

Anticipated but Unpredictable: Exploratory Scenario Planning for Climate Migration in Cleveland/Cuyahoga County, Ohio

Terry Schwarz, Cleveland Urban Design Collaborative, Kent State University

Contributing Authors: Joseph Schilling, Violet Sulka/Hewes, and Catherine Tumber, the Urban Institute; and Nicholas B. Rajkovich, the University at Buffalo

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Abstract

Anticipated but Unpredictable: Exploratory Scenario Planning for Climate Migration in Cleveland/Cuyahoga County, Ohio is a case study that explores the process and outcomes of a climate migration workshop held on March 23, 2023 at Kent State University's Cleveland Urban Design Collaborative in Cleveland, Ohio. The case study explores future migration patterns in the United States and the climate-related forces that may drive people and businesses to Northeast Ohio. The case study delves into the methods of exploratory scenario planning and explores other tools for climate migration planning in Great Lakes cities.

Keywords: climate migration, scenario planning, Great Lakes cities

About the Authors

Terry Schwarz, FAICP is director of Kent State University's Cleveland Urban Design Collaborative. Her work includes neighborhood and corridor planning, commercial and residential design guidelines, and ecological strategies for vacant land reuse.

Nicholas B. Rajkovich, Ph.D., AIA is an Associate Professor at the University at Buffalo. His research investigates the intersection of energy efficiency, renewable energy, and adaptation to climate change.

Joseph Schilling is a senior research associate in the Metropolitan Housing and Communities Policy Center and Research to Action Lab at the Urban Institute. His most recent work, a Lincoln Institute report in collaboration with Tumber and Gabi Velasco, outlines a policy framework for [Greening America's Smaller Legacy Cities](#).

Violet Sulka/Hewes is a Research Assistant at the Metropolitan Housing and Communities Policy Center of the Urban Institute.

Catherine Tumber is a historian and journalist. She is the author of *Small, Gritty, and Green: The Promise of America's Smaller Industrial Cities in a Low-Carbon World* (MIT Press, 2012).

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Summary

This case study describes a climate migration workshop held at Kent State University's Cleveland Urban Design Collaborative (CUDC) on March 23, 2023. The workshop was sponsored by the Lincoln Institute of Land Policy (LILP) and the Urban Institute in partnership with the Cuyahoga County Office of Sustainability, the University at Buffalo, and the CUDC.

Exploratory Scenario Planning for Climate In-Migration: A Guide for Cities in the Great Lakes Region, a working paper published by LILP in 2022, provided the basis for the workshop. This guide outlines the use of XSP to develop neighborhood-, city-, and county-scale plans for managing current conditions of population decline and vacancy, while anticipating the possibility of future growth through climate in-migration. The workshop tested the methodology of the guide with a group of engaged stakeholders to refine the XSP framework as a planning tool for climate migration.

Thirty people were invited to participate in the workshop including local government representatives in land-use planning, water and sewer infrastructure, sustainability, emergency services, and land banking. Nonprofit and philanthropic organizations participating in the event included the Cleveland Water Alliance, the Cuyahoga County Land Reutilization Corporation, the Cleveland Foundation, and the George Gund Foundation. Regional agencies, including the Northeast Ohio Regional Sewer District, the Northeast Ohio Areawide Coordinating Agency, and Dominion Energy also participated. Twenty-three people attended the workshop, representing Cuyahoga County and the cities of Cleveland, Cleveland Heights, and Lakewood, Ohio. Workshop participants are all currently involved in various aspects of climate resilience and sustainability with a primary focus on built environment programs and policies. The workshop laid the groundwork for on-going, inter-agency collaboration on climate migration issues within the region.

Following the principles of XSP, the workshop considered a range of scenarios rather than focusing on a single preferred vision of the future. XSP helps communities navigate uncertainty and prepare for a variety of outcomes that *could* happen, without knowing specifically what *will* happen. The XSP process is useful for discussions about climate change and climate migration since these issues involve many unknown factors.

Workshop participants discussed current and anticipated climate challenges in Cleveland and Cuyahoga County, as well as opportunities for attracting climate migrants to the Northeast Ohio region. The conversation did not begin from a preconceived position that Cleveland is destined to become "climate haven." Although the impacts of climate change in Northeast Ohio may be less severe than in other parts of the US, Cleveland and Cuyahoga County are not immune to the effects of climate change. Workshop exercises encouraged participants to consider a range of scenarios and grapple with the uncertainties inherent in climate change and climate migration.

Participants agreed that the impacts of climate migration on economically disadvantaged populations and communities of color are a central concern. However, workshop discussions did not lead to specific recommendations for addressing issues of climate equity.

The half-day workshop format was not enough time for participants to delve into all the issues related to climate migration. By incorporating mapping exercises into future workshops, more

site-specific scenarios for climate migration in the region might emerge. Expanding the workshop to a full-day event or conducting a series of sessions spread over weeks or months, could yield more comprehensive and detailed outcomes.

The last sections of this case study introduce topics that were not discussed in the workshop but could become part of future discussions and research into the promise and perils of climate migration into the Great Lakes region. These five topics include: (1) mapping and geospatial analysis for scenario planning, (2) understanding the timeframe in which climate migration might take place, (3) aligning the forces that push people from one community and pull them toward another, (4) adaptive management approaches, and (5) regional collaboration for developing meaningful responses to a changing climate.

Background

No one knows for sure how many people in the United States will need to move due to climate change. Since the Great Lakes region has ample access to fresh water and a more temperate climate than other parts of the country, it could eventually become a destination for individuals or communities experiencing severe climate-related challenges. But when and to what extent this will happen remains to be seen.

Older industrial cities in the Great Lakes region have been losing population for decades, resulting in vacant land and buildings and underutilized infrastructure. Climate in-migration presents a possible path to population regrowth and redevelopment. But aside from acknowledging the opportunities, Great Lakes cities are not yet actively planning or preparing for climate in-migration.

The likelihood of population growth in the Great Lakes region due to climate migration will depend on how numerous factors interact and evolve in the coming years. Policymakers, urban planners, and local communities need to be prepared to address potential changes in population patterns and to ensure that migration, if it occurs, happens in a planned, equitable, and sustainable manner.

Given the uncertainties about when and how climate migration may occur, and at what pace and scale, it is difficult for communities to plan for new arrivals. Perhaps the most important thing Cleveland (and other Great Lakes cities) can do right now is to invest in the fundamentals of climate resilience, including:

1. *Climate Action Plans*: Prepare, update, and implement climate action plans at the city and county levels that outline specific strategies and targets for reducing greenhouse gas emissions and adapting to the impacts of climate change. These plans should consider the “push” factors that may cause people to leave other regions of the country and the “pull” factors that could draw climate migrants to Northeast Ohio.
2. *Equitable Access to Resources*: Ensure that funds for climate adaptation programs and projects are allocated fairly and prioritized for existing communities that are most vulnerable and historically underserved.

3. *Affordable and Energy-Efficient Housing*: Expand the region’s affordable housing options and weatherize existing housing stock to improve energy efficiency.
4. *Blue-green Infrastructure*: Invest in blue-green infrastructure initiatives by expanding green spaces, restoring the urban tree canopy, and implementing green roofs and permeable pavements. These measures can help manage stormwater, reduce urban heat island effects, and improve overall climate resilience.
5. *Renewable Energy*: Encourage and support the adoption of renewable energy sources, such as solar and wind power, to reduce greenhouse gas emissions and enhance energy security. Promote equitable, decentralized renewable energy projects along with energy efficiency in buildings and infrastructure through building codes, incentives, and public awareness campaigns.
6. *Transportation*: Invest in public transportation systems and prioritize active transportation options like cycling and walking to reduce reliance on cars and lower emissions.
7. *Climate Resilient Infrastructure*: Upgrade existing infrastructure to withstand climate-related hazards, such as extreme heat, heavy rainfall, and storms. This includes climate proofing buildings, roads, and utility systems, and implementing the county’s plans for microgrids.
8. *Emergency Preparedness*: Develop and regularly update emergency response and preparedness plans to handle extreme weather events and other climate-related disasters.
9. *Education and Awareness*: Raise awareness about climate change and its impacts on the community, promoting behavior changes that contribute to sustainability and resilience.
10. *Collaboration and Partnerships*: Work with regional, state, and national governments, as well as local organizations and institutions, to access funding, share knowledge, and coordinate efforts in tackling climate change.

Through these and other actions, Cleveland and Cuyahoga County will be better prepared to receive an influx of climate migrants and refugees whenever they arrive. Even if the anticipated population growth never materializes, Northeast Ohio will be safer and healthier for the people who are already here.

Workshop Overview

In 2022, the Lincoln Institute published a *Guide to Exploratory Scenario Planning for Climate In-Migration in Great Lakes Cities*. The guide explores ways that climate change and population growth could be interlinked. The workshop discussed in this case study was the first field test of the XSP process and strategies described in the guide.

The workshop gathered twenty-three local leaders and experts for a series of presentations to introduce the scenario planning process and discuss the potential for climate migration in the region. The presentations and discussions are summarized below.

Climate Change in Northeast Ohio

The first presentation, led by Nick Rajkovich from the University at Buffalo and Terry Schwarz of the CUDC, focused on the impacts of climate change in Northeast Ohio. Although the Great Lakes region is not impacted by sea level rise or hurricanes, the effects of climate change are being felt in the form of increased rain, snow, and flooding, along with greater variations in temperature and freeze/thaw cycles. The region is also experiencing higher temperatures and degraded air quality. These climate hazards fall most heavily on older residents, people with pre-existing health conditions, residents with lower incomes, and communities of color.

Projected Change in Average Precipitation Period: 2041-2070 | Higher Emissions: A2

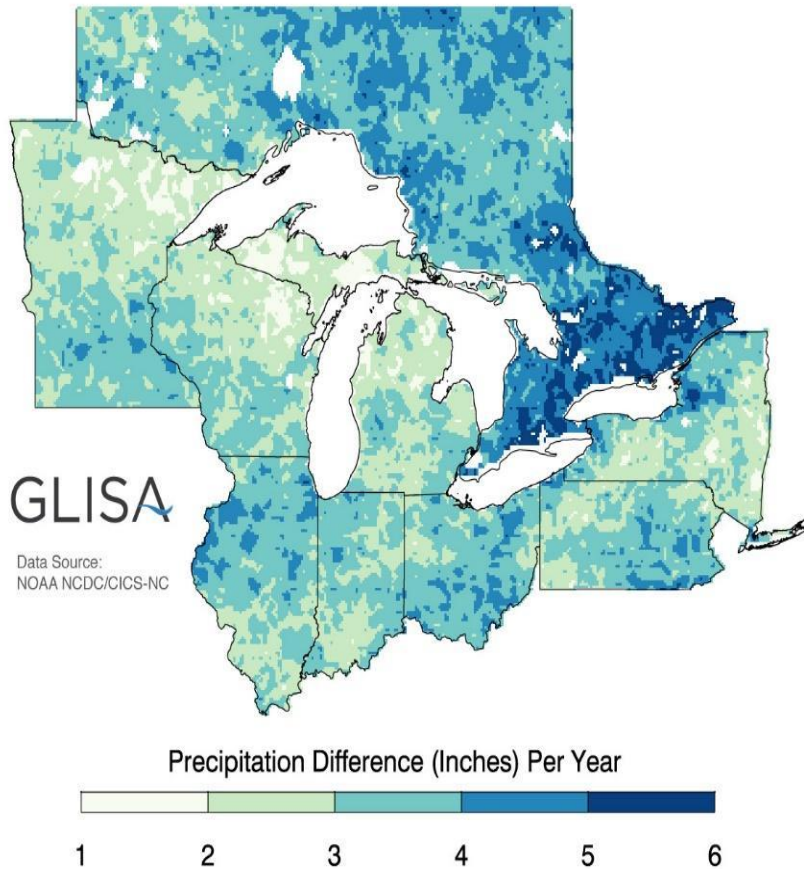


Figure 1: Climate impacts in the Great Lakes - Projected change in precipitation

Cleveland and Cuyahoga County are not immune to the risks of climate change. Whether climate impacts in northeast Ohio remain relatively moderate or become increasingly severe in the coming decades is unknown and beyond the control of local government agencies. National and

global policies will also impact Northeast Ohio in ways that local governments and agencies cannot fully anticipate.

Historical data is insufficient for modeling and predicting patterns of climate migration. The climate data we have overlooks several important variables that would be useful for tracking population movements. Most climate scientists focus on high-risk regions of the country using models that do not include data about the impacts of climate change on the Great Lakes. Since the Great Lakes are poorly simulated in most climate models, the impacts the region could face from flooding, drought, precipitation, and exposure to environmental toxins are likely underestimated. Also, Federal Emergency Management Agency (FEMA) maps are not designed to account for flooding caused by intense rainfall, which is a growing problem as the atmosphere warms and a major concern in Northeast Ohio.

Extreme temperatures, both hot and cold, are already an issue in Cleveland and Cuyahoga County. In addition to impacting human health and well-being, extreme temperatures affect buildings, bridges, roadways, pipe- and sewer- infrastructure, and soil integrity. As of now, the region is unprepared. Workshop participants noted that the region needs a more robust emergency management system. Also, public infrastructure and services must adapt to changes in underlying conditions.

Exploratory Scenario Planning (XSP) Process

The second presentation explored the mechanics of the XSP process for climate migration. The XSP process enables communities to envision many possible futures and to prepare for the uncertainties of climate migration while pursuing a positive vision for the region. XSP can serve as a platform for conversations about a community's underlying values that can guide decisions about future development. XSP can also help communities identify metrics and collect data to understand the specific impacts of climate change as a situation unfolds and identify a range of potential policy and program responses to climate migration.

XSP is essentially storytelling with data and research. Dire scenarios of climate catastrophes may get more attention than scenarios where climate crises are averted through thoughtful planning. The narrative advantage belongs to stories with winners and losers, where disinvested cities in the Great Lakes reclaim their former glory as other parts of the United States become increasingly uninhabitable. But we should be careful what we wish for.

Long-predicted climate concerns are becoming a reality—with heat waves gripping the southern and southwestern parts of the country, flash flooding inundating cities on the East Coast, wildfires raging in Canada and Hawaii, and a rapidly warming ocean setting the stage for destructive hurricanes in the Gulf Coast. As Al Gore recently noted, “Every night on the TV news is like taking a nature hike through the Book of Revelation.” (Gelles, 2023)

And yet, the population continues to grow in high-risk areas of the country, while many Great Lakes cities are still losing population. How difficult will conditions need to become before national patterns of population growth and decline begin to change? Will the revitalization of Great Lakes cities be inextricably linked to climate disasters in other parts of the country?

XSP provides a platform for exploring the positive and negative possibilities of climate migration using the best available data. The XSP process has six steps:

Step 1: Identify stakeholders and set goals.

Determine what a community would like to accomplish and the specific issues an XSP process will explore. Examples of goals for Northeast Ohio include:

- Attracting climate migrants and water-intensive businesses to Greater Cleveland.
- Preparing for the negative impacts of climate change in the region, which may be exacerbated by climate in-migration.
- Rebuilding and reconfiguring infrastructure networks to support the needs of the current population, while anticipating future demand.

Based on the goals, the XSP planning process next identifies key stakeholders and determines the best ways to engage them.

Step 2: Identify the central questions.

XSP works best when the process is narrowed down to a few central questions, based on stated goals and discussions with stakeholders. For Northeast Ohio, these questions might include:

- The City of Cleveland and some of its inner-ring suburbs have experienced decades of population loss. Large-scale demolition efforts have removed thousands of vacant and deteriorated houses. Does the city/region have sufficient housing to meet the needs of the current population, including low- and moderate- income households? Could the region's housing stock be expanded to accommodate an influx of climate migrants and refugees and still provide/maintain safe and affordable housing for existing residents, especially for families of color?
- If large numbers of people and businesses begin to relocate to Cleveland/Cuyahoga County, should this re-growth be focused in existing urban neighborhoods or accommodated at the periphery of the region? Are communities prepared for significant infill development across many sites, or would large-scale land assembly be needed? How could city and county land banks play a role in preparing for new growth in the region?
- The City of Cleveland has existing roads, sewers, and water lines designed to support a population of over one million residents; the current population is about 370,000 people. How can infrastructure funding be used most effectively to maintain existing infrastructure, while simultaneously preparing for a possible influx of new residents and businesses?
- High temperatures and flooding pose climate-related risks in Cleveland/Cuyahoga County. These risks are already impacting residents, especially in low-income

neighborhoods and communities of color. What initiatives are needed to address community needs right now and to ensure an equitable response in the future?

Step 3: Pinpoint driving forces of change.

Once the central questions have been identified, the next step is to identify what local, national, or global changes might make specific scenarios more likely, taking into account:

- What could change? Rising temperatures and increased flood risks could impact safety and development potential in Northeast Ohio. Shifting political priorities at the national level could threaten the health of the Great Lakes and Northeast Ohio's competitive advantage as a water-rich region. Cascading climate crises in other parts of the country and the world could have ripple effects in the Great Lakes region and reduce the available funding for climate adaptation here.
- What should change? Northeast Ohio should be working toward a shift to renewable energy sources, an expansion of equitable and affordable housing, and stronger protections for the Great Lakes ecosystem.

Step 4: Develop narratives for alternative scenarios.

Once goals are set, central questions have been identified, and the driving forces of change have been discussed, it is time to imagine different scenarios through stories, maps, and images about what the future could look like. This is the creative part of the XSP process, which is essential for helping community members imagine future scenarios in tangible and detailed ways.

Step 5: Outline strategies in response to each of the scenarios.

In this step, stakeholders discuss alternative scenarios, recognizing that each scenario represents a possible, plausible future for the community, and that none of the scenarios are likely to be completely good or bad. Each scenario comes with its own set of benefits and challenges. In the process of exploring scenarios, participants begin to envision responses (that is, if "this" happens, our response could be "that".)

Step 6: Track trends and indicators going forward.

This last step is ongoing. What does a community need to watch for to tell which scenario is unfolding? The XSP process can identify tipping points and triggers for taking action and shifting gears as we see how things are playing out. It sets up a framework for monitoring conditions like population growth, building permit activity, changing weather patterns, etcetera, and adapting strategies accordingly.

Business Attraction and Risk Assessment

In the third presentation, Mark Henning, a research associate in the Energy Policy Center in the Maxine Goodman Levin School of Urban Affairs at Cleveland State University (CSU) discussed a Climate Risk for Business tool he is developing in partnership with the Cuyahoga County Office of Sustainability and the Cleveland Water Alliance. The tool, still in prototype form, will support market-based decision-making about business investments, expansion, and relocation.

Although still in the initial stages, the tool will aggregate current data and estimate industry-specific costs and climate risks, comparing the costs of water, power, regulation, and insurance from one part of the country to another. It also might be able to provide insights into potential supply chain disruptions. Users can select the regions they want to compare and calculate the relative costs of climate change from one region to another.

The tool will help businesses determine a risk score for specific hazards, as well as an overall score, and to make comparisons not just state-to-state, but also at the county level. While much of the climate data used to create the tool is publicly available through the FEMA's National Risk Assessment model and the National Oceanic and Atmospheric Administration (NOAA), the most important data will come from the insurance industry, including property and claims information.



Figure 2: Workshop session on business attraction and risk assessment

Climate-based business location decisions might precede and signal climate migration patterns as they begin to unfold. Workshop participants suggested additional data points to track including environmental, social, and governance reporting, public health indicators, workforce preparation and education, access to broadband internet, and air quality conditions.

It remains to be seen whether businesses moving into the Great Lakes cities will attract new residents and workers to the region or the inverse, in which an influx of residents and workers to Great Lakes cities will motivate businesses to expand or relocate into the region. These two conditions may be mutually reinforcing, although advances in automation and artificial intelligence could reduce the overall need for workers, or for workers to be in the same geographical location as their employers.

Climate Equity

Climate equity surfaced as a core principle during the workshop, but there was little discussion on how to achieve this goal. Direct outreach, targeted focus groups, and one-on-one interviews could help to bring more diverse perspectives into the conversation. When it comes to climate migration, environmental justice becomes particularly relevant for several reasons, including:

1. *Climate Vulnerability:* Marginalized communities, including Indigenous people, Black people, and Latino people, often face greater vulnerability to the impacts of climate change due to factors such as location in high-risk areas, limited access to resources, and social and economic disparities.
2. *Displacement Potential:* Climate change can lead to forced displacement and migration, affecting vulnerable communities disproportionately. These communities may be more likely to experience climate-induced displacement and may have fewer resources to adapt or recover.
3. *Receiving Communities:* As climate migrants move to Northeast Ohio, there could be potential tensions and challenges within existing communities, which may already face their own environmental justice concerns.
4. *Social and Economic Impacts:* Climate migration can have far-reaching social and economic implications, including housing affordability, job availability, and access to essential services, which can disproportionately affect vulnerable communities.

An XSP process should begin by documenting and acknowledging the present harms that past land use policies and development decisions have inflicted on communities of color throughout the region, including displacement of Indigenous people from tribal lands, redlining, neighborhood segregation, exclusionary zoning, and the siting of highways and industrial facilities. By incorporating environmental justice principles into climate migration planning, Cleveland and Cuyahoga County can work toward ensuring that the burdens of climate change and climate migration do not fall disproportionately on already marginalized communities. The goal is to build a climate-resilient region that promotes social equity and inclusivity for all residents, regardless of race or socio-economic status.

XSP for Climate Migration - Workshop Exercise and Discussion

The Cleveland workshop piloted an exercise to identify relevant impacts from climate change and climate migration across four scenarios and then discuss a range of local and regional actions local organizations could take to prepare for and respond to these scenarios.

Cleveland/Cuyahoga County Exploratory Scenarios

The exercise followed a streamlined version of the first five steps of the six-part XSP process.

Step 1: Goal setting - for the purpose of the exercise, the following goals were identified:

- Raise awareness about and discuss the range of potential challenges that local governments in the Cuyahoga/Cleveland region could face from climate migration and offer a more realistic view of climate migration for the region.
- Identify potential actions (policies, plans, programs, projects) that local governments could take to prepare for and address those challenges and opportunities, recognizing the high degree of uncertainty that exists today.
- Document policy lessons and insights from the workshop that would be relevant for other local governments in the Great Lakes.
- Capture lessons and insights about the process of XSP and how local governments in Cuyahoga County/Cleveland region and the Great Lakes more generally could incorporate XSP in their strategic planning, land use planning, program and budget development, and overall community engagement around climate change and climate migration.

Step 2: Central Questions - the exercise focused on regional and local government actions that relate to land use, land development, growth, infrastructure, and equity based on the following questions:

- What socio-economic and environmental impacts could climate migration have on the region and its cities and what and how would local governments (the county and the cities) respond?
- How would you and your agency recalibrate, adapt, and adjust its current operations?
- What policies, plans, programs, and projects would you propose as short-term actions (the next 3-5 years) and mid-term actions (the next 5-10 years) to prepare and respond to climate migration?
- What actions are common across all scenarios - the “no regrets” actions that apply regardless of which future scenario unfolds?
- How to ensure the policies and programs put in place in response to climate change and climate migration have equitable impacts for existing residents and businesses and new ones?
- What data and information would you need to monitor and track to stay on top of climate migration trends and impacts?
- How can we foster stronger/deeper intra- and inter-governmental coordination and collaboration? What barriers or obstacles would make this difficult?

Step 3: Driving Forces of Change

Population and Demographic Change:

- Will the population grow or decline over time?
- Will population growth, if it occurs, be steady over time, or acute as climate impacts become more severe in other parts of the nation?
- How would current demographics factor into the rate of potential population increase? Note the region and the Great Lakes have a 50+ year legacy of population decline and/or stagnation.
- Who are the climate migrants and where are they coming from? Will they arrive with resources or needs?
- What other factors need to be considered?

Development and Land Use:

- Taking into account where people currently live and where new residents could be accommodated, where should housing investments be focused?
- Is there enough existing housing that could be rehabbed and retrofitted? If new development is needed, can large enough sites be assembled in the urban core, or would new development be needed at the fringe of the region?
- What are the environmental and socio-economic tradeoffs of infill versus sprawl?
- How would infrastructure be adapted and expanded to serve different development scenarios?

Step 4: Narratives for Four Scenarios at the Regional/County Level:

Regional scenarios focus on the land development and land use implications of climate migration in the region. The four scenarios consider whether new development will be concentrated in core/existing areas or expands outward to adjacent communities and counties, depending on whether the region's population as a whole grows or declines.

Workshop participants were organized into two break-out groups to discuss the scenarios.

Discussion questions included:

- What impacts (socio-economic, environmental, etcetera) could climate migration have on the region and its cities and what and how would local governments (the county and cities) respond?
- How would agencies recalibrate, adapt, and adjust current operations?

- What policies, plans, programs, and projects would you propose as short-term actions (the next 3-5 years) and mid-term actions (the next 5-10 years) to prepare and respond to climate migration?
- What actions would be beneficial, regardless of which future scenario unfolds?
- How to ensure the policies and programs put in place in response to climate change and climate migration have equitable impacts for existing residents and businesses, as well as new ones?
- What data and information would you need to monitor and track to stay on top of climate migration trends and impacts?
- What opportunities would exist to foster stronger intra- and inter-governmental coordination and collaboration? What barriers or obstacles would make it difficult? Who else should be involved that isn't represented here?

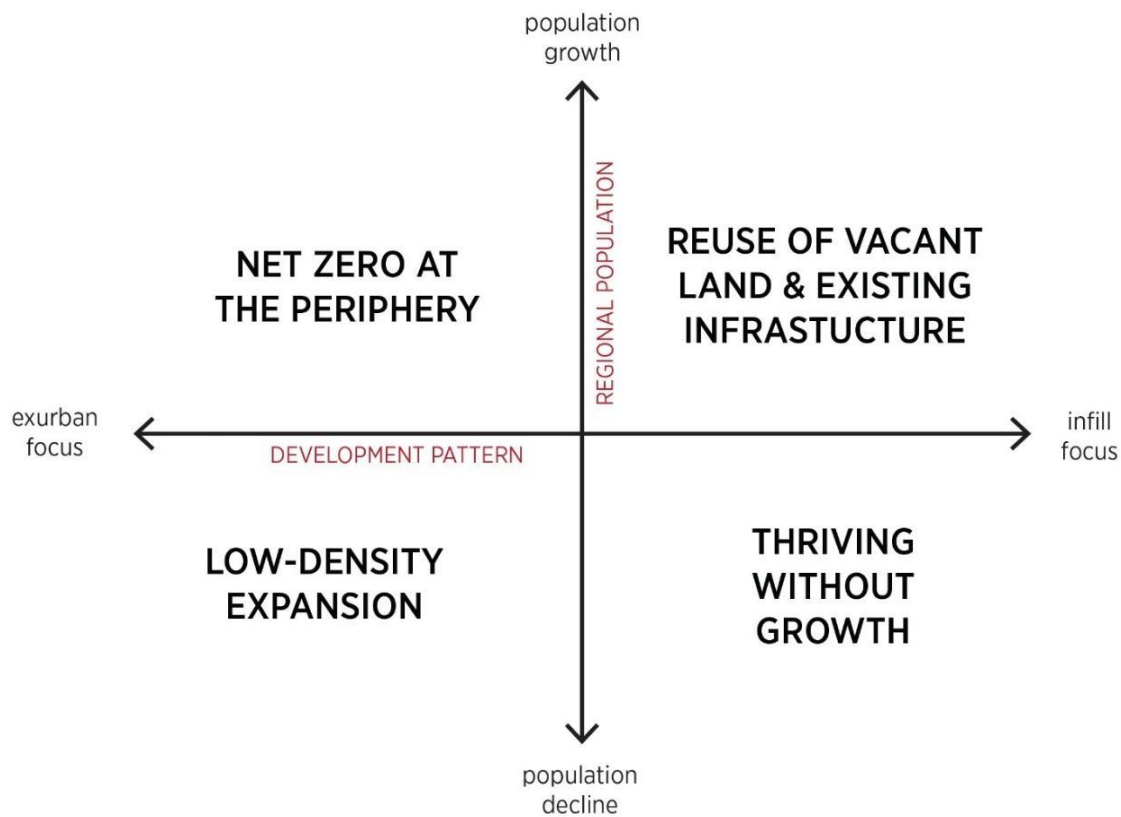


Figure 3: Four scenarios for climate migration in Cleveland/Cuyahoga County

Scenario 1. Net-zero at the periphery: In this scenario, the population is growing as climate migrants arrive from coastal areas and the southwest region of the United States. This spurs the development of new, high-density, energy-efficient communities on greenfield sites at the edges of the county, expanding into adjacent rural counties. Older energy-inefficient housing in core cities is gradually abandoned as more people opt for high-performance housing in new

communities emerging at the periphery, if they can afford to do so. Participants' ideas and comments included:

- On-site water reclamation to reduce the use of potable water
- Bike highways from suburbs to city; micro-transit opportunities
- Transit equity issues, access to jobs where growth is occurring; transit unprepared
- Aging infrastructure and utilities that can't accommodate fast growth
- Higher infrastructure costs for construction and maintenance; rural communities rely on growth for income water
- Opportunities for distributed generation and deployment through microgrids in new developments (for example, water management, infrastructure)
- Loosen regulation to add multiple housing types
- New housing and relatively cheap prices
- Changes needed in tax structures, more money for transit, higher taxes in older communities
- Market area as green and sustainable to attract young families
- Potential for more greenways/green space corridors
- Impacts of impervious surfaces
- Increased energy usage
- Create a model for climate neutral communities networked by public transit and with greenways and parks
- Potential for moving at-risk populations out of harm's way
- Increased focus on shared services and regionalization
- Loss of natural areas

Scenario 2. Low-density expansion: In this scenario, the county's population declines, and remaining residents move out toward low-density development at the periphery of the region. Neighborhoods are vacated in the core city. Vacancies also increase in first-ring suburbs. Housing demolition continues in the core city and accelerates in older suburbs.

- Regional transit strains to cover huge geography.
- Health impacts, asthma, and allergies.
- Green gentrification.
- Remove current unsustainable development and allow for exposed flood plains.
- Fiscal and infrastructure strain on fragmented municipalities and outdated, climate impacted infrastructure.
- The remaining urban population must support all the infrastructure costs.
- Agricultural infill.
- Extensive tree canopy upgrade.
- Greenfield sites for companies remove them from population centers.
- Lack of density makes transit difficult and too expensive.
- Greater segregation in a region that is disconnected spatially and politically.
- Increased personal green space.
- Lower cost of development due to clean land.

Scenario 3. Reuse of vacant land and existing infrastructure: In this scenario, the county's population is growing. New residents and businesses are moving to infill development sites in the core city and inner-ring suburbs, fully utilizing existing roads, sewers, water lines, and energy infrastructure. Population growth increases demand for some neighborhoods in the core city and inner ring suburbs; these neighborhoods are targeted for infill development. Other neighborhoods continue to lose population and areas of abandonment persist in the core city, especially in flood-prone areas, brownfield sites, and neighborhoods that lack transit access.

- Increased heat island effect.
- Public transit impacts of new construction on adjacent properties.
- Cities like East Cleveland must be engaged in decision making.
- Infrastructure capacity is available; pressure on aging infrastructure.
- Development will be more costly.
- Reinvestment in historic structures or decrease in demolition of historic neighborhoods.
- City budgets must be reoriented to fund public works and safety services as the highest priority.
- Redevelopment along transit corridors, rebuild walkable communities.
- Greater regional protection of green spaces and tree canopy.
- Air and water pollution impacts.
- Opportunities for clean distributed energy to meet higher demand EG solar on brownfields warehouse rooftops.

Scenario 4. Thriving without growth: In this scenario, regional population declines. Infill development is concentrated in established communities and growth controls are established at the periphery of the region. The Great Lakes Compact is under pressure as drought-stricken areas of the country increasingly demand access to water from the Great Lakes and have the population and political influence to support these demands.

- Turn vacant land into parks and ecological restoration areas that help with climate adaptation; more opportunities for open space.
- Reduced infrastructure maintenance.
- Preservation of farmland and green space.
- Negative impacts on the inner suburbs and remote areas.
- Inability for public transit to function without density.
- Are we thriving if we are declining? Suburban communities may suffer.



Figure 4: Participants’ ideas for the four climate scenarios

Reflecting on this exercise, workshop participants acknowledged that there is a great deal of uncertainty in all four scenarios. Cuyahoga County might experience climate in-migration, but how, when, where, and to what extent it will happen is still unknown. While it seems logical that people and businesses will begin to move away from higher risk regions of the country toward the comparative stability of the Great Lakes region, this phenomenon is not yet underway in Northeast Ohio. Current trends suggest that the opposite is happening, with higher-risk regions of the country (such as the West and the South) still experiencing rapid growth as Cleveland and other Northeast-Midwest cities continue to lose population.

Suggestions for Future Workshops

Participants shared suggestions for improving the process and delivery of future climate migration workshops.

- *Expanding exercise instructions:* A brief discussion of how XSP has been applied to other, more familiar planning issues might help to orient workshop participants.
- *Exercise process:* It was difficult to sustain any one conversation in the breakout groups. Conversations tended to focus on development impacts and policy implications from climate migration, with less attention to climate impacts. With so much ground to cover, more time was needed for the exercise.

- *Exercise Focus:* Having participants focus on one quadrant at a time would allow them to enter each scenario more fully and imaginatively, instead of jumping around between different scenarios. This might have focused participants' attention on equity issues across all four scenarios.
- *Break-out Sessions versus Whole Group Discussion:* While recognizing the benefits of holding breakouts (for example, they offer time and space for more reserved participants to share their thoughts) it might have been better to keep everyone together rather than splitting into two breakout groups. Given the small size of this group (23 participants), plenary discussions across the entire group might have allowed for more cohesion and idea sharing, with less confusion and duplicative thinking.
- *Participants:* To ensure greater diversity, future workshops should expand invitation lists to organizations and people who do not necessarily specialize in built environment and infrastructure issues, such as business owners, social service providers, educators, business leaders, property owners, and housing activists.

Going forward, this group thought it would be helpful to engage with a broader range of relevant Cuyahoga County/Cleveland organizations and leaders through meetings, focus groups, or similar workshops. An initial list included representatives from:

- Food banks and social service providers
- Organizations focused on migration issues, including The Refugee Response and Global Cleveland
- Libraries and educational institutions
- Housing developers
- Utility companies, energy providers
- Real estate organizations such as the National Association of Industrial and Office Properties (NAIOP) and the Urban Land Institute (ULI)
- Greater Cleveland Partnership (GCP), the regional chamber of commerce
- Greater Cleveland Regional Transit Authority (GCRTA)
- Community development advisors and community development financial institutions
- Insurers/Risk Managers, Insurance Institute for Business and Home Safety
- Suburban cities and organizations, such as NE Ohio First Suburbs Consortium.

The group suggested alternative meeting formats, including a one-hour introductory session for elected officials to brief them on climate migration issues. This shorter format could also be used to spark interest in climate migration at the community level, perhaps using a four-to-six-week community bootcamp model. For a more in-depth exploration, a day-long workshop or retreat or a three-part series over a few weeks with homework assignments in between would enable participants to develop more detailed and site-specific scenarios. All workshops and meetings should include a participant survey to help refine and improve the XSP process for climate migration.

Next Steps

Workshop participants identified some next steps for continuing the conversation about climate migration in Cleveland and Cuyahoga County:

- *Inventory climate initiatives in Cuyahoga County and the Great Lakes:* Identify relevant actors, agencies and organizations and the roles they play in climate migration planning within the region. A review and assessment of existing climate action plans could be conducted to determine whether they address climate migration and in what ways.
- *Stay connected:* Workshop participants would like to stay in touch with one another and continue the conversation about how agencies can work together to address climate migration issues. The Cuyahoga County Office of Sustainability holds a monthly session on regional issues which can provide a forum for further discussions.
- *Track the trends to identify which scenarios are unfolding:* Tracking climate migration is a complex task, as migration patterns can result from a combination of factors, and it is often challenging to isolate climate change as the sole reason for migration. In order to get a sense of what is happening with regard to climate change, government agencies and non-profit organizations in Northeast Ohio could collect and share data for key indicators such as: housing starts by municipality and throughout the county; business relocations into and out of the county; office space occupancy in core commercial districts; commercial and residential insurance rates; revenue from sales and property tax collections; fluctuations in the cost of water; transit ridership; and vehicle miles traveled per capita. None of these indicators alone will show whether climate in-migration is underway but taken together they can provide important signals about forces that are shaping the future of the region.

Further Explorations

The Cleveland workshop offered an introduction to some of the factors impacting climate migration. This section outlines ideas for taking the conversation further in Cleveland and in setting the stage for future dialogues, planning and preparations in other Great Lakes cities and counties.

Mapping and Geospatial Analysis

Maps showing land use and development patterns, vacancy, and other conditions would help support the XSP process and any recommendations that emerge for future planning and program development. As communities envision possible scenarios for in-migration, where could new residents live, relative to land availability and transit access? And where would new business development be concentrated?

Maps at the county, city, and neighborhood scales would ground various climate migration scenarios in the specific geography of Northeast Ohio. Participants would need more time to fully explore the spatial possibilities of different scenarios. The process could begin with an initial conversation to identify central questions and outline preliminary scenarios. Workshop facilitators could then take this information and prepare a series of maps and diagrams that

envision different scenarios. The group could be reconvened later to discuss the scenarios using these materials.

Vacancy maps could be used to identify areas where climate migrants could potentially be resettled. The City of Cleveland has about 4,100 acres of vacant land out of a total city area of 41,963 acres—a 10% vacancy rate. Cuyahoga County (excluding the city of Cleveland) has 23,000 acres of vacant land out of a total county area of 262,216 acres—a 9% vacancy rate. Figure 5 shows land that could potentially be available for development in Cuyahoga County, including land bank properties, privately owned sites, and other parcels without buildings.

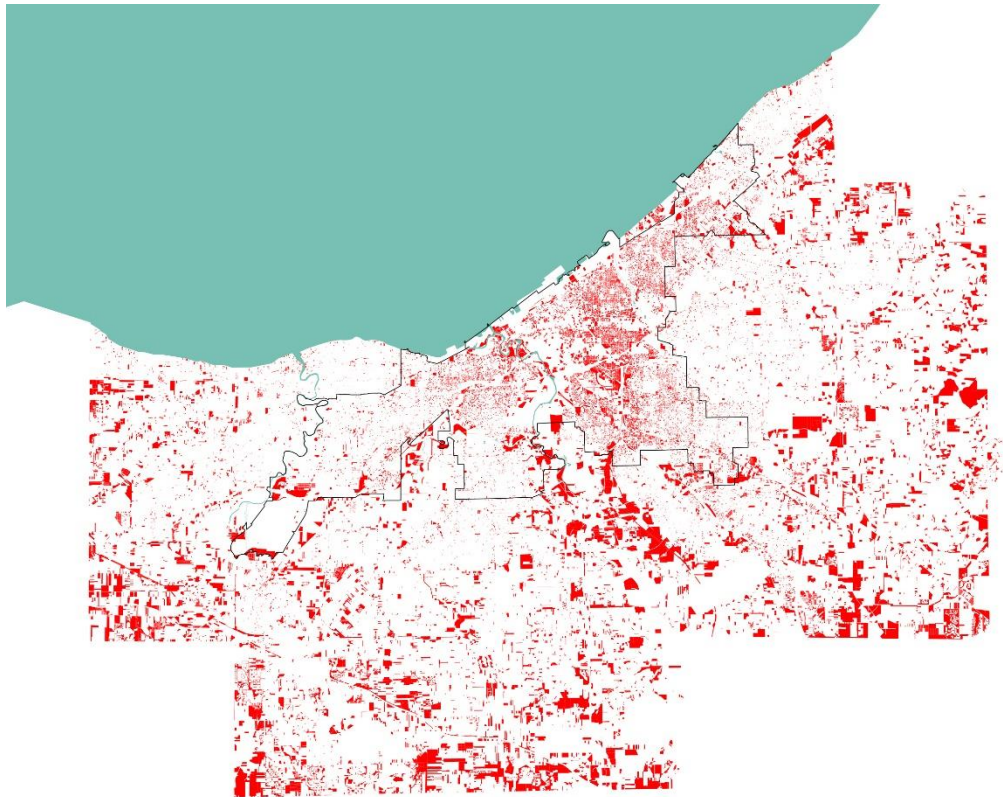


Figure 5: Probable vacant land in Cuyahoga County

Although vacancy rates are similar in the city and the county, the characteristics of vacant land differ across Cleveland’s east side neighborhoods, the city’s west side neighborhoods, the county’s first-ring suburbs, and outer suburban areas. In general, vacant sites can be classified as follows:

- *Concentrated urban vacancy:* areas within the city of Cleveland (most prevalent on the east side of the city) with high concentrations of vacant buildings and land, and depressed property values.
- *Scattered urban vacancy:* areas within the city of Cleveland where vacant residential lots are interspersed with occupied housing with stable or gradually declining property values.

- *Scattered suburban vacancy*: dispersed pattern of vacancy, increasingly occurring in first-ring suburbs. Characterized by growing numbers of vacant buildings, but fewer demolitions/vacant sites than comparable neighborhoods in the city of Cleveland.
- *Large-parcel vacancy*: concentrations of vacant commercial and/or industrial sites, typically found along industrial rail corridors in the city and along commercial streets in some of the first-ring suburbs, particularly the suburbs immediately south of Cleveland.
- *Prime development sites*: including never developed land and infill residential sites at the periphery of the county.

Figure 6 delineates areas of the county where distinct types of vacancy occur. Distinguishing between types of vacancy and analyzing the surrounding context can help to clarify development goals, identify where future growth could be located, and weigh the tradeoffs for climate migration scenarios in the city and county.

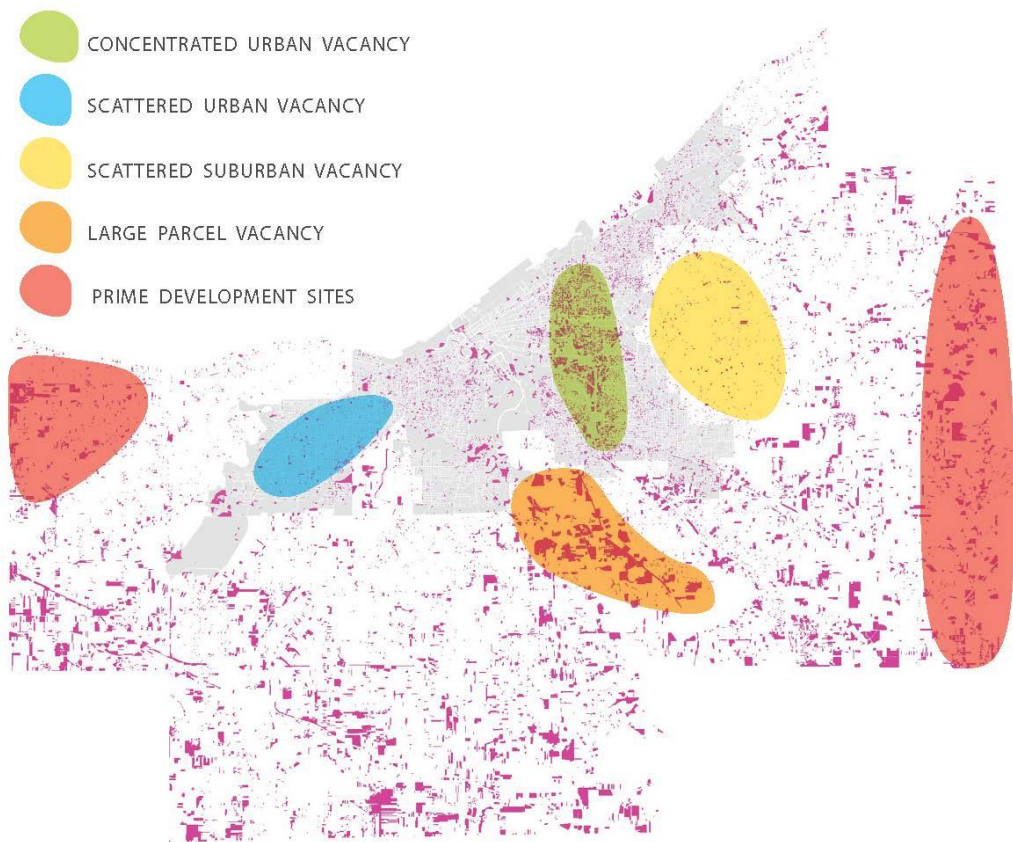


Figure 6: Vacant land typologies in Cuyahoga County

Figure 7 shows housing market values throughout the county. This data can be useful in planning for the arrival of climate refugees in need of immediate shelter, or climate migrants who could potentially displace existing residents by pushing property values higher.

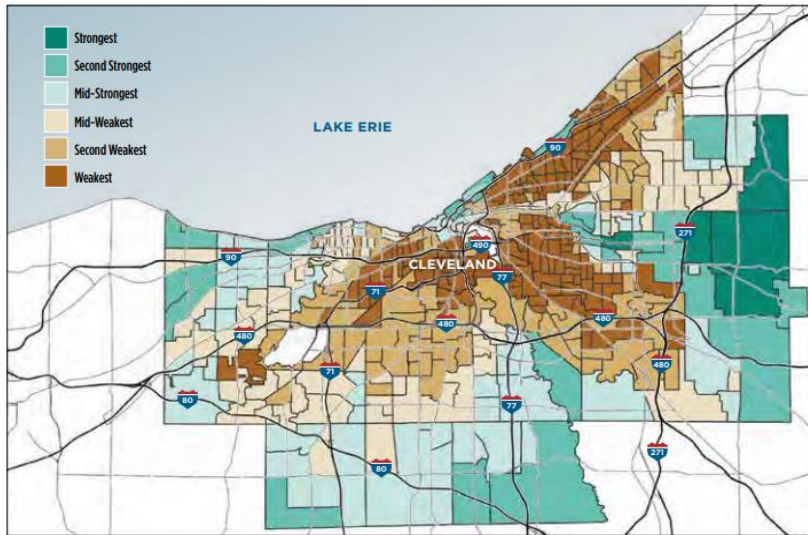


Figure 7: Housing submarkets in Cuyahoga County (Cuyahoga Land Reutilization Corporation/Dynamo Metrics, 2019)

City- and county-wide maps could be used to explore scenarios for land assembly and emergency management. Regional zoning and public transit maps could highlight areas where density could hypothetically be increased. Maps of green space, forests, and riparian corridors and wetlands (Figure 8) could be used to identify areas where land needs to be protected from development, even if population begins to grow rapidly, to avoid an increase in flooding and other negative climate impacts.



Figure 8: Riparian corridors in Cleveland

Digital tools can be used to explore climate migration scenarios in real time. [Risk Factor](#), a free tool created by the nonprofit First Street Foundation, shows anticipated flood, wildfire, hurricane, and extreme heat risks from a changing climate. In the context of an XSP workshop, Flood Factor could be used to identify lower-risk locations where climate migrants and refugees might be resettled in Cuyahoga County, and higher risk areas that should be avoided.

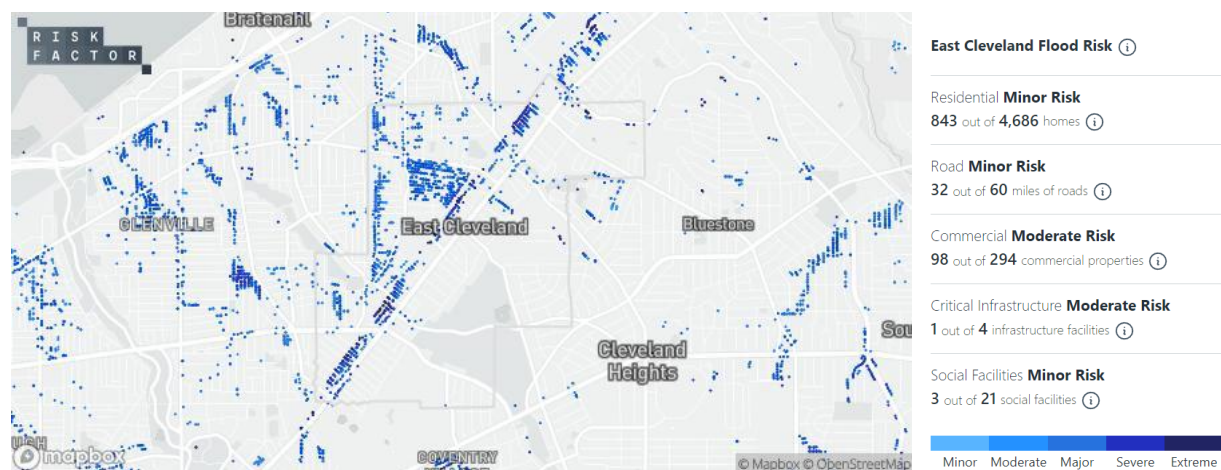


Figure 9: Risk Factor map showing properties with flooding risks on Cleveland's east side and in some of Cuyahoga County's eastern suburbs.

Timing, Pace, and Flow of Climate Migration

Many parts of the United States are already experiencing climate-driven instability. For example, Arizona may not have sufficient groundwater for all the new housing developments that have been approved in the Phoenix area. The groundwater shortage could cause the state to scale back permits for new housing construction in areas of Maricopa County that rely on wells for water. This could slow the rapid development that has made Phoenix the fastest growing metropolitan area in the country and reduce the availability of affordable housing in Phoenix (Flavelle and Healy, 2023).

In California, insurance companies have begun withdrawing from high-risk regions. State Farm, the largest home insurer in California, will stop selling homeowners insurance there—not just in wildfire zones but throughout the state (Flavelle, Cowan, and Penn, 2023). Allstate has stopped selling new home, condominium, and commercial insurance policies in California, citing worsening climate factors and high construction costs in the state (Mac, 2023). In Florida, most large insurance companies have ceased to operate and it is becoming increasingly difficult and expensive for homeowners to purchase storm coverage. In spite of this, Florida continues to have a steady influx of new residents who are willing to pay the rising costs of living. But Louisiana, another high-risk state, has been paying subsidies to private insurers to do business there. In Louisiana's low-income communities, homeowners sometimes make do without insurance, but as climate change intensifies storms in the Gulf Coast, this is not sustainable.

Climate-driven instability may not motivate people to move away from risk-prone areas into the Great Lakes region, at least not yet or in large numbers. People seem to disregard climate risks if

they haven't experienced a crisis directly. Despite the increasingly apparent impacts of climate change, people continue to live in and relocate to high-risk areas (Jarvis, 2023).

Large-scale climate migration within the United States may eventually occur, but the precise time frame remains uncertain. Some residents of impacted areas might adapt to the effects of climate change, or simply accept the negative impacts and make do. Others might move on a short-term basis to nearby communities and then return home once an immediate crisis is over.¹ Federal policies yet to be written will have a significant impact on what transpires.

Great Lakes cities could eventually become climate destinations, but no community is immune to the effects of climate change. Blizzards and frigid temperatures remain a deterrent for people who prefer the sunbelt and are willing to endure hot summers for mild winters. Gradual changes could make some parts of the country less desirable over time due to rising temperatures, poor air quality, and higher insurance premiums. Sudden events with severe consequences could lead to rapid changes. Scenario planning can help Great Lakes cities consider ways to accommodate a rapid influx of climate refugees, or a slow but steady flow of climate migrants.

Disaster planning tends to react to acute events with the goal to recover and rebuild what was there before. But as climate emergencies become more frequent, Great Lakes cities can prepare for in-migration by building institutional capacity and infrastructure. Receiving cities also need to be prepared to offer emergency assistance and on-going support to help new arrivals find jobs, access healthcare and schools, and find housing they can afford.

Whether the increase in new residents is gradual or rapid, policy makers, local government officials, business and civic institutions, nonprofits and community-based organizations will need to consider these and other issues as they plan and prepare:

- Can existing employment, healthcare, education, and housing programs in the region be adapted and expanded to meet the needs of existing residents and climate migrants? Do the relevant agencies have sufficient capacity to meet these dual needs?
- If a large number of refugees arrived in Cleveland following a climate emergency, where could they be sheltered?
- What kinds of advanced preparations are needed to be ready on short notice to address immediate needs?
- If many of these new arrivals decided to stay in Greater Cleveland, where could they be resettled, and which agencies are best equipped to assist them?

XSP can be used to model multiple scenarios, so the region is better prepared for whatever unfolds.

Aligning the Push and Pull Factors

Climate migration can be framed in terms of negative (push) factors that drive people away from their home communities and positive (pull) factors that attract people to new locations. Push factors from coastal areas and the Sunbelt might include high costs for housing and insurance,

¹ Research on the migration patterns of Gulf Coast residents driven by Hurricane's Katrina and Harvey illustrates that residents were more likely to relocate to similar communities near their original homes. <https://www.urban.org/projects/climate-migration-and-receiving-community-institutional-capacity-us-gulf-coast>

rising sea levels, tropical storms, extended heat waves, and water shortages. Factors that pull people toward Great Lakes cities might include affordable housing, abundant water supplies, and a temperate climate. If Northeast Ohio is to become a climate destination, we need to align the region's pull factors directly with the conditions that are pushing people away from other, higher risk parts of the country.

In the aftermath of a climate disaster, refugees move away from the immediate hazards but often stay as close as possible to where they lived. People tend to move to the nearest large city that does not face extreme climate risk, often with the intent to return home once rebuilding efforts are underway (Haurer, 2021). Sometimes people move from one high risk area to another, as when thousands of people who were displaced from New Orleans by Hurricane Katrina moved to Houston where Hurricane Harvey hit twelve years later.

When displaced people make permanent moves, they tend to relocate to familiar places nearby, where they have friends, family, and established support networks. Long distance moves do occur, but they are less common (Elliott and Wang, 2023). When choosing a destination, migrants look for affordable housing, health care access, employment opportunities, and social connections. Affordable housing, near job opportunities, services, and public transportation, is often the highest priority (Poon, 2023).

Some pull factors that could draw people to northeast Ohio might include:

- Family ties, especially if combined with outreach efforts and incentives to relocate.
- Employment opportunities and job growth in the region.
- Affordable housing, as compared to other parts of the country.
- Federal policy changes to focus FEMA resources on helping people to relocate from high-risk regions to the relative stability of the Great Lakes. Currently, federal disaster policies focus on rebuilding housing and businesses near where they once stood, but on lower risk sites.
- Water access may draw residents and businesses to Great Lakes cities, but only if cities reinvest in aging infrastructure, address algal blooms that could threaten drinking water supplies, and protect the fragile health of the Great Lakes basin.

Managed retreat could eventually become a push factor, moving residents and businesses out of cities affected by rising sea levels, extreme heat, or other existential crises. Managed retreat is a process that uses regulations, investments, and incentives to remove buildings, infrastructure, entire neighborhoods over time, and prevents future development in parts of a city that can't be adapted to withstand potentially devastating climate hazards. This expensive and politically challenging process might become more common if climate impacts worsen. More thoughtful decisions about where to relocate can happen if the relocation process gets underway before disaster strikes, rather than during a traumatic climate crisis. But it can be difficult to motivate people to act in response to risks that might not materialize (Plastrik and Cleveland, 2019).

Managed retreat might be triggered by a climate catastrophe that destroys buildings and infrastructure beyond repair, forcing people and businesses to relocate permanently. Or it could happen more gradually if financial losses due to climate change lead to real estate disinvestment and abandonment by property owners, developers, insurers, and financial institutions. Some communities might begin to intentionally plan for retreat, a process that could resemble the “smart decline” approach of some depopulating cities during the Great Recession.

Push and pull factors are difficult to pin down because no place is completely safe from the impacts of climate change. Anywhere it rains, it can flood. Catastrophic flooding can increasingly happen anywhere, with little or no warning. Heavy precipitation and flooding are already common in Northeast Ohio. These conditions are likely to worsen due to climate change.

The impacts and risks associated with climate change are becoming increasingly complex and difficult to manage. Climate crises in another part of the country or the world can undermine the relative stability of the Great Lakes region, as evidenced by recent Canadian wildfires that created air quality hazards in many Great Lakes cities. We may see more climate hazards occurring simultaneously—and even interacting with one another, compounding overall risk and cascading across sectors and regions (Intergovernmental Panel on Climate Change, 2022).

Contingency Planning

In the mid-20th century, many industrial cities in the Great Lakes region planned for population growth and were unprepared when their populations started to decline instead. Climate migration could trigger population regrowth in Great Lakes cities, but history teaches us to plan for contingencies and imagine a wide range of “what if” scenarios.

- What if population losses in Great Lakes states and population gains in southern states shift the balance of power at the federal level? Texas and Florida are growing and gaining congressional seats. Illinois and Ohio have lost congressional seats due to declining populations. The Great Lakes Compact could come under pressure as drought-stricken areas of the country increasingly demand access to water from the Great Lakes and have the population and political power to support these demands.
- What if the birth rate in the United States continues to decline and cities lose population in many parts of the country, not only in older industrial cities where this has been the case for decades? If urban populations decline throughout the country, will cities be better or worse equipped to adapt to the challenges of climate change?
- What if desalination technologies currently being tested in Arizona are successful and water becomes plentiful in the southwest?
- What if climate change impacts become severe in Cleveland/Cuyahoga County? Annual average temperatures in Cleveland warmed by 2.4 degrees from 1956 to 2012, faster than midwestern, national, and global rates of temperature increase (GLISA, 2015). Heat could become a major driver of voluntary climate migration. Even in temperate regions, extreme heat could become problematic. If severe heat waves begin to occur frequently in Cleveland, will people opt to migrate here from other parts of the country?

XSP can be used to explore these and other “what if” scenarios.

Adaptive Management

Great Lakes cities need to plan for climate change and climate migration, and also be ready to adapt to unforeseen circumstances. The following principles of adaptive management, originally outlined by Ramalingam et al (2020) in the *Harvard Business Review* in response to the uncertainties of the Covid-19 pandemic, provide a useful framework to guide short-term actions on climate change and shape long-term climate migration scenarios:

1. *Learn and adapt based on emerging evidence:* In XSP, each climate migration scenario represents a possible and plausible future. What do communities need to watch for in order to tell which scenario is unfolding? What kinds of data should be collected and how will it be shared? What are the tipping points and triggers for taking action and shifting gears, as we begin to see how things are playing out, and for adapting actions based on changes in data and trends?
2. *Test underlying beliefs and assumptions:* Cleveland has lost more than half of its population since the 1960s due to deindustrialization and out-migration. In the context of persistent population loss, it is understandable that residents and elected officials may see climate-related in-migration as good for the region. Population growth leads to more tax revenue, fewer vacant buildings and lots, new infrastructure investments, expanded economic development opportunities, and greater political influence. But the assumption that growth is good needs to be evaluated against the risks of climate gentrification, widening economic disparities, potential air and water quality issues, and political polarization.
3. *Streamline decision making:* Climate migration will require an on-going series of interrelated decisions about how many migrants to accept and under what conditions, where temporary shelters and permanent housing will be located to meet current and future needs, where to spend money on flood protection and climate resilience, and how to address the conflicts that will inevitably arise. Decision makers will need to explain what is being done and why, and how decisions are made, so that if errors are identified, people will still trust the process.
4. *Strengthen transparency, inclusion, and accountability:* Government actions will require input from people with the necessary expertise and from people affected by climate migration policies and investments.
5. *Mobilize collective action:* Climate change is creating massive challenges across the country and around the world. Effective responses will require collaboration across different sectors, industries, and professions, which can be difficult to put into practice. Collective action can include coordination among government agencies, non-profit organizations, and private sector partners, partnerships between different interest groups, and an on-going dialog across a range of stakeholders. The ways that Great Lakes cities respond to the climate crisis will have repercussions for years and decades to come.

Regional Collaboration and Capacity Building

Climate migration is a complex process. In order to attract and support climate migrants while meeting the needs of current residents, Northeast Ohio will need stable and sustainable neighborhoods that can thrive in an altered climate. This will require the on-going collaboration of many government agencies, non-profit organizations, and private sector partners. A first step would be to identify agencies, resources, and leaders throughout the region that can engage in a coordinated approach to climate migration and community resilience. And then assess their current plans, policies, and programs to better understand the current state of their capacities (organizational, staffing, technical, etcetera) and project what might be needed to manage various waves and types of climate migration in the future. Smaller suburban cities/towns and community-based nonprofits may need technical assistance to expand their capacities to prepare for and meet the climate migration challenges however they may unfold. Regional entities and nonprofit intermediaries may be in a good position to provide technical assistance, along with the recent infusion of federal climate resources through the Inflation Reduction Act.

Start with establishing (or reestablishing) the necessary institutional relationships, processes, protocols and forums for cross agency, cross section collaborations now, before climate migrants arrive. Once climate migrants have arrived, they may have to navigate years of uncertainty. As a receiving community, Cleveland/Cuyahoga County will need to address the evolving needs of climate migrants and refugees during the emergency, transitional, and long-term stages of the resettlement process.

Climate migration might occur in response to multiple, compounding, ongoing, and interrelated environmental crises. It is impossible to anticipate all the possibilities, but Northeast Ohio can begin to prepare for both rapid and gradual in-migration. Rapid in-migration could occur if a surge of climate refugees arrive in the aftermath of a crisis in another part of the country or the world. Gradual in-migration may take place over many years as people and businesses discover the geographical advantages and opportunities of the region. (Junod et al, 2023).

Affordable housing, healthcare access, employment opportunities, education, and transportation will all play a key role in attracting and retaining new residents while simultaneously buffering existing residents from the impacts of climate change and the risks of climate gentrification. Nonprofit entities and intermediaries, such as the city and county land banks could play a role in stabilizing real estate markets through land trusts and other strategies. The region may need to adopt high-ground mandates for new construction, and development restrictions on vacant land that aligns with buried streams and within the associated riparian setbacks. All of these issues will require interagency collaboration and coordinated land use planning at the regional scale.

Conclusion

It remains to be seen whether Northeast Ohio will experience planned in-migration, crisis in-migration, or little in-migration at all. We can be intentional or wait for what comes. Some Great Lakes cities may emerge as consensus destinations for climate migrants and lower risk locations for corporate investments and home builders. It could take decades for Cleveland and other Great Lakes cities to benefit from shifting policies and attitudes about climate change. For now, the best approach might be a focus on “no-regrets” strategies that offer benefits to residents and businesses regardless of which scenarios eventually unfold. Expanding the availability of

affordable housing, implementing large-scale blue-green infrastructure to manage stormwater, restoring the urban tree canopy, reducing overall energy usage, and strengthening the Great Lakes Compact are among the actions that will be useful no matter what the future may hold.

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