use of formal vs. informal markets), e.g. check cashing market, family for childcare, and access to services affects ability to move

jobs, business ownership can make it difficult to migrate; if you own a home and value is low because of impacts, you can't get rid of property/sell (affects ability to move) -> can't get fair market value for property, what do you do?

- also impacted by racism

access to digital services, e.g. broadband

chain migration is important, as well as intergenerational shifts -> we were always going to be here, but now families are relocating after disaster (e.g. Katrina, Ida); increasing stress and anxiety for people living in high risk areas

- also affects economic opportunity; access to water resources

jobs and business component; closing down a business, e.g. barber shop, has significant economic impacts

people coming in have more money than local residents (Duluth) and can afford to fix things up; landlords sell their properties because they can make more money

cultural perspective - people have deep ties to the land; why should they be forced to move?

Q: What information is needed to address these impacts?

more storytelling and lived experiences

just ask people (community surveys) how they are thinking about these issues -> affects policy

- timescale, how people reach decisions

mental health -> needs to build it into policy/framework

understanding of impacts over time (e.g. household/social burden), you're moving often from equal footing to being worse off

- monitoring and evaluation
- What are some metrics that can measure "successful" migration

natural climate solutions; what to do with land that's bought-out? Vs. Turning it into turf; could improve conditions
Oliver: total cost of mobility? How to factor in distance? What are successful strategies to lower that cost?

- how to factor mental health into those costs
- Societal costs
- For renters, security deposits, first and last month rent; how can local gov'ts learn from existing and on-going studies, also at state and federal scale
- Leadership in crisis; how to be responsive and not reactive

climate migration and violence

- collective mental trauma

Appendix F: Needs of Receiving Communities Panel and Breakout Notes

Q & A

- If error bars are too large… can also identify the maximum # of people that a city can handle. Then we could guess how many people may need to migrate. Note that they don't line up. What can your cities handle?
  - Duluth - pop of 80K (down from 100K in early 80s) - so could easily take 20-30K people
  - Ann Arbor - it depends… from a social perspective, some would say zero, others would say as many as we can. From a logistical perspective, could likely handle 40-60K if additional housing was built
  - NW IN - 800K - 1.2 million pop for 2050 plan; has rail stations planning for more densely populated communities around stations; already working to create space for influx of people
  - all together - room for 500K people

- How long will climate migration planning be necessary based on climate change projections?
  - Need to be working on this forever; don't stop doing this (Missy(

- In this planning, how do you account for the industry and communities that aren't included in regional plans? (e.g., Fon'Du Lac band in the Duluth area) How do you think about including areas outside jurisdictions?
  - NW IN works closely with other regional organizations outside of their area - directors of different regional planning orgs get together frequently (3-4 times a year) to discuss things that affect their larger area
  - Duluth - regional relationships can be challenging due to the rural / urban push and pull; the FonDuLac Band is very advanced on their climate resilience activities and a lot Duluth can learn from them; recently had a meeting with a collection of regional planning groups; have a long relationship with other groups related to stormwater management (but climate change makes people nervous to discuss)
  - Ann Arbor - have a group of over 100 organizations to help with coordination
    - do a lot of scenario planning
    - If one strategy fails, have others in back pocket that can already have some momentum

- What are some examples of effective storytelling? How can we better tailor our storytelling to those who think of climate change as unpalatable?
  - NW IN
    - did 3 "future states" (got in trouble for using the term "scenario", because federal transportation law requires that you pick a preferred scenario, and did not want to do that in this case)
    - did different stories about what those future states would look like.
    - Used those stories as the development criteria by which they fund future transportation investments;
    - had hand-drawn illustrations for those - never underestimate the power of visual aids
  - AA:
    - Daylighting examples of sustainable business; normalize through plaques around town that tell those stories
    - Have the people who have experienced benefits from the changes to share their personal stories - resonates better
  - Duluth
    - take data and metrics and put them in a story that will emotionally appeal to people

Panel/Breakout Session Title: Receiving Communities Breakout Group 1

Chronological Notes:

These questions assume municipalities want and/or know how to assess risk? Could be a requirement for funding or tie it to Federal grants; need a community-driven process. Does the need for ID risk come up in the comm-driven process? Depends on facilitator

Are there ways people might be talking about CC and they don't realize it? EX: been sustainable all along, hanging clothes on line– things families of color have done out of necessity but also sustainable practice

How do we use the info that's out there?

- Make info relatable to the audience; know your audience
- make them care; don't overwhelm them
- talk to them at their level

USDA SNAP cards: USDA provide incentives for people to learn things; ex: more SNAP points if they learn X

What information do communities need to assess their risk to climate change impacts?

- What information do communities have?

What	Where
Rising water levels and erosion along shoreline	
Many comms know what their issues are	need to be careful what you tell them; perhaps learn from the communities and not tell them what they already know are impacts; more community-driven data; less reliance on models
What timelines make sense here (i.e.e, when talking about buyouts and things like that)?	
Timeline Is important; they may understand what they're experiencing today but they many not understand how bad it could get; 30 year mortgage; other credible timeline sin their life (kids graduating HS; retirement; etc.) milestones instead of model timelines	
Conversations about thresholds/tipping points (how often flooding)	both ways; listening session from community and also provide the science; data-informed timeline; oriented around self-orientation and local scientists bc they know the impacts of their communities
Better ways to address uncertainty in CC modeling	social scientists
Gauge from utility bills; provide and receive information; in water bill provide some basic literacy	Utility bills; already established relationship
Tips about utility usage given different conditions; surge charging	Utility company/muni
Availability of food; Erie Co PA food deserts	
Localized/customized materials	Within the community/trusted leaders is most

	useful in directing resources to those of greatest need
climate info	USDA SNAP cards
practical info (how do you know if food is safe when power out for 3 days; water in basement, what do I do)	
Give people options and relatable examples	
Visualization; scenarios; etc	
Promote inclusivity and equity in conversations; put moratorium on tax increases to prevent pushing “locals” out of the market with influx of more affluent	

CoastSmart Community PRogram was brought up as an example of a way to interact with communities

Indigenous people and their responses to CC; valuing local knowledge can likely be transferred to non-Indigenous populations

Affordable housing for refugees; make cities and neighborhoods more welcoming

Recommendations or Major Themes: (bullet points outlining key recommendations and/or themes in conversation)

- Putting power back in comm member hands
- a lot of precursor questions before we get to real questions
- don’t make assumptions
- effectiveness of practical simulations
- Incentivizing CC knowledge and tools
- Be mindful and kind when talking to communities
- Grounded dna tailored messaging
- Trust is most important thing
- Defining what comms need now and how impacts exacerbated in future
- Use tech interface to disseminate info
- Spatial data t see how impact on their house/places they love
- Learn what the comms want so the data can be tailored to fit their decision-making needs
- Engage large scale infrastructure (international refugee)

Questions for Immediate Follow Up: (if applicable)

It’s important to think about the HOW

Panel/Breakout Session Title: Receiving Communities Breakout, Group 2

Questions:

What research is needed to better understand climate impacts on human systems and how they respond? What are barriers to using research in planning and how can we overcome them?

Chronological Notes:

- diffusion of innovation, from early adopters
    - need range of communities thinking about this
    - learning from leaders in this space
- volatility of community attitudes as a challenge
    - How do we measure and change community attitudes towards climate migration?
        - research tools to measure these things?
        - Who are we changing our city for? Are we open to migrants?
- would be interesting to understand attitudes but also who carries these attitudes?
    - the movers and shakers that are going to set or influence these policies
- climate is going to cost us money
    - invest today in the future that we want
    - cost of proactive investments vs avoided impacts
    - total life cycle costs
- How do we do a better job at valuing life?
    - How does this factor into a cost-benefit analysis?
    - we discount the lives of low-income BIPOC
    - there is a deeper humanity to how we better understand the impacts
    - current system that we use to measure is flawed
        - communities are differentially impacted. There are tools available in social sciences / other fields. How do they translate? Can they?
- hurricane sandy: raised homes in long beach
    - hispanic population left because it was no longer affordable
    - language/ education/ race barrier
    - need to create awareness among different community groups
        - not everyone understands climate change and the impacts

    - need to better understand the housing stock and population fluxs
        - some communities can't handle influx
- what is the catalyst to get someone to proactively relocate rather than waiting until the last minute, until it's hitting you in the face
    - What is the action point?
    - different priorities. single poor mothers may not have climate change on their minds for example
    - How do we get people to think about climate change?
- What do we do with uncertainties? immigration will happen unplanned
    - uncertainties and time scale as barrier
    - math needs to be in everybody's faces
    - growth will happen whether it is welcomed or not
        - not a question on if it's going to happen but how's it going to look
        - the city can only handle 20,000, what will you do when more show up?
- funding for strategic planning for when disaster happens
- people with less resources ARE proactive with planning because they have limited resources
    - conversation that they don't, feels patronizing
    - they are already being impacted
    - climate change is not only a topic for the elite
    - we have plenty to study starting today, people are already getting displaced
- world is always changing, there is a need for basic research to understand how our actions will play out
    - having the information may not change people's behavior ultimately
    - need to improve decision making processes
    - people hate change
    - role for research to take place, researchers need to better understand the political processes
        - need to better understand the context and legal systems for the research to be effective
        - barrier and disconnect between theory/ research/ and practice
    - need to have hard conversations
        - reasonable people can disagree
        - we're losing the ability to talk to people in a reasonable way

- shoreline recession in the great lakes, people don't realize we have been dealing with this problem for some time
    - we can't afford to build the seawalls that will destroy natural systems
    - damage to coastal infrastructure
    - people don't want these conversations to happen: developers and realtors
    - disaster benefits developers, almost a clear slate
    - having the science won't solve our problems, we need to engage in political conversations
- role of rural communities
    - different resources and services available
    - urban rural divide is important to understand
    - these areas have local farms, they protect our water
- What other sectors will be impacted by migration other than housing? food systems
- economic development folks in the GL, are going to start marketing as a climate destination without considering what we are discussing in this workshop
    - How do we talk to these folks? If we use climate migration as a marketing tool?
    - topic of climate migration is an opportunity to bring both sides together
        - it can be a marketing opportunity AND an informed / awareness opportunity
- systemic approach, how do we approach external factors that you can't control for
    - need to understand state codes
    - can only legally suggest best practices
    - need tools to facilitate the conversations
- service learning opportunities in universities
    - get students involved
    - Someone else disagrees, students are not helpful, their projects are for class credit and are not sustainable or beneficial or valuable
    - students can provide manpower, they can be boots on the ground,
        - we can mentor students
    - some universities have eliminated the project components of sustainability courses
- politicians do not get rewarded for proactive behavior
    - what would make sustainability and resilience efforts more urgent

        - what kind of research can convey a moment of panic to our elected officials so that they act
        - how do we tell them it's not about what the public wants but these impacts will be felt regardless
        - This creates a problem, but what is the solution? What is the action plan? How do we change our systems? Our systems perpetuate inequalities
- maybe a session needed on building better bridges between research and practice
    - researchers are holding information back for statistical purposes, this is arguably unethical
        - but researchers shouldn't be too fast and loose with their work, we need credible work
        - data is not wrong, the conclusions you draw from it is wrong
        - we need to have trust in the people who are receiving research
            - our planners can handle uncertainties
    - the general public doesn't care about the numbers/ the research/ peer reviewed articles

Panel/Breakout Session Title: Receiving Communities #3

Chronological Notes:

Q1: Information needs?

- migration has existed in the region for a long time; with history of migration - there wasn't planning or data, what are the concerns if we operate without the data?
    - This is an opportunity to plan; is what we're doing enough?
- How do we calculate the capacity of communities?
    - Cleveland (1 million to 400 thousand people); doesn't mean these places are ready for huge influxes of population
    - If we want to look like not planning: lots of sprawl (e.g. Phoenix); people currently are not coming to the Midwest; when they come back, they will probably go to places where there hasn't been a lot of in-migration; this impact on a small town is greater than a bigger city; communities want people to come in
    - Past migration has increased inequalities; how do we prevent this?
    - Erie, PA: cost of living is low, so lots of Afghan refugees are coming in; school systems are all being taxed, as well as public transportation; it's now an emergency; if there had been collaboration, the school system could have prepared by bringing in interpreters, etc.
- Benefits: resource guide (lessons learned from the past); options for building capacity for services
- Rochester post-Maria, huge influx of Puerto Rican migrants = strain on schools, housing, etc.; not to mention strain on migrants and their families; how can we take those lessons learned and make communities more ready for next Maria
- How do our communities feel about people moving into our communities
    - What are strategies for getting people on board with migration; it's going to happen no matter what?
    - Storytelling could make a difference
- Katrina lessons learned?
    - there is a good study that exists -> we don't have great tools to study these issues

- Who's having the conversations about climate migration and build political will to start taking on these topics; this may not be driven by data; how has population change caused upheaval
- Strong incentives from economic development community, without the studies, leads to social unrest, exacerbates problems; monetary incentives obscures challenges
- Calling GL a haven is misleading; water challenges!
  - These studies do injustices to the cities at the top of the lists; huge investments would be needed to bring dilapidated housing up to code (Rusty); now these devalued properties are being bought up by speculators to make money
- Worldwide up to 1B people could move due to climate change, but how are these numbers being developed?
- Natural infrastructure; people flock to the outdoors (Greg); do we have enough of this information?
  - We might have people coming in who do subsistence fishing (education issue when the fish are making people sick); also issues of loving resources to death and how that increases costs
  - Stress on these resources as more people move into these communities

Q: what resources do communities need to put this information into action?

- Other than staffing, $?
- $ needed for education, translators, interpreters
- Contaminated soil for gardening; migrants need to know about these issues
- Good organizers (Push Buffalo); but these groups can run into roadblocks with local government; how to make these organizations and actions scalable?
- Consistency in policy; how to get these processes, systems align over time; Buffalo has no climate action plan
- Planners and planning commissions have power but fly under the radar; education on planning commissions about climate and sustainability, investment in planners; these people also connect with NGOs, etc.
- Need to inform decision makers
- Information needs to be public and accessible; can also get data back as you help migrants learn about processes, etc.
- Ordinances and best practices; rural communities don't have planning capacity, but if they can adopt something that's already half-baked could help
- Open data policy; data-thons; leads to really interesting insights from diverse perspectives
- Pay communities to participate in research at the same billable rate
- Emergency design planning = possibility for investment, e.g. design charettes
- What are resources that don't require funding? Local governments need residents to take responsibility for action themselves, too

Appendix G: Research Notes

Panel/Breakout Session Title: Research Data Breakout Group (Day 2 PM)

Chronological Notes:

KEY:

Group 1: black

Group 2: purple

Group 3: green

Group 1:

1, 2, 4, All Activity

First set of questions:

Where are we in this work now?

- "larval" stage: minimal research has been done, many challenges to overcome still
    - still need to see how climate interacts with everything and have a better understanding of climate impacts
- international climate migration research is at a larval stage but national might be more like "conception" stage, not quite larval, but overall everyone agrees with it
- mostly theory and general understanding, lacking in context specific information and need more detailed information about thresholds
- moving companies have a lot of great data related to migration because they are helping people move but then you run into issues with privacy
- migration theory tells us how people are going to be moving but we don't necessarily want it to happen that way
- we know a lot about historic migration and climate but it's still difficult to make predictions about climate induced migration
- lack of political scientists working on this issue even though it is a political subject
- What regime type (ie., democracy, authoritarian) will best handle climate migration
    - Money is being wasted on these kind of non-actions or non-critical issues
    - some research is just not very helpful in moving things forward
- Knowledge varies across fields
- Need a better understanding of what individuals are doing within disciplines, more inter-/trans-disciplinary knowledge sharing

What parts of a network are already available?

- opportunity to work with existing refugee resettlement organizations where a lot of work and goals overlap
    - also with migration researchers, human rights, psychologists, etc.
- Arctic Council - sustainable development group, looking at migration issues, climate impacts - this would be a good framework for other climate networks
- Climate Pipeline Network - helps to connect climate researchers and students (academic)
- Flash - insurers
- IBHS - Insurance Institute Business of Home Safety
- GLCAN - Great Lakes Climate Adaptation Network (funded by GLISA)
- Out Steps.org - lower great lakes sustainability network, focus on sustainable development goals, brings in stakeholders engagement

What are the resources?

- data and data accessibility - less open source data available in US compared to CA, a lot of data is not accessible to the public
- issues with data lagging too (postal service change of address for example)
- using cell phone data to track migration, insurance data but difficult to get access

What research is being done?

What structures exist?

Second Set of Questions:

Where do you want to go?

What do you want a network to achieve?

- something that can help translate data into action
- develop close relationships with practitioners to share resources and inform research questions
- training on ethical issues since this is dealing with people, revisit research ethics, continue to be self critical to constantly improve upon research ethics since lives are at stake
- network could help us ensure that efforts are not being duplicated
- helps to identify which places to engage with
- the amount of available resources and information is overwhelming to the point where it's not necessarily helpful, need someone to sift through and provide guidance to find what is relevant
    - synthesize and consolidate knowledge into a report/framework that will connect all this information in a way that is relevant to the community
- reduce waste (time, food) at network conferences
- need advocacy, need to stand side by side with communities and help every step of the way

Group 2:

Where are we now?

- steep increase in research on buy out programs recently, retroactive and repetitive though, showing that they don't work and people dont want them - good to research older programs and find what doesn't work but there's no new solutions being proposed as a replacement
    - too much turn over
    - opportunity for applied research to get out and inform programming
- local leaders want to support something that can be backed up, lessening the risks for making decisions
- mismatch between researchers and policy makers (many repetitive studies, not meeting policy makers needs)
    - academics build upon research, lack of incentives for researchers to apply research
    - build the relationship with the research and the policy makers from the start
    - people coming out of academic programs that need jobs - potential opportunity for communities to use these people and their skills from academia

To what extent are researchers a part of the network?

- ASAP works to bring research and practitioners together, climate migration was an attractive topic because of how interdisciplinary it is
- at Hunter College, hard to develop relationships with researchers studying climate in Puerto Rico, made a large database to try and bring information together
- Challenge with climate migration, EJ work is that the most vulnerable communities are constantly researched and oftentimes nothing productive/meaningful comes out of it "Why am I always being researched?" resource online
- Sometimes its hard to get researchers involved for needed research projects and struggle getting funding and researchers time wasted for project proposals that dont get funded
- Research needs to be applicable, on the ground connections, "Great research but what do we do?"
- How do we build trust? - trust is shared vulnerability, being more transparent in the research goals would help to build trust

What makes for successful integration with research?

- if researchers have expertise and knowledge it needs to be shared but researchers also need to be able to listen and respect the expertise of local practitioners
- applied research - Small Grants Program recipients are paired with extension experts - good model for connecting researchers, practitioners, and educators
- Identify best practices - lacking at the state level, need more regional communication to learn from others
- need to think about these issues in a more holistic way
- capacity and resource issues

What would you ask of your research colleagues?

- how many people to prepare for (in migration)
- when will we hit a tipping point for in vs out migration, where the balance flips (right now more people are leaving)
- need to create partnerships that will help to move research findings forward so that they can be communicated in a way that is easy to understand and can help to produce actions (assistance with outreach, this would require funding)

Group 3:

What is your opinion on where research is now?

In response to “larval” or even ”conception” stage of research:

- agrees with larval stage, hasn’t been around very long yet
- at “Step 1” rather than larval or conception stage
- one person disagrees - there is a lot of research about historic migration and even though the context is different (now climate induced) we cannot forget about what we have already learned
- many different kinds of migration have happened historically so there must be something that can be applicable and helpful in understanding and making predictions about climate induced migration
- historic data is there but enough to make predictions about future
- Need key words or ways to search through available data, cross disciplinary research has been done but terminology differs so some information can be missed
- Research is generally funded because it has a purpose - perhaps we need a more direct purpose related to what we want out of climate induced migration in order to get more funding for it

Where are we in terms of adaptation and deciding to leave?

- for some people migration is a form of adaptation
- need more information about the specific reasons people decide to migrate

What is the scale?

- Global migration (migration to the US from other countries) vs domestic migration (Coastal migration inland within the US)
- disconnect with the terminology “migration” - most people would not relate with this

Are researchers integrated into the work that you do?

- very integrated (University of Minnesota, Minnesota Climate Adaptation Partnership)
- use research that's out there, if there’s questions then they connect with researchers to do the work with the available funding
- CHISM Legacy Project, conducts own research, provides letter of support to researchers

What makes research most helpful (as an educator/outreach person)?

- needs to be applicable to people and able to be applied
- opportunity to accelerate the on-the-ground work (access to data and tools that can be used within a community)
- research can potentially pose a problem - surveying people but not following through with the data collected from them (need a true co-production of research), results need to be digestible to the people who participated in the research
    - community participation fatigue
    - ethics of working with communities
    - not following through with participants and sharing results will degrade trust
- usable research needs to be iterative - going back to the community for input on next steps after sharing the findings with the community
- follow through needs to be incorporated into grants and there needs to be more accountability

- to better connect with communities we need to consider more traditional environmental knowledge and place based knowledge

What parts of a network/resources are available?

- grassroots organization networks that can help to connect researchers and practitioners

Closing Activity: Climate mobility research can help outreach and education by_____

- increasing understanding of how things and people are connected
- finding the right populations for outreach messaging
- being accessible
- building questions
- increase equity

Panel/Breakout Session Title: Research Data Breakout Group (Day 3 AM)

Chronological Notes:

1, 2, 4, all activity

All come together:

How can we integrate existing communities with incoming migrants?

What is the blueprint for planned migration?

- places with most resources, place without
- places that can sustain population growth/increase
- time scales
- what businesses exist there
- how humans are affecting the environment in these receiving cities (sprawling and increase in cities)
- long term solutions rather than short term

Compare planned migration to unplanned migration

Fundamental research on demographics (both quantitative and qualitative)

Prioritize understanding how to ask better questions that help all disciplines (how can we be more incentivized to collaborate across fields)

Need a better understanding of how we can live more sustainably and more equitably (climate change will be a mechanism to increase knowledge and understanding about literacy, equity, co production of science)

- major institutional issues that we need to address (fundamental issues with democracy), science can only go so far, governmental changes will need to occur
- Connect politics with research

Mobility of resources (not just mobility of people)

- how can we move resources into receiving cities that are going to need it

Don't need to reinvent the wheel, stop thinking so formally, within strict academic boundaries, need flexibility

What is the research question??

- the research question about climate induced migration is unclear, we need a common goal that we all agree on everyone can strive towards
- example: engineers and social scientists worked together to understand "why people aren't doing anything to help themselves" in regards to coastal homeowners unprepared for flood and erosion

People want to know:

- what are the best/most successful mitigation efforts
- access to data to see flooding projections
- impacts to drinking water

How can we redefine how our institutions work?

How do we make the Great Lakes more habitable and for how many people? (how is habitable defined?)

What resources are needed?

- develop a shared research agenda
- Need: workshops like PEMOCC that bring together people from different disciplines to brainstorm and network, a great way to continue the conversation and connect resources (ie. grants) and skill sets that can help move things forward (network is a way to source studies and projects that people are working on with others that are seeking the information)
- grant mechanisms that require local govt agencies involvement that will link the research to the policy
- pre prints shared/distributed within the network put into a shared, searchable database so others can pick up and continue that research
- academics need more time (not necessarily money) like buying out teaching or having more collaborators
- complex issues that doesn't need to be so formal and structures, need to take it slow

Recommendations or Major Themes: (bullet points outlining key recommendations and/or themes in conversation)

Priorities:

- How do we make the Great Lakes more habitable and for how many people? (how is habitable defined?)
- Restructuring of how our academic institutions work
  - good important work, rather than just moving on from project to project
- What is the blueprint for planned migration?
  - planned vs unplanned
  - Could be conversations, could be research questions
- How, when, why are people moving?
  - research driven
- Need to understand how to better collaborate and incentivize collaboration

Next steps:

- Shared research agenda
- Continuing holding workshops that foster brainstorming and networking (with funding to bring people together)
- Network to source projects and ideas (structured or lose)
- Way to share information, resources, knowledge (online searchable database shared with network)
- Need more time and money

Appendix H: Education and Outreach Notes

Chronological Notes:

Where are we in this work now?

Round 1:

- How do we define we?
    - community of researchers?
    - community of practitioners?
    - the public?
- As a community in terms of practice
    - we are all over the place
- We are a loose network with loose experts
    - there are people with expertise that could be brought on board
    - we have a lot to learn from the panelists
    - loose network with a lot of potential
    - we are at the beginning
- In PA we lead other agencies in adaptation and mitigation work. We thought we were the experts but we had never thought about climate migration before
    - robust climate action plan
    - covid-19 saw a spike in usership of state parks
        - overwhelmed systems
        - parallels the impacts of climate migration
- local short term migration, people are attracted to the water
- climate migration is largely an unknown term
    - very contentious topic
- expected outcomes of the workshop? research and practice
- feeling the effects in a different way because of covid
    - minnesota has started experiencing the effects of climate migration already
        - getting priced out of their land: land speculation
    - also in michigan
    - visible shifts towards the upper midwest post covid
- What parts of a network are already available
    - Climate justice is talked about as an issue, seen as a smaller part of environmental and social justice. these tie into the larger issues
    - How do you define a network?
    - combined brainpower, sharing stories and successes
    - ASAP, people who have associations and are working in this space
        - tapping into existing groups like asap who are already working on climate adaptation
        - resettlement agencies and GLISA as another resource/ ally
    - like a sunflower
        - Who is at the center of the network?
        - center network of people who are already talking about climate migration
        - petals are the extensions:
            - narrow vs expanded network
            - two networks, a core and an extended
        - Suzie clark writing paper on the climate adaptation network
            - strong nodes that are connecting the extensions
    - How is climate migration different from climate adaptation?
        - great lakes climate adaptation network
            - tap into some of these larger dialogues
        - could argue that migration is an adaptation strategy or the response when strategies fail

    - Receiving cities like duluth or ann arbor: what are the existing stories/ resources that we could tap into
    - Is the network just GL specific or is this network at the national level
        - The findings are interconnected
    - Don great lakes compact: ontario and quebec
        - great lakes are forced into an international conversation
        - Are Canadian communities thinking about climate migration?
- what are the outreach, extension, and education activities that are occurring
    - because we're at the beginning, are there any?
    - people are doing work that technically isn't termed climate migration
        - people are doing resilience work and this is indirectly related to climate migration
    - created 1 hour climate migration presentation for anyone who will listen: Future's of choice
        - What resources are you currently using?
        - developing a toolkit, on the ground with the community
    - climate migration becoming more embedded into our work: Chism legacy project
        - but we are keenly aware of how climate migration is resulting in displacement and gentrification
        - is a part of our work but not formally part of our work
    - perfect place for this work to be incorporated
        - green step cities in minnesota to help cities develop CAP
        - Climate smart municipalities
            - smaller towns in state partnering with towns in germany to develop sustainably
        - framework is here
        - primed to do it, may not be politically ready?
- structures that already exist
    - things that sea grant already has in place: SEAGull
    - adding in concept of climate migration, amplify the message through this structure
    - taking examples from international resources
        - Maldi, Indian Ocean
            - losing land, moved to new island called hope
            - we should look into this
    - lots of people leaving the great lakes and moving into the sun belt
        - these communities have already been dealing with migration
        - Is there old literature on this?
        - Great migration, huge movement in people
            - we don't have to reinvent the wheel
    - book: human and climate migration
        - discusses what happened after Katrina
        - body of knowledge here
- Where do you want to go?
    - the data needs to be mined, take an inventory of the data that we have
    - ASAP has done literature review
    - planned vs unplanned migration
        - a lot of history was unplanned migration
        - Are there models of planned migration?
            - blueprint for planned migration?
            - foresite into events of WW2 and how people would be displaced, there was planning that went into this

        - acceptance of planned migration increases with suffering. How much suffering needs to occur for us to be more open to planning for and welcoming migrants?
    - planned vs unplanned migration
        - when people started moving out of the rust belt: these were highly planned cities
            - cities did not know how to deal with the shrinking population and disinvestment
        - pros and cons of planned vs unplanned migration
        - confusion on the definitions of planned vs unplanned migration
        - smith island, older community in the chesapeake
            - state government started to move people out of harm's way, proactively
            - huge backlash from the public despite good intentions
        - planned is more proactive, unplanned is immediate forced by an event
            - sudden vs slow onset events
        - examples of planned community migration
- what do we want to see in the future
    - most of the conversation has been focused on in migration
        - uneven migration, some may experience population losses
        - need to identify strategies that will work for uncertainties in population
        - niagara falls is losing population while buffalo is growing
    - clearinghouse/ wiki of climate migration
        - references to institutions and concepts
        - if we could put our collective knowledge here to create a home for these concepts
    - Need to define the terminology
    - How do we teach that to people and how do we conduct outreach?
        - knowing your audience and creating consistent messaging
    - People who are coming and going are not the enemies. we should be fighting the climate crisis not each other
        - common enemy
    - tailored outreach for receiving and sending communities
    - we need a better humanity in discussing this, we can’t treat people like numbers
        - should create ethical guidelines for discussing climate migration
    - Are we considering an international frame?
        - thinking about global relationships and information sharing
    - sea grant related to coastal issues and conservation
        - What is the connection between climate migration?
        - Water is a driving force in the decisions people make
    - operators and utilities are essential to this conversation
        - and farmers being challenged by a lack of water
    - native american reservation in niagara county doesn’t have access to clean water
        - we don’t have a great track record, we aren’t serving the people who live here now
    - identifying the pinch points, how are we going to protect the water?
    - what is the population capacity of the great lakes basin
        - how many more people will it take before the lake system collapses

Round 2

- Who are we? Who is the audience?
    - are we a good representative of the people who will actually be impacted by the climate crisis
        - group of mostly white people
    - barrier/ challenge of working with policy makers and stakeholders
        - no formal support or resources
        - a lot of funding mechanisms don't allow for direct funding
    - we don't know who will be displaced
        - we do know locations and how climate change will impact us at the local level
        - scale
    - if you're addressing displacement through the creation of equitable and affordable housing you are indirectly connected to climate migration
- community engagement and research collaboration instead of outreach and education
    - let's not limit it to climate migration
- How do we find and identify communities that will welcome migrants?
    - Who needs more people? What demographic characteristics do these communities have? What resources do they have to offer?
- distinction between welcoming and carrying community
    - buffalo has limited infrastructure
    - a carrying community does have the infrastructure
    - historic communities have weathered all the harm
    - hasn't been a discussion on where the resources are coming from? Where is the political will?
    - green quantitative easing program increasing communal ownership over the land
- great lakes st lawrence cities initiative
    - network of city mayors
    - hires consultants, opportunity for researchers
- cognitive capacity as a barrier
- financial barriers to capacity building
    - rural and coastal capacities are limited
    - government wants to fund shovel ready projects
        - need consulting services
- climate change job corps under biden administration?
    - could help build capacity by doing education
    - can be done outside of the university structure
    - workforce development
- outreach about other forms of migration
- nations policy makers are not focusing on these important issues
    - champions for climate action are marginalized
    - how do we make this a national partisan emergency
    - you talk about climate: that's a buzzword, if you focus on your resources
        - they'll talk about water, weather events, and impacts but they don't want to talk about climate change
    - federal government needs to get involved, need a blueprint for the nation
    - superfund is tagged to a watershed but not directly to climate change
- individual decision making: not assigning definitions to what rational decisions entail
    - we can't decide what's rational for other people
        - some people are aware of the risks but people are deeply connected to place
    - federal and state agencies assume that they know

    - There is a role for regulation here
        - individual decisions affect the whole
    - there is a responsibility to undo the harm without creating more harm
        - how can we find comparable ground
    - The great lakes is a great place, how can we direct development to keep it that way, to maintain this sense of place

Round 3

- loose network for policy and research but not for outreach
    - no network of people doing outreach across the region regarding climate migration
- are we actually able to transfer knowledge and share best practices or are there limitations to this
- Who is trying to be reached by this network?
    - journalists
- What kind of network do we want to build?
    - connection, alignment, vs production networks
        - framework to identify the network and its purpose
    - What are the objectives?
    - Is there a need for this network?
    - Are people asking for sea grant to fulfill this role?
- Is the conversation around climate migration always exclusive?
- Where do we want to go?
    - we should be learning from global lessons instead of just saying that we have the info
    - Environmental justice being led by the youth
        - this is their future
        - adults need to listen and learn
- receiving cities need clearer state and federal leadership to address this issue, this is a bigger policy issue
    - nationally many cities feel constrained because they don't have the information or the resources
    - What should states be doing about this?
    - need to take a strategic look at the types of outreach and who is doing the outreach
    - city of buffalo has been designated as a climate refuge
        - administration and policies we currently have in the city
        - majority of the population lives in poverty and there is a lack of affordable housing
        - city of buffalo isn't going to take on the task of planning for climate migration
    - Is this group solving a problem or are we striving towards a vision?
        - there is responsibility at all levels
    - how do we engage states

Panel/Breakout Session Title: Outreach Breakout Day 2

Chronological Notes:

- #5 identify willing participants may fall under policy as well; not just outreach
- develop set of ethical guidelines is a tangible action item, creating caring communities is a vision but may be an ambiguous action item to undertake
- the group we have is primarily from sea grant/ universities and the dots on the charts reflect this
    - before engaging with members of the community a suggestion would be to consolidate these action items into broader categories and create a survey that can engage a more diverse group of stakeholders
- propose an organizing framework, we have unstructured information as of right now
    - climate induced mobility falls into 3 categories
        - is, will, and could
            - is = definitions, stakeholders, case studies, history, etc.
            - will = models, predictions, planned efforts
            - could = hypothesis, interconnections with other disciplines, we have open issues
    - can we translate some of the existing knowledge into a framework we can use
    - for education and outreach we are playing primarily in these two buckets = is and will buckets
    - our job is to filter out what is ready for education and outreach
- Create / determine aspirational goals and actionable items
- Action priorities with the most sticky notes:
    - develop guidance for how cities can respond to impacts of migration: 13
    - workforce development: 8
    - awareness of carrying capacity of the basin: 9
    - tailored outreach for both sending and receiving communities as well as for those who are migrating: 9
    - mining resources that already exist: 7
    - Develop a set of ethical guide rails to help us have the hard conversation: 8
- carrying capacity comment: can be interpreted as outreach if it means spreading awareness of the basin's carrying capacity
    - also, teaching people about the conservation of water
- workforce development has two components
    - how we work with communities
    - other is more internal: how do we create a shared understanding
    - to many jobs not enough people in the workforce
- two types of priorities
    - things that are production ready
    - things that are urgently needed
        - <u>clear definitions are needed</u>
        - ethical guidelines are not shovel ready but they need to be written
- next steps
    - mining resources that exist right now might be the next steps for number 1 and 4
    - we do have ethical guidelines to have these conversations elsewhere
        - we do not need to reinvent the wheel
        - but it has been shortened to the point where it is unrecognizable
        - ethical guide rails may not exist to talk about climate migration
        - we are not reinventing the wheel, we are improving the wheel

        - *flag mining resources: likely needed in general
            - shared and common definitions are needed
- for ethical guardrails
    - a lot of people are not in the room, we have certain blinders on
    - we need to define who we are missing: rural communities
- include comparisons planned and unplanned and individuals vs community level climate mobility can fit under 1.2
    - we can start with educating people on what those definitions are
        - planned vs. unplanned
    - educate receiving communities: about influxes and about who might be coming in
- How do we tailor this outreach? we need to do an assessment
    - different messaging for receiving and sending communities
- list of professions and people who are affiliated with the process of moving
    - social workers, housing resources, resettlement agencies (people who are already working in this space)
    - they are critical for success
- combine literature review with case studies
- what resources that are needed to do this
    - people and money
    - multidisciplinary backgrounds
    - a cat herder: someone needs to coordinate this work
    - need a platform, electronic workspace, shared document or workspace, wiki or directory , which people who can feed information
        - internal and for the public
    - resilience migration for states that don't use climate
        - shared understanding needed on what resilient migration is
        - maybe resilient relocation
            - migration may mean temporary movement
- awareness of carrying capacity of the basin
    - this makes it seem like we don't want people to migrate into the basin
    - it can be positive or negative, have to be careful on the terminology that we used, need inclusive terminology
        - natural capacity, infrastructure
    - focus on water conservation
    - what's the capacity if business as usual vs what's the capacity if we become more sustainable
- trust building and including people who are being targeted in the outreach when defining the terminology
    - include them in the messaging
- things that we can do now
    - create a literature review that provides background info with terminology and definitions
    - we can also create a directory right away as well
- when you give cities these guidelines, can cities pass ordinances regarding what resilience relocation will look like to them
    - place based understanding
- may have missed, the people who facilitate the migration
    - moving companies, realtors, land speculators
    - need to be included in tailored outreach and in discussions
    - having these stakeholders at the table will help us determine next steps
- for tribal communities in migration is colonization and for communities in buffalo, it could mean gentrification
    - tailored materials that are in alignment with consistent messaging
    - understanding sensitivities of language
    - gentrification vs redevelopment

Appendix I: Policy Notes

Panel/Breakout Session Title: Policy Day 1

Facilitator: KBH

Notetaker: KF

Flip Chart: NC

Attendees:

Chronological Notes:

Where are we in this work now in terms of a policy network that is effective in addressing climate migration?

American Society of Adaptation Professionals

Lots of Great Lakes policy organizations, but not sure if they are tackling migration outside of ASAP. Maybe the Army Corps of Engineers, and we would have to believe that for the great lakes they must have estimates and work on infrastructure.

FEMA - transitional shelter assistance, not sure if they have migration as part of their policy. They have relocation data.

National Flood Insurance Program

International Organizations - maybe learn from them (ex., refugees international, refugee assistance program)

Climate Leadership and Community Protection Act (CLCPA) - environmental justice piece is a part of that law

NYSERDA - leading effort to do a climate assessment

MI policy that deals with disadvantaged communities

1% environment tax in MN; MCAP - But how the tax gets used is political

California has state-level policy related to climate - each community have to have climate resilience plan

Ohio State research on climate migration

National League of Cities - Cincinnati involved

There is not a current map on how to do this. Small tentacles of things that we can grasp onto.

People have moved south and west for the climate over time. This has been done overtime for a long time. Now we can look at that to better understand how this plays out. Lots of de facto social, economic, land-use policies to look at and how they would affect climate-induced migration.

Also look back on Harvey, Maria, Katrina, Sandy

Any information on the slower movement of the community. How you work on equity in an emergency is different from just choosing to move.

Southeast FL compact - lots of work done to draw people to Miami Beach, this was a slow migration.

Travel and tourism campaigns - Pure Michigan, Ohio during COVID as a place to move for economic development

Casket movement to track where people came from

Justice 40 - from Biden administration

Where do we want to go? What do we want to achieve?

Do we (Great Lakes) want to be an attractor of people? These are people who have resources to move to an area. This can create inequalities.

How do you take advantage of the people and businesses with resources to fund those who do not have the resources?

Duluth - A percentage of disadvantaged workers on each project (15%, women, minority, post-incarceration)

Ypsilanti- citizen communities automatically formed to determine benefits to the community, made developers redo annual median income (AMI) to set fair housing prices. That housing needs to be transferred as affordable housing, but you need to allow people to build wealth and sell homes for more money.

Preferred visas for job creation (green jobs), prove you have a skill or benefit that is needed, skilled labor is needed in US

Master planning - could be grants available to smaller communities, fellowship model to bring in younger workforce, ARPA, community identifies participants, Oregon example (Rare program) vs Community-based fellowship (Chism foundation example)

Bill moving through congress now - CEDARZ Act - more private financing for projects in resilience zones

Houses along Lake Michigan causing people to retreat due to coastal erosion

Infrastructure assets - retreat

NYSERA - also has a fellowship program

Valmire, IL moved out of the Mississippi River flood zone. Well documented and researcher who has followed this closely

Large municipality in Iowa (Des Moines?) that moved due to flooding.

Managed retreat possibly due to aquifer contamination moving to counties with GL water in future

Love Canal - they moved

RV or Mobile homes parks - A lot of the RV parks were destroyed during storms due to flooding, but people just keep populating these areas

Living with Water - rapid testing with multiple communities in NY state to work these communities to see what is needed and is managed retreat an option - Shamika Hanson

Desire for incoming populations from an economic development perspective, but people want to build and buy new. How do we incentivise rehabilitating older infrastructure? And don't just want people to use the funds and flip the houses or use it as a second home. (UP MI example) - Puerto Rico is a good example of this (look at habitat for humanity reports)

Push Buffalo, need more land trusts - don't want land sold by govt to people not from here to flip areas, community land trust

Savannah does something similar. Hire community members to grow trees to make the area greener.

One caveat with community land trust is that it doesn't get land and money back into the people who were there.

White farmers gifting land to BIPOC farmers

Buffalo - land gifted to habitat for humanity

Reparations (Ann Arbor and Evanston)

State building codes are hindering groups from getting creative to creating affordable housing. ex, separate HVAC systems for each unit (Duluth)

Tiny homes or communities that share utilities, code prevents them from doing that. Actively working against density. Also a zoning issue.

Currently a lot of the comments/push back they are getting on CLCPA scoping project is based on these housing issues. Ex., changing a boiler is expense

Universal-based income in Ann Arbor - not yet in place, but are trying to get there

Communities Benefits agreement, new housing agreement will make HOA that is paid for by new houses, but then not everyone is paying for this

Decoupling race from calculations at the federal level - Implementation of the CLCPA will maybe cause more lawsuits

Tenants first right of refusal program, allows tenants to be first to offer money for a house if it is being sold. Need to have resources for affordable housing financing for this to work.

What is the best way to mobilize for policy change? Community level? Regional? State?

California has passed a lot of aggressive affordable housing mandates

New BRIC program through FEMA has pretty aggressive building codes (2016 standards). To update homes with this federal money and leverage program to get resilience funding.

Parametric insurance- level of event triggers payout, not damage (theoretical at this point)

Bill proposed in congress (NCARS)- establish a quadrennial assessment on climate adaptation and climate czar at national level, giving lasting authority to what is usually done by executive order, funded at 2mil/year

Gov't accountability office put forth the climate migration pilot program

Storm water fees

Comprehensive Economic Development Strategy - need to have these concepts in your overall project

Stretch code makes building codes more stringent (LEED communities)

Making climate change a reason to be granted refugee status

In Ohio building codes can be more set by cities, not just at state level. More leniency

Add agricultural land trusts to this list

Take away subsidizing utility companies and shift those dollars to climate issues

Resilience means different things to different people, need to have language that we need to collectively define

When governmental programs step in sometime we can promote to build in areas we shouldn't

FIP program as an example

New policy vs revisiting existing policies

Stopping new development in risky areas

Stormwater infrastructure into account in new development, this should be incorporating future climate scenarios

Hard honest conversations before things happen again (ex, New Orleans). No more patches on known problems.

Decoupling community development block grants (CDBG) from current population levels (same for the educational system)

All tied to affordable housing

Intergovernmental funding programs: Analyzing and making sense of all of these federal programs and the effects they are having. Get regional planners all together.

What parts of the network are available?

ASAP

Climigration Network

Welcoming America

National Partnership for New Americans (based in Chicago), new offshoot Climate Justice Collaborative

Wetlands Watch, Coastal Retreat Network

Economic Development organizations

A lot of push towards zoning reform - not sure what networks here

Population Association of America - little on climate here

APA

Congress of New Urbanism, The places initiative - 3 part report, receiving communities playbook, national level analysis they are designating as receiving communities

American Association of Geographers

Georgetown Climate Center - Adaptive retreat, assessment of policies around the nation

International Joint Commission (IJC) - may have a group looking at this?

Special Interests Groups - really a monetary process, realtors, farmers, is anyone in the special interest groups pushing this. Would be good to know about lobbying interests.

Federal Highway Authority

Grass-root local groups, Monica Lewis of People's Water Board Coalition, Climate Justice Alliance

USDA (gov't agencies)

Water AID

Army Corps

Water Equity

Big DC think tanks such as Urban Institute, Center for American Progress, Joint Economic Committee

Natural Resources Defense Council

The Nature COnservancy

ASFPM - Association of State Floodplain Managers

GLCAN - Great Lakes CLimate Adaptation Network

Sea Grant Network

Public and Private Institutions

Department of Homeland Security

Department of Defense

USDN

Existing Policies:

FEMA

Justice Boarding, current administrations

Clean Water Act - protect water we have and use existing acts

Safe Drinking water act

New policy vs revisiting existing

Overarching policy vs fragmented

Taxation could be used as a carrot or a stick

Tax incentives for economic development - to incentivise growth (existing policies)

Stormwater fees

Great Lakes Compact - problems with it from a legal standpoint, this is the lynchpin to migration to this area (freshwater access)

Program Open Space in Maryland

Bipartisan Infrastructure Bill

Maybe Build Back Better in the future

Immigration policies

Take a note from California - where are people moving after wildfires

State Wind pool

Private Insurance

DAY 2

Where do we want to go? What do we want to achieve? - Buckets (lumping above)
Should be thinking about inequalities throughout

1. 1-stop-shop for innovative climate migration policy (4 dots)
2. Focus on the need for National-level Climate Policy (shared definitions) AND Include climate induced migration in the definition of Refugee (8 dots)
3. Synthesis of all federal funding opportunities that can be accessed by communities for climate migration (0 dots)
4. Center for advising communities on how to improve building codes, ordinances and zoning related to climate migration (7 dots)
5. Data and Modeling and scenarios for planning - tell us how many people to expect and then look at city capacities to help inform them (4 dots)
6. Preparedness plans in communities for accepting incoming people during emergency events (ex. Puerto Ricans that came to Buffalo) (1 dot)
7. Policy on Resilience Hubs (USDN and private support) (2 dots)
8. Need to change Cost and Benefit calculations in BRIC (3 dots)
9. Regional Policy (ex. great lakes region working together, state coordination) (7 dots)

Informing a National Framework for Climate Policy by providing shared definitions for resilience, migration, refugees (currently NCARS).

Next Steps

1. Contact Beth Gibbons (ASAP) to get your elected official to sign onto bill
2. If bill is passed, this network may want to advocate for who they would want on the Advisory committee (local, state representatives)
3. Identify terms needed to be defined
4. What groups would want to identify terms to be defined
5. Create definitions
6. Share definitions with group

Resources needed

- Time
- People

One-stop-shop or Center for Advising communities about codes, ordinances, policies related to climate migration.

1. Identify existing resources and players
    a. examples: World Resources Institute, Pace Land-use center, RMI, Columbia
    b. Often communities do not know what zoning ordinances allow. Visualizations can really help people (see #2).
2. Data, modeling, scenarios, case studies relevant to climate migration so that we can help identify how communities can adapt existing resources in order to implement local
    a. include demographers and municipal organizations
    b. Needs to stay laser focused on climate migration
    c. Communities need visualizations, maps
3. Convene existing players to tease out codes and ordinances that are useful for climate migration
4. Identifying individual community needs and what resources can be adapted to help them (you have to think about scale and scope)
    a. Rapid vs. Slow migrations - have resources for communities for each type or migration
    b. Rural vs urban as well

Great Lakes Regional Policy and State Coordination

Next Steps

1. Bring together State Coastal Management people, PEW Center (bipartisan think-tank), NEMW institute, to discuss current policies
    a. important from a rural perspective, not just urban
    b. with a focus on water and people
    c. centered on equity and justice

Recommendations or Major Themes: (bullet points outlining key recommendations and/or themes in conversation)

The Great Lakes and Climate-Induced Human Migration

By Andrea Harder *an M.U.P.* candidate at the University at Buffalo*

Overview

Lake Superior, Michigan, Huron, Erie, and Ontario come together to form the Great Lakes, an invaluable freshwater resource that contains 95% of the United States' surface water supply.[1] More than 34 million people in the United States and Canada and 3,500 species of plants and animals live within the Great Lakes basin.[1] We depend on the Great Lakes and the social, environmental, cultural, and economic benefits that they provide. These services have created the preconditions for a thriving regional economy that directly supports more than 1.3 million jobs in coastal counties in the following sectors: "manufacturing; tourism and recreation; transportation and warehousing; and agriculture, fishing, and food production".[2] However, unsustainable growth and development are exacerbating environmental degradation at the local level while contributing to rising temperatures across the globe.

In 2020 approximately 30 million people were displaced by extreme weather events internationally.[3] Without action to mitigate the impacts of climate change, it is projected that nearly 216 million people across six regions, including Sub-Saharan Africa, East Asia and the Pacific, South Asia, North Africa, Latin America, and Eastern and Central Asia, could be displaced within their countries by 2050.[3]

After decades of population decline in manufacturing centers across the Great Lakes region in the latter half of the twentieth century, there is an opportunity to welcome those who have been displaced from other regions while supporting equitable growth and revitalization efforts. Climate migrants may find themselves attracted to the Great Lakes basin due to its northeastern and midwestern location, an abundance of freshwater resources, and room to accommodate growth. Even though the region is anticipated as a future climate destination, climate change will still impact the Great Lakes at the local level. Understanding the specific challenges that climate change will pose and how those challenges will likely induce human migration is critical to ensuring resilience in the Great Lakes moving forward.

PEOPLE ON THE MOVE IN A CHANGING CLIMATE

Sea Grant New York

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The Impacts of Climate Change on the Great Lakes

Record-Breaking Temperatures

Human activity and the consumption of coal, oil, and natural gas have significantly increased the concentration of greenhouse gases in our atmosphere while contributing to rising temperatures across the globe. In 2019, carbon dioxide concentrations in the atmosphere "were higher than at any time in at least 2 million years".[4] Consequently, 2020 was documented as the second-warmest year on record.[5] At current rates, average air temperature trends are on track to exceed 1.7°C to 3.3°C by mid-century and 3.3°C to 6.1°C by the end of the 21st century.[6] However, studies have shown that temperatures are already on the rise across the Great Lakes and that average annual air temperatures have increased in the region by 1.3°C since 1951.[6] Since the 1960s, heat waves have become more common and by the end of the century, the region will likely experience 30 to 60 additional days each year of extremely warm weather.[1] In general, nights and winters will become warmer, and the Great Lakes region will experience 15-16 fewer days in which the temperature drops below freezing by the 2030s.[1] Rising average annual temperatures could thus have serious implications for human health and environmental processes that have historically relied on relatively stable and predictable atmospheric conditions.

Algal blooms on Lake Ontario.
Image credit: Save Our Sodus

Water Quantity and Water Quality

Rising temperatures have allowed the atmosphere to retain more moisture resulting in a 14% increase in precipitation over the Great Lakes since 1951.[6] By the end of the century, warmer winters mean that more snow will fall as rain in the Great Lakes Basin. Projections forecast a 30-50% decrease in annual total snowfall under different emissions scenarios.[1] Meanwhile, warmer air and water temperatures have already led to a reduction in ice coverage on the Great Lakes in the past several decades.[1] Despite general increases in precipitation in the Great Lakes region as a whole, some areas and land surfaces within the region are expected to become drier.[6] As the soil becomes more arid during the summer months when annual temperatures are at their peak, there is an increasing need for irrigation. As a result, groundwater resources have increasingly been tapped and depleted to irrigate crops in the Midwest.[1]

Increasingly erratic precipitation patterns can have serious implications on hydrological and watershed processes. Stormwater that cannot be absorbed fast enough via natural processes can lead to flooding, and can overwhelm sewer systems in urban areas. Rain that is more frequent and intense can also amplify the risk of erosion and runoff. In general, runoff will increase in the winter and spring and decrease during the summer months.[1] However, stormwater runoff to date has impacted each of the Great Lakes in unique ways. For example, runoff into Lake Superior has decreased by 8.6% while simultaneously increasing by 7.3% for Lake Erie and 9.8% for Lake Ontario.[1]

Stormwater runoff can also carry fertilizer from agricultural areas as well as other contaminants that can reduce water quality and cause Harmful Algal Blooms (HABs) when introduced to elevated water temperatures.[1] Toxic algal blooms have already impacted water security across the Great Lakes watershed. In 2014, 500,000 people in the Toledo area went without safe drinking water for 72 hours because of toxic algal blooms on Lake Erie.[1] More recently, unprecedented blue-green algal blooms have been spotted on Lake Superior. Despite being the "deepest and most northern of the Great Lakes", Lake Superior is now regarded as one of the "fastest-warming lakes in the world" according to Robert Sterner, director of the Large Lakes Observatory at the University of Minnesota Duluth.[7]

More than 30 million residents currently rely on the Great Lakes to supply drinking water to their communities, including "10 percent of the U.S. population and 30 percent of the Canadian population".[8] As the prevalence of water-borne pathogens increases as a result of climate change, the costs of maintaining safe and reliable drinking water will rise.

Agriculture and Wildlife

Agriculture and associated industries play a significant role in the region's economy, "contributing $1 billion in revenue and about 19,000 permanent jobs".[9] Over a third of the land in the Great Lakes basin is dedicated to agricultural practices and "main agricultural outputs include dairy, produce, and commodity crops".[1,9] Changing temperatures, precipitation patterns, atmospheric conditions, and ecological processes will impact food production and biodiversity in the Great Lakes moving forward. Conventional agricultural practices have plowed, tilled, and over-cultivated the land, resulting in soil degradation, poor plant health, and crops that are more susceptible to infestation and disease. To date, inferior crop yields have been compensated with herbicides, pesticides, fungicides and fertilizers that can pollute freshwater resources when not properly managed. Some studies have found that crop yields in the Midwest could potentially decline by 10-30% by the middle to latter parts of the century as a result of a changing climate.[1] However, other studies have predicted that rising average annual temperatures could extend the duration of the growing season and increase the proportion of arable farmland which could ultimately improve the yield of certain commodity crops.[2]

Climate change is also affecting the composition, distribution, and migration of both plants and animals. Numerous studies have shown that different plant and animal species are shifting northwest in an attempt to adapt to rising temperatures. For example, some tree species are moving northwest at a pace of 10-15 km per decade and different species of sportfish across the Great Lakes have shifted "northward at a rate of 8 to 11 miles (12.9 to 17.5 km) per decade over the past 30 years".[1] As the distribution and composition of plants and animals continue to shift, native species could effectively be replaced by invasive species and impacted by the introduction of previously unacquainted pests and diseases.[1]

Ultimately, targeted habitat restoration and conservation efforts can prevent or reduce the loss of agricultural yields and protect ecosystem biodiversity by making plant and animal species more resilient to the impacts of climate change.[2]

Infrastructure

Infrastructure plays a critical role in providing everyday services that are required to ensure human health and wellbeing. However, across the Great Lakes and throughout the country as a whole, much of our infrastructure is in a state of decline. The American Society of Civil Engineers graded the current state of infrastructure in the United States as a D+ on their infrastructure report card in 2017.[10] In general, aging and inadequate power, transportation, water, and sewer infrastructure are more sensitive to adverse weather conditions.

Power plants across the Great Lakes region require large amounts of water for cooling. Because of this, thermo-electric power plants tend to be built along waterways and can thus be impacted by "lower lake levels and higher water temperatures".[1] Changing lake levels, increased precipitation, and extreme heat can also erode and damage transportation infrastructure throughout the region.[1] The shipping industry currently transports more than 150 million tons of cargo throughout the Great Lakes each year and has relied on relatively stable lake levels to navigate throughout the region.[1] Lower lake levels can thus force cargo ships to lighten their loads, making shipping more expensive, and can also "affect the ability of ships to safely navigate shallow portions of the Great Lakes' channels and harbors".[1]

One report states that "2019 was the fifth consecutive year (2015–2019) in which 10 or more billion-dollar weather and climate disaster events have impacted the USA".[11] Therefore, proactive investments should be made to improve the quality of the country's infrastructure. More specifically, money invested in green infrastructure and renewable energy technologies can improve environmental and atmospheric conditions, spur economic development, and ensure the resilience of our communities.

Coastal Infrastructure impacted by erosion in Monroe County. Image *credit: Mary Austerman, New York Sea Grant. 2017 Coastal Flooding Survey Project*

Public Health and Wellbeing

In 2012, a Midwestern heatwave and drought caused more than $30 billion in economic damage, 123 deaths, and harmful long-term impacts across most of the mid-western United States.[1] Today extreme heat takes on average 1,300 lives on an annual basis and remains one of the "leading causes of weather-related deaths in the United States".[12] Moving forward, heatwaves, flooding, unfavorable atmospheric conditions, and extreme weather events will continue to jeopardize the physical and mental health of the public through increased risk of heat-related illness, respiratory disease, and death.[12]

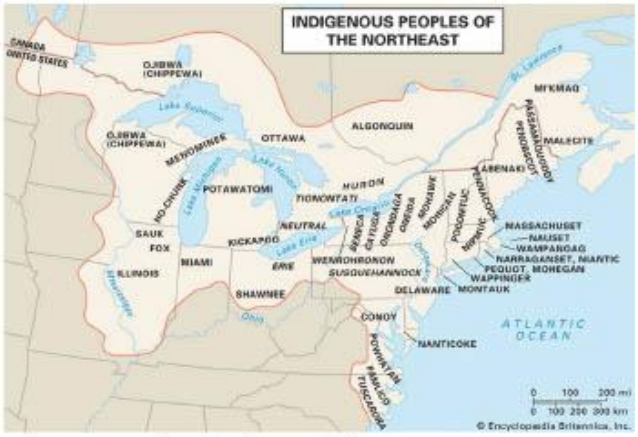
As we continue to burn fossil fuels, the concentration of greenhouse gases and other pollutants in the atmosphere will continue to increase, having a negative impact on human health while contributing to rising average annual temperatures across the globe. Nationally, the impacts of fossil-fuel generated air pollution and climate change exceed $820 billion in healthcare costs each year.[12] Without meaningful action to reverse current emissions trends from the burning of fossil fuels, the World Health Organization estimates that 250,000 additional climate-related deaths will occur per year between 2030 and 2050.[12]

Despite contributing the least to global greenhouse gas emissions, low-income, communities of color, and coastal communities will be most impacted by the effects of climate change. Underserved and underrepresented communities are more likely to reside in areas of high exposure to localized environmental burdens such as air pollution or in zones that are prone to flooding. This is in part due to inequitable housing policies that resulted in racially-segregated residential areas. The residents in underserved and underrepresented communities, including women and children, as well as those with pre-existing conditions, the elderly, and people with disabilities often find themselves at the frontlines of the climate crisis yet without the resources and the assets to effectively prepare for and recover from its impacts.[11]

Tribal Nations and Indigenous Communities

The Great Lakes region has been home to approximately 120 bands of Native peoples throughout history.[13] Today, Indigenous populations that reside in the Great Lakes region are leading the fight against the climate crisis. For example, the Anishinaabe people of the Bay Mills Indian Community (BMIC) have protested Enbridge's Line 5 petroleum pipeline and the expansion of fossil fuel infrastructure in the state of Michigan for nearly a decade.[14]

Tribal nations rely on and protect the ecosystem and the benefits it provides. However, environmental degradation and pressures from encroaching development pose a threat to tribal sovereignty and wellbeing. Moving forward, the Traditional Ecological Knowledge that has been acquired by indigenous and local peoples over hundreds or thousands of years and emphasizes a balance between mankind and the environment will be valuable in restoring and preserving the natural world.[15]



Indigenous populations in the Great Lakes Region.
Image credit: Encyclopædia Britannica, Inc.

Climate Migration: Global Trends

By the end of the 21st century, climate change is expected to make well-established communities across the globe increasingly uninhabitable. Rapid and slow onset events will drive short-term and long-term human mobility which broadly includes displacement, migration, and planned relocation. Slow onset effects can include but are not limited to "desertification, glacial retreat, increasing temperatures, land degradation, loss of biodiversity, ocean acidification, salinization and sea-level rise".[16] Meanwhile, rapid and extreme weather-related events, such as hurricanes, floods and wildfires, have already become more frequent over the past couple of decades, driving hundreds of thousands of people out of their homes and causing billions of dollars in damages. For example, in 2005, Hurricane Katrina, an unprecedented tropical storm that struck New Orleans, displaced 800,000 residents and damaged more than 100,000 housing units.[17] However, communities of color were disproportionately displaced and often lacked access to the resources required to return following the reconstruction and subsequent gentrification of their communities.[11]

Approximately 40% of the population in the United States lives in coastal areas.[11] Sea level rise alone could displace 13.1 million Americans from the Atlantic and the Pacific coast, the Gulf of Mexico, and the Great Lakes by 2100.[2] International studies, on the other hand, have found that 30 million people were displaced by extreme weather events across the globe in 2020.[3] Without action to mitigate the impacts of climate change, it is projected that nearly 216 million people across six regions, including Sub-Saharan Africa, East Asia and the Pacific, South Asia, North Africa, Latin America, and Eastern and Central Asia, could be displaced within their countries by 2050.

Seiche waves blast a shoreline structure in Buffalo, NY in April 2018. *Image credit: New York State Department of Environmental Conservation*

that could exceed 216 million across six regions, including Sub-Saharan Africa, East Asia and the Pacific, South Asia, North Africa, Latin America, and Eastern and Central Asia, by 2050.[3] However, meaningful mitigation and adaptation efforts could "reduce the scale of internal climate migration by as much as 60–80%" across the globe.[3]

Different push and pull factors influence the decisions people will make when faced with no other option than to move. Numerous studies have found that a vast majority of climate migrants across the globe have relocated within their own countries, not across international borders and that "migration tends to be short distance and driven largely by social networks and kin ties".[3,18] However, in situations where climate migrants do seek to cross national borders as a result of uninhabitable living conditions, there are "no domestic laws or multilateral treaties" to ensure that they will not be turned away.[19] In 1951 when the United Nations refugee convention decided that refugee status would be determined based on an individual's "fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion" the term climate migration wasn't widely recognized.[20]

Today, when climate migrants can take refuge in a host community, they "often face worse social and economic conditions following resettlement".[2] However, it is important to recognize that not everyone will have the same opportunity or capacity to evacuate, relocate, and or return when climatic conditions become hostile. Socio-demographic factors involving race, gender, class, age, and ability can create additional inequalities and obstacles for those who would like to move but can't, making them "demographically stuck".[21]

Cities generally will be more capable of receiving the people who can and will want to relocate after a disaster due to existing services, programs, and infrastructure to accommodate growth. Most cities will fall under one of the three following categories when it comes to climate migration: vulnerable cities, recipient cities, and climate destinations.[11] Vulnerable cities will suffer population losses as a result of climate change. Recipient cities may be unsuspecting, unwilling, and unprepared to receive migrants following a rapid onset event. Meanwhile, climate destinations will include cities that are open to accepting new migrants, embracing sustainable development, and rebranding their communities as "climate havens".[11]

Preparing for Climate Migration in the Great Lakes

Across the Great Lakes region, "climate amenities, like mild seasonal weather, high elevation, inland location, abundant surface water, and minimal wildfire risk could be a potential draw for climate migrants".[2] Post-industrial "cities like Duluth, Minnesota; Buffalo, New York; and Cincinnati, Ohio" have the potential to frame themselves as climate destinations.[11] Ultimately, there will be a myriad of opportunities and challenges associated with climate-driven population growth in cities across the Great Lakes.

Opportunities

After a half-century of population declines and suburbanization that resulted in housing vacancies and neighborhood disinvestment, post-industrial Rust Belt cities across the Great Lakes have an opportunity to focus revitalization efforts on climate-driven population growth while advancing sustainable and equitable development across the region. Immigration from Asia, Africa, and Central and South America has already helped to fuel revitalization efforts across the Great Lakes.[2] Cities such as Buffalo, New York, have enjoyed "economic benefits to hosting newcomers including $622 million in taxes paid, and $1.5 billion in spending power in 2017".[11] Money that is spent to mitigate the impacts of climate change, improve the condition of the region's infrastructure, and expand affordable housing options, social services, and employment opportunities would benefit both existing and future populations. The result could revitalize the region's economy through increased economic activity and productivity if incoming climate migrants complement existing local labor forces and our communities are prepared to receive them.[2]

Challenges

Despite numerous cities across the Great Lakes region being characterized as climate destinations, each community will face "their own share of social, economic, and environmental stressors".[11] Extreme weather events and the long term effects of climate change can and likely will impact housing, land values, programs, and services.[2] Aging and inadequate infrastructure across the region will likely struggle to cope with the effects of climate change and an influx of climate migrants. As the population continues to grow and investment returns to these previously disinvested post-industrial urban centers across the Great Lakes, land values will likely increase. Climate-based gentrification could be the result if low-income populations are displaced by more affluent populations looking to relocate to cities that are portrayed as climate havens. Additionally, in communities that have a long history of being segregated across socio-demographic lines, climate migrants could be met with hostility. Therefore, a community's openness to accept new residents and climate migrants will play a critical role in building social cohesion, unity, and harmony.

The shoreline of Lake Superior at Duluth, Minnesota with Canal Park in the foreground, a Baymouth sandbar that separates Lake Superior from the Port of Duluth-Superior. August 2019.
Image credit: University of Minnesota Duluth

Moving Forward

What we do now to prepare for the primary and secondary effects of climate change will be critical to ensuring social, environmental, and economic resilience across the Great Lakes moving forward. To date, support for climate migration efforts has been provided on an ad hoc basis.[2] With a lack of dedicated funding, guidance, and policies, the U.S. federal government may be "ill-prepared to deal with the immense and undeniable human security challenge".[2] Ultimately, preparing for climate-induced migration in the Great Lakes region will require a concerted effort and partnerships among a variety of stakeholders including community members, the public sector, the private sector, and non-profit organizations. However, local, state, and federal governments can undertake specific actions to catalyze equitable and sustainable growth.

Climate change is a known "injustice accelerator" that will have a disproportionate impact on low-income, communities of color, and coastal communities while amplifying existing inequalities. For this reason, equity must be a central component of all mitigation and adaptation strategies moving forward.[9] Incentives, policies, and plans that equitably distribute resources and benefits could be put into place to minimize injustices across socio-economic lines. The most effective plans will include migrants and other vulnerable or at-risk populations in discussions and decision-making processes while recognizing them as the resident experts on their communities. Additionally, resources could be allocated to established community-based organizations and resettlement agencies that are already advocating for change and supporting in-migration at the grassroots level.

Additional and continued science-based research by Sea Grant and others will help further our understanding of the primary and secondary impacts of climate change. Public outreach and education will extend that understanding to help communities learn about the opportunities and challenges associated with climate-induced human migration in the Great Lakes region.

Further investments may need to be made to improve the physical condition of the region's infrastructure and to expand services that will meet the needs of existing and future populations. Existing and future populations could specifically benefit from investments in affordable housing, public transportation, renewable energy, healthcare, and other services.[2]

Building Community Resilience: Possible Areas for Engagement

Level of Government	Action Items
Local	• Support infill development and revitalization efforts in urban neighborhoods through community engagement and participation • Engage the community in climate migration-related discussions and decisions • Identify environmental justice communities and other vulnerable populations that may be adversely impacted by the effects of climate change • Protect and expand affordable housing options for existing and future populations • Support and empower the efforts of community-based organizations
State	• Encourage investment in mitigation and adaptation efforts through the creation of tax incentives • Provide technical expertise and assistance to local governments • Invest in critical infrastructure • Plan and prepare for a variety of climate-related and migration-related scenarios
Federal	• Create and implement policies that extend rights to those displaced by climate change • Establish both public and private partnerships • Provide federal funding for mitigation and adaptation efforts • Invest in continued research in relation to climate migration

New York Sea Grant is part of a multi-Sea Grant project that is providing a science-based framework for studying climate-driven population shifts. Learn more at https://www.pemocc.org.

Conclusion

Overall, climate-induced human mobility is a growing concern within the U.S. and throughout the Great Lakes region and there are many questions that have yet to be answered. Climate-induced displacement and migration "is the result of a complex process with many drivers" and there are many uncertainties regarding exactly who will be displaced, when they will be displaced, where they will go, and why.[16] Understanding the specific opportunities and challenges related to climate change and climate-induced migration will be critical to ensuring social, economic, and environmental resilience in the Great Lakes moving forward.

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