Climate Ready Gary

MAY 2024

INDIANA UNIVERSITY
ENVIRONMENTAL RESILIENCE INSTITUTE

GEOS INSTITUTE

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Welcome Letter

May 1, 2024

Dear Community,

Climate change is a serious and immediate concern for our local environment, as well as our character and way of life in the City of Gary. The impacts of climate change can greatly increase potential hazards, such as extreme heat and flooding, and chronic community stressors like poor air quality, and adversely impact our local businesses, industries, health, and more. We must act now to simultaneously reduce future greenhouse gas emissions and prepare for changes that are, in many cases, already underway.

As a forward-looking city, we are committed to action, working collaboratively across all sectors to build partnerships and develop a roadmap for long-term resilience. This collaborative process has been underway for many months. It is with great pleasure that we introduce *Climate Ready Gary*, the city's first climate resilience plan.

This plan describes how climate change is projected to impact the City of Gary and the vulnerabilities that need to be addressed. Bold strategies have been developed to protect our residents, infrastructure, economy, community culture, and environment. These strategies were created through extensive stakeholder input by diverse community stakeholders to ensure the City of Gary maintains its character and continues to improve residents' quality of life.

This plan is a crucial first step in the process of preparing the City of Gary for the effects of climate change. The strategies identified here will serve as a launching point for policy adoption and implementation, while also complementing our greenhouse gas reduction and sustainability efforts.

I encourage you to dive into this plan and evaluate how you can contribute to each resilience measure. To create a climate-ready Gary, we must all reduce our individual and collective carbon footprints and adapt to the cascading effects of a changing climate. Together, we can ensure that the City of Gary endures as a safe and vibrant community for years to come.

Sincerely,

Brenda Scott-Henry

Director, Office of Sustainability and Environmental Affairs

Acknowledgements

This report is the product of a year-long process led by the Gary Department of Sustainability and Environmental Affairs, the Environmental Resilience Institute at Indiana University, and the Geos Institute's Climate Ready Communities Team. With appreciation and gratitude for their time and expertise, we thank all involved in this important work.

City of Gary Staff

Brenda Scott-Henry, Director, Dept. of Sustainability and Environmental Affairs
Delores Brown, Office Manager
Reanell Bradley, Land Quality/Policy Manager and Code Enforcement Officer
Rolando Gonzalez, Air Quality Control Manager and Code Enforcement Officer
Pete Julovich, Air Quality Manager
Melissa Soline, Sustainability Coordinator
Erin Walsh Dennehy, McKinney Climate Fellow, Environmental Resilience Institute, Indiana University
Isioma Nmayor, McKinney Climate Fellow, Environmental Resilience Institute, Indiana University

Special Thanks

Much of the information in this report was developed during two daylong stakeholder workshops and an online survey, which are described in more detail in Appendix 6: Community and Stakeholder Outreach. Thank you to the following people and organizations for their input, perspective, and commitment to building climate resilience in Gary.

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Executive Summary

Introduction

The City of Gary is already experiencing the impacts of climate change with more extreme heat, storms, and flooding. Therefore, Gary's Department of Sustainability and Environmental Affairs is stepping up to the challenge by taking concrete action that protects and benefits people today as well as future generations.

Preparing for climate change is not an easy task — it requires action by every member of the community, as well as government, businesses, organizations, and others. The threat of climate change also presents us with opportunities. The City of Gary is in position to harness its innovation, compassion, diversity, and strong community networks to make serious and systemic change. By prioritizing resilient infrastructure, clean air and water, healthy parks and waterways, and social equity and justice, the *Climate Ready Gary* plan aims to benefit all community members and protect future generations.

Climate Ready Gary is a plan to reduce climate-related risk to both people and nature. Strategies and actions presented in this plan are designed to protect the most vulnerable residents while building resilience across all people, businesses, and natural resources throughout the community.

Climate Ready Gary is the culmination of an intensive and highly participatory, community-driven process. To ensure that *Climate Ready Gary* is based on local community values and reflects the expertise of residents, two stakeholder workshops and two community surveys provided community input and feedback throughout the process. Participation from diverse sectors of the community guided the process and ensured that all policies and actions were designed to conserve nature, advance equity, and protect those on the frontlines of climate change.

The City of Gary's Changing Climate

Climate change may be a global phenomenon, but the impacts are felt at the local level. The region is expected to experience substantial impacts brought on by climate change. These impacts affect all sectors of our community, including human health, natural resources, infrastructure, emergency response, the economy, and others. Those who are already vulnerable in our community will be impacted the most.

Climate Trends Snapshot – City of Gary

	HISTORICAL TRENDS (1961–1990)	MID-CENTURY PROJECTIONS (2040–2069)	LATE-CENTURY PROJECTIONS (2070–2099)	LATE-CENTURY PROJECTIONS *with reduced emissions*
Average annual temperature	59.9° F	↑ 64.8° F to 67.3° F	↑ 68.7° F to 71° F	↑ 65.5° F to 66.1° F
Average maximum temperature (Summer)	82.4° F	↑ 89.6° F	↑ 93.9° F	↑ 88.8° F
Average minimum temperature (Winter)	20.6° F	↑ 27.7° F	↑ 31.8° F	↑ 27.3° F
Number of days per year above 90° F	16	↑ 49 to 68	↑ 78 to 95	↑ 53 to 55
Number of days per year below freezing	41	↓ 17 to 23	↓ 10 to 14	↓ 19 to 22
Days per year with precipitation over 1 inch	4.3	↑ 4.8 to 5.5	↑ 5.4 to 6	↑ 4.7 to 5.2
Average annual total precipitation (in)	36.5”	↑ 33.2” to 43.8”	↑ 34.9” to 46”	↑ 35.3” to 43.4”

Table 1. Summary of climate trends expected for the City of Gary

Climate Equity and Our Community

Climate change threatens our people, resources, and overall quality of life, including the features and values that create our vibrant community.

While climate change affects everyone in the City of Gary, it impacts some residents far more than others. Climate change exacerbates many existing stressors related to health, income, and housing quality and availability. The strategies outlined in the *Climate Ready Gary* plan address climate impacts to the entire community, with a focus on the needs of those on the frontlines.

Climate Vulnerabilities

This plan examines the climate vulnerabilities across five community systems: Human Systems, Natural Systems, Infrastructure, Business and Economy, and Community Culture. Some of the City of Gary’s identified vulnerabilities include:

- Higher cost of doing business due to rising energy and insurance costs as well as disaster losses

- Overburdened healthcare system due to increasing mental and physical health challenges from worsening climate impacts
- Worsening food insecurity due to disturbances in food production and supply chains
- Decline in water quality due to increased flooding events, potentially exposing residents to hazardous materials
- Increased risk of adverse health conditions due to air pollution from heavily polluting industries
- Urban heat island effect from heat-absorbing buildings, impervious surfaces, and the removal of canopy cover
- Continued transportation disruption due to extreme weather events and damaged/aging infrastructure

Climate Resilience Strategies

The City of Gary is actively working to prepare and build resilience in the face of accelerating climate impacts. Many of the strategies and actions within the *Climate Ready Gary* plan provide co-benefits, thereby strengthening the whole community by addressing not only climate change but also many other stressors.

The strategies presented in this report are organized into five themes that reflect our future vision of the City of Gary as climate change progresses.

Healthy Residents

Maintaining and improving the physical and mental health of Gary residents is a top priority. As new climate-related impacts arise, greater investment in wellness, personal resilience, access to health care, and health care capacity will be needed.

Robust Natural Systems

Green spaces and nature are critical for healthy neighborhoods. Parks, clean waterways, and healthy ecosystems provide connections to nature throughout the city. Healthy, intact natural systems can also provide valuable ecological functions, such as filtering pollutants from the air and water, reducing flood impacts, and reducing air temperatures.

Sustainable Energy

Sustainable energy includes renewable energy production, energy efficiency, and energy conservation. Renewable energy production through solar installations generates electricity without emitting greenhouse gases, helping to mitigate climate change and reduce air pollution. It can also lower energy costs and build backup energy capacity for solar installers. Likewise, energy efficiency and conservation efforts lower demand for electricity, natural gas, and other fuels, leading to lower utility bills for consumers in addition to lower carbon footprints.

Resilient Infrastructure

Changes like increasing temperatures, more frequent and severe flooding, and drought can impact the critical infrastructure in our community. Such structures include homes, buildings, energy distribution, water delivery, storm- and wastewater, floodwalls, roads and highways, bridges, culverts, communications networks, and many other basic structures found throughout the region.

Community Readiness

Extreme events and emergencies can happen with or without warning. The City of Gary has systems and policies in place to prepare for and respond to both human caused and natural events. But residents and businesses also need to take steps to reduce the potential for impacts and be prepared for extreme weather.

Climate Resilience Actions for the City of Gary

These are some of the top climate resilience actions developed to address the specific climate vulnerabilities faced by the City of Gary, as identified by local stakeholders and community members, city staff, and the planning team.

Priority	Actions	Theme
1	**Address illegal dumping through city's Illegal Dumping Taskforce efforts**	Healthy Residents
2	**Conduct air quality health impact study for the city**	Healthy Residents
3	**Increase the number of farmers markets with a focus on local food deserts**	Healthy Residents
4	**Evaluate health services for extreme temperature events and identify partnerships to increase access to these services**	Healthy Residents
5	**Update the 2021 Gary Urban Forest Management Plan to expand the local tree canopy**	Natural Systems
6	**Update the Gary Green Links Master Plan and coordinate with the Bicycle and Pedestrian Master Plan**	Natural Systems
7	**Educate residents, municipal employees, and first responders on wildfire/fire safety**	Natural Systems
8	**Establish a community working group to assist the city with land use planning and implementation**	Natural Systems
9	**Launch an educational campaign to educate local municipal stakeholders on the benefits of solar energy**	Sustainable Energy
10	**Publish an inventory of existing programs and resources for residential and commercial sectors to advance solar adoption**	Sustainable Energy
11	**Publish an inventory of existing programs and resources for residents and businesses that advance energy efficiency**	Sustainable Energy
12	**Assess existing stormwater and wastewater management system**	Resilient Infrastructure
13	**Continue development and implementation of Gary's Long Term Control Plan**	Resilient Infrastructure

14	**Implement City's Green Infrastructure Plan**	Resilient Infrastructure
15	**Improve vegetation management near power lines**	Resilient Infrastructure
16	**Retrofit older buildings and require higher standards for new construction projects**	Community Readiness
17	**Review and update Gary's Emergency Preparedness Plan**	Community Readiness
18	**Educate city officials on climate vulnerabilities and impacts**	Community Readiness
19	**Identify and prioritize floodprone areas**	Community Readiness
20	**Educate homeowners on flood protocols**	Community Readiness

Introduction

The City of Gary is already experiencing the impacts of climate change with more extreme heat, storms, and flooding. Gary's Department of Sustainability and Environmental Affairs is rising to the challenge by taking concrete actions that protect and benefit both current and future generations.

Reducing greenhouse gas emissions is critical to avoid locking-in more extreme climate impacts. In its 2021 Climate Action Plan, the City of Gary outlined aggressive greenhouse gas emissions targets that reflect the seriousness of the challenge. By 2030, it intends to generate 50 MW of renewable energy and reduce local government operations emissions by 50%. It also aims to see a reduction in community-wide greenhouse gas emissions (excluding industrial sources) from its 2017 baseline by 2030.

Efforts to cut greenhouse gas emissions must go hand-in-hand with action to prepare for the changes that are already taking place. That is why the City of Gary launched *Climate Ready Gary* to determine the risks climate change poses and the steps that can be taken to increase resilience as outlined in this plan.

A more resilient community will be better able to withstand and bounce back from extreme events, such as more intense heat waves, bigger storms, flooding, and drought. Climate action must also include the creation of thriving and resilient neighborhoods, families, businesses, cultural and faith communities, food systems, infrastructure, and other key community components.

Preparing for climate change is not an easy task — it requires action by every member of the community, as well as government, businesses, organizations, and others. The threat of climate change also presents us with opportunities. The City of Gary can harness its innovation, compassion, diversity, and strong community networks to make serious and systemic change. By prioritizing green and grey infrastructure, energy efficiency, urban forests, healthy parks and waterways, and social equity and justice (to name a few), the *Climate Ready Gary* plan aims to benefit all community members and protect future generations.

Resilience is the ability of people and their communities to anticipate, accommodate and positively adapt to or thrive amidst changing climate conditions and hazard events. Resilient communities enjoy a high quality of life, reliable systems, and economic vitality, and they conserve resources for present and future generations. (Urban Sustainability Directors' Network)

Climate Change Adaptation is anticipating the adverse effects of climate change and taking appropriate action to prevent or minimize the damage.

This plan is a combination of both concepts. We strive to anticipate adverse effects and utilize proven and new approaches that allow our community to spring back from disruptions. This plan presents an opportunity to do things in new ways, so that all members of our community can prosper and flourish, even if the future is very different from what we experience today.

The *Climate Ready Gary* plan is the culmination of an intensive and highly participatory process. The process included extensive engagement by the community, with local stakeholders representing many different sectors, including health care, neighborhood associations, transportation, business, government, emergency preparedness and response, non-profit organizations, conservation groups, industry, and others. This diverse community input, along with the planning team, ensured that identified strategies will advance equity and protect those most at-risk from climate impacts.

Purpose of this Climate Resilience Plan

Climate Ready Gary is more than a planning document. It is also an opportunity for our community to clarify our vision for the future and develop a pathway to realize that vision. The guiding principles and vision statements below are the result of a highly collaborative effort with local government staff and community members. These statements represent our best understanding of the challenges and opportunities in our community today, recognizing that they may shift and change over time.

Vision Statement

Our vision: A resilient, carbon-neutral future with equity for all

A resilient Gary: We plan for, and successfully respond to, our changing climate. Our resilience is measured by the health of our air, water, land, people, and all living things.

A less carbon-intensive Gary. We reduce our emissions through individual and collective action, and we sequester carbon by ensuring the health and vitality of our landscapes.

Climate action in the City of Gary advances:

- → Green jobs and living wages
- → Neighborhood networks and support
- → Cross-cultural and interracial understanding
- → Investment in underserved areas
- → Opportunities to be active and healthy
- → More efficient and healthier homes
- → Preparedness for extreme events
- → Cleaner air, waterways, and parks
- → Improved ecosystem health
- → Greater biological diversity
- → Environmental and social awareness

Guiding Principles

Climate Ready Gary used the following principles throughout its planning process. These guiding principles reflect the values of our community and provide guideposts that were used throughout the planning process to ensure this plan aligns with community values.

1. **Collaborate and think holistically**. Climate change touches all aspects of our lives, requiring us to collaborate in new ways, to work across sectors and silos, and to think beyond our geographic boundaries.
2. **Prioritize equity.** Adaptation actions should not increase inequity. Prioritize actions that build resilience while focusing on underrepresented and vulnerable groups and increasing equity.
3. **Act with, not for.** Maximize transparency and inclusivity in planning and implementation. Empower people with knowledge and tools to participate and take ownership of climate resiliency actions.
4. **Use science**. Make decisions based on the best available science while explicitly considering uncertainty.
5. **Value natural processes**. Learn from nature and protect and restore naturally resilient ecological processes.
6. **Don't exacerbate the problem**. Adaptation actions should avoid increasing our contribution to climate change or undermining the ability of other sectors or regions to adapt. Prioritize actions that reduce our contribution to climate change while building resilience.
7. **Build on past work**. Recognize, value, and integrate prior and ongoing work. Don't reinvent the wheel.
8. **Balance immediate and long-term needs**. When prioritizing actions, select a combination of easy, quick wins and critical, but challenging, longer-term initiatives.
9. **Consider costs and benefits**. Adaptation actions should be evaluated by considering their long-term costs and benefits alongside the costs of not taking action.
10. **Focus on prevention**. When possible, prioritize actions aimed at avoiding problems rather than addressing them after they occur.
11. **Innovate and adapt.** Monitor and evaluate actions to learn what's actually working. Experiment with emerging solutions, be creative, maintain flexibility as conditions change, and build capacity to respond to the unexpected.

Scope of Plan

The scope of *Climate Ready Gary* encompasses the municipal boundaries of the City of Gary.

Figure 1: Territorial boundaries of the City of Gary

Whole Community Resilience

Climate change affects everyone and everything in our community at the same time. As people start to make changes to adapt to climate change, some of these changes can have unintended consequences. Close coordination and communication are needed to prevent redundancy or conflicting actions. People will need to work together to ensure all sectors and populations in the City of Gary are protected.

The Planning Process

Climate Ready Gary is the culmination of an intensive and highly participatory, community-driven process. A planning team of city staff and input from diverse sectors of the community guided the process and ensured that all policies and actions were designed to conserve nature, advance equity, and protect the most vulnerable populations from climate impacts. To ensure that *Climate Ready Gary* is based on local community values and reflects the expertise of residents, stakeholder workshops and surveys provided community input and feedback throughout the process.

Figure 2. The Whole Community climate resilience planning framework.

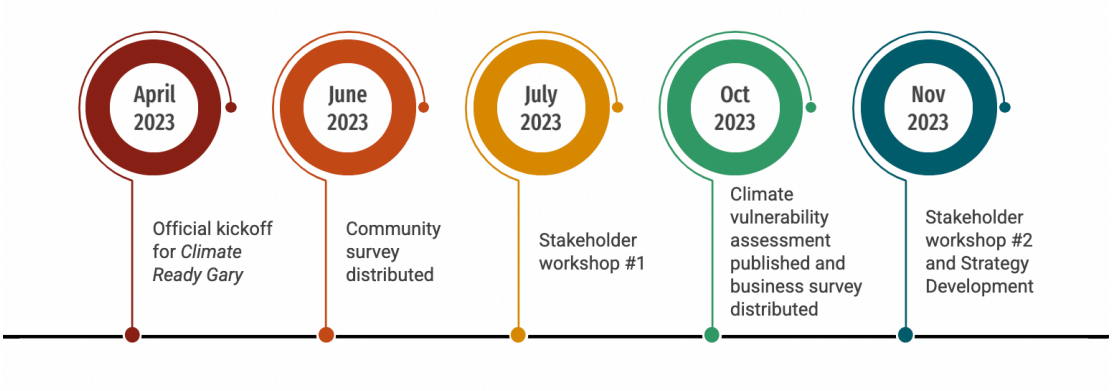

Figure 3. Timeline of major milestones in the *Climate Ready Gary* planning process.

Stakeholder Workshops

Subject matter experts from a diversity of community sectors came together on two occasions to guide this planning process. In the first workshop, participants reviewed future climate change projections and then identified and prioritized climate impacts across the five community systems: Built, Natural, Economic, Cultural, and Human. This information was combined with broad public input collected via a community survey to develop the Vulnerability Assessment portion of this plan.

Four months later, stakeholders met again to identify cross-sector and collaborative strategies to address the vulnerabilities identified in the earlier workshop. These strategies, along with input from the broader public via community surveys, form the foundation of this adaptation plan.

Community Surveys

The community resilience and local business resilience surveys were distributed across the city in both electronic and paper formats. The community survey was divided into two sections: a climate vulnerability and a climate resilience solution section. See Appendix 6: Community and Stakeholder Outreach for more information.

Climate Ready Gary is a plan to reduce climate-related risk to both people and nature. Strategies and actions presented in this plan are designed to protect the most vulnerable residents while building resilience across all people, businesses, and natural resources throughout the community.

How to Use This Report

This report provides information on the past and future climate trends of Gary, information about the climate vulnerabilities across all sectors of the community, and the specific goals, strategies, and actions the City of Gary will use to address those vulnerabilities. It is important to note that this report represents an understanding of the City of Gary at one point in time. The information in this report should be used as a starting point for building climate resilience, with regular updates and revisions over time.

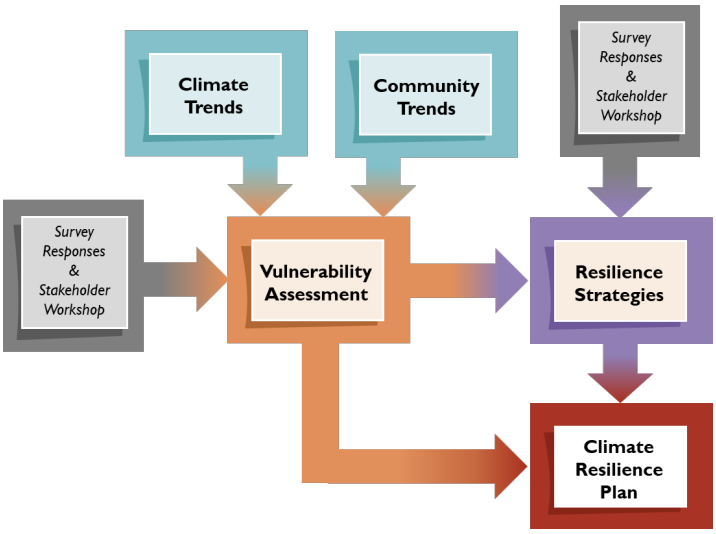

Figure 4. The components that comprise the *Climate Ready Gary* Plan.

The *Climate Ready Gary* plan is divided into four primary sections:

1. Climate Trends
2. Community Trends
3. Climate Vulnerabilities
4. Resilience Strategies

Each section builds on the information from the previous, ensuring that the resulting strategies are based on the best available information and address local priorities. This robust list of recommended strategies and actions was directly tied to the identified climate vulnerabilities for the City of Gary. They provide clear and prioritized steps to building greater climate resilience.

This report has been designed so that each section acts as a summary and may be used independently, with additional details and supporting information provided in the appendices.

Connecting Past and Present

This *Climate Ready Gary* plan builds upon our efforts to date. As we look to the future, climate change will need to be considered in all decisions. In that consideration is the opportunity to plan for climate impacts in ways that make our community more equitable for people of different income levels and backgrounds.

Young people in Gary face a future very different from the past, with warmer average temperatures, new weather patterns, and more severe storms. We have a responsibility to prepare for this future by building resilience across all parts of the community to allow people and nature to respond and adapt in positive ways.

Climate Ready Gary will join the list of the city's plans and initiatives for building a more sustainable and resilient community. For example, in 2021, the city published a Green Infrastructure Plan that provides a framework for planning, implementing, regulating, and managing green infrastructure in Gary. That same year, Gary also published a Climate Action Plan which outlines the city's greenhouse gas emission reduction goals and strategies.

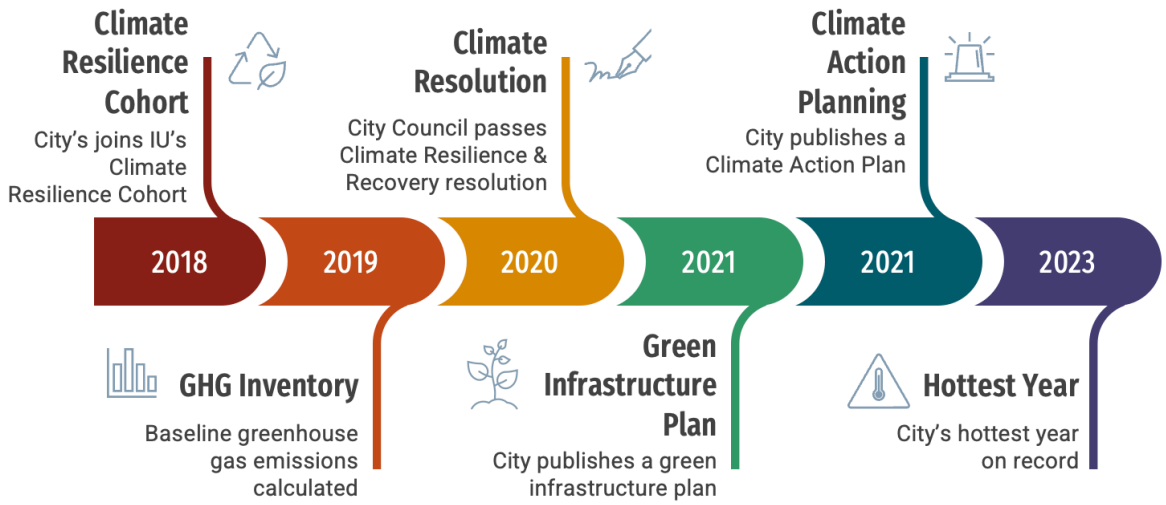

Figure 5. A timeline of the City of Gary's steps and major milestones towards climate resilience.

Advancing Climate Equity

Climate change does not affect all residents evenly. Many people experience more severe impacts than others. Those who are most impacted often contributed the least to the problem. Climate inequities stem from the existing unequal distribution of social, political, and economic power.

Preparing the City of Gary for the impacts of climate change requires significant investment of time and resources across all parts of the community, including businesses, health, schools, infrastructure, community culture, and natural resources. Investments in climate solutions need to support and empower those who are most at risk. Unless climate equity is prioritized from the beginning, and power disparities recognized throughout the process, climate planning will likely default to existing inequitable and exclusionary patterns and approaches and prevent real progress.

What is Climate Equity?

Climate equity is a framework, a goal, and a process. It asks that the diversity of histories, abilities, and needs across community members be accounted for in the design and implementation of climate change solutions. Residents of Gary have differing levels of ability to protect themselves from impacts. As climate change progresses, important work on social and environmental justice will increasingly need to focus on climate impacts.

Many Gary residents are disadvantaged due to lower income, race, language, gender, LGBTQ+ status, mobility, disability, housing status, health condition, age, etc. By engaging and empowering disadvantaged residents to take on leadership roles and become the recipients of much of the investment in climate resilience,

Equitable climate action must address historically disadvantaged and/or marginalized groups or populations by:

1. **Actively seeking direction**
2. **Prioritizing investment**
3. **Reducing stressors and preventing new stressors**
4. **Shifting power**

existing inequities can begin to be corrected. All residents of Gary benefit when those who are most vulnerable become more resilient and empowered.

More information about those on the frontline of climate change impacts in the City of Gary is included in the Community Trends section (see Appendix 2).

Climate Change Trends

Climate change may be a global phenomenon, but the impacts are felt at the local level here, and all around the world. These impacts affect all sectors of our community, including human health, natural resources, infrastructure, emergency response, and the economy. Those who are already vulnerable in our community will be impacted the most.

Cars navigating a flooded street in Gary, Indiana. Photo credit: *The City of Gary*

Gary's Climate is Already Changing

Since 1895, Indiana has seen an average temperature increase of approximately 1.2° F, or an average of 0.1° F per decade (Widhalm et al., 2018). However, since 1960, the average temperature increase has risen to approximately 0.4° F. Maximum temperatures have increased decade- on-decade as well, with a marked increase from 1960 to present (Widhalm et al., 2018). Maximum temperatures from 1960 to 2016 have increased by an average of 0.3° F per decade. Moreover, from 1895 to 2016, maximum winter and spring temperatures have increased by an average of 0.1° F per decade.

Finally, annual precipitation in Indiana has also increased significantly since 1895. Average annual precipitation has increased by 5.6 inches, though average precipitation rates vary by region.

Future Climate Change in Gary

Atmospheric scientists created models that help us predict future climate. These Global Climate Models (GCMs) were adjusted to the local scale and help us understand how the City of Gary will be affected. Gary's climate is expected to continue to change. If greenhouse gas emissions are reduced, this change is expected to level off mid-century. Table 1 highlights the expected changes for continued business-as-usual emissions and reduced emissions.

Downed trees in nearby Porter County after a powerful storm. Photo credit: *National Weather Service*

Table 1. Projected changes in key climate indicators for the City of Gary. The arrows represent the overall trend, either upwards or downwards.

Climate Trends Snapshot – City of Gary

	HISTORICAL TRENDS (1961–1990)	MID-CENTURY PROJECTIONS (2040–2069)	LATE-CENTURY PROJECTIONS (2070–2099)	LATE-CENTURY PROJECTIONS *with reduced emissions*
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Days per year with precipitation over 1 inch	4.3	↑ 4.8 to 5.5	↑ 5.4 to 6	↑ 4.7 to 5.2
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Table 1. Summary of climate trends expected for the City of Gary

More details about the climate change trends and projections for the City of Gary can be found in Appendix 1: Climate Change Trends Primer.

Community Trends Summary

Climate change threatens our people, resources, and overall quality of life. As the City of Gary works to develop a plan that will ensure long term climate resilience, it is important to identify the features and values that create our vibrant quality of life.

This overview of basic community systems in the City of Gary provides a snapshot of how the community and its surrounding area function at the time this report is written. It is intended to support the climate change vulnerability assessment workshop process, and lead to robust strategies. More information about these community trends can be found in Appendix 2: Community Trends.

People and the Economy

- Between 2020 and 2021, the population of Gary declined from 75,486 to 69,739 (7.61% decrease)
- 78% of residents identify as Black or African American (Non- Hispanic) and 10% identify as white (non-Hispanic)
- The largest employment sector is manufacturing, followed by trade, transportation, and utilities
- The largest employer in Gary is U.S. Steel/Gary Works
- Important anchor institutions include Indiana University Northwest and the Gary/Chicago International Airport
- 32.2% of residents are in poverty, according to the United States Census
- Disadvantaged populations in the City of Gary include low-income neighborhoods, non-English speakers, people with disabilities, and people without health care

A busy street lined with local businesses in downtown Gary. Photo credit*: The City of Gary*

Nature and the Environment

- Air quality in the City of Gary is generally considered poor. The 2018 State of the Air report from the American Lung Association placed Chicago and northwest Indiana in the top 25 most polluted areas.
- Of the 13 miles of coastline in Gary, 3.5 miles is comprised of publicly accessible beachfront along Lake Michigan, representing nearly 16% of the regional total (over 22 miles)
- Gary lies within the Indiana Dunes ecosystem and is home to Miller Woods/Green Heron Pond/Bayless Dune, the Clark & Pine Nature Preserve, and the Ivanhoe Nature Preserve

Gary residents taking a boat into Calumet Lagoon. Photo credit: *Peggy Blackwell (www.visitmillerbeachgary.com)*

The Gary Aquatorium is open to the public year-round and offers stunning views of Lake Michigan. Photo credit: *Peggy Blackwell*

Infrastructure

- Gary's water supply comes from Lake Michigan and treated water is discharged to the Little Calumet River and the Grand Calumet River
- Electric service in Gary is principally supplied through the Northern Indiana Public Services Company (NIPSCO), which is one of the state's largest electricity providers
- Major transportation routes include Interstate 80/94, as well as key thruways like East and West 19th Avenue, Broadway, Front Street, and Martin Luther King Drive
- The city's public transport is provided by the Gary Public Transportation Corporation and the South Shore Line passenger railway, which connects to the Chicago transit system

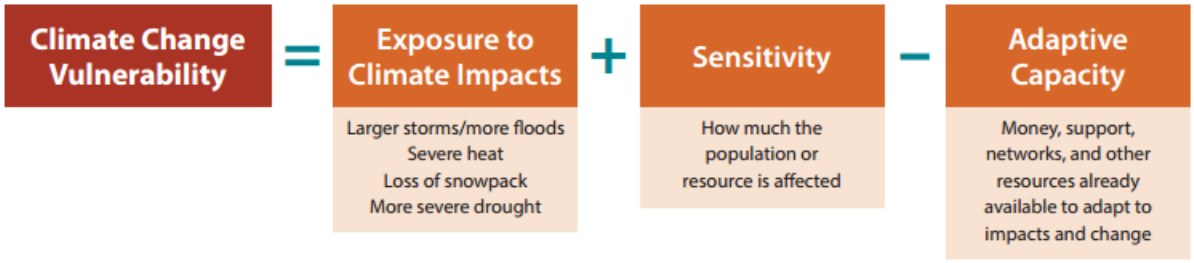
Statue of Octave Chanute, the grandfather of flight, at the Octave Chanute & Tuskegee Airmen Museum in Marquette Park.
Photo credit: *Peggy Blackwell (www.visitmillerbeachgary.com)*

Cultural Resources

- Important cultural landmarks in Gary include Marquette Park, the Gary Aquatorium, and the U.S. Steel Yard
- Gary is home to the Indiana Dunes National Park
- The city is also home to a professional baseball team, the Gary SouthShore RailCats
- The city is known for being the birthplace of the Jackson family, a family of well-known entertainers whose members include singer Michael Jackson
- Octave Chanute, a pioneer in aviation and a mentor to the Wright Brothers, used to test his gliders in the Indiana Dunes, including on Gary's Miller Beach
- Gary elected one of the nation's first African American mayors, Richard G. Hatcher, in 1967
- In 1972, the City of Gary hosted the National Black Political Convention

Climate Change Vulnerabilities

Climate impacts affect every person, structure, business, natural resource, and organization in the City of Gary. And yet, some will be impacted far more than others. Vulnerability depends on many factors, including ongoing stressors, potential climate impacts, and existing adaptive capacity.



This plan examines the vulnerabilities across five community systems:

The CN Kirk Yard serving Gary Works and the Chicago area. Photo credit: *The City of Gary*

Built Environment – this includes all the built elements in our community such as stormwater, wastewater, and drinking water systems; transportation networks like roads and railways; energy production and distribution; and homes, businesses, and other buildings.

Natural Systems – this includes all the aquatic and terrestrial ecosystems in our community. These may be public lands or privately owned, and includes urban greenways such as parks, tree lawns, and private yards.

Business and Economy – this includes the economic drivers of our community such as small business owners, large industry, commercial spaces, and tourism.

Human Systems - this includes the health care system, education and schools, law enforcement, emergency response services, and under-represented populations such as communities of color, people with disabilities, youth, elders, low-income workers, and those experiencing homelessness.

Community Culture – this includes all the specific ways that make our community special and feel like home to its residents, such as faith communities, civic organizations, local cultural groups, festivals, and events. This also includes any specific cultural practices or needs of the indigenous people in our community, as well as any immigrant populations.

Climate Change Vulnerabilities in the City of Gary

Local experts from diverse sectors of the community created the list of vulnerabilities and prioritized them across all five systems. For more information and details on this process, see Appendix 3: Climate Vulnerability Assessment.

Climate hazards - The specific climate trend or projection that is already causing or is expected to cause the impact.

Severe Heat – There could be 32-57 more days/year above 90° F

Larger Storms - The amount of precipitation in the largest storms could increase 5-30%

Extreme Cold – Even as average temperatures rise, Gary still experiences days below 32°F

Flooding – More homes and businesses at risk of flooding

Timeframe

When the impact is expected to occur
Near-term = current to 2030s
Mid-term = 2040s to 2060s
Long-term = 2070s to 2090s and beyond

Sensitivity

How much of a response or how great of an impact is expected (e.g. how disruptive it is, how serious the consequences are, and how much overall change is expected)
High, Medium, or Low

Adaptive Capacity

Whether there are already existing resources, programs, or policies in place to protect people or to respond to the changes with little disruption
High, Medium,or Low

Rank	Sector(s)	Vulnerability	Climate Hazard(s)	Time frame	Sensi-tivity	Adaptive Capacity
1	Economic	Higher cost of doing business due to rising energy and insurance costs as well as disaster losses		Near term	High	Low
2	Human	Overburdened healthcare system due to increasing mental and physical health challenges from worsening climate impacts		Near term	High	Med
3	Human	Worsening food insecurity due to disturbances in food production and supply chains		Near term	High	Med
4	Human	Decline in water quality due to increased flooding events, potentially exposing residents to hazardous materials		Near term	High	Med
5	Human	Increased risk of adverse health conditions due to air		Near term	High	Low

		pollution from heavily polluting industries				
6	Natural	Degradation of aquatic systems due to increased water pollution, leading to loss of wildlife habitat and ecological function		Near term	High	Med
7	Human/ Natural	Urban heat island effect from heat-absorbing buildings, impervious surfaces, and the removal of canopy cover		Near term	High	High
8	Built	Continued transportation disruption due to extreme weather events and damaged/aging infrastructure		Near term	High	Med
9	Human	Risk to unhoused population due to increased frequency of extreme temperatures		Near term	High	High
10	Built	Greater risk of property damage due to extreme precipitation, storms, and flooding events		Near term	High	Med
11	Built	Accelerated degradation of abandoned and/or vacant buildings due to extreme weather events		Near term	High	Med
12	Built	Damaged stormwater infrastructure due to increased precipitation, leading to collapse, flooding, and the potential for exposure to hazardous materials		Near term	High	Med
13	Built	Increased cost of residential energy due to storm and heat damage, aging infrastructure, and higher demand		Near term	High	Low

14	Culture	Risk to outdoor culture due to extreme heat and cold events		Near term	High	Low
15	Human	Risk to first responders, outdoor workers, and service industries due to increased frequency of extreme temperatures		Near term	High	Low
16	Built / Economic	Potential electrical outages due to extreme weather events like heat waves, extreme cold, and flooding		Near term	High	Med
17	Natural	Threats to native biodiversity posed by invasive plants and animals		Mid term	High	Low
18	Built / Economic	Damaged roads due to extreme weather events like extreme cold, heat waves, and flooding		Near term	High	Med
19	Natural	Threats to urban tree canopy from severe storms, drought, disease, and heat		Mid term	High	Low
20	Natural	Loss of connectivity of natural areas due to invasive species and extreme weather events		Long term	Med	Med
21	Natural	Reduced carbon storage due to wildfires, extreme heat, and drought		Mid term	Med	Low

Table 2. The following populations and resources were identified as vulnerable to climate change.

Strategies to Prepare for Change

The following sections provide an overview of the ways that our community will prepare and build resilience in the face of accelerating climate impacts. Many of the goals, strategies, and actions within the *Climate Ready Gary* plan provide co-benefits, thereby strengthening the whole community by addressing not only climate change but many other stressors.

Effective strategies and actions will address climate vulnerabilities by either *reducing the potential impact* or *increasing the adaptive capacity* for the population or resource affected. Actions that reduce the potential impact may reduce the exposure to the climate hazard, or the sensitivity of the population or resource, or both. Actions that address the adaptive capacity can increase existing or develop new adaptive capacity.

Areas where Gary can lead through direct governmental action are highlighted throughout the plan. To achieve success, however, actions must also be supported and implemented by residents, businesses, neighborhoods, nonprofit organizations, faith communities, schools, and others.

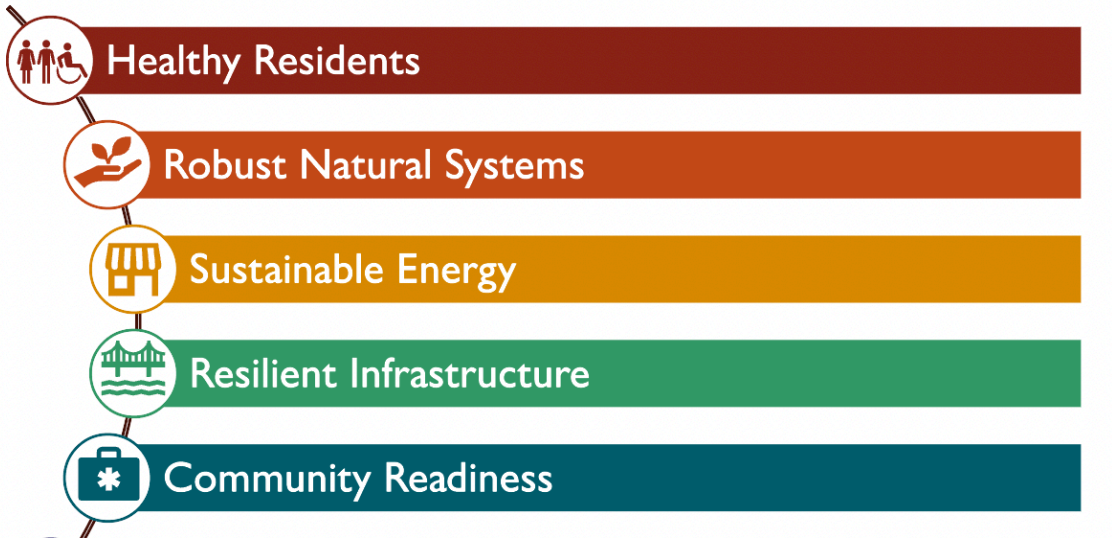
Symbols used in this plan

- Enhances environmental health and biological diversity
- Helps to build equity for historically marginalized groups
- Supports efforts to reduce greenhouse gas emissions (mitigation)
- Addresses multiple needs across community sectors
- The City of Gary leads through direct governmental action
- Indicates a high priority item

How to Read This Plan

Climate Ready Gary is organized into five themes that reflect the future of the City of Gary as climate change progresses. Within each theme are some key goals and a suite of strategies to address those goals. Strategies that help to address other important community values such as equity, nature, and mitigation are highlighted throughout the plan. For a complete list of actions/strategies, see Appendix 5.

Climate Ready Gary Themes



Healthy Residents

Maintaining and improving the physical and mental health of Gary residents is a top priority. As new climate-related impacts arise, greater investment in wellness, personal resilience, access to health care, and health care capacity will be needed.

Beachgoers enjoying a trip to dog-friendly Miller Beach. Photo credit: *Peggy Blackwell (www.visitmillerbeachgary.com)*

The impacts of climate change on peoples' health are multiple and significant. They include heat-related illnesses, increasing incidences of allergies and asthma, respiratory and heart disease related to ozone exposure, exposure to contaminants and hazardous materials, and mental health impacts. More frequent and severe storms, floods, heat waves, and other extreme events increase the risk of serious injury and add stress to healthcare systems and infrastructure.

Health-related impacts of climate change are unevenly distributed. Those who are most at risk include lower-income residents, people who work or live outdoors, infants and older adults, people with existing health conditions, and people who live in areas with higher heat, flood, and/or pollution risks.

Strategies to create healthy residents:

- Improve and enforce local regulations on pollution
- Reduce air pollution
- Promote locally grown food and build a food system to meet demand
- Educate public on extreme temperature health risks and increase access to health services during extreme weather events

Walking and biking trail at Marquette Park. Photo credit: *Peggy Blackwell (www.visitmillerbeachgary.com)*

Theme: Healthy Residents

Strategy: Improve and enforce local regulations on pollution

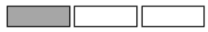
Addresses Risks
2, 4, 6

Pollution from illegal dumping is a persistent problem in the City of Gary. Illegal dumping refers to the unauthorized disposal or abandonment of materials within city limits, including tires, construction debris, and hazardous waste. Hazardous materials are substances that are toxic or corrosive, such as chemical solvents, pesticides and herbicide, electronics and electronic waste (e-waste), and oil and petroleum products, to name a few. Illegal dumping of hazardous waste can lead to the contamination of soil, water bodies, and groundwater, posing serious health risks to both humans and wildlife. It can also result in long-term environmental damage, ecosystem disruption, and economic burdens for communities tasked with cleanup efforts. Addressing this issue requires a combination of enforcement, education, and community engagement to prevent and mitigate the impacts of illegal dumping. For example, to combat pollution in the City of Gary, sites that have been used for illegal dumping can be reclaimed and repurposed for productive uses such as redevelopment, wildlife habitat restoration, or green infrastructure projects.

Action: Address illegal dumping through city's Illegal Dumping Taskforce efforts

Effectiveness

Relative Costs



Addressing illegal dumping of hazardous materials requires a collaborative effort involving community members, local authorities, and relevant public and private organizations. The city's Illegal Dumping Taskforce can oversee these efforts.

Proposed Lead* & Implementing Partner(s)

Gary Illegal Dumping Taskforce*, Gary Office of Sustainability and Environmental Affairs, local authorities, public & private partners

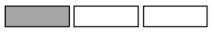
Evaluation Metrics

- Reduction in hazardous materials at illegal dumping sites

Action: Educate residents and businesses on proper hazardous waste disposal

Effectiveness

Relative Costs



Educating residents and businesses on proper hazardous waste disposal is crucial for reducing illegal dumping and minimizing the environmental and health risks associated with improper hazardous waste management. Some effective strategies for educating the community include the publication of online resources and the development of comprehensive public awareness campaigns.

Proposed Lead* & Implementing Partner(s)

Gary Public Works Department & Recycling Department*, state & federal agencies, local businesses, nonprofit partners, faith-based organizations, community leaders, Gary City Health & Human Services Department

Evaluation Metrics

- Public awareness campaign established
- Publication of online resources

Theme: Healthy Residents

Strategy: Reduce air pollution

Addresses Risks
2, 5

The City of Gary has historical ties to the steel industry and continues to produce steel and steel finished products such as sheet metal, tin plates, and tubing, to name a few. While the steel industry continues to play a role in the city's economy, Gary's economic landscape is diverse, hosting many different types of manufacturing within city limits. Some examples of items and goods produced in Gary include paper products, plastics, chemicals, rubber, hardware, springs, windshield wipers, light fixtures, apparel and bed linens, and processed foods.

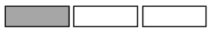
Although Gary's industrial sector plays a significant role in the city's economic growth and development, it is also linked to poor local air quality. Industrial air pollution refers to the release of harmful substances into the air because of industrial activities such as manufacturing, power generation, and chemical production. These processes can release a variety of pollutants into the air, including particulate matter, gaseous pollutants, heavy metals, and toxic chemicals.

These pollutants can have significant adverse effects on both the environment and human health. For example, particulate matter (PM) can penetrate deep into the respiratory system, causing respiratory problems, cardiovascular issues, and other health problems. Gaseous pollutants can contribute to the formation of smog and acid rain and can cause respiratory issues when inhaled. Heavy metals such as lead, mercury, and cadmium can accumulate in the environment and pose serious health risks when humans are exposed to them. Lead exposure, for example, can result in neurological damage, especially in children. Finally, exposure to toxic chemicals, either directly or through contaminated air, can lead to various health problems, including cancer, reproductive issues, and neurological disorders. Long-term exposure to any of these industrial air pollutants can contribute to respiratory problems such as asthma, chronic bronchitis, and other lung diseases. Additionally, some pollutants can increase the risk of cardiovascular disease.

Action: Conduct air quality health impact study for the city

Effectiveness

Relative Costs



An air quality health impact study is a comprehensive examination of the effects of air pollution on human health within a specific geographic area. The primary goal of the study is to assess the potential health risks associated with exposure to various air pollutants, such as particulate matter (PM).

Air quality health impact studies play a crucial role in informing public health policies, environmental regulations, and community planning efforts. By understanding the potential health risks associated with localized air pollution, authorities can implement measures to improve air quality and protect community well-being.

Proposed Lead* & Implementing Partner(s)
Gary Human and Health Services Department*, state & federal agencies

Evaluation Metrics

- Air quality health impact study conducted

Action: Establish an independent pollution monitoring program

The City of Gary can address multiple health concerns by establishing an independent pollution monitoring program to track industrial air pollution and ensure compliance with environmental regulations. An independent air pollution monitoring program can objectively assess and report on air quality conditions, providing reliable information to the public, regulatory agencies, and other key stakeholders.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)

The City of Gary*, local businesses, state & federal agencies, independent partners, local leaders, academic institutions, Gary City Health & Human Services Department

Evaluation Metrics

- Independent program established

Theme: Healthy Residents

Strategy: Promote locally grown food and build a food system to meet demand

Addresses Risks
3

Food insecurity may be hard to see, but many families and individuals must choose between enough food and other daily needs like housing or medicine. Children and older adults are most at risk. Local food insecurity is compounded by the widespread availability of calorie-rich and nutrient poor food products, contributing to high rates of chronic noncommunicable disease among Gary residents, such as heart disease and diabetes. A lack of access to grocery stores and other access points to fresh foods further exacerbate the issue. In fact, nearly 25% of Gary and East Chicago is designated a USDA food desert according to the NWI Food Council.

Additional barriers to people having food are affordability and awareness. As climate change progresses, those with the least resources are expected to be the most impacted by large storms, heat waves, floods, and other extreme weather events. As a result, food supplies could become restricted on a national and even global level, inflating prices. Current food availability, transportation, and security concerns are also expected to be exacerbated by these climate impacts.

Many actions are already being taken through collaboration with farmers, grocers, non-profit organizations, food banks, faith groups, and others. However, more needs to be done to increase access, affordability, and awareness by supporting and expanding on existing efforts.

Action: Increase the number of farmers markets with a focus on local food deserts

Farmers markets offer various public health benefits, including increased access to fresh, nutrient-rich foods, the promotion of plant-based diets, and a reduced reliance on processed foods.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)

Gary Food Council*, local nonprofits, community partners, private partners, Gary City Health & Human Services Department

Evaluation Metrics

- Number of market stalls
- Frequency of market days
- Number of neighborhoods served

Action: Improve access to local food resources and supporting infrastructure to residents

Effectiveness

Relative Costs

There are many public benefits of urban farming and the locally grown food it produces, such as enhancing food security and reducing a community's dependence on external food sources. The City of Gary can increase the social benefits of urban farming by expanding its existing programs and resources to more residents, boosting productivity of existing plots and increasing the number of urban growers.

Proposed Lead* & Implementing Partner(s)

Gary Food Council*, Legacy Foundation, local nonprofits, churches, schools, farmers/growers, NWI Food Bank, NWI Food Council

Evaluation Metrics

- Availability of locally grown food
- Number of growers participating in the program

Theme: Healthy Residents

Strategy: Educate public on extreme temperature health risks and increase access to health services during extreme weather events

Addresses Risks
2, 7, 9, 14

Extreme temperature events, whether excessively hot or cold, can pose significant public health risks. Some of the health risks associated with extreme temperatures include heat-related illnesses like heat exhaustion and heatstroke. These conditions can result in symptoms such as dehydration, rapid heartbeat, dizziness, nausea, confusion, and even loss of consciousness. Heatstroke, in particular, is a medical emergency that requires immediate treatment and can be fatal if not addressed promptly. Excessive heat can also lead to dehydration, especially if individuals do not adequately replace fluids lost through sweating.

Hot weather can also put strain on individuals with pre-existing health conditions. For example, high temperatures can increase heart rate and blood pressure, potentially leading to heart attacks or exacerbating heart-related problems. Respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD) are also exacerbated during hot weather, as high temperatures can worsen air quality, increasing the concentration of pollutants in the air and triggering respiratory symptoms in individuals with existing respiratory conditions.

Finally, illnesses and injuries can also occur during extreme cold events, including hypothermia and frostbite. An individual develops hypothermia when the body loses heat faster than it can produce it, leading to dangerously low body temperatures. Frostbite occurs when skin and underlying tissues freeze due to prolonged exposure to cold temperatures, resulting in tissue damage.

Communities can prepare for extreme temperatures by developing comprehensive plans for responding to extreme heat and cold events, establishing heat/cold relief centers, and conducting outreach campaigns to raise awareness about the health risks associated with exposure to extreme temperatures.

Action: Evaluate health services for extreme temperature events and identify partnerships to increase access to these services

Effectiveness

Relative Costs

While updating Gary's Emergency Preparedness Plan, the city can develop a plan for responding to extreme heat and cold events. The plan may include early warning systems, guidelines for activating cooling or heating centers, communication strategies to reach vulnerable populations, and coordination among local agencies and community organizations.

Proposed Lead* & Implementing Partner(s)

Gary Police & Fire Departments*, City's Emergency Response Team, Gary City Health & Human Services Department, city warming centers, Lake County Emergency Management Agency, Red Cross, neighborhood groups

Evaluation Metrics

- Available health services study
- Extreme weather public awareness campaign

Action: Improve extreme temperature preparedness throughout the Jewel Parks Program

Effectiveness

Relative Costs

To prepare for extreme temperatures, the City of Gary can establish cooling centers during extreme heat events and warming centers during extreme cold events. These centers could be provided through the Jewel Parks Program and provide a safe environment for individuals who may not have access to adequate heating or cooling in their homes. Water stations could also be installed to provide hydration to parkgoers on hot days.

Proposed Lead* & Implementing Partner(s)

Gary Department of Parks*, City Emergency Response Team, Red Cross, neighborhood groups

Evaluation Metrics

- Number of heating and cooling centers
- Number of water stations

Robust Natural Systems

Green spaces and nature are critical for healthy neighborhoods. Parks, clean waterways, and healthy ecosystems provide connections to nature throughout the city. They raise property values, provide recreational opportunities such as walking, hiking, and biking, improve physical and mental health, and support wildlife and biodiversity. Healthy, intact natural systems can also provide valuable ecological functions, such as filtering pollutants from the air and water, reducing flood impacts, and reducing air temperatures. Finally, parks and open spaces contribute to social cohesion by serving as social gathering spaces for sports, education, art, and volunteer work.

The Calumet Lagoon and bridge in Marquette Park. Photo credit: *Peggy Blackwell (www.visitmillerbeachgary.com)*

Natural systems are not limited to parks and protected areas. Yards, grounds, open lots, gardens, and other vegetated areas can provide critical habitat for native insects and birds, stopover areas for migrating species, and connections between more substantial blocks of habitat. As wilderness and natural areas become stressed and/or degraded, maintaining biological diversity within cities and other inhabited areas becomes increasingly vital to the persistence of native species throughout the region.

Gary's beaches, wetlands, rivers, and parks are highly vulnerable to climate impacts. Native trees are susceptible to drought, disease, and pests.

Strategies for robust natural systems:

- Expand urban tree canopy and improve tree maintenance
- Review, update, and implement the Gary Green Links Master Plan
- Take measures to reduce the risk of wildfires
- Improve vegetation management throughout the city
- Improve city's approach to land use

Hiking in Marquette Park with the dunes and Lake Michigan in view: *Peggy Blackwell (www.visitmillerbeachgary.com)*

Theme: Natural Systems

Strategy: Expand urban tree canopy and improve tree maintenance

Addresses Risks
6, 17, 19, 20, 21

Urban forests offer many biological benefits. They increase support for local biodiversity by providing habitats for various species of birds, insects, and other wildlife. They also manage stormwater runoff by absorbing rainwater through their root systems. This helps reduce the risk of flooding and improves local water quality, thereby supporting aquatic ecosystems. Additionally, urban forests enhance soil health by stabilizing soil with their root systems, which helps prevent erosion. This is especially important in regions prone to soil erosion and degradation. Finally, fallen leaves and organic matter from these trees also enrich soil, promoting healthier soils in urban environments. Thus, well-managed urban forests contribute to sustainable and vibrant communities.

The City of Gary has already taken steps to expand and maintain its urban forests. For example, in 2020, the city completed a tree inventory of over 2,367 trees, and in 2021, the Department of Venues, Parks and Recreation published an "Urban Forest Management Plan." The plan aims to increase canopy cover, filter and reduce stormwater runoff, reduce the urban heat island effect, create shade and energy savings, promote general health and wellbeing, provide a source of enjoyment and aesthetics, uptake carbon dioxide and filter pollutants, reduce crime, and raise property values.

Action: Update the 2021 Gary Urban Forest Management Plan to expand the local tree canopy

Effectiveness

Relative Costs

Expanding Gary's urban forest management plan can offer a wide range of benefits for both the environment and the community, including enhanced water quality and stormwater management, temperature regulation, air quality improvement, and aesthetic and recreational value. The plan could also focus on leveraging existing partnerships to acquire land for additional tree planting.

Proposed Lead* & Implementing Partner(s)

Gary Department of Parks*, Gary Department of Public Works, US Forest Service, regional government, nonprofit partners like CommuniTree

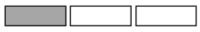
Evaluation Metrics

- Publication of an updated plan

Action: Develop a community education campaign on proper tree care

Effectiveness

Relative Costs



Poor tree maintenance through excessive pruning, overcrowding, or soil compaction, makes trees more susceptible to pests and diseases. By educating residents on proper tree care, the city can better maintain its urban canopy.

Proposed Lead* & Implementing Partner(s)

Nonprofit partners* like CommuniTree, resident volunteers

Evaluation Metrics

- Number of pruned or inspected trees in a given year

Theme: Natural Systems

Strategy: Review, update, and implement the Gary Green Links Master Plan

Addresses Risks
4, 6, 17, 19, 20, 21

Completed in 2005, the Gary Green Links Master Plan outlines a plan for a natural resources greenway and recreation corridor that connects the Grand Calumet River, the Little Calumet River, the Lake Michigan shoreline, and the Indiana Dunes National Lakeshore. The proposal also restores native ecological communities and expands the number of bicycle and pedestrian trails in Gary. The greenway would create a natural ring around the city, connecting residents to nature and recreational opportunities. While parts of the plan have been implemented, others have not.

Updating and implementing the Gary Green Links Master Plan would preserve and create green spaces throughout the city, such as parks, nature reserves, and urban forests. The green corridor will also provide habitats for local wildlife, support biodiversity, and contribute to ecosystem services such as pollination, soil stabilization, and water filtration. For instance, the updated plan may consider resilient design elements such as permeable pavement, tree plantings, and rain gardens, which could help manage stormwater runoff and reduce the risk of flooding and erosion. Additionally, these features absorb and filter rainwater, promoting groundwater recharge and improving water quality by removing pollutants before they reach rivers, lakes, and streams.

Completing the greenway project will also enhance connectivity between Gary's green spaces. The "ring-like" greenway will connect wildlife corridors, allowing animals to move freely between habitats. By providing safe passage across Gary's urban landscape, the greenway will mitigate the impacts of habitat fragmentation and facilitate gene flow among populations, supporting healthy ecosystems and species conservation.

Finally, increasing access to bike and pedestrian trails as outlined in the Bicycle and Pedestrian Master Plan also promotes physical activity and outdoor recreation, leading to improved public health outcomes and reduced healthcare costs. By providing opportunities for exercise, relaxation, and social interaction in natural settings, new trails and parks can improve mental wellbeing and quality of life.

Action: Update the Gary Green Links Master Plan and coordinate with the Bicycle and Pedestrian Master Plan

Effectiveness

Relative Costs

The City of Gary can coordinate efforts that expand bicycle and pedestrian paths by integrating goals from the Bicycle and Pedestrian Master Plan into an updated Gary Green Links Master Plan.

Proposed Lead* & Implementing Partner(s)

Gary Department of Parks*, Nature Conservancy, Little Calumet River Basin Development Commission, Calumet Collaborative

Evaluation Metrics

- Updated Gary Green Links Master Plan
- Updated maps of bike & pedestrian trails

Action: Continue to acquire and make use of vacant and abandoned property to connect trails and parks

The city can implement the Gary Green Links Master Plan by acquiring vacant and abandoned properties to connect existing trails and parks.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)

Gary Department of Parks* Gary Redevelopment Department, Little Calumet River Basin Development Commission, Land Trusts

Evaluation Metrics

- Number of connected trails and parks
- Number of acquired properties

Theme: Natural Systems

Strategy: Take measures to reduce the risk of wildfires

Addresses Risks
19, 21

Climate change causes higher temperatures, which can increase the likelihood of wildfires by prolonging fire seasons and creating more favorable conditions for fire ignition and spread. Higher temperatures also increase evaporation rates, leading to drier soils and vegetation that are more susceptible to ignition and combustion.

More frequent and intense extreme weather events, such as heatwaves, droughts, lightning storms, and high winds, can also increase the likelihood and severity of wildfires. Lightning strikes, in particular, can ignite wildfires during dry and windy conditions, while strong winds can fan flames and accelerate fire spread, making containment efforts more challenging for firefighters.

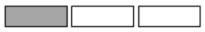
Communities can reduce the risk of wildfires through comprehensive planning, vegetation management, and community outreach and education. Developing a fire protection plan, for instance, can establish evacuation routes, evacuation shelters, and communication channels. It can also help cities to allocate resources more effectively and coordinate response efforts among various stakeholders such as emergency responders, government agencies, and local organizations. Vegetation management activities, such as thinning, pruning, and removing ladder fuels (i.e., vegetation that allows fire to climb from the ground into the tree canopy), can also help communities lower the risk of wildfires by reducing the amount of available flammable material. By decreasing fuel loads, vegetation management helps limit the intensity and severity of wildfires and reduces the potential for rapid fire spread. Finally, communities can provide opportunities for public engagement and education about fire safety, prevention, and preparedness. Educated and informed communities are better equipped to take proactive measures to prevent fires and protect themselves during emergencies.

In addition to protecting residents and built infrastructure, community-wide strategies to prevent wildfires has ecological benefits. Reducing the risk of catastrophic wildfires helps to maintain biodiversity, restore natural habitats, and protect critical ecosystems and water resources. Thus, sustainable fire management strategies support resilient landscapes and promote long-term ecological sustainability.

Action: Develop a city-wide fire protection plan

Effectiveness

Relative Costs



A comprehensive fire protection plan outlines procedures, protocols, and resources for responding to fire emergencies effectively. It can also help identify and assess fire risks within the community. By understanding potential fire hazards, vulnerabilities, and exposure through a fire protection plan, the City of Gary can take proactive measures to mitigate risks and reduce the likelihood and impact of wildfires or other fire emergencies.

Proposed Lead* & Implementing Partner(s)

Gary Fire Department*, National Park Service

Evaluation Metrics

- Publication of an updated plan

Action: Educate residents, municipal employees, and first responders on wildfire/fire safety

Effectiveness

Relative Costs

Through outreach campaigns, workshops, and training programs, the City of Gary can educate local officials and residents about fire risks, evacuation procedures, and the importance of early detection and reporting of wildfires.

Proposed Lead* & Implementing Partner(s)

Community organizations*, National Park Service, Gary Fire Department

Evaluation Metrics

- Creation of a community fire safety campaign
- Number of municipal fire safety trainings

Theme: Natural Systems

Strategy: Improve the city's approach to land use

Addresses Risks
4, 6

Land use planning is integral to building and managing a resilient city. Land use plans determine how local properties should be used, ranging from green space to residential areas and industrial sites. They also create the basis of local zoning laws and restrictions on certain kinds of land use. Updating the current plan to adopt more sustainable strategies can help reduce the environmental impact of current zoning practices on Gary's natural ecosystems. In addition to preserving the environment, an updated plan would conserve resources, promote social cohesion, enhance community resilience, and support transportation, industry, and economic activity.

An example land use policy that can be effective in protecting the natural environment includes establishing buffer zones along bodies of water with restrictions on development and land use within these zones. Buffer zones help prevent direct runoff of pollutants into water bodies, thereby protecting aquatic habitats and maintaining natural vegetation that can filter and absorb pollutants. Additionally, improved stormwater management regulations that require the use of best

management practices (BMPs) to control runoff from urban areas and construction sites could be adopted in the updated plan. Proper stormwater management helps reduce the transport of pollutants, such as sediment, nutrients, and chemicals, into natural ecosystems. Finally, the new land use plan could include regulations to protect existing wetlands and encourage wetland restoration projects. Gary is home to several wetlands, which act as natural filters by trapping sediments and removing pollutants from runoff before it reaches a body of water. Protecting and restoring these wetlands enhances local water quality while supporting aquatic ecosystems.

Once the new plan is developed, the City of Gary can increase the likelihood of its success by establishing strong enforcement and compliance mechanisms for violations of the updated land use regulations. Effective enforcement ensures that landowners and developers adhere to established policies, contributing to the overall success of the city's renewed environmental protection efforts.

Action: Implement existing ordinances and/or develop additional policies that protect aquatic systems

The City of Gary can improve overall water quality and support aquatic ecosystems by updating its development policies or creating new ones. To be effective, the policies must also be enforced.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)

Gary Redevelopment Department*, state & federal agencies

Evaluation Metrics

- Water sampling & water quality trends

Action: Establish a community working group to assist the city with land use planning and implementation

The City of Gary can build support for its updated land use plan by creating a working group or commission dedicated to supporting public officials throughout the planning and implementation process.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)

Gary Redevelopment Department*, residents, local advocacy groups, IU Northwest

Evaluation Metrics

- Number of commission members
- List of commission meetings and decisions

Sustainable Energy

The Gary Climate Action Plan sets ambitious targets for greenhouse gas emissions reductions, including a 50% city government operations emissions reduction (from its 2017 baseline) by 2030. Additionally, Gary aims to produce 50 MW of local renewable energy generation by 2030 and reduce overall community emissions by 35% (from its 2017 baseline) by 2030 (excluding industrial sources). To achieve these goals, the city will need to reduce emissions in both the commercial and residential sectors. Opportunities for emissions reductions include energy efficiency and renewable energy initiatives.

In addition to lowering Gary's carbon footprint, these efforts also boost local resilience and offer a multi-faceted approach to addressing environmental, economic, and social issues in the community. Financial benefits will be crucial for supporting residents and business owners as other costs (such as the cost of energy, insurance, goods and services, and transportation) increase due to climate change impacts. For instance, more severe storms, flooding, drought, and extreme heat significantly increase insurance costs due to the damage these events can cause, creating a financial strain on Gary residents and business owners. Companies may need to raise prices of their goods and services due to the costs associated with these extreme events, creating a financial burden for their consumers. One way to reduce the cost burden on businesses and residents is the conservation of energy and production of renewable energy sources. Therefore, some of the actions outlined in *Climate Ready Gary* will support sustainable energy, resulting in lower energy costs and a more diversified (and resilient) energy supply.

A residential rooftop solar installation. Photo credit: *Gary's Residential Solar Consumer Guide ("Going Solar in Gary, Indiana")*

Strategies to support sustainable energy:

- Increase solar adoption in residential, commercial and municipal sectors
- Improve energy efficiency of existing buildings throughout the city

Theme: Sustainable Energy

Strategy: Increase solar adoption in residential, commercial and municipal sectors

Addresses Risks
1, 13

Solar power can significantly reduce energy costs for both residents and businesses, offering financial benefits, greenhouse gas emissions reductions, and energy independence. Federal tax credits and state incentives are available, and customers generally see a reduction in their monthly energy bill. While Indiana no longer has a quality net-metering program, solar panels still offer Gary residents financial savings, with the average solar payback period between 9- and 12-years post-installation. The systems also have a long shelf life, typically lasting between 25 and 30 years. Solar adoption may increase property values and energy efficiency, offering additional financial benefits.

The City of Gary has already made significant progress, earning SolSmart bronze designation for its efforts to educate residents on the economic and environmental benefits of solar power. It also participates in the Soul Power program (part of the city's SolarizeGary initiative) which trains residents, particularly people of color and low-income residents, for jobs as solar installers—and then connects them with employment opportunities. The city has also undertaken efforts to increase the amount of solar providing electricity to the community. For instance, in 2016, Gary participated in the Solarize Northwest Indiana campaign, which allowed people to purchase rooftop solar at a lower group rate. The Solarize campaign spurred other solar installations in the community, even if they were not directly connected to the initial campaign.

While the City of Gary has already pursued its own solar efforts, there is room for improvement. For example, some communities partner with government agencies, utilities, and non-profit organizations to provide technical assistance, low-interest loans, or financing programs for solar projects. Communities could also host informational workshops, webinars, and community events to educate residents about solar technology, financing options, available incentives, and the installation process. Finally, many communities invest in municipal solar projects such as rooftop solar or solar arrays. By implementing similar strategies, the City of Gary can accelerate the deployment of solar installations, reduce greenhouse gas emissions, enhance energy resilience, and promote economic development.

Action: Launch an educational campaign to educate local stakeholders on the benefits of solar energy

Effectiveness

Relative Costs

Educating residents about the benefits of solar energy is crucial for promoting its adoption and fostering a transition to renewable energy sources. The City of Gary can host workshops or webinars on solar energy basics, including how solar panels work, the financial incentives available for solar installations, and the environmental benefits of solar energy.

Proposed Lead* & Implementing Partner(s)

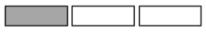
Gary Office of Sustainability and Environmental Affairs*, Faith CDC, Laporte County NAACP, SolSmart

Evaluation Metrics

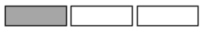
- Number of solar trainings or webinars
- Number of resident participants in solar trainings or webinars

Action: Publish an inventory of existing programs and resources for residential and commercial sectors to advance solar adoption

Effectiveness



Relative Costs



To increase solar adoption, the city can publish an inventory of state and federal incentives available to residents and business owners who install solar panels. The inventory can also include resources for free technical support and guidance for residential and commercial solar installations.

Proposed Lead* & Implementing Partner(s)

Gary Office of Sustainability and Environmental Affairs*, IU Environmental Resilience Institute

Evaluation Metrics

- Publication of solar resources inventory

Action: Pursue financial resources to assist vulnerable communities with solar adoption and resilience

Effectiveness

Relative Costs

Financial barriers can hinder the adoption of solar energy in both residential and commercial sectors. However, the city can offer financial support and resources to residents and business owners who qualify for assistance.

Proposed Lead* & Implementing Partner(s)

Gary Office of Sustainability and Environmental Affairs*, NIPSCO, contractors, Solar United

Evaluation Metrics

- Number of solar installations in Gary by neighborhood

Theme: Sustainable Energy

Strategy: Improve energy efficiency of existing buildings throughout the city

Addresses Risks
1, 13

Energy efficiency programs not only benefit individuals and businesses directly through cost savings, but they also contribute to Gary's broader emissions reduction goals. Moreover, more energy-efficient buildings lower Gary's energy demand, thereby reducing strain on its energy infrastructure, such as its power grids. This can enhance the resilience of Gary's energy system, making it more robust and less susceptible to disruptions. These programs may also offer economic development benefits. That is, the development, implementation, and maintenance of energy efficiency programs create jobs in various sectors, including manufacturing, construction, and technology. This can stimulate economic growth and support a transition to a greener economy.

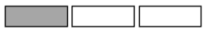
Social benefits are also generated through energy efficiency programs, which can be designed to address social and economic equity by making energy-efficient technologies and upgrades accessible to a broader range of income levels. This helps ensure that cost savings are distributed more equitably.

Educational campaigns often accompany energy efficiency programs and raise public awareness about the importance of energy conservation. This can lead to informed consumer choices and more sustainable behavior. Community outreach can be performed by the city or through nonprofit or private organizations.

Action: Publish an inventory of existing programs and resources for residents and businesses that advance energy efficiency

Effectiveness

Relative Costs



The City of Gary could publish a comprehensive inventory of governmental, nonprofit, and private energy efficiency programs to increase local awareness and participation in these programs.

Proposed Lead* & Implementing Partner(s)

City of Gary*, state & federal energy efficiency programs, NWICA (weatherization), contractors, public & private partners

Evaluation Metrics

- Publication of energy efficiency resources

Action: Offer support for program implementation

Effectiveness

Relative Costs

To improve the energy efficiency of residential and commercial buildings in Gary, the city could support state, private, and/or nonprofit actors in the implementation of existing energy efficiency programs.

Proposed Lead* & Implementing Partner(s)

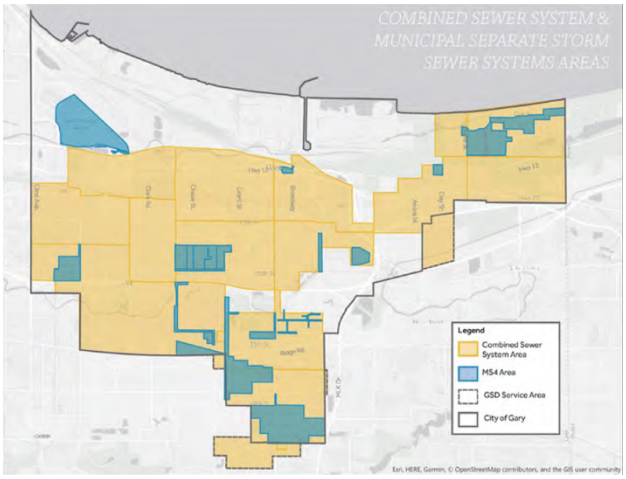
City of Gary*, state & federal energy efficiency programs, NWICA (weatherization), contractors, public & private partners

Evaluation Metrics

- Number of energy efficient homes (with a focus on low-income homeowners)
- Percent efficiency increase
- Total energy savings
- Number of partners

Resilient Infrastructure

Infrastructure includes buildings, energy distribution, water delivery, storm- and wastewater, floodwalls, roads and highways, bridges, culverts, communications networks, and many other basic structures found throughout the region. Gary's infrastructure varies significantly in age and condition and improving its efficiency, resilience, function, and health is a top priority.



A map of Gary's combined sewer system and municipal separate storm sewer systems that are susceptible to flooding. Photo credit: *Gary Green Infrastructure Plan (2019)*

Like many legacy industrial cities in the United States, the City of Gary has struggled with population loss and the problem of vacant land throughout its various neighborhoods and corridors, creating a significant infrastructure problem. However, the city has already taken steps to stabilize, manage, and redevelop thousands of vacant and abandoned properties, eliminate neighborhood blight, and regenerate its economy. For example, in 2019, the city published the Gary Green Infrastructure Plan in partnership with several nonprofit and private entities. The plan provides a framework for planning, implementing, regulating, and managing green infrastructure in the city, creating a blueprint for building more resilient infrastructure.

With 793 miles of roads, dense neighborhoods, and numerous industrial properties, Gary's total acreage of impervious surfaces is significant. As a result, flooding is common throughout the city during severe storms. The prevalence of flooding can put critical infrastructure at risk. For example, Gary has a Municipal Separated Stormwater Sewer System (MS4) that covers about 10% of the city. These areas include Glen Park, areas north of US 20, and areas located around the Little Calumet River, which are particularly prone to flooding. In summary, the city's most at-risk infrastructure includes its sewer system, flood-prone neighborhoods, and flood-prone roads and highways, necessitating more resilient infrastructure to withstand more frequent and severe flooding, along with other extreme weather events.

Strategies to support resilient infrastructure:

- Improve effectiveness of city's grey infrastructure
- Expand city's green infrastructure
- Replace and upgrade roads
- Increase resilience in local power distribution

Combined sewer outfall. Photo credit: *Gary Green Infrastructure Plan (2019)*

Theme: Resilient Infrastructure

Strategy: Improve effectiveness of city's grey infrastructure

Addresses Risks
4, 6, 12

The City of Gary has a combined sewer system that joins domestic sewage, industrial wastewater, and stormwater runoff into the same pipe. Combined sewers account for about 90% of the city's sewer system and serve approximately 25,000 customers. This system is designed to efficiently transport the combined wastewater to a sewage treatment plant, where it is treated, and then discharged into a water body. Currently, eleven Combined Sewer Overflows (CSOs) discharge to local rivers in Gary.

The problem with a combined sewer system is that during severe storms, when a large volume of stormwater rushes into the system, the wastewater in this system will overflow and discharge polluted, untreated water into larger water bodies. Therefore, Gary's CSOs have negative impacts on the water quality of the Lake Michigan watershed, and for this reason, the US Environmental Protection Agency (US EPA) placed the Gary Sanitary District under a consent decree to better control its CSOs through the creation of a Long-Term Control Plan (LTCP).

Improvements can be made to Gary's existing wastewater and stormwater infrastructure to not only address current water management needs, but also create a system that is adaptable and robust enough to withstand and recover from future uncertainties. For example, the city could adopt sensors and smart technologies that provide real-time data on stormwater conditions, allowing for more responsive and adaptive management strategies. The city can also invest in separate sewer networks—one for sewage and one for stormwater runoff. This approach keeps sewage and stormwater separate, allowing for more efficient treatment of wastewater and reducing the risk of overflows during heavy rain events.

Action: Assess existing stormwater and wastewater management system

Assessing the needs of Gary's existing stormwater and wastewater management system will help the city identify opportunities to improve performance.

Effectiveness

Proposed Lead* & Implementing Partner(s)
Gary Sanitary District*, state & federal agencies

Relative Costs

Evaluation Metrics

- Publication of a study on Gary's stormwater and wastewater management system

Action: Continue development and implementation of Gary's Long Term Control Plan

The City of Gary developed a long-term control plan (LTCP) to reduce the occurrence of combined sewer overflows (CSOs). To limit the occurrence of CSOs, the city will continue to implement its LTCP, reducing pollutant discharge and improving local water quality. Implementing the LTCP will also involve reducing invasive plant species and restoring native vegetation to stream banks and riparian areas in Northwest Indiana, which have been impacted by Gary's CSOs.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)
Gary Sanitary District*

Evaluation Metrics
- Number of CSO occurrences
- Number of completed Supplemental Environmental Projects (SEPs)

Theme: Resilient Infrastructure

Strategy: Expand city's green infrastructure

Addresses Risks
4, 6, 10, 11, 12, 17

Green infrastructure refers to natural or semi-natural systems that provide multiple environmental, social, and economic benefits while managing water, enhancing biodiversity, and improving urban resilience. Examples of green infrastructure projects include green roofs, rain gardens, permeable pavements, natural wetlands and riparian buffers, and community gardens and green spaces.

Green infrastructure projects offer social and ecological benefits such as improved water quality by mimicking and/or enhancing natural processes that filter stormwater, resulting in less runoff and fewer pollutants in local water bodies. Green infrastructure also retains stormwater, reducing the volume of runoff that flows overland and enters drainage systems. Therefore, green infrastructure projects also reduce the frequency and severity of flooding events and CSOs.

There are many ways communities can promote green infrastructure. For instance, a city could raise awareness about the benefits of green infrastructure through educational campaigns, workshops, public meetings, and outreach events to provide information about different types of green infrastructure practices, their environmental benefits, and potential cost savings. Communities can also offer financial incentives, grants, rebates, or tax credits to encourage property owners to implement green infrastructure on their properties. Finally, incorporating green infrastructure into local planning and development regulations, such as zoning ordinances, subdivision regulations, and building codes is another way communities can encourage green infrastructure projects.

In 2019, the city developed the Gary Green Infrastructure Plan to create a community-wide framework for green infrastructure. The plan integrates proposed projects with broader land use planning and redevelopment efforts. It also provides tools, strategies, and recommendations for project prioritization and discusses management, funding, and financing structures.

Action: Implement City's Green Infrastructure Plan
The City of Gary can expand its green infrastructure by implementing its Green Infrastructure Plan (2019).

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)
City of Gary*, property owners, residents, community partners

Evaluation Metrics
- Percentage of completed proposals

Action: Incentivize the creation of green infrastructure in low-income areas

Incentivizing residents to adopt natural processes for stormwater management can help the City of Gary reduce the negative impacts of flooding events.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)

City of Gary*, property owners, residents, community partners

Evaluation Metrics

- Number of residents participating in the incentive program

Theme: Resilient Infrastructure

Strategy: Increase resilience in local power distribution

Addresses Risks
16

Climate change is associated with more frequent and intense extreme weather events, such as hurricanes, storms, heatwaves, and floods. These extreme weather events can cause physical damage to power lines, substations, and other infrastructure, leading to outages and disruptions.

For example, rising temperatures can lead to increased consumer demand for electricity due to higher cooling needs, straining the grid. Overheating of electrical equipment may also occur, reducing its efficiency and accelerating the aging of power infrastructure. Additionally, changes in precipitation patterns can lead to increased flood risks and more severe storms, posing a threat to overhead power lines. In summary, climate change can significantly impact electrical power distribution systems, posing challenges to their reliability, resilience, and overall functionality.

To improve resilience in local power distribution, communities can adopt advanced technologies, like underground electrical wiring, smart grids, or microgrids. They can also implement vegetation management programs to control and trim trees near power lines, reducing the risk of tree-related outages during storms. Finally, cities can educate residents on the importance of energy conservation, emergency preparedness, and investing in a resilient power system.

Action: Install underground electrical wiring

Transitioning from overhead power lines by investing in underground electrical infrastructure would reduce Gary's vulnerability to weather-related events, minimize outages caused by fallen trees or debris, and enhance system reliability. However, underground systems should only be installed in areas with a low flood risk.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)

Gary Department of Public Works*, utility companies, contractors, property owners

Evaluation Metrics

- Number of deactivated overhead power lines
- Scope of underground electrical wiring installations

Action: Improve vegetation management near power lines

The City of Gary can launch a vegetation management program to control and trim trees near power lines, reducing the risk of tree-related outages during storms.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)

Gary Department of Public Works*, property owners

Evaluation Metrics

- Number of trimmed trees

Community Readiness

Extreme weather events and emergencies can happen with or without warning. The City of Gary has systems and policies in place to prepare for and respond to both human caused and natural events. But residents and businesses also need to take steps to reduce the potential for impacts and be prepared for these events.

Communities with close-knit neighborhoods and active networks fare the best during and after disasters. Community networks, including churches, temples, interfaith groups, neighborhood associations, and less formal systems of friends, family, and neighbors who look out for one another are vital to resilience. Interfacing with existing networks and supporting the development of new ones creates longer-term resilience. Resilience hubs are one way to create the networks and relationships needed.

Lower-income community members, people who lack adequate housing, older adults, those with limited mobility or health conditions, outdoor workers and people without access to a vehicle all face greater risk. Also included are community members in care facilities, jails, dorms, or other group settings where people are dependent on others for their emergency response and evacuation. Finally, non-English speakers may not receive timely emergency instructions that they can understand.

Emergency preparedness plays a crucial role in enhancing the City of Gary's ability to prepare for, respond to, and recover from climate emergencies. In addition to upgrading local infrastructure to prepare for extreme weather events, the city can also focus its efforts on public education and incentivizing residents and property owners to act.

Strategies to increase community readiness:

- Create a more resilient built environment
- Improve community emergency preparedness with an emphasis on at-risk neighborhoods
- Prevent or mitigate flood damage

Fire truck serving the City of Gary. Photo credit: *Gary Fire Department*

Theme: Community Readiness

Strategy: Create a more resilient built environment

Addresses Risks
1, 7, 10, 11, 13

Climate change can significantly impact local weather patterns, leading to changes in temperature, precipitation, and storm intensity. To make Gary's built environment more resilient, existing buildings can be retrofitted and new construction can be designed to enhance each building's ability to withstand and recover from the impacts of extreme weather events.

Some resilient building strategies include wind-resistant design features, such as reinforced roofs, impact-resistant windows, and/or storm shutters to mitigate damage from high winds, flying debris, and water intrusion. The city could also promote the use of weather-resistant materials for exterior surfaces to protect against water damage, extreme temperatures, and UV radiation. Properly insulated buildings are also more resilient due to their ability to regulate interior temperatures, providing both cooling and heating efficiency during extreme weather events. Property owners may also incorporate backup power systems to ensure continued operation during power outages.

Altering a building's exterior can also increase its resilience. For example, plant windbreaks, such as trees or shrubs, can provide natural protection against strong winds and reduce the impact of wind-driven debris. Using permeable surfaces in landscaping can also reduce stormwater runoff and prevent flooding.

The City of Gary can promote these kinds of interior and exterior building strategies through incentive programs or regulations. Incentive programs may involve offering financial incentives such as tax credits or rebates for property owners who implement resilient building practices. Conversely, the city could implement and enforce new building codes and regulations that address the risks posed by extreme weather events. Finally, the city could work with local nonprofits to establish retrofitting programs that upgrade existing buildings to meet new resilience standards. In short, Gary could use a combination of incentives and regulations to influence the behavior of property owners and increase resilience in the city's built environment.

Action: Retrofit older buildings and require higher standards for new construction projects

Effectiveness

Relative Costs

Retrofitting buildings involves strengthening their structural components to withstand more extreme weather events. By identifying older buildings and enforcing higher standards for new construction projects, the city can increase the resilience of its building stock.

Proposed Lead* & Implementing Partner(s)

Gary Building Department*, Gary Redevelopment Department, property owners, contractors

Evaluation Metrics

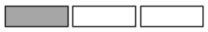
- Number of retrofitted buildings
- Creation of an incentive program
- Adoption of more resilient construction standards

Action: Pass ordinance allowing resilient landscaping practices for new and existing buildings

The City of Gary can further increase resilience in its built environment by allowing resilient landscaping that can withstand and mitigate the impacts of severe weather conditions such as heatwaves, heavy rainfall, storms, and droughts. An example of resilient landscaping practices includes planting windbreaks of trees or shrubs to reduce the impact of strong winds, protecting buildings from storm damage.

Effectiveness

Relative Costs



Proposed Lead* & Implementing Partner(s)

Gary Redevelopment Department*, City Council, property owners

Evaluation Metrics

- Passage of resilient landscaping ordinance

Theme: Community Readiness

Strategy: Improve community emergency preparedness with an emphasis on at-risk neighborhoods

Addresses Risks
2, 15

There is a well-established link between climate change and the frequency and intensity of certain types of natural disasters, including floods, tornadoes, and hurricanes. While climate change does not directly cause these events, it can exacerbate their impacts. For example, climate change is leading to changes in weather patterns, resulting in more frequent and severe extreme weather events. Warmer temperatures can lead to increased evaporation rates, which in turn can fuel more intense rainfall events and increase the risk of flooding. Additionally, warmer oceans can provide more energy to tropical storms and hurricanes, resulting in stronger and more destructive storms. Climate change also increases the frequency of wildfires due to rising temperatures, which can lead to drier conditions, reduced soil moisture content, and increased vegetation dryness, making forests more susceptible to ignition.

Communities can and must prepare for more frequent and severe natural disasters through comprehensive planning and coordination. The most common way to do so is through an emergency preparedness plan, which is a comprehensive strategy designed to mitigate, respond to, and recover from various types of emergencies and disasters that may affect a city and its residents. Such a plan typically involves collaboration among government agencies, emergency responders, community organizations, and residents. While most cities are already equipped with emergency preparedness plans, many have not updated the plans to reflect the increased frequency and severity of natural disasters brought on by climate change.

An updated emergency preparedness plan for a city should begin with a risk assessment, which is a thorough assessment of the climate-related risks facing the community, considering factors such as extreme weather events, increased temperatures, changes in precipitation patterns, and impacts on critical infrastructure, natural resources, and vulnerable populations. Next, the community can develop scenarios that anticipate various climate-related emergencies, such as floods, heatwaves, hurricanes, wildfires, and extreme storms, considering their potential impacts on the community and

critical infrastructure. Planners will then establish clear lines of communication and coordination among key government agencies, emergency responders, community organizations, and residents to facilitate an effective response to climate-related emergencies. They will also develop protocols for early warning systems, evacuation procedures, sheltering, and emergency transportation to ensure the safety and well-being of residents, particularly those in high-risk areas.

Many communities will combine emergency preparedness planning with public education and outreach efforts. For example, cities may engage with residents, businesses, schools, and community groups to raise awareness about climate change impacts, promote emergency preparedness protocols, and encourage individual and collective actions to reduce vulnerability and enhance resilience. They may also distribute training and educational resources.

Action: Review and update Gary's Emergency Preparedness Plan

The City of Gary can better prepare for climate-related natural disasters by updating its Emergency Preparedness Plan.

Effectiveness

Relative Costs

Proposed Lead* & Implementing Partner(s)

Gary Police & Fire Departments*, City Emergency Preparedness working group, NIPSCO, homeowners, property owners

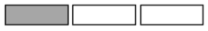
Evaluation Metrics

- Publication of updated Emergency Preparedness Plan

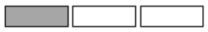
Action: Educate city officials on climate vulnerabilities and impacts

To raise awareness of climate-related risks and improve coordination amongst city officials during emergencies, the City of Gary can publish educational materials and hold training sessions or workshops for municipal employees.

Effectiveness



Relative Costs



Proposed Lead* & Implementing Partner(s)

Gary Office of Sustainability and Environmental Affairs*, IU Environmental Resilience Institute

Evaluation Metrics

- Number of training sessions or workshops
- Number of city officials participating in training sessions or workshops

Theme: Community Readiness

Strategy: Prevent or mitigate flood damage

Addresses Risks
4, 6, 8, 10, 11, 16, 18

Another significant threat to Gary's resilience is flooding. The last major flood to hit the city was in June of 2008. The storm affected multiple states in the Midwest and was triggered by a series of heavy rainstorms that saturated the region's soil and caused rivers to swell. The rainfall was

exacerbated by melting snow from the winter months, contributing to elevated water levels in rivers and streams. As a result of the flood, local rivers and tributaries reached or exceeded record flood stages, including the Little Calumet River in Gary. Numerous northwestern Indiana communities faced severe flooding, resulting in the evacuation of residents and causing substantial damage to homes and businesses. Critical infrastructure, including roads, bridges, and levees, was damaged or breached in several locations, causing widespread transportation disruption. The flood of 2008 had significant economic consequences, with billions of dollars in damages reported.

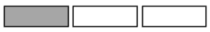
Flood-prone cities like Gary can take proactive measures to prepare for major flooding events and minimize the potential impact on residents, infrastructure, and the local environment. To reduce the incidence of flooding, communities can develop flood risk maps and zoning regulations to identify high-risk areas and guide development away from flood-prone neighborhoods. Communities can also implement and enforce land use planning that considers floodplain management, restricting certain types of development in flood-prone areas.

Additionally, communities can adopt strategies to reduce the impact of floods when they occur. For example, cities can develop evacuation plans for flood-prone areas, including designated evacuation routes, shelters, and communication strategies, as well as implementing flood monitoring systems to track river levels and rainfall data. This information can be used for early detection of potential flooding, enabling cities to disseminate timely and accurate flood alerts and warnings. Finally, cities can conduct educational campaigns and trainings to raise awareness about flood risks, emergency procedures, and the importance of preparedness.

Action: Identify and prioritize flood-prone areas

Identifying the areas in Gary that will be most susceptible to floods in the coming decades will help the city target its flood mitigation efforts to high-risk areas.

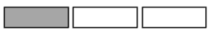
Effectiveness



Proposed Lead* & Implementing Partner(s)

Gary Office of Sustainability and Environmental Affairs*, state & federal agencies

Relative Costs



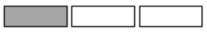
Evaluation Metrics

- Creation of local flood map

Action: Educate homeowners on flood protocols

The City of Gary can further reduce flood damage by providing information on how to prepare for floods, including creating emergency kits, developing evacuation plans, and understanding warning systems.

Effectiveness



Proposed Lead* & Implementing Partner(s)

City of Gary*, residents, property owners, community groups, NIRPC, Red Cross

Relative Costs

Evaluation Metrics

- Number of public education events
- Publication of emergency preparedness materials

Implementation and Evaluation

Climate Ready Gary is a plan for building climate resilience. To realize this vision, the strategies and actions identified here need to be implemented, monitored, and revised as necessary.

To ensure a strong implementation process, the City of Gary will convene an Implementation Task Force made up of local government staff and civic leaders whose organizations are tasked with implementing these strategies. It is important to recognize that much of the work outlined in this plan falls on community groups, organizations, and partner agencies. Coordination and collaboration with these entities will be essential.

Creating Implementation Plans

This Task Force's first order of business will be to develop 1-year and 3-year implementation plans focusing first on the high priority actions identified in this plan. Determining the order of implementation for these actions will require the Task Force to consider public support, political feasibility, and available resources. These can include existing tools and resources such as Multi-Hazard Mitigation Plans, partnerships with anchor institutions, and innovating funding mechanisms. Additionally, any pre-requisites for implementation of specific actions should be identified and included in the implementation plan timeline.

At regular intervals, likely every 12 months, the Task Force will assess what is needed to keep the current actions moving forward or what corrective action may be needed. They will also consider if changes to the next 3-year plan are needed based on what has been learned.

Monitoring and Evaluation

An important component of these implementation plans is the identification of indicators and metrics for evaluating success. The Task Force will use the information provided during the Vulnerability Assessment and Strategy Development workshops to begin building the evaluation framework and identifying thresholds where corrective action may need to be taken.

The Task Force will identify what to measure for each action and what defines success. They will also identify whether existing data collection efforts may be used and opportunities for community members to participate in data gathering.

Sharing Progress

The City of Gary is committed to providing regular updates and sharing the progress towards implementing these strategies and actions. The Implementation Task Force will present their progress, obstacles, and new opportunities to the city council annually.

Local Government Action

Concurrently, the City of Gary will undertake implementation of the strategies identified as internal. These actions should be in place and operational within three years of the completion of this *Climate Ready Gary* plan. Progress updates, obstacles, and opportunities should occur on the same timeline as the other actions in this plan and be included on the Sustainability Office's website.

Glossary

100-year flood zone – the land that is expected to be flooded due to a flood event that has a 1 in 100 chance of being equaled or exceeded in any given year.

Biodiversity – The overall number and types of species of plants and animals in a particular place or habitat.

Bioswales – Channels or other low-lying areas that use plant materials and soil mixes to treat, absorb, and convey stormwater runoff, as an alternative to storm sewers. They improve water quality by removing debris and pollution. They also provide landscaping that, depending on the plant species chosen, may create habitats for birds, butterflies, and local wildlife.

Brownfields – A property that may have soil or groundwater contamination.

Carbon Storage or Sequestration – The removal of carbon (CO2) from the atmosphere to be stored elsewhere, especially in natural systems, such as trees, soils, and wetlands.

Clean energy – Energy used by people and businesses that doesn't cause pollution. Includes electricity, transportation, buildings, and food systems.

Climate Change Adaptation – Actions that protect people or nature from, or prepare them for, the current and future impacts of climate change.

Climate Change Mitigation – Actions that reduce greenhouse gas emissions (primarily from fossil fuels combustion) or increase the storage of carbon (primarily in soils, forests, and other natural systems).

Climate Equity – Removing or addressing obstacles to climate resilience such as discrimination, poverty and their consequences.

Contaminant/toxin/pollutant – a substance that makes something less pure or makes it poisonous (contaminant); any substance poisonous to an organism (toxin); any substance, as certain chemicals or waste products, that renders the air, soil, water, or other natural resource harmful or unsuitable for a specific purpose (pollutant).

Ecosystem services – Represent the many and varied benefits of a healthy natural environment. They include the production of food and water, the control of climate and disease, nutrient cycles and oxygen production, and spiritual and recreational benefits.

Energy efficiency – is the reduction of the amount of energy required to provide the same level of products and services.

Equity – Achieving the same level of opportunity based on variable levels of support and assistance depending on the difference in historical disparity and current need. Some types of equity of concern include racial, economic, social, and intergenerational.

Food Insecurity – An economic or social condition of limited or uncertain access to adequate food supply.

Fossil fuels – a group of energy sources that were formed when ancient plants and organisms were subject to intense heat and pressure over millions of years. There are three major types of fossil fuels: coal, oil, and natural gas.

Green Building design – the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction.

Green infrastructure – is the use of natural and engineered ecological systems to provide specific services to the community, often in relation to stormwater management, but also including cooling, pollination, and filtration.

Green roofs – a roof of a building that is partially or completely covered with vegetation, planted over a waterproofing membrane, often with drainage and irrigation systems. Also sometimes called a 'living roof'.

Greenhouse Gas (GHG) – A gas that absorbs infrared radiation (heat) in the atmosphere and contributes to climate change. Greenhouse gases include carbon dioxide, methane, water vapor, nitrous oxide, and others.

Habitat - the natural home or environment of an animal, plant, or other organism.

Impervious surfaces – These are land surfaces that repel rainwater and do not permit it to infiltrate (soak into) the ground. Impervious surfaces are mainly artificial structures—such as pavements that are covered by water-resistant materials such as asphalt, concrete, brick, stone—and rooftops. Soils compacted by urban development are also highly impervious. (Also see "Pervious surfaces").

Infill – In urban planning infill refers to developing vacant or under-used parcels within existing urban areas that are already largely developed. The slightly broader term "land-recycling" is sometimes used instead.

Infrastructure – refers to the built environment such as buildings, energy generation and distribution systems, water delivery, storm- and wastewater, floodwalls, roads and highways, bridges, culverts, and many other basic structures.

Multi-modal transportation – Travel by multiple means of transportation, including biking, driving, taking a bus or subway, riding an electric scooter, etc. It is particularly relevant for people using public transportation because routes are usually not completely provided by one mode of transportation. For example, walking to catch a bus to a train station.

Natural Capital – the value of natural systems and the services that they provide for humanity, from the inherent value of biodiversity to the economic value of flood abatement, natural pest control, or tourism.

Passive Solar – Technology that uses sunlight without active mechanical systems. Such technologies convert sunlight into usable heat (in water, air, and thermal mass) with little use of other energy sources. This contrasts with active solar which converts sunlight into electricity.

Pervious surfaces – Surfaces that allow water to percolate through to the area underneath rather than becoming runoff (Also see "Impervious surfaces").

Resilience – the ability of people and their communities to anticipate, accommodate and positively adapt to or thrive amidst changing climate conditions and hazard events.

Renewable energy – Energy produced from sources that do not deplete or can be replenished within a human's lifetime. The most common examples include wind, solar, geothermal, biomass, and hydropower.

Riparian vegetation – Refers to the plants along the river margins and banks and are characterized by plants that like water.

Sustainability – A broad concept that refers to meeting the needs of the present without compromising the ability of future generations to meet their needs.

Urban Heat Island – The increase in temperature within an urban area as compared to the surrounding rural and naturally vegetated areas. This additional heat comes from heat-absorbing buildings, impervious surfaces, channelization of waterways, and the removal of canopy cover.

Vectors – An insect that transmits a disease is known as a vector, and the disease is referred to as a vector-borne disease. For example, Lyme disease transmitted by a deer tick.

Weatherization – Weatherization or weatherproofing is the practice of protecting a building and its interior from the elements, particularly from sunlight, precipitation, and wind, and of modifying a building to reduce energy consumption and optimize energy efficiency.

Appendix 1: Climate Change Trends Primer

People around the world are experiencing changing conditions that affect their daily lives. Many changes are due to human-caused climate change, resulting from the combustion of fossil fuels and deforestation. Climate change is a global problem, yet the impacts and opportunities for action are local. As climate change accelerates with continued greenhouse gas emissions, local communities will need to be prepared for impacts and take action to protect people and the natural resources they depend on.

Like other parts of the U.S., the City of Gary is experiencing rapid changes in climate, and people are seeking strategies to increase safety, wellness, and resilience. Gary residents report changes in severe storms, extreme events like heat waves, timing of the seasons, water availability, and plants and wildlife. All these changes can affect peoples' health, culture, and livelihoods. Local infrastructure such as roads and bridges are also at risk from severe heat, storms, and flooding. In summary, local changes are already occurring, and many more are expected to occur in the future.

If global action to greatly reduce greenhouse gas emissions is taken quickly, the long-term severity of climate change will be reduced, and local strategies to adapt will be more successful. However, in the near term, because of long-lasting greenhouse gases already emitted, drastic change will continue over the next few decades. Local action and planning to reduce the impacts of climate change are needed.

This climate change primer provides information on the expected trends and impacts specific to the City of Gary (Figure A1-1). Understanding climate change trends and impacts is the first step in identifying climate related risks and vulnerabilities. The next step will be to develop strategies that build overall resilience for both the people and natural resources of the region.

Figure A1-1: Territorial boundaries of the City of Gary

Climate Trends Snapshot – City of Gary

	HISTORICAL TRENDS (1961–1990)	MID-CENTURY PROJECTIONS (2040–2069)	LATE-CENTURY PROJECTIONS (2070–2099)	LATE-CENTURY PROJECTIONS *with reduced emissions*
Average annual temperature	59.9° F	↑ 64.8° F to 67.3° F	↑ 68.7° F to 71° F	↑ 65.5° F to 66.1° F
Average maximum temperature (Summer)	82.4° F	↑ 89.6° F	↑ 93.9° F	↑ 88.8° F
Average minimum temperature (Winter)	20.6° F	↑ 27.7° F	↑ 31.8° F	↑ 27.3° F
Number of days per year above 90° F	16	↑ 49 to 68	↑ 78 to 95	↑ 53 to 55
Number of days per year below freezing	41	↓ 17 to 23	↓ 10 to 14	↓ 19 to 22
Days per year with precipitation over 1 inch	4.3	↑ 4.8 to 5.5	↑ 5.4 to 6	↑ 4.7 to 5.2
Average annual total precipitation (in)	36.5”	↑ 33.2” to 43.8”	↑ 34.9” to 46”	↑ 35.3” to 43.4”

Figure A1-2. Summary of climate trends expected for the City of Gary

Climate change data and models

The Earth’s climate is regulated by a layer of gases commonly referred to as greenhouse gases for their role in trapping heat and keeping the earth at a livable temperature. These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and water vapor (H_2O). CO_2 plays an especially large role due to its long-lasting nature and amount compared to other gases. The atmospheric concentration of CO_2 has risen from 280 to more than 417.06 parts per million (ppm) in the past century, driven largely by the burning of fossil fuel, deforestation, and other human activity (Climate Change: Atmospheric Carbon Dioxide, 2022).

Information from ice cores allows us a glimpse into CO_2 levels over hundreds of thousands of years. This data shows us that CO_2 has fluctuated between about 175 and 300 ppm over the last 800,000 years and the current level is far above anything detected in that time period. As CO_2 levels changed in the past, changes in temperature tracked closely and we can expect this relationship to hold in the future as CO_2 and other greenhouse gases continue to increase.

For over a century, we have known that increases in the concentration of greenhouse gases in the atmosphere result in warmer temperatures. Long-term tracking data from weather stations and other research support this expected trend. Traditional knowledge from indigenous communities around the globe also indicates that there has been substantial change in conditions over time, especially since the end of the last ice age.

In order to look at projected future climate trends, we use computer models based on our understanding of the Earth's climate. The Intergovernmental Panel on Climate Change (IPCC), which is made up of thousands of leading scientists from around the world, has created a suite of 25+ global climate models (GCMs) from different institutions with which to predict future trends.

The IPCC models were created independently and vary substantially in their output. Yet most of the uncertainty in future conditions comes not from the models themselves, but from estimating how much action will be taken to reduce greenhouse gas emissions in the future. The different possible greenhouse gas concentrations (called Regional Concentration Pathways, or RCPs), depend on whether the international community cooperates on reducing emissions.

In this report, we provide projections based on a lower emissions pathway where emissions are greatly reduced (RCP 4.5) and a higher emissions pathway where emissions are only slightly reduced (RCP 8.5), which is similar to the current global trajectory.

A Note About Uncertainty

All models have uncertainty because complex processes are simplified, and assumptions are made about how the Earth's processes work. Therefore, different models show different trends in future climate. How much they agree or disagree with each other gives us information about uncertainty. The uncertainty is similar to other types of models that we use every day to make decisions about the future, including economic models, population growth models, and ecological system models.

Much of the data on future trends in this report are compiled from an "ensemble" or average across many GCMs, which have been adjusted or "downscaled" from the global scale (coarse) to local scales (fine) using climatological data that reflects variation across the local landscape. When ensembles are used, it is important to understand the range of variation among the different models, as it can be quite great. In general, precipitation projections are associated with higher uncertainty (more variation among models) while temperature projections are associated with lower uncertainty (more agreement among models). Also, short to medium-term projections have lower uncertainty than long-term projections.

Global Trends

Global climate is changing quickly compared to past climate change throughout the Earth's history. Larger storms and severe heat waves increased in both frequency and severity across most of the world (Wuebbles et al., 2017).

The hottest year on record was 2016 (Figure A1-3). The average global temperature for 2016 was 1.7° F (about 1° C) above the 20th century average (Wuebbles et al., 2017). The last few years have also seen record-breaking, climate-related weather extremes. In the U.S., there were 18 weather- and climate-related events that cost more than $1 billion each in 2022, making it the third largest total on record ($165 billion) since 1980 (National Centers for Environmental Information, 2023).

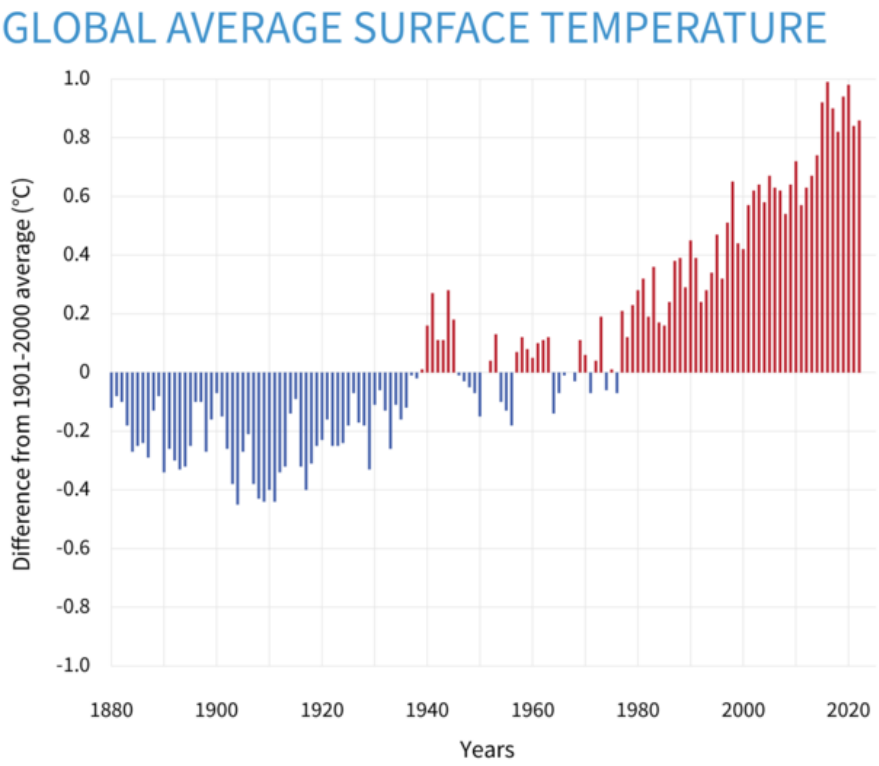


Figure A1-3. Yearly surface temperature compared to the 20th-century average from 1880–2022. Blue bars indicate cooler-than-average years; red bars show warmer-than-average years (*Climate Change: Global Temperature*, 2023).

Models project continued average global warming of 5.0° to 10.2° F (2.8° to 5.7° C) by the end of this century and continued warming for the next two centuries if emissions are not reduced (Figure A1-4) (Wuebbles et al., 2017). Because higher latitudes (closer to the poles) warm faster than areas closer to the equator, the United States is expected to warm significantly more than the global average.

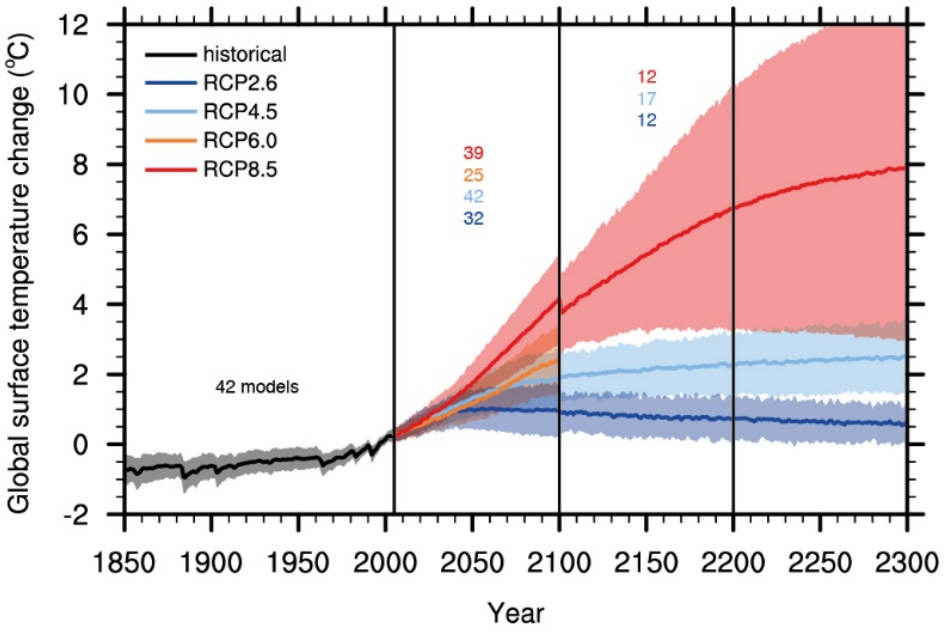


Figure A1-4. Global average surface temperature projections relative to 1986-2005. In this report, we provide projections based on a lower emissions pathway where emissions are greatly reduced (RCP 4.5) and a higher emissions pathway where emissions level off (RCP 8.5) (Schmittner, 2018).

Past and Future Trends in Indiana

Temperature

Since 1895, Indiana has seen an average temperature increase of approximately 1.2° F, or an average of 0.1° F per decade. However, since 1960, the average temperature increase is approximately 0.4° F, showing an increase in climate change's effects over time. By 2050, temperatures are projected to increase between 5-6° F under the medium and high emissions scenarios, respectively. By the end of the century, average temperatures are expected to be 6 to 10° F higher than the historical average (Widhalm et al., 2018).

Maximum temperatures have increased decade-on-decade as well, with a marked increase from 1960 to present. Maximum temperatures from 1960 to 2016 have increased by an average of 0.3° F per decade; from 1895 to 2016, maximum winter and spring temperatures have increased by an average of 0.1° F per decade.

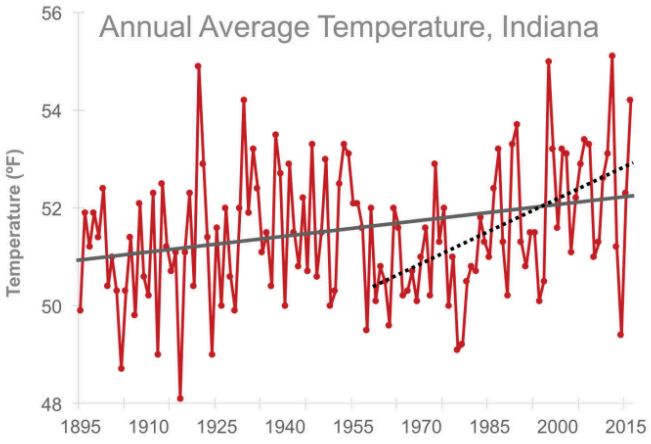


Figure A1-5. Statewide annual average temperature for Indiana from 1895 to 2016 is shown in red. The black solid line shows the increasing trend in annual temperature (0.1°F/decade) for the period from 1895 to 2016. The black dotted line shows the temperature trend since 1960 (0.4°F/decade). Image from Widhalm et al. (2018).

Extreme cold days (where the minimum temperature was below 5° F) and frost days have decreased from 1960 to 2016 by 8 and 9 days respectively. The northern third of Indiana is expected to experience the most significant increase, from an average of 13 per year to only six by 2050.

While there has not been an increase in extreme heat days (defined as days where the maximum temperature is over 95° F) from 1960 to 2016, they are projected to increase significantly in the future, from seven per year (present) to between 38 to 51 days per year.

Indiana Temperature Trends (1895 to 2016)

Variable	Winter	Spring	Summer	Fall	Annual
Tmax	0.1ºF	0.1ºF	- 1ºF	0ºF	0ºF
Tavg	0.1ºF	0.2ºF	0ºF	0.1ºF	0.1ºF
Tmin	0.2ºF	0.2ºF	0.1ºF	0.1ºF	0.2ºF

Units = ºF per decade

Indiana Temperature Trends (1960 to 2016)

Variable	Winter	Spring	Summer	Fall	Annual
Tmax	0.5ºF	0.6ºF	0.1ºF	0.2ºF	0.3ºF
Tavg	0.7ºF	0.5ºF	0.3ºF	0.2ºF	0.4ºF
Tmin	0.8ºF	0.5ºF	0.5ºF	0.3ºF	0.5ºF

Units = ºF per decade

Figure A1-6. Annual and seasonal temperature trends for Indiana from 1985 to 2016 (top) and from 1960 to 2016 (bottom). Both tables show maximum temperature (Tmax), average temperature (Tavg), and minimum temperature (Tmin). Image from Widhalm et al. (2018).

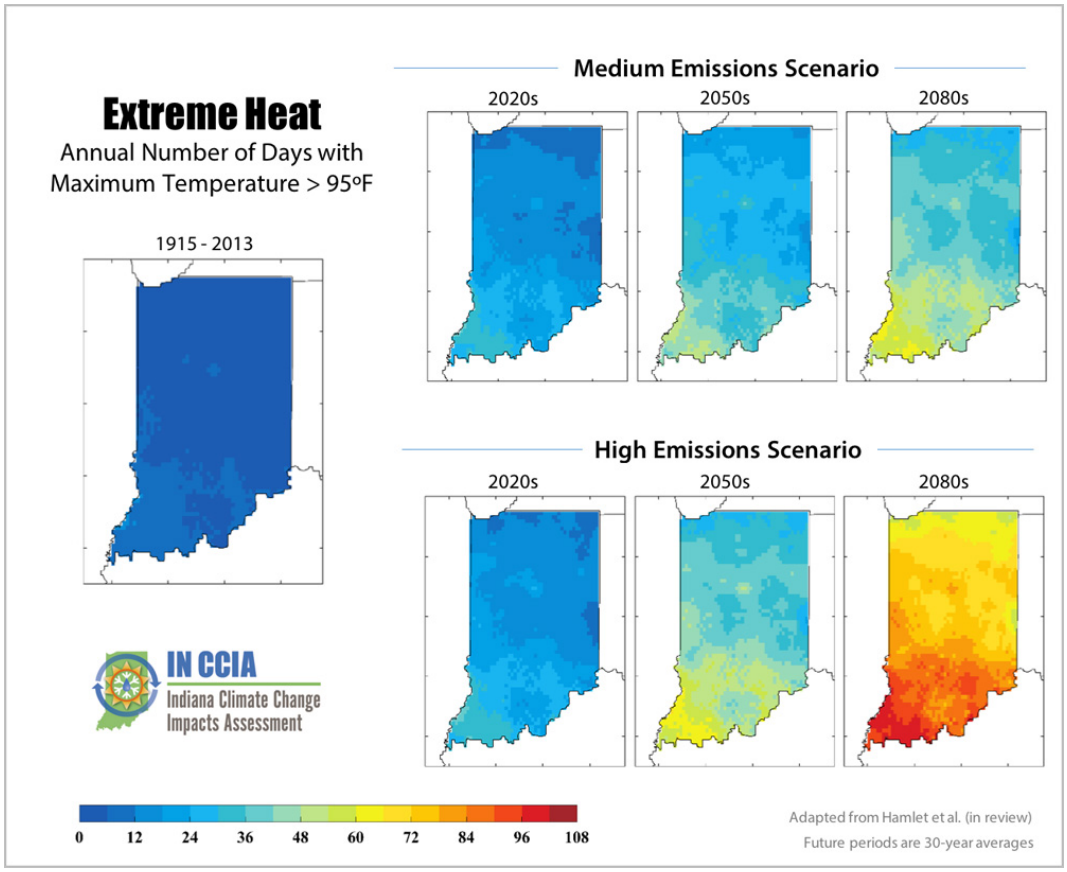


Figure A1-7. Maps showing the annual number of extreme heat days (maximum temperatures above 95°F) Image from Purdue University (n.d.).

Indiana's frost-free season has increased by nine days since 1895. By the middle of the century, the number of frost-free days is projected to increase by between 3.5 and 4.5 weeks.

Annual precipitation in Indiana has also increased significantly since 1895. Average annual precipitation has increased by 5.6 inches, though average precipitation rates vary by region. In the future, rainfall is expected to increase by approximately 6-8%, depending on the emissions scenario. This increase is not expected to fall evenly throughout the year; rather, multiple climate models suggest a high likelihood of more precipitation during the winter and spring months, with less certainty about changes in precipitation during the summer and fall.

Indiana's risk of drought conditions in the future is also worsening. The frequency of drought conditions is expected to increase, particularly during the later parts of the growing season (Cherkauer et al., 2021).

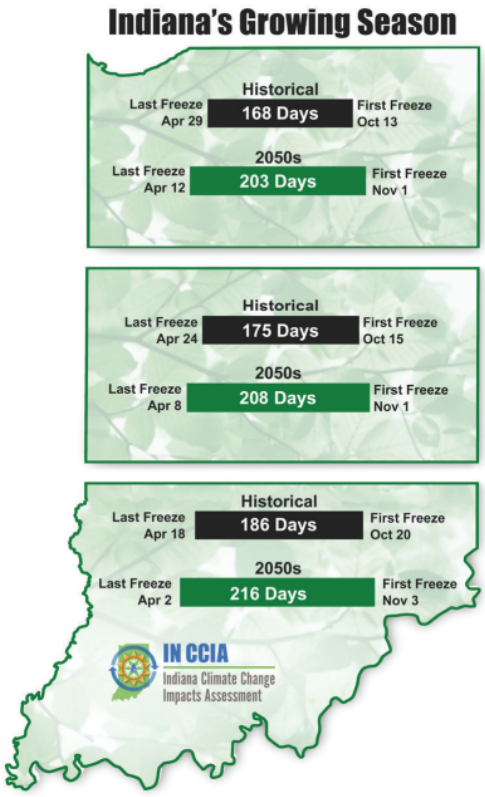


Figure A1-8. Growing season length and average first/last freeze dates for northern, central, and southern Indiana. "Historical" is the average for the period 1915 to 2013. For future projections, "2050s" represents the average of the 30-year period from 2041 to 2070 for the high emissions scenario. Image from Widhalm et al. (2018).

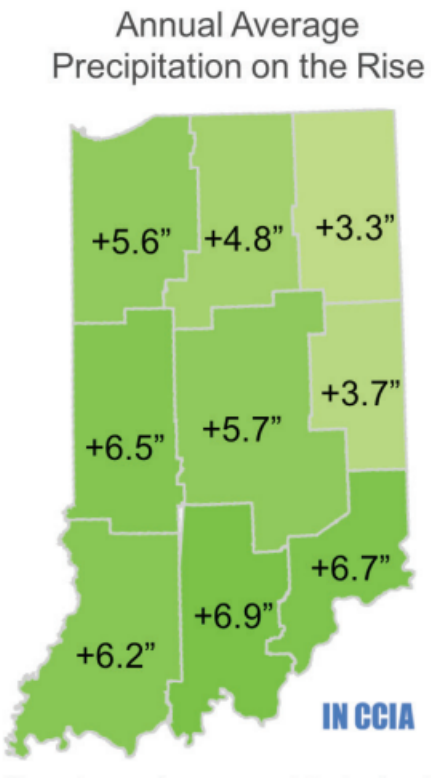


Figure A1-9. Increase in annual precipitation for Indiana's nine climate divisions, based on a linear trend, from 1985 to 2016. Image from Widhalm et al. (2018).

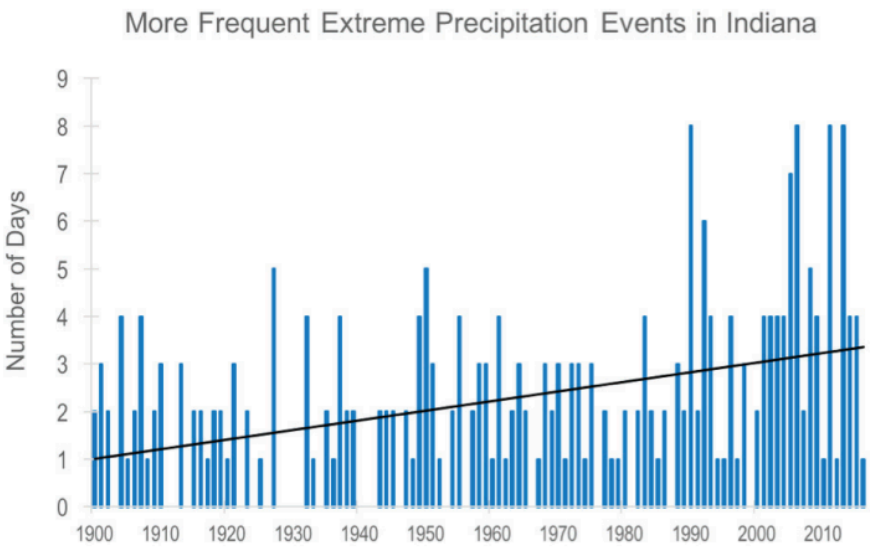


Figure A1-10. The number of days with precipitation events that exceed the 1900 to 2016 period's 99th percentile for Indiana (statewide average). The black line represents the trend line (0.2 days/decade) for the 1900 to 2016 period. Image from Widhalm et al. (2018).

Past and Future Trends in Gary

Temperature

The Representative Concentration Pathway 8.5 (RCP 8.5) represents a high-emission scenario that assumes a future where no substantial efforts are made to mitigate greenhouse gas emissions. Often referred to as the "business-as-usual" or "baseline" scenario, it reflects a trajectory where fossil fuel consumption remains dominant and there is limited action to reduce emissions. In this scenario, the annual trend of climate variables in the City of Gary indicates a significant increase in both average maximum and minimum temperatures over the years. By the end of 2090, the average annual maximum temperature is expected to rise from around 62°F in 2023 to about 71°F. This suggests a noticeable escalation in peak temperatures experienced throughout the year. At the same time, the average minimum temperature is projected to increase from approximately 44°F in 2023 to about 52°F by 2090. This signifies warmer nights and milder winters, with the lowest temperatures encountered during the year becoming higher. These changes collectively point towards a long-term warming trend in the City of Gary. The average maximum temperature is predicted to rise by approximately 9°F, while the average minimum temperature is anticipated to increase by around 8°F over the course of almost seven decades. Major shifts in average temperatures can have far-reaching implications for the environment, ecosystems, and human activities in the region.

On the other hand, while average annual precipitation is expected to increase from about 39.5 inches in 2023 to 41.1 inches in 2090, the rate of precipitation change is relatively modest compared to the temperature increase. This indicates a dryer climate as the temperature rises at a faster rate than the precipitation. The imbalance between temperature and precipitation trends raises concerns about

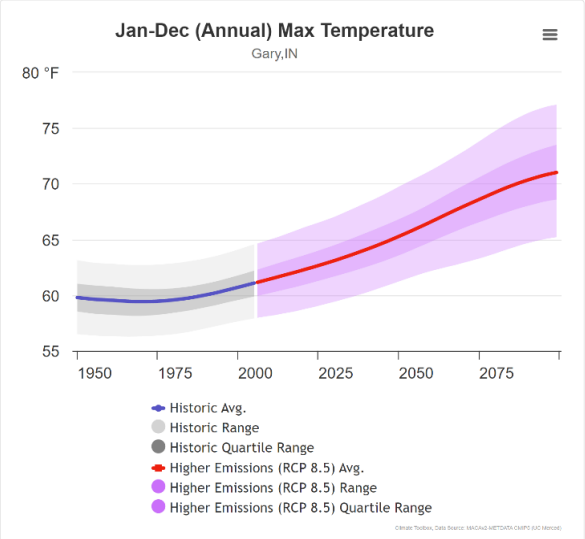
potential impacts. This long-term warming trend is further supported by the potential evapotranspiration projection, which is estimated to increase from 40.6 inches in 2023 to 51 inches by the end of the same period. The significant rise in potential evapotranspiration, which represents the combined water loss through evaporation and plant transpiration, further emphasizes the increasing aridity and water demands resulting from the temperature changes. With a drier climate, the risk of drought conditions and water scarcity is heightened. Agriculture, ecosystems, and water resources may be negatively affected, and the likelihood of increased wildfire and poor air quality occurrences could also rise. This is supported by the potential evapotranspiration projection that goes from 40.6 inches to 51 inches in the same time frame.

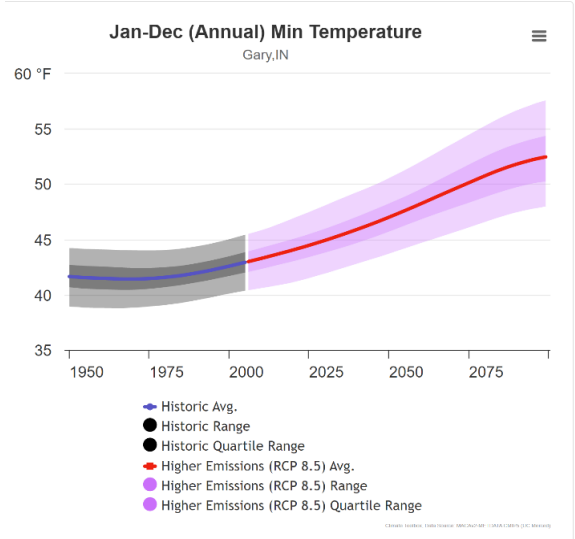
Under the RCP 8.5 scenario (representing higher greenhouse gas emissions), the number of days with a maximum temperature exceeding 100°F is projected to increase significantly from around 2 days in the 2020s to approximately 33 days in the 2080s. However, under the RCP 4.5 scenario (with moderate emissions reductions), the number of such days increases to about 8 days. Conversely, the number of days with a minimum temperature below 32°F is projected to decrease from 118 days in the 2020s to 73 and 100 days in the RCP 8.5 and RCP 4.5 scenarios, respectively.

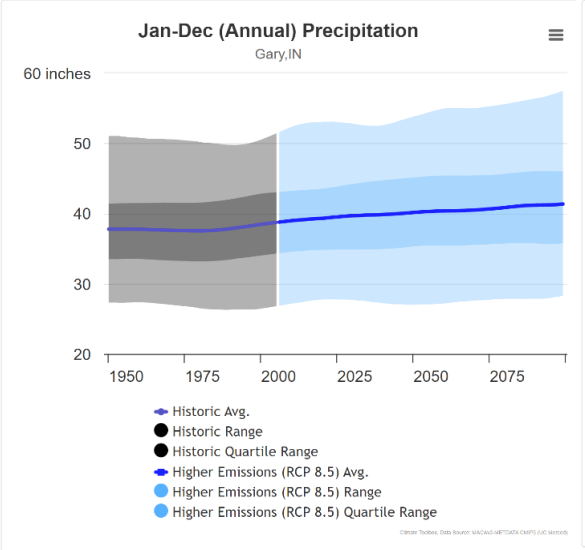
Heating Degree Days (HDD) measure the energy demand for heating, with a cumulative value of 1000 indicating colder weather and an increased need for heating. Cooling Degree Days (CDD) estimate the energy demand for cooling and are like HDD. In the context of the trends mentioned, the number of cooling degree days is projected to rise from approximately 1200 days in the 2020s to about 2500 days in the 2080s, while warming degree days decrease from 5700 to 4300.

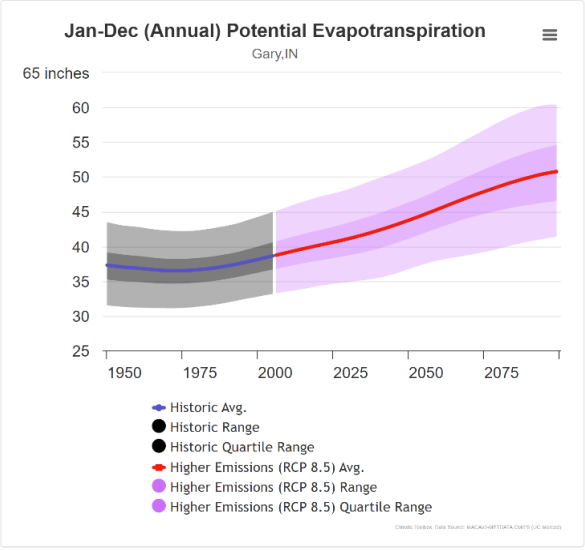
The projected changes in temperature extremes and degree days have significant implications for various aspects of society and the environment. The substantial increase in the number of days with maximum temperatures exceeding 100°F under the RCP 8.5 scenario suggests more frequent and prolonged heatwaves, posing risks to human health, agriculture, and infrastructure. Additionally, the decrease in the number of days with minimum temperatures below 32°F indicates milder winters, potentially affecting ecosystems, cold-dependent industries, and water resources.

The contrasting outcomes between the RCP 8.5 and RCP 4.5 scenarios underscore the importance of greenhouse gas emissions reductions. The moderate emissions reductions in the RCP 4.5 scenario result in a relatively lower increase in extreme heat days, providing some mitigation against heat-related impacts compared to the higher emissions pathway. However, even under the more moderate scenario, there is still a noticeable rise in extreme heat events.



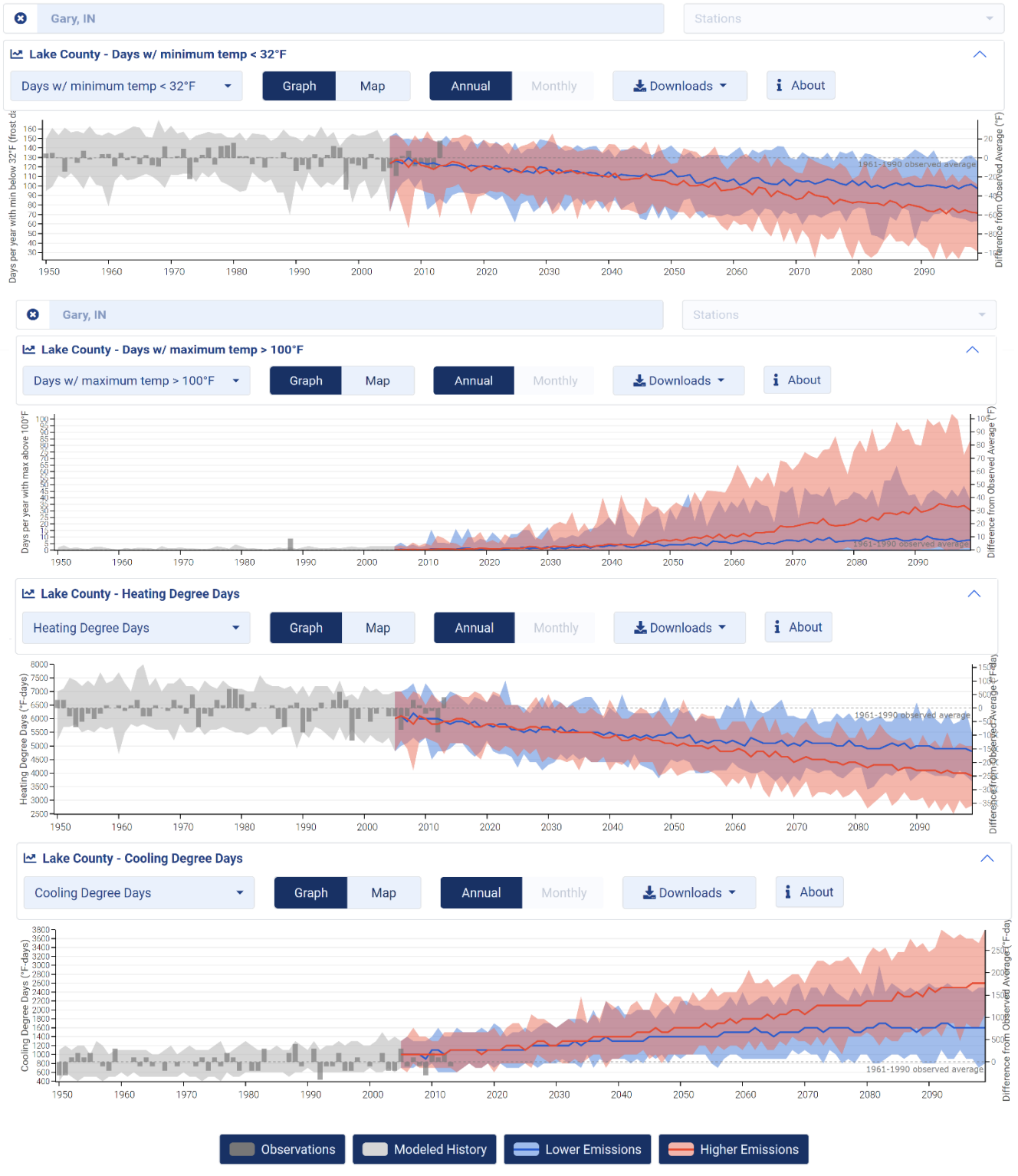






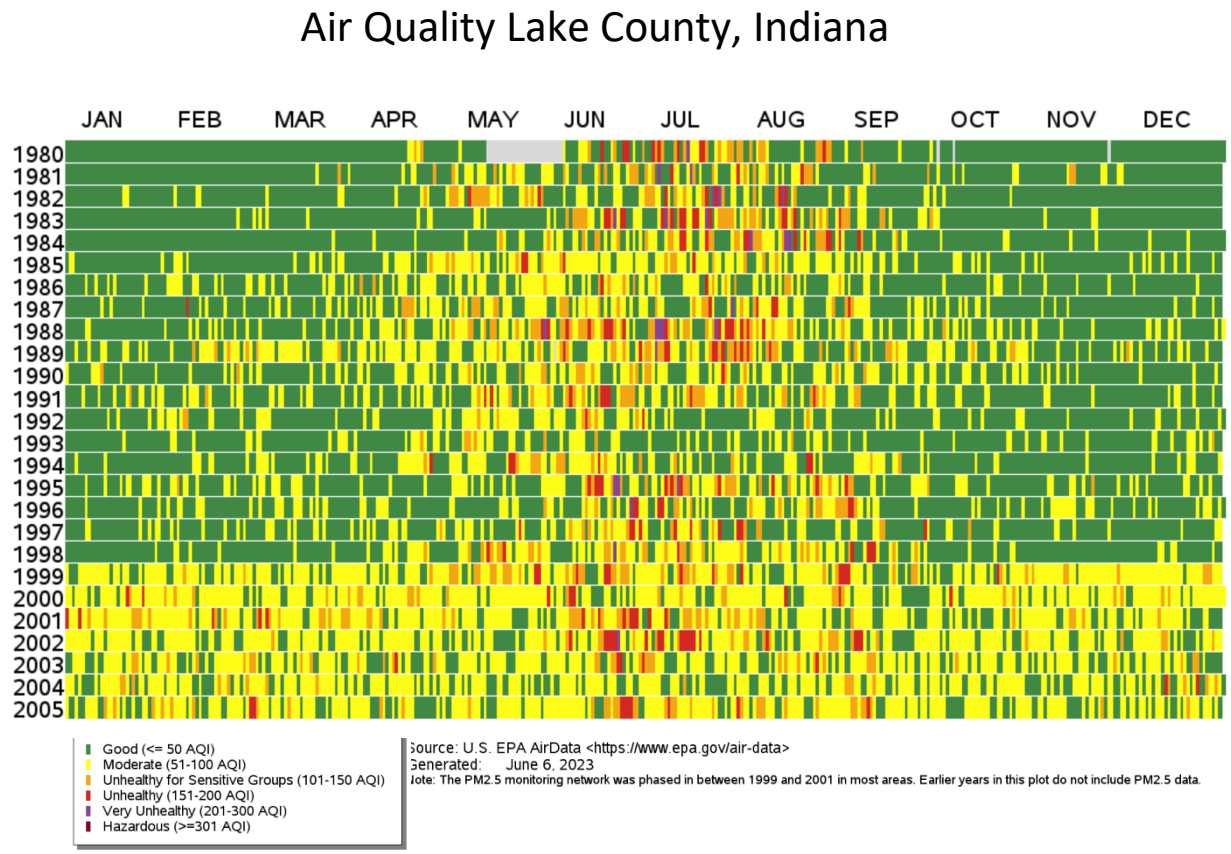
Historic changes in average temperatures in Gary indicate shifts in energy demands for space heating and cooling. That is, the increase in cooling degree days signifies a heightened need for air conditioning, potentially straining energy systems, increasing electricity consumption, and raising concerns about energy affordability and grid reliability. Conversely, the decrease in warming degree days suggests reduced energy requirements for heating but may also have negative implications for industries and systems dependent on colder temperatures, such as winter tourism and snow-based recreation.

These projected implications highlight the importance of adaptation measures, sustainable energy planning, and policies aimed at reducing greenhouse gas emissions. By understanding and addressing these climate change impacts, communities can better prepare for temperature extremes, manage energy demands, protect vulnerable populations, and work towards a more resilient and sustainable future.


Gary, IN
Stations
Lake County - Days w/ minimum temp < 32°F
Days w/ minimum temp < 32°F
Graph
Map
Annual
Monthly
Downloads
About
Days per year with min below 32°F (frost d
Difference from Observed Average (°F)
1961-1990 observed average
Gary, IN
Stations
Lake County - Days w/ maximum temp > 100°F
Days w/ maximum temp > 100°F
Graph
Map
Annual
Monthly
Downloads
About
Days per year with max above 100°F
Difference from Observed Average (°F)
1961-1990 observed average
Lake County - Heating Degree Days
Heating Degree Days
Graph
Map
Annual
Monthly
Downloads
About
Heating Degree Days (°F-days)
Difference from Observed Average (°F-da
1961-1990 observed average
Lake County - Cooling Degree Days
Cooling Degree Days
Graph
Map
Annual
Monthly
Downloads
About
Cooling Degree Days (°F-days)
Difference from Observed Average (°F-day
1961-1990 observed average
Observations
Modeled History
Lower Emissions
Higher Emissions

Air Quality

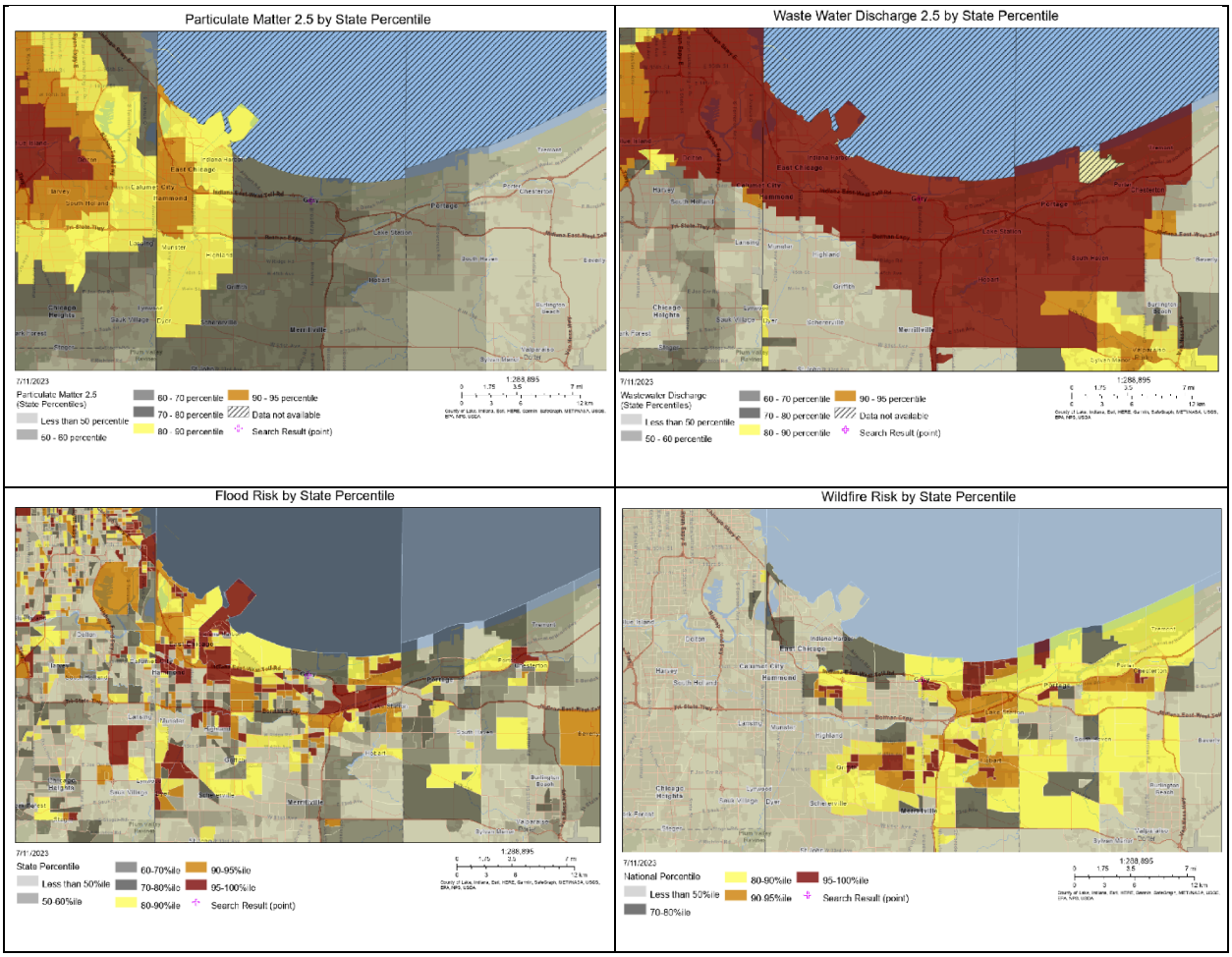
The Midwest region is identified as having the highest level of industrial pollution, with Indiana ranking at the top in terms of toxic emissions per square mile, according to the U.S. Environmental Protection Agency's Toxic Release Inventory. The image below offers a comprehensive and vivid representation of the significant decline in air quality within Lake County between 1980 and 2005. The visualization also emphasizes the critical importance of adopting measures to achieve cleaner and more sustainable air in the region. By analyzing this data, we are prompted to take immediate action to address the pressing issue of air pollution, ensuring a healthier and more environmentally conscious future for the community.



The City of Gary surpasses 5% of days where the air quality fails to meet the standards set for fine particulate matter (PM 2.5), as outlined in the Gary Climate Action Plan. According to the EPA's Environmental Justice Screening and Mapping Tool that uses data since 2010, Gary falls within 60% - 80% percentile of PM 2.5 pollutant in the state of Indiana, that means, 60% to 80% of other cities in Indiana have less PM 2.5 pollutant than the City of Gary.

These findings have crucial implications for public health and the environment. The high level of industrial pollution in the Midwest, especially in Indiana, raises concerns about the potential adverse effects on air quality, waterways, and surrounding ecosystems. The significant percentage of days exceeding air quality standards for PM 2.5 in Gary also suggests a heightened risk of respiratory issues

and other health complications for the local population. It highlights the urgency to address and reduce pollution sources, improve industrial practices, and enhance air quality management measures.



Wastewater Discharge, Flood Risk, and Wildfire Risk

According to the EPA tool, Gary has a relatively high level of Wastewater Discharge compared to other cities in Indiana (90% - 100% percentile range). This indicates that most cities in Indiana have lower levels of wastewater discharge than Gary. This difference in wastewater discharge levels could have environmental and public health implications.

In terms of flood and wildfire risks, a significant portion of Gary (70% - 80% percentile range) is vulnerable to these natural disasters. Only a few locations remain unaffected, while most areas face a considerable degree of risk. This heightened risk could lead to property damage, displacement of residents, and potential threats to life and safety.

In summary, the EPA tool reveals that Gary has a higher level of wastewater discharge compared to most cities in Indiana. Additionally, a significant portion of the city is vulnerable to flooding and wildfires. It is important to take proactive measures such as improving wastewater treatment systems, implementing land use planning, and establishing emergency preparedness measures to ensure the safety and well-being of Gary residents.

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Appendix 2: Community Trends

Demographics

The City of Gary, located in Lake County, Indiana, United States, is situated approximately 25 miles (40 km) from downtown Chicago, Illinois. The City of Gary is near the Indiana Dunes National Park and shares borders with the southern shores of Lake Michigan. It was previously the second largest city in Indiana, with a population of 80,294 according to the 2010 census, thereby ranking as the ninth-largest city in the state of Indiana.

According to the 2010 census, the City of Gary had a population of 80,294, with 31,380 households and 19,691 families. The population density was recorded at 1,610.1 inhabitants per square mile (621.7/km2). In terms of housing, there were 39,531 units available, with an average density of 792.7 per square mile (306.1/km2). The racial composition of the city was as follows: 84.8% African American, 10.7% White, 0.3% Native American, 0.2% Asian, 1.8% from other races, and 2.1% from two or more races. Additionally, individuals of Hispanic or Latino origin, regardless of race, accounted for 5.1% of the population. It is worth noting that the non-Hispanic white population comprised 8.9% of the total population in 2010, a notable decrease from 39.1% in 1970.

Government		General Info		Area		Population	
Type	Strong mayor–council	Country	United States	Total	57.21 sq mi (148.17 km^2)	Total	80,294
Body	City Council	State	Indiana	Land	49.72 sq mi (128.78 km^2)	Estimate (2018)	75,282
Mayor	Jerome A. Prince (D)	County	Lake	Water	7.49 sq mi (19.40 km^2)		
City Clerk	Suzette Raggs (D)	Townships	Calumet and Hobart	Elevation	607 ft (185 m)	Density	1,537.06/sq mi (593.46/km^2)
City Judge	Deidre L. Monroe (D)	Incorporated	July 14, 1906				
		Named for	Elbert Henry Gary				

Physical Environmental and Natural Systems

The City of Gary incorporates an aesthetically pleasing open space land use designation, which encompasses various areas managed for conservation purposes. These spaces serve as havens for ecological preservation, public access to open areas, recreational activities, and stormwater management. They encompass valuable habitats, including sensitive ecosystems, as well as actively maintained conservation lands such as the Indiana Dunes National Park and local parks like Buffington Park.

Built Environment

Gary's land use designations primarily encompass the central areas of Downtown Gary, Residential, Neighborhood Mixed-Use Corridor, Neighborhood Commercial and Services, Flexible Commercial, Transit-Oriented Development, the Entertainment District, and Highway Commercial.

Downtown Gary, with its focal point at 5th Avenue and Broadway, aims to foster ongoing reinvestment and revitalization efforts within the Downtown core. Neighborhood Mixed-Use Corridor encourages the establishment of mixed-use developments along important city corridors, promoting a walkable environment. Neighborhood Commercial and Services facilitates the consolidation and investment in commercial and service-oriented establishments that cater to the needs of local neighborhoods. It specifically targets key nodes along the main commercial or neighborhood thoroughfares within the city. Flexible Commercial areas are applicable to commercial areas experiencing significant distress,

characterized by high vacancy rates and disinvestment. It permits greater flexibility and targeted investment specifically within viable activity centers, transit stops, and commercial nodes. Transit-Oriented Development allows for a wide variety of commercial, service, office, residential, recreational, institutional, and other supportive uses. The Entertainment District supports a wide variety of entertainment-related uses such as hotels, casinos, sports complexes, retail, services, dining, the arts, and other supportive uses. Highway Commercial allows for auto-oriented retail and service uses that serve a broader regional market including gasoline service stations, food, and beverage sales, eating, and drinking establishments, and hotels and motels (City of Gary Comprehensive Plan).

Social Services

The Chief Fire Inspector leads the Gary Fire Department's Community Risk Reduction Bureau, also known as the Fire Prevention Bureau. This bureau consists of sworn personnel who are committed to preventing or minimizing fire-related damages. They strive to ensure compliance with relevant city and state codes and ordinances. The Gary Police Department oversees security, protecting and listening to the people of Gary.

The Gary Health Department manages and provides services that affect the well-being of Gary residents. They assess and address health issues, recommend policies based on Indiana codes and community needs, and serve a culturally diverse population with respect and without discrimination.

The Department of Student Services includes various roles such as School Nurses, School Counselors, Social Workers, Interventionist Specialists, Alternative Education, Discipline, Security, Drop Out Prevention, Student Registration, and McKinney Homeless Education. This department's primary focus is to address the overall well-being of students and support their academic success.

In terms of resources dissemination, the Gary Division of Family Resources (DFR) has the responsibility of determining eligibility for Medicaid, Supplemental Nutrition Assistance Program (SNAP), and Temporary Assistance for Needy Families (TANF) benefits. Additionally, the division oversees efficiently and accurately distributing SNAP and TANF benefits. Moreover, the DFR offers employment and training services to selected recipients of SNAP and TANF. The primary objective of the division is to provide assistance and maintain the well-being of families by promoting self-reliance and individual accountability.

Community Culture

Gary, Indiana boasts a variety of museums and galleries that offer a glimpse into its rich history and culture. Here are the top ones to explore:

- Gary Public Library and Cultural Center: A vibrant hub for culture and learning, offering art exhibits, live performances, and author talks
- Gary SouthShore RailCats Museum: Dedicated to the Gary SouthShore RailCats baseball team, it displays artifacts, photographs, and memorabilia from their history
- Paul H. Douglas Center for Environmental Education: A learning center situated in the Indiana Dunes National Lakeshore that provides educational programs and exhibits on the area's ecology and environment
- Marshall J. Gardner Center for the Arts: A community arts center hosting exhibits, workshops, and performances, creating opportunities for local artists

- Gary Historical and Cultural Society Museum: A museum showcasing Gary's history and culture, featuring exhibits on local industry, politics, and social movements
- Indiana University Northwest Art Gallery: An art gallery displaying contemporary art exhibitions and supporting local artists
- South Shore Arts: A nonprofit organization promoting the arts in Northwest Indiana, offering multiple galleries and exhibition spaces

Community History

Gary has experienced a significant racial transformation during the latter part of the 20th century, leading to political changes that reflected the shifting racial demographics. The proportion of Black and Hispanic residents in Gary increased from 21% in 1930 to 39% in 1960, and further to 53% in 1970. Most Black and Hispanic residents resided in the Midtown area located just south of downtown, with the 1950 Census indicating that 97% of Gary's Black population lived in this neighborhood. Notably, Gary became one of the first cities in the United States to have an African American mayor, Richard G. Hatcher, and it hosted the influential 1972 National Black Political Convention.

During the late 1990s and early 2000s, Gary had the highest proportion of African Americans among cities in the U.S. with a population of 100,000 or more, reaching 84% according to the 2000 U.S. census. However, due to a decline in population, Gary no longer holds this distinction as its current population has fallen below 100,000 residents. As of 2013, the Gary Department of Redevelopment estimated that approximately one-third of all homes in the city were unoccupied or abandoned.

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Appendix 3: Climate Vulnerability Assessment

Aerial view of the City of Gary. Photo credit: *The City of Gary*

Cities and counties throughout the nation and world are working to reduce greenhouse gas emissions in efforts to prevent warming more than 1.5°C (2.7° F). This level of warming has been recognized by the international scientific community as an important threshold, below which we can avoid catastrophic and runaway climate change (IPCC, 2022).

In addition to reducing greenhouse gases, however, communities need to respond to the changes already being felt and plan for those still to come. Because greenhouse gases can remain in the atmosphere for decades after release, we will continue to warm and experience impacts for many decades, even if we reduce emissions today.

While greenhouse gases are measured globally, climate change impacts are experienced locally. Each community feels climate change in a different way, depending on historic conditions and local climatic conditions and patterns of change. As these local impacts and changes worsen over time, we will need to prepare and protect our most vulnerable resources and populations from the impacts.

The City of Gary has already experienced changes in temperature, rainfall, and extreme weather events. As changes in climate continue, we can expect increasing severity and frequency of extreme heat, larger storms with more wind and precipitation, more prolonged periods of drought, and changes to the forests and other natural features in and around Gary. These changes are expected to become increasingly severe over the course of the century.

City skyline with Gary Works steel mill in the background. Photo credit: *The City of Gary*

Determining which resources and populations are most vulnerable to ongoing and future impacts of climate change is the first step in developing effective strategies and sound solutions. While this Climate Change Vulnerability Assessment presents sector-specific vulnerabilities to the community, it is important to also look at the City of Gary in a holistic way. Many of the vulnerabilities identified here cross diverse sectors and affect people of all different walks of life.

As climate change solutions are developed, an opportunity arises to develop adaptation strategies that prioritize equity as a major outcome. Careful consideration of governance systems and policies, as well as entrenched systems of power that create relative advantage and disadvantage and make certain populations more and/or less vulnerable to climate change, is vital. This demands that resilience strategies be developed that not only address climate change vulnerabilities, but also the intersecting factors that make some populations more prone to experiencing direct and indirect impacts, along with

the intentional allocation of resources to support sustainable solutions and enhanced resilience capacity for populations that need it most.

Methods

On July 18th, 2023, a group of 37 local experts from diverse sectors of the community met for a daylong vulnerability identification workshop. These stakeholders combined their local knowledge and expertise with information provided about climate science and model projections to identify and prioritize local vulnerabilities in the five primary systems of the community: Built Environment, Natural Systems, Infrastructure, Business and Economy, Human Systems, and Community Culture.

Participants identifying climate vulnerabilities at the stakeholder workshop on July 18, 2023. Photo credit: *The City of Gary*

The workshop participants reviewed the scientific information on climate change and identified the impacts that are already underway as well as the potential impacts that are expected in the future. Using that information, participants identified vulnerabilities as the first step in building climate resilience.

For each identified vulnerability, participants collected the following information:

Exposure	The specific climate trend or projection that is already causing or is expected to cause the impact
Timeframe	When the impact is expected to occur in the City of Gary
Certainty	The relative certainty that the impact will occur
Sensitivity	A relative measure of the degree of severity of the impact, given our understanding of the specific sector or population
Adaptive Capacity	The extent of existing resources, programs, or policies *already in place* to protect people or to respond to the changes with little disruption
Focal Populations	The specific neighborhood, population, area, or resource that is expected to be especially affected by the impact
Other Stressors	Additional and ongoing stressors to the focal population
Secondary Vulnerabilities	Other potential responses to, or effects related to, climate change that are likely to affect the vulnerability under consideration

Indicators	A quality or trait related to the focal population that can be tracked to indicate the effectiveness or success of actions taken to address this vulnerability

After describing the specific vulnerabilities within each community system, participants ranked vulnerabilities across all systems to determine their relative priority. The impacts identified in this vulnerability assessment are important to address, but action on some may be more urgent than on others, which is reflected in the ranking. Refer to the risk matrix at the end of this report for a list of vulnerabilities in priority rank order. Additional populations and resources not specifically mentioned in this report may also be vulnerable.

Two local businesses located in downtown Gary. Photo credit: *Library of Congress*

Built Environment

The built environment covered in this vulnerability assessment for the City of Gary include communications, electricity, water, wastewater, and energy utilities as well as roads, bridges, public buildings, homes, and businesses. Most infrastructure is built according to building codes that take into consideration variations in temperature, precipitation, and other climatic factors in the region. Unfortunately, these codes are based on historical climate trends rather than future climate scenarios. In many cases, outdated standards will be inadequate to meet the needs for safety and basic functioning under changing climatic conditions.

Some increasingly common infrastructure failures associated with climate change include inadequate stormwater infrastructure leading to road failure and water contamination during extreme precipitation events; dry wells due to drought; school shutdowns due to lack of air conditioning during extreme heat events; and toxic algae contaminating municipal water supplies, particularly in low water years.

Identified climate change vulnerabilities to the built environment in the City of Gary include:

Aging Infrastructure and Flooding – One of the major disruptions to infrastructure exacerbated by climate change is flooding. Flooding is expected to become more severe and frequent with climate change. Urban areas are susceptible to flooding because a high percentage of the surface area is composed of impervious streets, roofs, and parking lots where runoff occurs very rapidly.

A recent example of severe flooding in Gary occurred in the spring of 2019. Multiple precipitation events, including a rain/snow event, brought 3 to 5+ inches of precipitation across northern Illinois and northwest Indiana between April 27th and May 2nd. By April 29th, most area rivers were flooded, including Gary's Little Calumet River, which reached a moderate flood stage with a crest of 14.24 feet between May 1st and 2nd. Since then, the Little Calumet River has reached moderate flood stage two more times (once in 2019 and once in 2020).

A flooded river and nearby home after a storm. Photo credit: *Library of Congress*

However, northwestern Indiana's largest flooding event in recent memory occurred in September 2008. Triggered by Hurricane Ike, the severe flooding event dropped more than 11 inches of rain in some areas, including Gary, where flooding was particularly severe. Two deaths were reported, and hundreds of residents were evacuated across the state. Six counties in northwestern Indiana were declared federal disaster areas, resulting in millions of dollars of damage to residences, businesses, and infrastructure. In Gary, the Little Calumet River reached its highest recorded crest (17.29 feet) on September 14th, 2008, surpassing its record-breaking 17.03-foot crest from November 1990.

In addition to property damage, large floods can cause sewer backups and the collapse of a community's combined sewer infrastructure. When a combined sewer and stormwater system is overwhelmed, some sewage can go untreated. As climate change worsens and storms become even more extreme, dropping larger quantities of precipitation in shorter periods, older and outdated infrastructure will become even more at risk, also creating a risk for health and safety.

As older infrastructure is updated, prices for housing may increase. Increased mandates for energy efficiency, sewer upgrades, extreme heat resistance, water conservation, natural shading, wildfire risk reduction, and other sustainability measures associated with combating climate change could result in fewer housing opportunities for lower income residents unless efforts are made to specifically address housing affordability.

A gas station designated as a brownfield site. Photo credit: *Michiana Area Council of Governments (MACOG)*

Hazardous Materials – Increases in flood risk to the area also result in increased hazardous materials risk. Water pollution and soil contamination in the City of Gary will be exacerbated by climate change. According to the Indiana Department of Environmental Management, there are roughly 90 brownfields in Gary which are remnants of Gary's highly industrial past. As the potential for large storms and floods increases, it becomes increasingly likely that these pollutants will be released from soils and contaminate local waterways, homes, and businesses, and affect human health. These sites will require sensitivity and caution during climate resilience planning efforts.

Energy Disruption and Pricing – Electric service in Gary is principally supplied through the Northern Indiana Public Services Company (NIPSCO), which is one of the state's largest electricity providers. NIPSCO also provides natural gas to the community. In addition to residential and commercial energy use, Gary must also meet its industrial energy demand. In fact, the city has the 4th highest number of

power producing plants in Indiana, with 54% of its electricity consumption attributed to Gary's blast furnace plant (U.S. Steel Gary Works).

As temperatures rise and extreme weather events occur more frequently, electrical use is expected to rise with increased demand for air conditioning, heating, and smoke filtering. New investments in energy production and distribution will be needed to meet peak demand. Because of the community's heavy reliance on fossil fuel-based energy, replacement of fossil fuels with renewable energy sources (in addition to energy conservation) is necessary to meet the City of Gary's greenhouse gas emissions targets, as outlined in the city's Climate Action Plan. These new investments could result in higher prices, depending on the cost of new infrastructure and energy prices. Lower income residents and small business owners could be disproportionately impacted by increasing energy prices.

The city received SolSmart bronze designation for its efforts to make solar energy more accessible to residents. Photo credit: *The City of Gary & SolSmart*

Extreme temperatures also reduce the efficiency and reliability of energy production and distribution. Power outages are common during heat waves and extreme cold events due to overburdening of the power grid. Power outages can put older adults, low-income residents, and people with existing health problems at risk due to soaring temperatures. Additionally, if electric prices increase during extreme heat periods, many residents will be unable to afford to cool their homes, making them vulnerable to heat-related illnesses like heat stroke and dehydration.

Transportation Disruption – Gary's primary modes of transportation for residents include automobiles, public transit, biking, and walking. The city's public transportation system is managed by the Gary Public Transportation Corporation (GPTC) and offers busing service to numerous stops throughout the city and neighboring suburbs. GPTC also has express service to locations outside the city, including connections to Chicago transit. Additionally, Gary is a member of the Northern Indiana Commuter Transportation District (NICTD), which operates its commuter rail system between Chicago and South Bend with a stop at the Adam Benjamin Metro Center in Gary. It is one of the country's last original operating interurban railway systems.

Aerial photograph of railcars at the Canadian National's Kirk Yard in Gary. Photo credit: *The City of Gary*

Increasing temperatures and flooding pose risks to these transportation networks. Rail traffic can be disrupted by severe heat, which leads to buckling (sun warping) and derailments (EPA, 2022). In extreme heat, asphalt may begin to soften and melt.

Extreme temperatures associated with climate change can lead to lower weight limits on air cargo. Because warm air is less dense, planes have a harder time taking off in triple-degree heat, leading to less cargo and weight capacity per flight. More frequent and severe heat waves can increase costs of shipping and disrupt air travel, sometimes grounding all planes until temperatures cool again (Coffel et al., 2017).

Identified Vulnerabilities: Built Environment

The vulnerability assessment identified the following built environment-related vulnerabilities for the City of Gary.

HIGH

- Damaged stormwater infrastructure due to increased precipitation, leading to collapse, flooding, and the potential for exposure to hazardous materials
- Urban heat island effect from heat-absorbing buildings, impervious surfaces, and the removal of canopy cover

MEDIUM-HIGH

- Greater risk of property damage due to extreme precipitation, storms, and flooding events
- Potential electrical outages due to extreme weather events like heat waves, extreme cold, and flooding
- Continued transportation disruption due to extreme weather events and damaged/aging infrastructure
- Accelerated degradation of abandoned and/or vacant buildings due to extreme weather events

MEDIUM-LOW

- Damaged roads due to extreme weather events like extreme cold, heat waves, and flooding

Note: Overall vulnerability ranking is determined from the combined scores for time frame, sensitivity, and adaptive capacity

Ongoing Efforts: In Gary's 2019 Comprehensive Plan, several transportation improvements, including planned and programmed roadway, transit, rail, airport, bicycle, and pedestrian facility improvements, were outlined. Some of these planned improvements also include green infrastructure projects and gateway beautification, as outlined in the Gary Green Infrastructure Plan that was published in collaboration with the Delta Institute in February 2019.

Natural Systems

Duneland ecosystem in the Indiana Dunes National Park. Photo credit: *Peggy Blackwell* (*www.visitmillerbeachgary.com*)

Situated at the southern extremity of the ancient Lake Chicago and adjacent to the present-day Lake Michigan, Gary occupies a landmass that was once a lakebed. Notably, the soil composition in most parts of the city consists predominantly of pure sand extending to a depth of almost one foot below the surface. This abundant and high-quality sand has been a valuable resource for more than a century, attracting various companies to engage in mining operations, particularly for glass manufacturing.

While Gary is thoroughly urbanized, it is also home to a vibrant natural system. Two rivers run through Gary: the Little Calumet River and the Grand Calumet River. The Gary Parks Department maintains 13 public parks as well as 3.5 miles of beach along Lake Michigan, including Lake Street Beach, Marquette Park Beach, and Wells Street Beach. The city is also part of the Indiana Dunes National Park. Finally, Gary hosts several hiking trails and walking paves, including the Paul H. Douglas (formerly Miller Woods) Trail, the Little Calumet River Levee Trail, the Three Rivers Park Lake Loop, and the Gary Green Link Trail, which is part of the Buchanan Street Green Gateway Project.

Climate change can have significant impacts on natural systems through increases in temperatures, extreme storms, and drought. Increasingly, one of the most important functions of natural systems is to provide a buffer against the impacts of climate change. Intact natural systems can reduce the impacts of extreme events, such as floods, fire, and drought, on local communities. Forest and ecosystem management to maximize natural function is increasingly becoming a priority.

The City of Gary's natural systems are vulnerable to climate change in the following ways:

Signage at the Paul H. Douglas Trail in Miller Woods, an official stop on the Indiana Birding Trail. Photo credit: *Peggy Blackwell* (*www.visitmillerbeachgary.com*)

Overall Degradation of the Natural Environment & Loss of Species – Open space is a valued resource, providing a visual and physical connection to the natural environment. Like natural lands outside the city, natural lands and open space within city limits are increasingly being affected by climate change and will need to be managed for continued natural function. Some of the climate-related threats to parks and open spaces include pests that can affect tree canopy species, drought that weakens vegetation, floods and large storms that knock down trees and destroy landscaping, and overall climate shifts that make existing vegetation incompatible with changing climate conditions.

Studies indicate that changes in local climate conditions will occur on a faster time scale than species and ecosystems are able to shift or adapt to. Overall, natural systems are expected to become degraded by climate change, with some specific species and habitats especially vulnerable. These include wetlands, riparian areas, meadows, high elevation species, and species highly dependent on cold waterways or snow.

Pedestrian bridge with views of the Calumet Lagoon at Marquette Park. Photo credit: *Peggy Blackwell (www.visitmillerbeachgary.com)*

As climate change progresses, more extremes are expected. This includes an increase in floods, drought, larger storms, severe heat waves, wind speeds, and hailstorms. Many of these extreme events will have impacts on species and their habitats.

Spread of Pests and Disease – Climate change is also expected to lead to increases in pests and disease, affecting natural areas, urban trees, and fish and wildlife. Gardens and crops could also experience reduced production due to extreme events, as well as pests and disease. With increase in temperatures, fewer nights below freezing, and stressed native vegetation, invasive species could decimate urban tree canopies and other vegetation.

Identified Vulnerabilities: Natural Systems

The vulnerability assessment identified the following natural systems-related vulnerabilities to the City of Gary.

MEDIUM-HIGH

- Degradation of aquatic systems due to increased water pollution, leading to loss of wildlife habitat and ecological function
- Loss of connectivity of natural areas due to invasive species and extreme weather events

MEDIUM-LOW

- Threats to urban tree canopy from severe storms, drought, disease, and heat
- Reduced carbon storage due to wildfires, extreme heat, and drought
- Threats to native biodiversity posed by invasive plants and animals

Note: Overall vulnerability ranking is determined from the combined scores for time frame, sensitivity, and adaptive capacity

Ongoing Efforts: Organizations like CommuniTree are working to grow and maintain Gary's urban tree canopy. CommuniTree grew out of the need to promote tree planting, after-planting care, and maintenance of local trees. It is supported by community, industry, and government partners with the goal of creating a healthy and diverse tree population. Other programs like the city's 2014 Vacant to Vibrant (V2V) program aim to address the high percentage of vacant and abandoned property within Gary while reducing stormwater runoff through green infrastructure.

Business and Economy

The City of Gary's economy is built on many different types of businesses and industries, ranging from large industries to small local and diverse businesses. Originally founded by the United States Steel Corporation in 1906 to serve its steel mill, Gary maintains strong ties to the steel industry and is home to Gary Works, which was once the largest steel mill complex in North America. Although the steel industry has been on the decline in recent decades, Gary Works remains the city's largest single employer with 2,246 employees as of 2023.

Light manufacturing, including plastics, paper products, rubber, and chemicals, have also become integral parts of Gary's economy. Another sector that has grown in recent years is tourism. In addition to historic attractions like the Michael Jackson Family Home, Gary's tourist attractions include casino boats, restaurants, and entertainment venues at Buffington Harbor along the city's lakefront. Finally, the Gary Regional Airport has become a major Midwest cargo carrier. In addition to its airport, Gary hosts six truck terminals that serve more than 100 trucking firms, which also contribute to the city's economic growth.

Smoke billowing from Gary Works, a steel mill operated by U.S. Steel. Photo credit: *The City of Gary*

Gary's nonagricultural labor force is approximately 323,633 people, with 59,100 workers in trade, transportation and utilities, 40,200 workers in government, 39,600 in educational and health services, and 38,100 workers in manufacturing. The city's unemployment rate was 5.3% as of August 2023 (U.S. Bureau of Labor Statistics, 2023).

Climate change is expected to affect the local economy in numerous ways. Not only are transportation routes expected to be interrupted more frequently, but the cost of doing business is expected to rise.

Identified climate change vulnerabilities to Gary businesses and the local economy include:

Energy Costs – The cost of energy is likely to increase due to climate impacts, potentially affecting the cost of doing business in the region. With higher temperatures, demand for electricity is expected to increase as residents and businesses increasingly need air conditioning. Heavy reliance on coal and natural gas leaves the region vulnerable to increasingly volatile energy prices. As demand increases, costs could rise substantially to meet the need for new infrastructure investments.

A public bus carrying passengers in Gary, Indiana. Photo credit: *The Gary Public Transportation Corp (GPTC)*

Transportation Interruptions – The City of Gary's businesses and industry rely heavily on inexpensive, reliable, and efficient distribution of products throughout the nation. As detailed in the built environment section, businesses and industry are increasingly vulnerable to disruptions in transportation by river shipping, air cargo, rail, and interstate shipping. As shipping reliability is increasingly impacted by extreme events, overall cost and profitability could be affected.

Cost of Municipal Credit – Credit rating agencies have added "resiliency" in their rating criteria for city and state governments, affecting the ability of local governments to raise bond funds and the rates that taxpayers pay for those funds. For instance, Standard and Poor's regularly publishes extensive research on the climate-related risks to cities (S&P Global, n.d.). They also evaluate environmental, social, and governance risks as a key part of their ratings methodology. Communities that do not address resilience are likely to find it more expensive to access municipal bonds for large infrastructure projects over time.

Outdoor Workers at Risk – Increasing smoke and heat events may severely disrupt the productivity of outdoor workers in fields such as construction, agriculture, landscaping, forestry, and recreation. Those employment disruptions are likely to cause financial instability, particularly for low-income workers. Businesses may also experience higher turnover of workers and increased workers compensation claims.

Identified Vulnerabilities: Business and Economy

The vulnerability assessment identified the following business and economy-related vulnerabilities to the City of Gary.

HIGH

- Risk to first responders, outdoor workers, and service industries due to increased frequency of extreme temperatures
- Increased risk of adverse health conditions due to air pollution from polluting industries

MEDIUM

- Increased cost of residential energy due to storm and heat damage, aging infrastructure, and higher demand
- Higher cost of doing business due to rising energy/insurance costs and disaster losses

Note: Overall vulnerability ranking is determined from the combined scores for time frame, sensitivity, and adaptive capacity

Ongoing Efforts: The City of Gary is advancing efforts to ease the energy burden on lower income populations through efforts such as its Solarize Gary initiative that provides residents with resources and tools to pursue solar power. Additional projects are also being pursued to expand community solar and support homeowners with energy efficiency and weatherization.

Human Systems

The City of Gary is not immune to global health risks from climate change. Existing health threats are expected to be exacerbated with climate change, while new and emerging threats also take hold. Extreme events are already occurring more frequently, and emergency services will be increasingly taxed as these events become even more common.

Illnesses and Mortality from Extreme Temperatures– One of the biggest health threats facing Gary residents is the increasing incidence, severity, and longevity of heat waves. By the end of 2090, the average annual maximum temperature is expected to rise from around 62°F in 2023 to about 71°F. This suggests a noticeable escalation in peak temperatures experienced throughout the year. Extreme heat days are also expected to rise throughout the state of Indiana, from seven per year (present) to between 38 to 51 days per year in the coming decades.

Many Gary residents are already vulnerable to heat waves, and with changing temperatures, more people will become vulnerable. People in areas with less tree canopy coverage and less access to air conditioning are highly vulnerable. Lower income neighborhoods and communities of color often have fewer trees, putting these communities at higher risk. Elderly people are very sensitive to heat, as are infants and people with existing health conditions.

> *"Climate change is among the greatest health risks of the 21st Century. Rising temperatures and more extreme weather events cost lives directly, increase transmission and spread of infectious diseases, and undermine the environmental detriments of health, including clean air and water, and sufficient food."*
> **World Health Organization**

In addition to the risks posed by elevated daytime highs, nighttime low temperatures can also threaten human health. When nighttime temperatures do not cool below 75° F, core body temperature does not cool enough to protect people from the heat which can lead to increased mortality. People who already suffer from chronic disease are particularly vulnerable.

A flooded street in Indiana during the 2008 flood. Photo credit: *National Weather Service*

Flooding and Hazardous Materials Exposure – Severe thunderstorms are a major source of catastrophic loss. Increasing convective potential energy and strong winds associated with climate change indicate that severe thunderstorms are likely to increase. Severe storms can cause energy outages and flooding. During energy outages, some of the most vulnerable populations include medically sensitive populations and elders, because the loss of power can lead to exposure to extreme heat or cold, as well as failure of vital medical equipment.

Flooding affects many neighborhoods throughout Gary. Flood waters often become contaminated with hazardous materials that can impact human health and contaminate drinking water. People most vulnerable to flood impacts include those living in high flood risk areas, and especially those with limited mobility, such as elders, homeless, and people without vehicles.

Stress to Public Safety During Extreme Weather Events – Higher temperatures increase irritability and hostility, which can lead to higher rates of violence and domestic abuse. In addition, economic disruptions due to wildfires or floods can lead to a generation of traumatized families.

Overburdened Healthcare System – A primary climate change vulnerability identified for the City of Gary is the potential for an overburdened healthcare system tasked with responding to outbreaks and extreme weather events. An influx of climate refugees could exacerbate this issue even more. Recurring disasters, such as flooding, disease outbreaks, and heat waves, could overwhelm the system's current capacity. Vulnerable populations include elderly residents, people who live in flood-prone areas, non-English speaking populations, people without health insurance, homeless populations, and those with already compromised health.

An existing lack of services, including in-home support services, may also be exacerbated. Extreme conditions and events are expected to lead to declines in overall health and struggles to remain independent. Elderly residents and people with disabilities are especially vulnerable.

Community Culture

Gary's character comes from a local history and culture that has developed over many generations. The city experienced a rapid and significant racial transformation during the latter part of the 20th century. These demographic shifts had a profound impact on its political landscape, closely mirroring its evolving racial composition. The proportion of black and Hispanic residents surged from 21% in 1930, to 39% in 1960, and further rose to 53% by 1970. This demographic evolution marked a pivotal moment in the city's history, exemplified by the election of one of the nation's first African American mayors, Richard G. Hatcher, and the hosting of the groundbreaking 1972 National Black Political Convention.

Visitors enjoying their food at the Marquette Beach concession stand. Photo credit: *Peggy Blackwell* (*www.visitmillerbeachgary.com*)

By the late 1990s and early 2000s, Gary earned the distinction of having the highest percentage of African Americans among U.S. cities with a population of 100,000 or more, reaching an impressive 84% according to the 2000 U.S. census. This demographic makeup further illustrates the enduring impact of the earlier racial changes that reshaped the city's identity and politics. These and other historical events and policies formed the neighborhoods that are present today, with continued legacies in culture, race, education, and opportunity.

Identified climate change vulnerabilities to community culture in the City of Gary include:

Children learn yoga in one of Marquette Park's picnic shelters. Photo credit: *Peggy Blackwell* (*www.visitmillerbeachgary.com*)

School and Youth Experience – Young people in Gary participate in many outdoor sports and activities that will be affected by heat and larger storms, leading to a lifetime of poorer health among residents and a loss of nature-based recreational values.

Quality of Life and Sustainable Lifestyles – Gary residents' quality of life is vulnerable to climate change impacts. Heat and severe storms keep people indoors, reduce their connection with nature, and negatively impact their mental health. Tourism may decline, resulting in less revenue and fewer government services. If schools are impacted, families may move away from the area, worsening the problem. Finally, residents who are paying more for housing, energy, and food may struggle to access essential resources and opportunities that contribute to overall well-being.

Gary residents kayaking in the Calumet Lagoon, which offers blah blah blah. Photo credit: *Peggy Blackwel*l (*www.visitmillerbeachgary.com*)

Political & Economic Feasibility of Sustainability Efforts – The City of Gary is currently increasing its efforts to become a sustainable community. Residents care about their impact on the environment, and many programs are in place and growing. These programs stem from local values and support. They also require significant resources and investment. With greater disruptions to livelihoods and higher stress from climate impacts, residents may no longer have the capacity or values to support sustainability programs and actions. Also of concern is the ability of local businesses to meet sustainability requirements or mandates, as their resources become more limited and/or variable.

Threats to Community Cohesion – The ability of Gary cultural organizations to hold important ceremonies and community events will be impacted by extreme heat, storms, flooding, and drought, particularly in the summer months. As a result, residents will have fewer opportunities to connect with one another. Newer residents may also find it difficult to integrate into the community if fewer outdoor events are hosted.

Identified Vulnerabilities: Cultural and Human Systems

The vulnerability assessment identified the following cultural and human system vulnerabilities in Gary

HIGH

- Decline in water quality due to increased flooding events, potentially exposing residents to hazardous materials
- Worsening food insecurity due to disturbances in food production and supply chains

MEDIUM-HIGH

- Overburdened healthcare system due to increasing mental and physical health challenges from worsening climate impacts
- Risk to unhoused population due to increased frequency of extreme temperatures

MEDIUM-LOW

- Risk to outdoor culture due to extreme heat and cold events

Note: Overall vulnerability ranking is determined from the combined scores for time frame, sensitivity, and adaptive capacity

Ongoing Efforts: Gary is fortunate to host a myriad of community programs and organizations working to foster community cohesion, improve quality of life and engage youth, to name a few. One example is the Aetna Manor Revitalization Program. AMRP is a nonprofit working to improve the community and Aetna Manor neighborhood through coordinated action. Supporting further community and neighborhood identity and cohesion will be critical to increasing Gary's climate resilience.

Conclusions

Climate change is a global threat with locally unique impacts for communities. Because each region is affected differently, and each community has a unique combination of existing vulnerabilities and assets, it is vital to develop climate change solutions at the local level. Some of Gary's most important vulnerabilities include failure of aging infrastructure, health impacts associated with water and air quality, exacerbated impacts to populations and resources already under stress, and degradation of natural systems that are vital to public health and well-being. The most vulnerable residents and resources are generally those with the least adaptive capacity to deal with the impacts of climate change.

The international scientific community agrees that keeping average warming at the global level below 1.5°C (2.7° F) is vital to protect young people and future generations from catastrophic and runaway climate change. Emissions reductions are the first and most important step to preventing many of the worst impacts on the community. However, many impacts are already occurring and need to be addressed to protect people and resources throughout the community.

Because climate change affects all sectors and resources, actions must be coordinated to increase overall resilience. Without coordination, actions in one sector or population could shift impacts to other sectors or populations, especially those who are already most vulnerable. Truly co-beneficial solutions to climate change address economic and social inequities, increase ecological health and resilience, and collaborate across diverse groups and resources.

Risk Matrix

The symbol → indicates highest priority for strategy development

High Sensitivity	Low Adaptive Capacity	Medium Adaptive Capacity	High Adaptive Capacity
	→ **Higher cost of doing** business due to rising energy and insurance costs as well as disaster losses → **Increased risk of adverse** health conditions due to air pollution from heavily polluting industries → **Risk to first responders**, outdoor workers, and service industries due to increased frequency of extreme temperatures Increased cost of residential energy due to storm and heat damage, aging infrastructure, and higher demand Threats to urban tree canopy from severe storms, drought, disease, and heat Threats to native biodiversity posed by invasive plants and animals Risk to outdoor culture due to extreme heat and cold events Greater risk of property damage due to extreme precipitation, storms, and flooding events Damaged stormwater infrastructure due to increased precipitation	→ **Overburdened healthcare** system due to increasing mental and physical health challenges from worsening climate impacts → **Worsening food insecurity** due to disturbances in food production and supply chains → **Decline in water quality** due to increased flooding events, potentially exposing residents to hazardous materials Continued transportation disruption due to extreme weather events and damaged/aging infrastructure Damaged roads due to extreme weather events like extreme cold, heat waves, and flooding Potential electrical outages due to extreme weather events Accelerated degradation of abandoned and/or vacant buildings due to extreme weather events Degradation of aquatic systems due to increased water pollution, leading to loss of wildlife habitat and ecological function	Urban heat island effect from heat-absorbing buildings, impervious surfaces, and the removal of canopy cover Risk to unhoused population due to increased frequency of extreme temperatures

Medium	Reduced carbon storage due to wildfires, extreme heat, and drought	Loss of connectivity of natural areas due to invasive species and extreme weather events	

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Appendix 4: Developing Climate Resilience Strategies

On November 9th, 2023, a group of 33 local experts from diverse sectors of the community met for a daylong strategy development workshop. Most participants also attended the Vulnerability Assessment workshop (see Appendix 3). These stakeholders combined their local knowledge and expertise to identify and prioritize strategies that address Gary's climate vulnerabilities. Workshop participants represented all five community systems: Health and Emergency Services, Natural Systems, Infrastructure, Business and Economy, and Community Culture.

In the first part of the workshop, participants reviewed the climate projections and vulnerabilities for the City of Gary and learned about best practices for developing climate adaptation solutions, such as creating win-win and no-regrets strategies. Then participants developed a list of guiding principles that reflect Gary's common values and priorities.

Participants spent most of the day working in cross-sector breakout groups, identifying strategies and actions for a specific sub-set of vulnerabilities from the Vulnerability Assessment (see Appendix 3). These five breakout groups were organized around the following categories: Water Quality and Flooding; Urban Forests, Natural Areas, and Biodiversity; Population, Economy, and Development; Health, Pests, and Disease; and Outside Influences. Participants were assigned a group to match their expertise, as well as to ensure representation of all five community systems in each group.

For each vulnerability, group members reviewed a list of possible strategies and actions for each assigned vulnerability developed from a review of existing community plans and reports, and a national database of climate solutions. Participants then identified specific initial actions to begin implementing each strategy. For each action, participants collected the following information:

Co-benefits	Any potential positive impacts of the strategy to groups, resources, or populations other than those that are the focus of the action.
Trade-offs	Any potential negative impacts of the action related to groups, resources, or populations other than those that are the focus of the action, or how the action could make climate change worse or prevent resilience in other sectors.
Equity Consideration	And details or information that will be important to consider relating to social equity when designing and/or implementing the action.
Responsible Party	Who is potentially responsible for implementing the action, and other implementation partners

Relative Cost	The relative cost of the action (High, Medium, or Low)
Effectiveness	The relative effectiveness of the proposed action (High, Medium, or Low), based on how much the action will reduce vulnerability and lead to greater climate resilience.
Evaluation	How might we tell if the proposed action is making an impact on the specific climate vulnerability?

At the end of the workshop, participants ranked all the proposed actions across the five breakout groups in terms of their relative priority and according to the set of guiding principles developed earlier in the day. The actions that received eight votes or more are listed in priority order below.

It is important to note that this ranking is only a starting point for the implementation phase of *Climate Ready Gary.* Additional information and resources may impact which strategies and actions are implemented first, and which may need to wait.

Priority	Action	Theme
1	**Address illegal dumping through city's Illegal Dumping Taskforce efforts**	Healthy Residents
2	**Conduct air quality health impact study for the city**	Healthy Residents
3	**Increase the number of farmers markets with a focus on local food deserts**	Healthy Residents
4	**Evaluate health services for extreme temperature events and identify partnerships to increase access to these services**	Healthy Residents
5	**Update the 2021 Gary Urban Forest Management Plan to expand the local tree canopy**	Natural Systems
6	**Update the Gary Green Links Master Plan and coordinate with the Bicycle and Pedestrian Master Plan**	Natural Systems
7	**Educate residents, municipal employees, and first responders on wildfire/fire safety**	Natural Systems
8	**Establish a community working group to assist the city with land use planning and implementation**	Natural Systems

9	**Launch an educational campaign to educate local municipal stakeholders on the benefits of solar energy**	Sustainable Energy
10	**Publish an inventory of existing programs and resources for residential and commercial sectors to advance solar adoption**	Sustainable Energy
11	**Publish an inventory of existing programs and resources for residents and businesses that advance energy efficiency**	Sustainable Energy
12	**Assess existing stormwater and wastewater management system**	Resilient Infrastructure
13	**Continue development and implementation of Gary's Long Term Control Plan**	Resilient Infrastructure
14	**Implement City's Green Infrastructure Plan**	Resilient Infrastructure
15	**Improve vegetation management near power lines**	Resilient Infrastructure
16	**Retrofit older buildings and require higher standards for new construction projects**	Community Readiness
17	**Review and update Gary's Emergency Preparedness Plan**	Community Readiness
18	**Educate city officials on climate vulnerabilities and impacts**	Community Readiness
19	**Identify and prioritize floodprone areas**	Community Readiness
20	**Educate homeowners on flood protocols**	Community Readiness

Appendix 5: Climate Resilience Strategies

Listed below are the proposed climate adaptation strategies for the City of Gary, as identified by local stakeholders and community members. The risk numbers refer to the identified climate vulnerabilities, listed at the end of this table and described in more detail in Appendix 3.

Community Values


Enhances environmental health and biological diversity


Helps to build equity for historically marginalized groups


The City of Gary leads through direct governmental action


Supports efforts to reduce greenhouse gas emissions (mitigation)


Cross-sector strategy addresses multiple types of needs across the community


Indicates a high priority item

Effectiveness

High, Med, Low

The level of certainty that the strategy will reduce vulnerability and lead to greater climate resilience

Relative Cost

$ or $$ or $$$

The relative costs of implementing the action

Strategies for Healthy Residents

HR-1: Improve and enforce local regulations on pollution			Addresses Risks: 2, 4, 6	
Actions	**Community Values**	**Proposed Responsible Party & *Supporting Parties***	**Effectiveness**	**Relative Costs**
HR-1.1: Address illegal dumping through city's Illegal Dumping Taskforce efforts		Gary Illegal Dumping Taskforce *Gary Office of Sustainability and Environmental Affairs, local authorities, public & private partners*	Med	$
HR-1.2: Assess polluters and pollution sources impacting the city		Work Group of City Departments *EPA, IU Northwest, local advocacy organizations*	Med	$
HR-1.3: Educate residents and businesses on proper hazardous waste disposal		Gary Public Works Department & Recycling Department *State & federal agencies, local businesses, nonprofit partners, faith-based organizations, community leaders, Gary City Health & Human Services Department*	High	$

HR-2: Reduce air pollution				Addresses Risks: 2, 5
Actions	**Community Values**	**Responsible Party** *Supporting Parties*	**Effectiveness**	**Relative Costs**
HR-2.1: Conduct air quality health impact study for the city		Gary Human and Health Services Department *State & federal agencies*	Low	$
HR-2.2: Assess local monitoring programs and improve as necessary with updated digital technologies		City of Gary *Gary City Health & Human Services Department*	Med	$$
HR-2.3: Establish an independent pollution monitoring program		City of Gary *Local businesses, state & federal agencies, independent partners, local leaders, academic institutions, Gary City Health & Human Services Department*	Med	$$
HR-3: Promote locally grown food and build a food system to meet demand				**Addresses Risks: 3**
Actions	**Community Values**	**Responsible Party** *Supporting Parties*	**Effectiveness**	**Relative Costs**
HR-3.1: Increase the number of farmers markets with a focus on local food deserts		Gary Food Council *Local nonprofits, community partners, private partners, Gary City Health & Human Services Department*	High	$$
HR-3.2: Plant food forests using permaculture and best maintenance practices in line with appropriate city codes		CommuniTree	High	$$

		Gary Food Council, PNW, local nonprofits, churches, schools, farmers/growers, NWI Food Bank, NWI Food Council, Gary City Health & Human Services Department		
HR-3.3: Improve access to local food resources and supporting infrastructure to residents		Gary Food Council *Legacy Foundation, local nonprofits, churches, schools, farmers/growers, NWI Food Bank, NWI Food Council, Gary City Health & Human Services Department*	Med	$$
HR-4: Educate public on extreme temperature health risks and increase access to health services during extreme weather events			**Addresses Risks: 2, 7, 9, 14**	
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
HR-4.1: Evaluate health services for extreme temperature events and identify partnerships to increase access to these services		Gary Police & Fire Departments *City's Emergency Response Team, Gary City Health & Human Services Department, city warming centers, Lake County Emergency Management Agency, Red Cross, neighborhood groups*	Med	$
HR-4.2: Assess workplace safety educational resources for outdoor workers and employers and develop		City of Gary	Med	$

workplace safety operational procedures and education for extreme weather conditions		*City Emergency Response Team, local employers*		
HR-4.3: Improve extreme temperature preparedness throughout the Jewel Parks Program		Gary Department of Parks *City Emergency Response Team, Red Cross, neighborhood groups*	High	$$

Strategies for Robust Natural Systems

NS-1: Expand urban tree canopy and improve tree maintenance			Addresses Risks: 6, 17, 19, 20, 21	
Actions	**Community Values**	**Responsible Party** *Supporting Parties*	**Effectiveness**	**Relative Costs**
NS-1.1: Update the 2021 Gary Urban Forest Management Plan to expand the local tree canopy		Gary Department of Parks, Public Works *CommuniTree, US Forest Service, regional government nonprofit partners*	Med	$
NS-1.2: Develop a tree replacement plan as part of the 2021 Gary Urban Forest Management Plan update		Gary Department of Parks *Gary Department of Public Works, US Forest Service, regional government, nonprofit partners like CommuniTree*	Med	$
NS-1.3: Develop a community education campaign on proper tree care		CommuniTree *Nonprofit partners, Gary residents*	Low	$

NS-2: Review, update, and implement the Gary Green Links Master Plan			Addresses Risks: 4, 6, 17, 19, 20, 21	
Actions	**Community Values**	**Responsible Party** *Supporting Parties*	**Effectiveness**	**Relative Costs**
NS-2.1: Update the Gary Green Links Master Plan and coordinate with the Bicycle and Pedestrian Master Plan		Gary Department of Parks *Nature Conservancy, Little Calumet River Basin Development Commission, Calumet Collaborative*	Med	$
NS-2.2: Incorporate policies in the land use plan to address the issue of invasive plants and animals		Gary Department of Parks *Gary Redevelopment Department, Little Calumet River Basin Development Commission*	Med	$
NS-2.3: Continue to acquire and make use of vacant and abandoned property to connect trails and parks		Gary Department of Parks *Gary Redevelopment Department, Little Calumet River Basin Development Commission, Land Trusts*	High	$$$

NS-3: Take measures to reduce the risk of wildfires			Addresses Risks: 19, 21	
Actions	**Community Values**	**Responsible Party** *Supporting Parties*	**Effectiveness**	**Relative Costs**
NS-3.1: Develop a city-wide fire protection plan		Gary Fire Department *National Park Service*	Med	$
NS-3.2: Incorporate the use of mycelium soil in landscaping to help prevent fires		Gary Fire Department *National Park Service*	Low	$

NS-3.3: Educate residents, municipal employees, and first responders on wildfire/fire safety		Community organizations *National Park Service, Gary Fire Department*	High	$
NS-4: Improve vegetation management throughout the city			**Addresses Risks: 17, 20, 21**	
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
NS-4.1: Encourage citizens to grow native plants in their gardens through education and awareness		Gary Office of Sustainability and Environmental Affairs *U.S. Forest Service*	Low	$
NS-4.2: Expand the scope of the city's current vegetation management program with a focus on low-income and vulnerable neighborhoods		Gary Department of Public Works *State & federal agencies, property owners*	Med	$$
NS-5: Improve city's approach to land use			**Addresses Risks: 4, 6**	
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
NS-5.1: Evaluate city's current land use plan		Gary Redevelopment Department *State & federal agencies*	Low	$
NS-5.2: Implement existing ordinances and/or develop additional policies that protect aquatic systems		Gary Redevelopment Department *State & federal agencies*	Med	$
NS-5.3: Establish a community working group to assist the city with land use planning and implementation		Gary Redevelopment Department Residents, local advocacy groups, IU Northwest	Med	$

Strategies for Sustainable Energy

SE-1: Increase solar adoption in residential, commercial, and municipal sectors			Addresses Risks: 1, 13	
Actions	**Community Values**	**Responsible Party** *Supporting Parties*	**Effectiveness**	**Relative Costs**
SE-1.1: Launch an educational campaign to educate local stakeholders on the benefits of solar energy		Gary Office of Sustainability and Environmental Affairs *Faith CDC, Laporte County NAACP, SolSmart*	Med	$
SE-1.2: Publish an inventory of existing programs and resources for residential and commercial sectors to advance solar adoption		Gary Office of Sustainability and Environmental Affairs *IU Environmental Resilience Institute*	Low	$
SE-1.3: Pursue financial resources to assist vulnerable communities with solar adoption and resilience		Gary Office of Sustainability and Environmental Affairs *NIPSCO, contractors, Solar United*	Med	$$
SE-2: Improve energy efficiency of existing buildings throughout the city			**Addresses Risks: 1, 13**	
Actions	**Community Values**	**Responsible Party** *Supporting Parties*	**Effectiveness**	**Relative Costs**

SE-2.1: Publish an inventory of existing programs and resources for residents and businesses that advance energy efficiency		City of Gary *State & federal programs, NWICA, contractors, public & private partners*	Low	$
SE-2.2: Offer support for program implementation		City of Gary *State & federal programs, NWICA, contractors, public & private partners*	Med	$

Strategies for Resilient Infrastructure

RI-1: Improve effectiveness of city's grey infrastructure			**Addresses Risks: 4, 6, 12**	
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
RI-1.1: Assess existing wastewater and stormwater management system		Gary Sanitary District *State & federal agencies*	Low	$
RI-1.2: Continue development and implementation of Gary's Long Term Control Plan		Gary Sanitary District	High	$$$
RI-2: Expand city's green infrastructure			**Addresses Risks: 4, 6, 10, 11, 12, 17**	
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
RI-2.1: Implement City's Green Infrastructure Plan		City of Gary *Property owners, residents, community partners*	High	$$$

RI-2.2: Incentivize the creation of green infrastructure in low-income areas		City of Gary *Property owners, residents, community partners*	Med	$$
RI-3: Replace and upgrade roads			**Addresses Risks: 8, 18**	
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
RI-3.1: Create an inventory of vulnerable roads and alleys		Gary Department of Public Works *NIRPC, INDOT*	Low	$
RI-3.2: Establish a program to complete targeted road and alley upgrades		Gary Department of Public Works *INDOT*	High	$$$
RI-4: Increase resilience in local power distribution			**Addresses Risks: 16**	
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
RI-4.1: Install underground electrical wiring		Gary Department of Public Works *Utility companies, contractors, property owners*	High	$$$
RI-4.2: Improve vegetation management near power lines		Gary Department of Public Works *Property owners*	Med	$

Strategies for Community Readiness

CR-1: Create a more resilient built environment				Addresses Risks: 1, 7, 10, 11, 13
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
CR-1.1: Retrofit older buildings and require higher standards for new construction projects		Gary Building Department *Gary Redevelopment Department, property owners, contractors*	High	$$$
CR-1.2: Pass ordinance allowing resilient landscaping practices for new and existing buildings		Gary Redevelopment Department *City Council, property owners*	Low	$

CR-2: Improve community emergency preparedness with an emphasis on at-risk neighborhoods				Addresses Risks: 2, 15
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
CR-2.1: Review and update Gary's Emergency Preparedness Plan		Gary Police & Fire Departments *City Emergency Preparedness working group, NIPSCO, homeowners, property owners*	Med	$
CR-2.2: Publish a Homeowner's Guide to educate the public and prepare them for natural disasters		Red Cross	Med	$

		City of Gary, Lake County Emergency Planning, neighborhood groups		
CR-2.3: Educate city officials on climate vulnerabilities and impacts		Gary Office of Sustainability and Environmental Affairs *IU Environmental Resilience Institute*	Low	$
CR-3: Prevent or mitigate of flood damage			**Addresses Risks: 4, 6, 8, 10, 11, 16, 18**	
Actions	**Community Values**	**Responsible Party** ***Supporting Parties***	**Effectiveness**	**Relative Costs**
CR-3.1: Identify and prioritize floodprone areas		Gary Stormwater Management District *State & federal agencies*	Low	**$**
CR-3.2: Educate homeowners on flood protocols		Gary Office of Sustainability and Environmental Affairs *Gary Police & Fire Departments, residents, property owners, community groups, NIRPC, Red Cross*	Low	**$**
CR-3.3: Develop a program to encourage flood mitigation practices within the community		City of Gary *Residents, property owners, community groups, NIRPC, Red Cross*	Med	**$$**

List of Climate Vulnerabilities or Risks

This list is presented in priority order as determined by stakeholders and community members. See Appendix 3 for more details and information on these identified vulnerabilities.

1. Higher cost of doing business due to rising energy and insurance costs as well as disaster losses
2. Overburdened healthcare system due to increasing mental and physical health challenges from worsening climate impacts
3. Worsening food insecurity due to disturbances in food production and supply chains
4. Decline in water quality due to increased flooding events, potentially exposing residents to hazardous materials
5. Increased risk of adverse health conditions due to air pollution from heavily polluting industries
6. Degradation of aquatic systems due to increased water pollution, leading to loss of wildlife habitat and ecological function
7. Urban heat island effect from heat-absorbing buildings, impervious surfaces, and the removal of canopy cover
8. Continued transportation disruption due to extreme weather events and damaged/aging infrastructure
9. Risk to unhoused population due to increased frequency of extreme temperatures
10. Greater risk of property damage due to extreme precipitation, storms, and flooding events
11. Accelerated degradation of abandoned and/or vacant buildings due to extreme weather events
12. Damaged stormwater infrastructure due to increased precipitation, leading to collapse, flooding, and the potential for exposure to hazardous materials
13. Increased cost of residential energy due to storm and heat damage, aging infrastructure, and higher demand
14. Risk to outdoor culture due to extreme heat and cold events
15. Risk to first responders, outdoor workers, and service industries due to increased frequency of extreme temperatures
16. Potential electrical outages due to extreme weather events like heat waves, extreme cold, and flooding
17. Threats to native biodiversity posed by invasive plants and animals
18. Damaged roads due to extreme weather events like extreme cold, heat waves, and flooding
19. Threats to urban tree canopy from severe storms, drought, disease, and heat
20. Loss of connectivity of natural areas due to invasive species and extreme weather events
21. Reduced carbon storage due to wildfires, extreme heat, and drought

List of Climate Strategies and Actions from Workshop #2

The following climate adaptation strategies and actions were developed by participating community members at the second climate resilience planning workshop on November 9th, 2023. The Task Force reviewed each strategy and action and then synthesized them into a new list that reflects the city's current initiatives and the goals of workshop participants.

1. Strategy: Improve & enforce local regulations on water pollution
    a. Action: Assess polluters & pollution sources impacting the City of Gary
    b. Action: Educate residents on proper hazardous waste disposal
2. Strategy: Reduce air pollution
    a. Action: Improve local monitoring systems with updated digital infrastructure/ technologies
    b. Action: Establish an independent pollution monitoring program
3. Strategy: Promote locally grown food and build a food system to meet demand
    a. Action: Increase number of local farmers markets
    b. Action: Expand urban farming program and increase available resources
    c. Action: Market access to local food resources & supporting infrastructure to residents
    d. Action: Compile list of available resources (e.g. food storage network) and share with urban growers
4. Strategy: Increase access to prevention services (e.g. cooling centers, mobile mental health providers)
    a. Action: Assess current options and identify partnerships for creating alternate transportation or mobile services for health visits
5. Strategy: Improve workplace safety operating procedures for outdoor workers
    a. Action: Assess available resources for outdoor workers (If needed)
    b. Action: Establish an education program for employers and workers
6. Strategy: Consult arborist to help diversify planting & selection of tree species
    a. Action: Develop a tree replacement plan
    b. Action: Develop a master tree canopy plan
    c. Action: Create a community education initiative that involves tree care
7. Strategy: Continue implementing the Gary Green Link Corridor
    a. Action: Review ordinances to complete implementation
    b. Action: Develop plan for addressing invasive species
    c. Action: Connect trails and parks
    d. Action: Increase number of bike and pedestrian trails
8. Strategy: Create a fire protection plan to reduce risk of wildfire
    a. Action: Plant food forests using permaculture principles
    b. Action: Use mycelium soil to increase water and nutrient absorption in plants
    c. Action: Control undergrowth
    d. Action: Perform prescribed burns
    e. Action: Educate residents on fire safety
9. Strategy: Improve management of local vegetation
    a. Action: Schedule open burns
    b. Action: Monitor & enforce prohibited plants and animals
    c. Action: Cut and remove undergrowth

    d. Action: Continue to acquire urban spaces to restore native vegetation
10. Strategy: Reduce pollution from wastewater & stormwater
    a. Action: Improve wastewater & stormwater treatment
    b. Action: Separate storm and wastewater infrastructure
11. Strategy: Update land use plan
    a. Action: Develop policies that protect aquatic systems
    b. Action: Create a community engagement working group to help with planning & implementation of land use plan
12. Strategy: Increase solar adoption
    a. Action: Connect with local leaders to raise awareness of community solar
    b. Action: Set aside solar funding & implementation assistance for vulnerable communities
13. Strategy: Improve energy efficiency of existing buildings
    a. Action: Create & publish an inventory of existing programs that support energy efficiency efforts
    b. Offer support for program implementation
14. Strategy: Improve stormwater (grey) infrastructure
    a. Action: Assess & upgrade existing stormwater management system
    b. Action: Incentivize the creation of green infrastructure (e.g. rain gardens, tree planting) in low-income areas
15. Strategy: Increase use of green infrastructure
    a. Action: Implement existing green infrastructure plan
16. Strategy: Replace and upgrade roads
    a. Action: Create an inventory of vulnerable roads
    b. Action: Establish & launch a program to complete targeted road upgrades
17. Strategy: Increase resiliency in residential & commercial sectors
    a. Action: Retrofit older buildings & require higher standards for new construction projects
    b. Action: Leverage partnerships to acquire land and plant food forests to remove concrete & increase canopy cover
18. Strategy: Reduce heat absorption in most concentrated areas
    a. Action: Pass ordinance supporting green building upgrades/new construction and green landscaping
    b. Action: Expand tree canopy & diversify species
19. Strategy: Improve community emergency preparedness emphasis on at-risk neighborhoods)
    a. Action: Improve maintenance (e.g. cutting tree limbs) in high risk areas
    b. Action: Install underground electrical wiring
    c. Action: Provide at-risk residents with solar-powered generators (or other solar powered technology)
    d. Action: Educate public on existing plans and strategies to prepare for natural disasters
    e. Action: Assist residents in the development of individual household disaster preparedness plans
20. Strategy: Develop alternative plans for outdoor events
    a. Action: Prepare local parks for hot weather conditions (e.g. establish cooling centers, water stations, etc)

21. Strategy: Assess existing infrastructure needs for unhoused population during extreme weather events
    a. Assess existing facilities available (from the City, the Red Cross, etc) and share with residents
22. Strategy: Prevent or mitigate flood damage
    a. Identify & prioritize floodprone areas
    b. Educate homeowners on flood protocols & incentivize flood mitigation practices

Appendix 6: Community and Stakeholder Outreach

The process of developing the *Climate Ready Gary* plan was the result of significant time and input from a variety of people in and around the City of Gary. The "Whole Community Resilience" process utilized by the City of Gary included a series of stakeholder workshops, each designed to solicit feedback to inform the development of appropriate and actionable solutions. The city also promoted two online surveys to get additional feedback from the public throughout the process.

Stakeholder Workshops

On July 18th, 2023, a group of 37 local experts from diverse sectors of the community met for a daylong vulnerability identification workshop. These stakeholders combined their local knowledge and expertise with climate science and model projections to identify and prioritize local vulnerabilities in all major sectors of the community. This information was used to help develop the Climate Vulnerability Assessment, found in Appendix 3.

On November 9th, 2023, the City of Gary hosted a second stakeholder workshop with many of the same participants from the vulnerability assessment workshop. This second workshop focused on identifying strategies and actions to address each of the vulnerabilities identified in the Climate Vulnerability Assessment (see Appendix 4). The 33 participants worked in cross-sector breakout groups, each with a set of related vulnerabilities from across the five community systems. These breakout groups were: Water Quality and Flooding; Urban Forests, Natural Areas, and Biodiversity; Population, Economy, and Development; Health, Pests, and Disease; and Outside Influences.

The City of Gary deeply appreciates the time, expertise, and knowledge of these workshop participants.

Community Surveys

During the development of *Climate Ready Gary*, community surveys were used to gather information from the broader public. These two surveys were distributed across the community via many different networks and channels. In addition to the City of Gary website and social media, Task Force members shared the surveys with their local networks, and other stakeholders involved in this process were encouraged to do the same.

These surveys are not intended to be scientifically sound; rather, they are designed to inform the resilience-building process while also serving as a mechanism to educate local residents. Information is provided here to explain how responses were used and facilitate transparency in this planning process.

Community Climate Survey

The first survey was conducted from June 14, 2023 to December 31, 2023 and collected a total of 138 responses. This survey presented information about the changes expected in the City of Gary, and asked what impacts are already being seen and what, if any, specific concerns exist. The responses collected before October 31st were used in the Vulnerability Assessment workshop. An overview of the responses can be found on Gary's Office of Sustainability and Environmental Affairs website.