Adapting to Minnesota's Changing Climate:

State Policy Proposals for Building Resilience in a Fast-changing State

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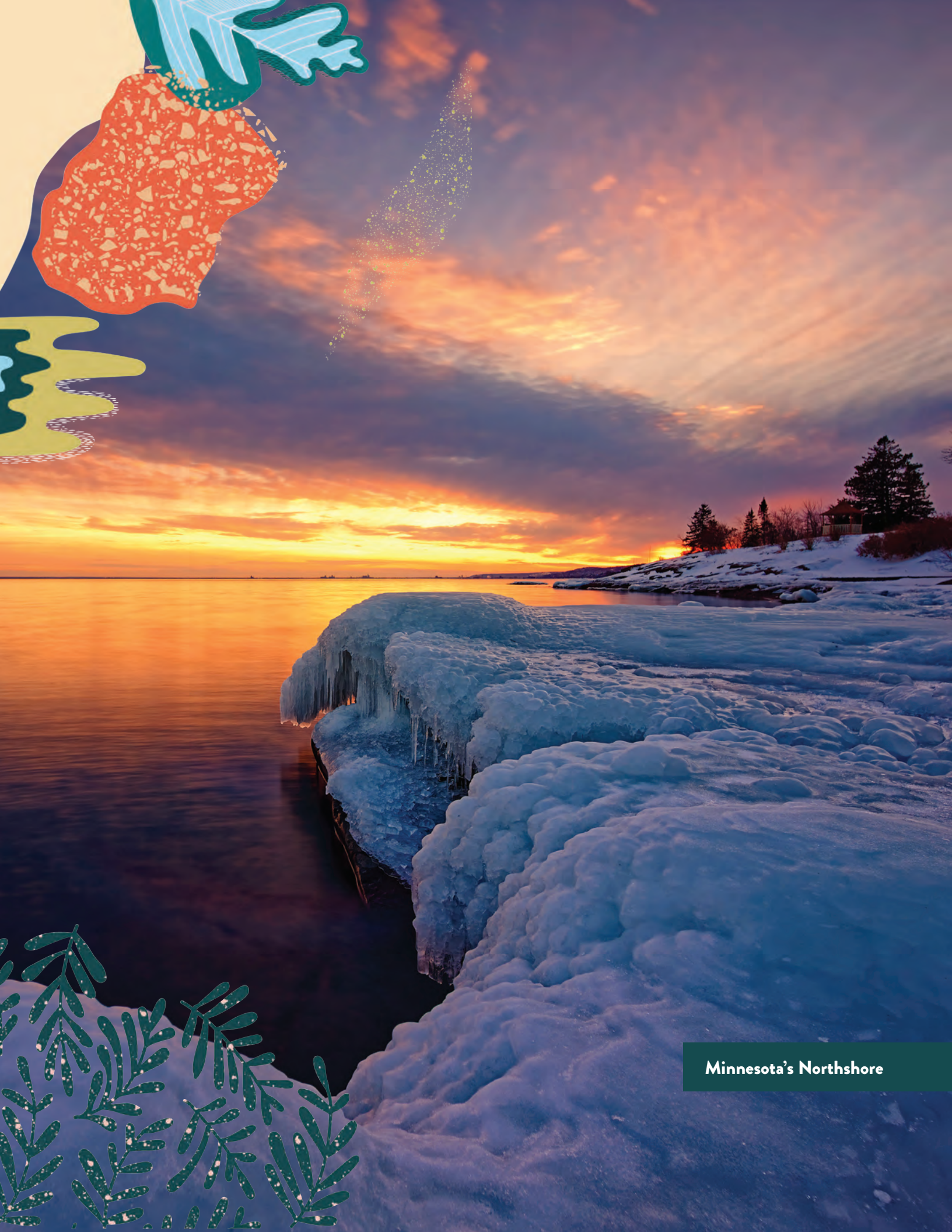


Minnesota's Northshore

Minnesotans are already experiencing the impacts of a changing climate.

As a state, we're just starting to learn what it means to live in a home that's warmer and wetter. We're learning to making our home resilient to the increasing risks of both acute events, like extreme weather, and chronic stresses, like our changing biodiversity. But these climate impacts affect more than just our natural systems. They affect people: our families and communities, our work and our governments.

Fortunately, we can act together to prepare for and adapt to the ongoing and expected impacts of climate change in Minnesota. This is the time for Minnesotans, and our state government, to step up with a coordinated, well-supported effort to build the adaptive capacity of people and systems across the state. Together, we can make Minnesota more resilient in the face of climate change.

This white paper is our first effort to bring a climate adaptation and resilience policy agenda to the Minnesota State Capitol. In this paper, we aim to develop a shared language around climate adaptation and resilience among state policymakers and advocates. We also aim to ground our policy approach in the understanding that while everyone will feel the increasing impacts of climate change, some communities will continue to experience these impacts unequally. To accomplish this, our paper does five things:

- Provide an overview of key concepts in climate adaptation and resilience.
- Highlight how climate adaptation and resilience solutions can be used to make systemic change, to address racial, gender, and class inequalities.
- Contextualize, explain, summarize, and analyze recent climate adaptation planning and policy action in Minnesota.
- Identify ten gaps in climate adaptation planning and action in Minnesota.
- Outline eight policy proposals for the Minnesota State Legislature.

While Minnesota does not yet have a well-coordinated and fully-supported climate adaptation response from state government, many Minnesota communities, local governments, and state agencies are leading innovative and effective climate adaptation and resilience initiatives. For example, recent climate action plans in Northfield[1] and Saint Paul[2] include climate resilience sections. State agencies have been coordinating their work through an interagency climate adaptation team.[3] Counties do extensive emergency-response-oriented all-hazards planning that includes most of our known climate hazards. These are just three of the dozens of efforts we inventory in Section 4 to create a 'state of play' on resilience and adaptation in Minnesota.

Based on this research, in Section 5, we identify 10 gaps that ought to be closed and, in Section 6, offer a suite of eight state policy recommendations. Taken together, these recommendations will go a long way toward making Minnesota, and Minnesotans, better prepared to thrive through the climate change era. You can read them on the next page.

Our policy recommendations:

1. **Create a Climate Resilient Communities Division within the MPCA:** To meet the needs of our communities, Minnesotans need a one-stop shop in state government to locate grant programs, data, expertise, and technical assistance on climate resilience and adaptation. A Climate Resilient Communities Division within the Minnesota Pollution Control Agency would meet this need.
2. **Create a Resilient Communities Grant Program:** Local governments could accelerate their progress on climate adaptation and resilience if they could access planning grants from a new, fully-funded state grant program.
3. **Create a Climate Resilient Communities Fund:** In order to make sure communities have the sustained support needed to adapt and build resilience, we propose creating a dedicated fund made up of a variety of tax revenues dedicated to paying for climate resilient community solutions.
4. **Continue identifying Minnesota's climate vulnerabilities:** In order to be prepared to adapt to ongoing climate impacts, Minnesota needs to continue to identify and quantify climate hazards as well as the risks and vulnerabilities these hazards pose to infrastructure, communities, financial systems, and the state as a whole.
5. **Expand, integrate, map, and make accessible small-area climate hazards and population adaptive capacity data:** Getting high-quality, user-friendly data on climate hazards, their likelihoods, and the people they'll impact is a key step in every climate adaptation planning process. We recommend state government take the lead in making sure this data is organized and easily accessible for local governments and the public.
6. **Create climate resilience training and certification programs:** We recommend programs to better prepare Minnesota's essential workers and local leaders for future climate crises by training them on local climate hazards, disaster preparedness, and community resilience.
7. **Strengthen Minnesota's fiscal preparedness:** Increased climate risks translate into increased impacts on Minnesota's public finances. We recommend the state strengthen its fiscal preparedness with an eye toward the financial risks created by climate change.
8. **Enact low-regrets greenhouse gas mitigation & climate adaptation policies as we go:** While Minnesot a invests in developing our capacity to plan for and respond to future climate hazards, it's also important to enact low-regrets strategies and learn-as-we-go. There are three types of low-regrets policy recommendations that Minnesota should prioritize:
    a. **Climate Resilient Infrastructure Investments:** Minnesota regularly invests in major public infrastructure using our state bonding process. Going forward, capital investment decisions should consider climate risks and prioritize adaptation strategies.
    b. **Policies That Increase Adaptive Capacity:** Improving Minnesotans' economic security and increasing our civic engagement will make us more able to engage productively in public life and weather disasters of any kind.
    c. **Greenhouse Gas Mitigation Policies:** While not the focus of this white paper, climate resilience requires quickly reducing emissions to avoid the worst climate change impacts. We support ambitious, multisector reductions in greenhouse gas emissions.

Definitions

Adaptation:

The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Democracy:

A government in which the supreme power is vested in the people and exercised by them directly or indirectly through a system of representation usually involving periodically held free elections.[14]

Impacts:

Effects on natural and human systems. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system.

Mitigation (of climate change):

A human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs).

All definitions in this document are from the IPCC Fifth Assessment Report on Impacts, Adaptation, and Vulnerability unless otherwise noted.[15]

Section 1: Introduction

Minnesotans are already experiencing the impacts of our changing climate. At the same time, we're stepping up together to adapt and build resilience in the face of these changes. From Northfield[1] to Grand Marais,[4] and many places in between, Minnesota communities are taking the lead on planning for a climate-adapted future. Yet, even as many Minnesotans are preparing for the changes already happening - and those to come - the state as a whole still has work to do.

The State of Minnesota can play a critical role in making sure we take on the challenges of adapting to our changing climate. More specifically, state government can be an essential partner in making sure families and communities have the tools and support they need to increase their adaptive capacity and build systemic resilience in the face of climate change.

Minnesotans are seeing climate change impacts in their everyday lives. It's changing our weather, our seasons, where species live, and how we live with each other.

- Minnesota has seen a 65% increase in 3-inch storm events over the last century.[5] Some are mega-rain events, like the one that caused widespread damage in southeast Minnesota in 2007[6].
- Our growing season is lengthening due to earlier thaws, but wetter springs are delaying planting.[7]
- Our northern recreation season is shrinking[8] due to irregular freezes[9] and earlier ice-out dates.
- Loons are losing livable habitat every year.[10]
- Walleye live in warmer, less hospitable lakes and have fewer cisco on which to feed.[11]
- People are moving to Minnesota from other regions and countries where climate change impacts are currently (and predicted to be more) severe.[12,13]

As more Minnesotans experience climate impacts, conversations are changing in neighborhoods and board rooms, city councils and church basements, at county commissions and union halls, wherever people meet.

Community leaders, from the local to the state level, are responding creatively with a range of responses: planning processes, staff directives,

comprehensive plan amendments, ordinances, and bonding proposals, to name a few. However, our state government itself has not yet driven the coordinated and at-scale effort that it's uniquely positioned to lead.

Local governments do not have all the support they need to effectively plan for and act on both greenhouse gas (GHG) mitigation and climate adaptation. Funding, technical assistance, user-friendly data portals, mapping capacity, common analytic tools, and a statewide climate resilience plan would all be helpful. They would accelerate local efforts, improve coordination, and help shape much-needed public conversation and action.

While Minnesota does not yet have a comprehensive, public-facing, at-scale approach to adaptation and resilience, we have many of the building blocks we need for it. This white paper aims to bring together the work already happening on climate adaptation in order to contextualize our state policy recommendations.

In Section 2, we sketch out a basic overview of key concepts for understanding climate adaptation and resilience. In Section 3, we deepen key concepts and define additional terms. In addition, we dig into the ways climate adaptation and resilience solutions interact with Minnesota's economic, political, natural, and built systems, with a particular focus on the equity impacts in each. We summarize recent state and local climate adaptation planning and policy action in Section 4. That literature review is the basis of the gap analysis we share in Section 5, where we identify eight ways to deepen climate adaptation and resilience work and make it more effective for Minnesotans. We close, in Section 6, by outlining ten policy proposals for the Minnesota State Legislature. These are concrete ideas that advocates and policymakers could pursue to create a more equitable and climate-adapted future for Minnesotans.

This paper has been created by the 100% Campaign, a coalition of over fifty organizations advocating for a 100% equitable and clean energy future in Minnesota. The campaign brings together faith leaders, labor unions, health professionals, scientists, youth, environmental advocates, community organizations, new Americans, Indigenous leaders, rural organizations, artists, and small business owners. Together, we're engaging with Minnesotans across the state to both reduce greenhouse gas emissions sector-by-sector and to build the adaptive capacity of families and communities in the face of the changing climate.

Definitions

Adaptive capacity:

The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences

Resilience:

The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.

All definitions in this document are from the IPCC Fifth Assessment Report on Impacts, Adaptation, and Vulnerability unless otherwise noted.[15]

Section 2: What is Climate Adaptation and Resilience?

Because climate change is already affecting Minnesota ecosystems, infrastructure, and communities – and these changes are expected to increase – the state needs to take proactive action to adapt to current and future climate impacts and to support family, community, and systemic resilience. But what exactly does climate adaptation mean? And how is it connected to resilience, adaptive capacity building, greenhouse gas mitigation, and other associated concepts?

Over the last three decades, Minnesota has been an on-again, off-again leader in reducing greenhouse gas emissions, the key driver of human-caused climate change.

In 1994, our state legislature required Xcel Energy (then Northern States Power) to use 400 MW of wind power generation by 2004 as part of an agreement for allowing nuclear waste storage in the state.[16] In 2001, Minnesota passed our first statewide Renewable Energy Objective, strengthening it to a requirement for all electric utilities in 2007.[17] In the same year the legislature passed, and Governor Tim Pawlenty signed a goal to reduce economywide greenhouse gas emissions by 80% between 2005 and 2050.[18] In 2013, the legislature added a solar energy standard, requiring utilities to generate 1.5% of their electricity from the sun.[19] More recently, Governor Tim Walz has initiated Clean Cars Minnesota,[20] an effort to adopt state rules that would increase electric vehicle options for consumers and reduce greenhouse gas emissions.

Policies like these are often categorized as greenhouse gas mitigation efforts. They mitigate the pollutants, carbon dioxide and other greenhouse gases,

that are causing harm to our planet's atmosphere. The outcomes of these efforts to reduce emissions are reported across seven economic sectors every odd-numbered year by the Minnesota Pollution Control Agency (MPCA), most recently in January 2021.[21]

While these ongoing mitigation efforts are essential and urgent, Minnesota's advocates and policymakers have been less focused on policy solutions that better prepare us for the current and future tangible impacts of our changing climate. This work, often referred to as climate adaptation, includes a wide range of solutions designed to make our economic, political, social, and natural systems more resilient to climate impacts.

These adaptation and resilience solutions may mean concrete changes to our built environment, like designing and building stormwater sewers to better handle more intense rainstorms. Some solutions strengthen our natural infrastructure – such as increasing urban tree canopies to reduce heat island effects. The solutions may be economic. For example, we could fully fund Minnesota's Disaster Contingency Account, a kind of public insurance program that helps manage the state's financial risks in the face of increasing disaster costs. Some solutions are social. Encouraging voter participation is a one way to make communities more resilient by making governments more accountable.

Finally, climate adaptation solutions include both official acts – like building up public health infrastructure and making sure emergency response systems are prepared – and non-governmental actions, like neighborhood organizing or creating informal mutual aid networks.

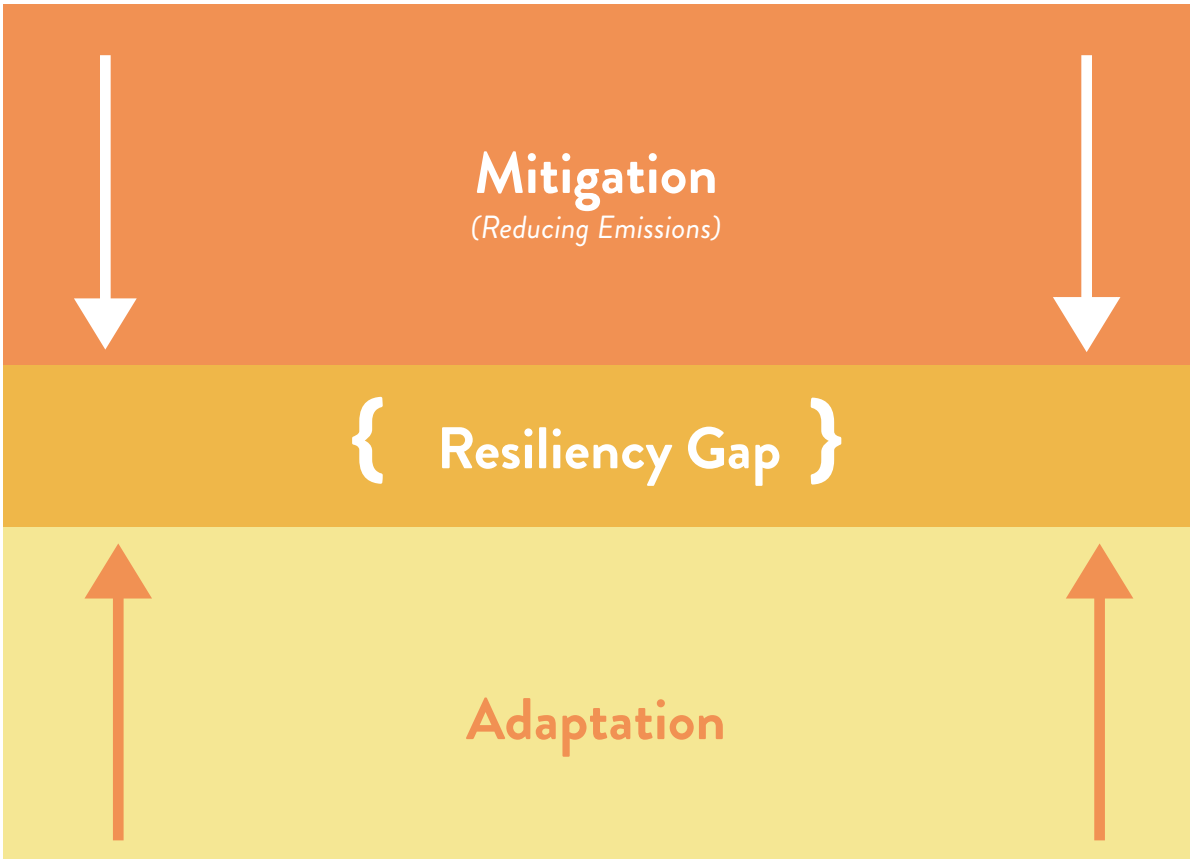
The reason to proactively adapt to climate impacts is to make Minnesota's families, communities, and systems more resilient, to provide a foundation for thriving through the climate change era. Resilience in the ability of a system to cope with crisis, to respond, to learn, and to improve itself so it's better prepared for the next crisis. Rather than react to a one flood after another, as though their increasing frequency is just coincidental, we could treat the rising risks of floods as a trend and respond with comprehensive statewide planning and investments. We could proactively manage forests by planting species that thrive in a warmer, wetter environment. We could prepare essential workers, local elected officials, and first responders for the climate impacts most likely to happen where they live or work.

But climate adaptation is about more than disaster preparedness. Building resilience depends on simultaneously addressing at least two kinds of threats - acute shocks and chronic stresses. Acute shocks are the things we often think of as emergencies, things like the Ham Lake wildfire of 2007,[22] the mudslide along the Mississippi River in Minneapolis in 2014,[23] or the Polar Vortex of 2019.[24] Chronic stresses are ongoing issues that strain a community over time – things like public health conditions - longer, more intense pollen seasons[25] and rising cases of vector-borne illnesses,[26] increasing lifecycle costs of built infrastructure,[27] or the cumulative effects of multiple forms of pollution.[28] Taken all together, these threats hamper our ability to handle emergencies, making bad situations worse.

Building systemic resilience depends on building the adaptive capacity of individuals, families, organizations, communities, and governments. Adaptive capacity is the ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

Adaptive capacity building goes well beyond what's typically thought of as a climate or an environmental solution. For example, a family has more adaptive capacity if they have enough money in the bank to handle an emergency – whether that emergency is a power outage caused by a climate-change-charged electrical storm or needing to fix a broken-down car.

Communities and governments can grow adaptive capacity as well. For example, strengthening social ties increases neighborhood resilience. Neighbors who know and trust each other are better prepared to help each other in a heat wave, or after a straight-line wind blow down event. Cities and towns with more robust civic engagement will usually have more responsive governments. More responsive governments will usually be better prepared for extreme weather events and more likely to address long-run problems: housing shortages, poverty, or racial

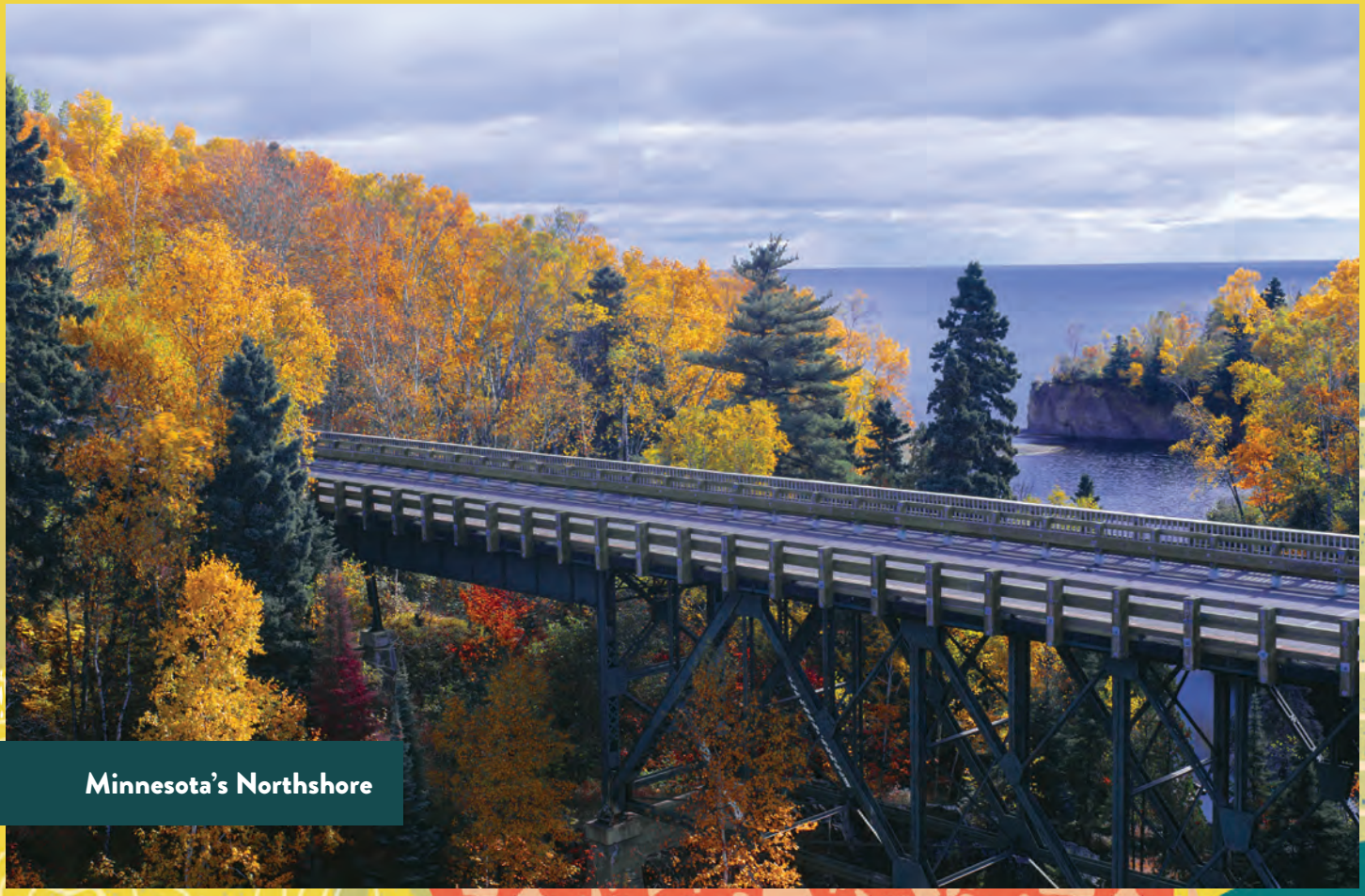


discrimination. Adaptive capacity-building is important for resilience because systems with more adaptive capacity are more resilient in how they respond to both acute shocks and long-term stresses.

A comprehensive approach to a climate adapted future, then, would bring together three related strategies: (1) reducing greenhouse gas emissions, (2) building adaptive capacity, and (3) strengthening democracy.[29] Reducing emissions reduces the likelihood that climate change will drive impacts beyond what society can adapt to. Building adaptive capacity raises the ability of society to navigate increased climate change-driven impacts. The gap between these two types of climate action is often called the resilience gap. Closing that gap also requires strengthening our collective decision-making processes so together we can better address complex climate challenges. In other words, resilience requires strengthening democracy.

Strengthening democracy matters for systemic resilience because the changes coming in the climate change era will strain our collective governance systems. These changes – both the changes we make proactively, like building a clean energy economy to reduce emissions, and reactively, as we adapt to a warmer, wetter, less predictable environment – demand we respond with creativity and a sense of common purpose. We will be best positioned to do this if our government is fully representative, responsive to popular demand, and capable of acting both in a crisis and for the long-term.

An example of simultaneously strengthening democracy and addressing climate change is city climate action planning focused on both greenhouse gas mitigation and climate resilience and adaptation. A growing number of Minnesota communities have created city climate action plans. The process of creating these plans engages citizens and makes government work better. Planning helps residents better understand where they live, builds relationships between policymakers, city staff, and the public, and creates a shared vocabulary about both climate change impacts and solutions. At their best, these plans are an engaging way for local residents to imagine, plan for, and start creating more inclusive, better adapted towns, cities, school districts, and counties.



Minnesota's Northshore

Section 3: Hazards, Vulnerability, & Resilience: Using a Systems-thinking Approach

Climate change is playing out in the complex, imperfect society we all live in. It's increasing risks within our society's various systems, for example, our economy, politics, culture, and built infrastructure. As a result, communities are experiencing the risks of climate change differently based, in part, on their pre-existing relationship with those systems, i.e. their historic and geographic advantages and disadvantages. Communities have unique vulnerabilities to place-specific hazards.

Risk is a function of how much impact a hazard would have and the likelihood of it happening. With the COVID-19 pandemic, we've experienced a high-hazard, low-likelihood event, illustrating the importance of preparing for hazards even if they seem unlikely. The degree to which a community is vulnerable to specific climate hazards varies within different parts of the community. For example, older people are more vulnerable to the hazard of extreme heat. A geographic community that can only be reached by a single bridge or small land area could be more vulnerable to the hazard of major flooding.

The pandemic also shows how an acute shock – COVID-19 – layers on top of chronic stresses like racial inequality, health disparities, and low-wage jobs in ways that create very different risk levels and unequal health and economic outcomes.

Likewise, communities usually have their own culturally-specific responses to risk that have made them more resilient in that past and continue to do so going forward. These could include local programs of nonprofits, parents' organizations, or faith communities. They might be digital, using Nextdoor, Signal, or WhatsApp to connect neighbors. They could be mutual aid networks where Minnesotans lend money, swap childcare duties, or share a car.

Without understanding how climate change intersects with our history and our systems, climate hazards will almost certainly make systemic injustices even worse. Without considering the interaction of climate change and systems, our policy responses may not work, or, even worse, could deepen the disadvantages too many communities face.

To be effective, then, efforts at climate resilience and adaptation should be intentional about how they impact systems that distribute status and resources unequally based on race, gender, class, and geography. In this section, we describe climate hazards, risks, vulnerabilities, exposures, adaptive capacity, and resilience and how they interact with some of the systems that shape Minnesota.

Systems thinking can help us develop the ability to think through how climate change intersects with society's systems. It does so by helping us see the systems we live in in a broader way, revealing how the overall structures and purposes of a system create patterns and cycles of feedback and influence. A full discussion of systems thinking is beyond the scope of this paper. But several lessons from systems thinking are helpful in making sense of how the hazards of climate change intersect with Minnesota's systems, influencing our vulnerabilities and capacities.

First, we can put conceptual boundaries around a system to help us think through them - for example we can talk about systems of governance, economics, nature, or built systems, like housing, transportation, or information technology. Second, causes and effects within systems are often separated by space and time, which means it can take more effort to think through and figure out the impacts of various actions. Climate change is a prime example of this systems thinking challenge; the impacts of carbon emissions play out over decades and across the earth.

Third, history is built into systems and continues to impact systems going forward. From a climate perspective, an example of this is our transportation infrastructure. It was built before we fully understood the impacts of burning fossil fuels. History is also built into our political and economic systems. Those in power have distributed wealth and power unequally based on race, gender, class, immigration status, indigeneity, sexual orientation, etc. Those disadvantaged in these systems are often more vulnerable to climate hazards.

Finally, one of the best parts of systems thinking is that it helps us to understand that each of us, and all of us together, can act within systems to change the purposes of the system and how the system works.

To illustrate the dynamic relationships between climate risks, hazards, exposures, vulnerabilities, adaptive capacity, and resilience and the systems that shape our state, we'll explore three examples: urban heat and systemic racism, extreme

weather and farming, and climate impacts on Indigenous cultures. Together, these examples help illuminate how climate adaptation and resilience efforts can intervene in systems in ways that would make Minnesota more equitable.

Urban Heat Islands

As climate change ramps up, Minnesota will experience more days with heat indices in the 90s or above. It's the kind of heat that creates health issues for more vulnerable people who are exposed to it. Studies show that climate-change-charged heat waves have already increased heat-related fatalities for people living in cities.[30] In Minnesota, the hazard of more days with high heat indices is not experienced equally. During summer heat, cities are usually several degrees warmer than surrounding areas because of the heat trapping properties of buildings and pavement – a phenomenon called urban heat islands.

Scientists have recently documented that differences in urban heat islands can be tracked at the neighborhood level.[31] The hottest neighborhoods today are those that were subject to race-based real estate practices during the 20th-century. During that time, some neighborhoods and individual properties included racial covenants, barring sales to people who weren't considered white. The resulting segregation was made worse by the practice of denying home mortgages in areas with more Black, brown, immigrant, or Jewish residents through a practice known as 'redlining'. Once institutionalized, that segregation was maintained by racial steering, when prospective homeowners were shown some homes, but not others, based on their race. These racist practices were a system that created conditions leading to today's unequal exposure to heat islands.

Minneapolis is a local example of this phenomenon. In the city, redlined neighborhoods are on average more than 10 degrees hotter than neighborhoods that were given the best credit grades.[32] Even more, residents in redlined neighborhoods, like the Near North neighborhood, are predominantly Black and brown and have fewer financial resources to pay for residential cooling systems, increasing their exposure to extreme heat. Nearby Bryn Mawr residents, with larger, leafier yards, have both less urban heat and more financial resources to adapt to heat hazards.

In this context, many heat-exposed communities respond resiliently. They may create daytime programing in an air-conditioned church basement, check in with elderly neighbors, or crowd-source funding for a family's window air conditioning unit. These solutions have an impact, but they can't replace city, county, and state policy initiatives, like investing in green spaces, funding senior centers, or raising the state minimum wage.

Agricultural Risk Management

Agriculture is another area where climate hazards play out with inequitable risks and vulnerabilities. Farmers have always had to contend with the hazards of extreme weather like hail, high winds, floods, fires, and droughts. They need to be ready

Definitions

Exposure:
The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected.

Hazard:
The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.

Risk:
The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerabilities, exposures, and hazards.

Vulnerability:
The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

All definitions in this document are from the IPCC Fifth Assessment Report on Impacts, Adaptation, and Vulnerability unless otherwise noted.[15]

for unpredictable seasons—early or late planting, early or late harvest, too much precipitation or too little. Over decades, as we recognized the public's interest in agriculture and the risks associated with it, our government responded by creating a host of risk reduction policies.

Crop insurance, which is subsidized by government in significant ways, is one tool for mitigating risks in agriculture. However, not all farmers have access to crop insurance in equitable ways. From 2000-2016, 74% of acres enrolled in crop subsidy programs were planted in commodity crops - corn, soybeans, wheat, and cotton.[33] Meanwhile, many small-scale growers planting more diverse crops like vegetables or perennials, or raising perennial pastured livestock, have limited or no access to crop insurance.

Small-scale growers are often emerging farmers that include more women, people of color, Indigenous people, and younger people.[34] These more diverse farmers are more vulnerable to climate risks, in part because of the design of crop insurance programs. In addition, larger operations often have more financial wiggle room–causing further economic inequities. Finally, soil-healthy agriculture practices that build climate resilience by holding water on the land, practices like cover cropping and planting perennial crops, are not supported through crop insurance and other agricultural risk reduction policies.

In spite of these policy gaps, many farmers have proved to be very resilient: diversifying their operations, developing other sources of income, and building local markets for their products. However, shifting more and more risk toward individual family farms makes climate-adapted agricultural practices harder and harder to adopt at scale. A 2020 Minnesota Department of Agriculture report about emerging farmers in Minnesota includes a number of suggestions for reducing the risks of starting an agricultural business for these groups.[34]

Impacts on Indigenous Culture & Land

Indigenous communities face many of the same climate hazards as all Minnesotans, but they experience unique climate vulnerabilities because aspects of Indigenous cultures are uniquely at risk.

For the Ojibwe, culture and natural resources are inextricably related. A climate vulnerability assessment and adaptation plan developed by the 1854 Treaty Authority (which helps manage land ceded by the 1854 Treaty as well as the Bois Forte, Fond du Lac, and Grand Portage reservations) noted the following: "To the Ojibwe, natural resources are cultural resources. There is no separation between how the bands manage and interact with a resource and how their culture endures: one is dependent on the other. Climate change, however, is threatening the very viability of many natural resources important to the Ojibwe."[35]

In other words, the climate-change-induced loss of species habitat is also a loss of culture. In response, these tribes developed climate vulnerability assessments and

a menu of adaptation actions focused on protecting key species – such as wild rice and walleye – and ecosystems that are essential for not just for our shared natural environment, but for tribal culture, wellbeing, and health. The Backyard Phenology Project[36] collaboration between Indigenous Minnesotans, artists, and the University of Minnesota scientists and researchers is a great example of a resilient response that's focused simultaneously on both natural and cultural engagement.

Additionally, the lasting impacts of French, English, and American colonialism have made tribes less able to rely on cultural practices that would make their communities more resilient to climate change. According to the Dibaginjigaadeg Anishinaabe Ezhitwaad: A Tribal Climate Adaptation Menu, "Colonialism has been extremely detrimental to the continuation of tried and true indigenous lifeways. The transfer of ancient understandings has been disrupted by extermination, assimilation, and other government policies, leaving an enormous void within tribal communities."[37] In spite of this, Minnesota's Ojibwe and Dakota tribes have been global leaders in preserving natural resources, languages, and cultural practices that have made Minnesota and the U.S more resilient.

There are state policy interventions that could help tribal communities be even more resilient. For instance, building new partnerships to restock better adapted fish in Minnesota's coldwater lakes could be mutually beneficial.[38] However, the relationship of these efforts to policymaking is different than in the first two examples. While tribes may seek and benefit from partnerships with federal, state, or local governments, the relationships are always structured in light of tribal sovereignty. The tribes are sovereign nations related to the U.S. by treaty. Joint efforts to create climate solutions start with this recognition and understanding. Dibaginjigaadeg Anishinaabe Ezhitwaad: A Tribal Climate Adaptation Menu offers practical guidance on how to build these kinds of partnerships.[37]

Preparing for increased urban heat, reimaginging agricultural risk management systems, and preserving indigenous cultures are three examples of how Minnesotans are managing climate vulnerabilities in the context of Minnesota's economic, political, and cultural systems. Some vulnerabilities, like those resulting from racist redlining practices and suppression of tribal cultural practices, are the result of histories of oppression. Other vulnerabilities, like those resulting from pregnancy or old age, are the normal cycles of life. Still others, like not having savings or being unhoused, emerge from a ongoing political and economic systems that distribute power and resources unequally based on race, gender, and class.

These examples illustrate how core concepts of climate resilience and adaptation (i.e. hazards, exposure, risk, vulnerabilities, adaptive capacity, and resilience) appear in practice. The examples also show how a systems-thinking approach helps make the intersection of climate change and equity clearer.

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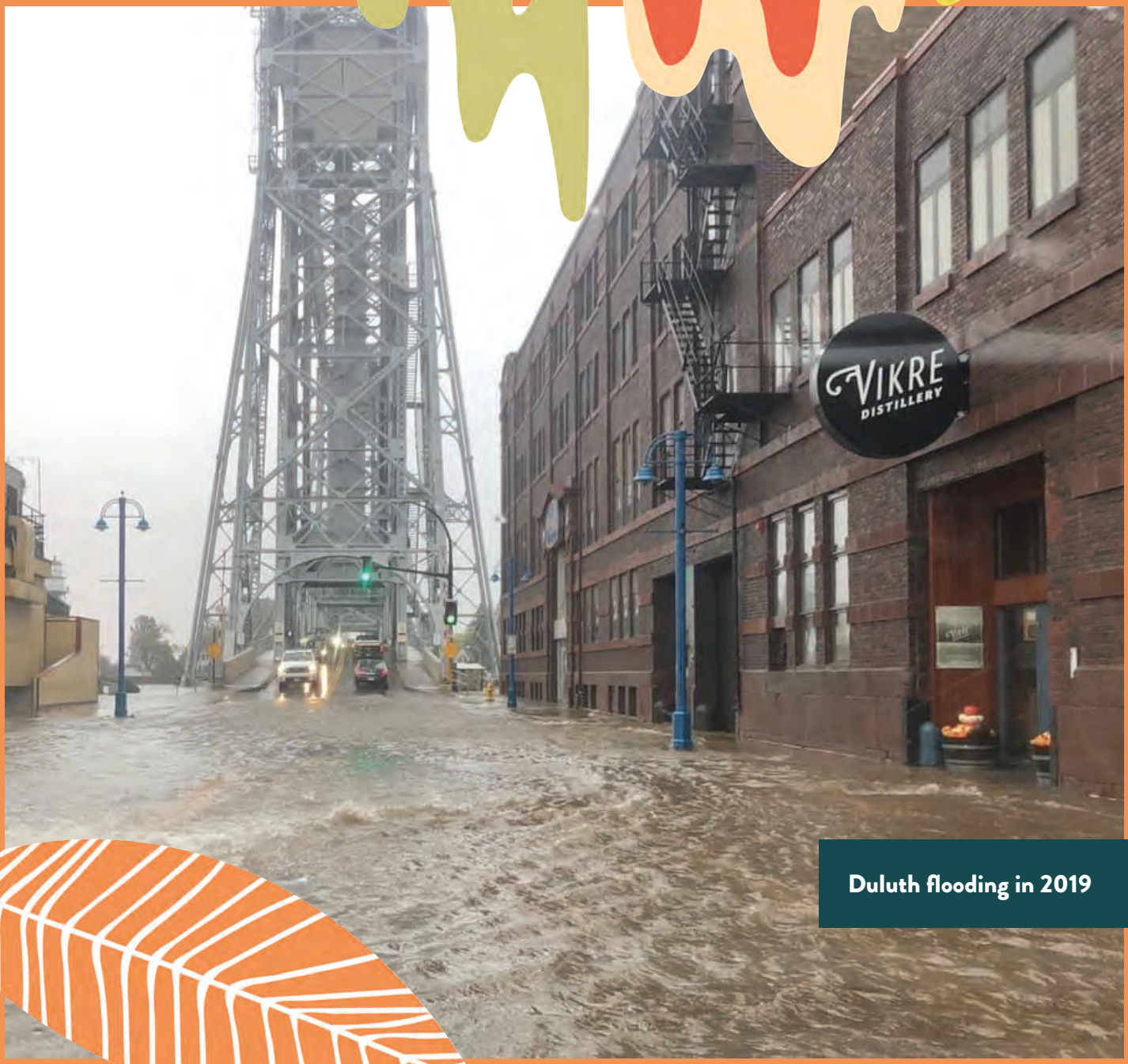


Duluth flooding in 2019

Climate resilience and adaptation is a field in formation.

Its core concepts and vocabulary still differ across regions and disciplines. Agencies, states, local governments, and non-governmental organizations can describe their work using similar language that has distinctly different, context-specific meanings, or use different terms that mean more-or-less the same thing. Some of the work is captured in municipal codes or charters, state statutes or rulemaking, in executive orders or organizational policies. The field's emergent nature makes literature reviews more complicated than usual.

We undertook an extensive review of climate planning and action in Minnesota communities to analyze the landscape of this work. We reviewed the work of more than 13 programs or reports at 7 state agencies, 4 Minnesota tribal nations and groups supporting them, 4 national tribal resources, 10 local climate planning processes plus a program supporting an additional 23 processes, 4 Intergovernmental Panel on Climate Change (IPCC) reports, resources from 7 federal agencies, and 4 resources from 3 other states. In addition, we reviewed 5 Minnesota-based NGOs and professional associations, 6 national professional associations, and 3 adaptation resource hubs. We also reviewed 8 reports from 7 NGOs particularly focused on equity and climate adaptation. Overall, impressive, useful work is happening in our state. However, climate adaptation and resilience work in Minnesota is behind because this work is not yet well-coordinated, nor does it have the state support it needs with resources like technical assistance, user-friendly data, mapping capacity, common analytic frameworks, shared policy objectives, and funding.

In this section, we start by framing our review with five grounding observations about the climate resilience and adaptation practices we studied. Second, we describe some of the emerging best practices in the field of climate resilience and adaptation. Most of this section is a high-level summary of our literature review. The more extensive version of can be found online in our report appendices at www.100PercentMN.org. This survey is the research foundation of the Gap Analysis we share in Section 5.

Five grounding observations are useful to remember when making sense of this overview of climate adaptation and resilience work in Minnesota:

- Climate adaptation and building resilience is iterative work. It happens through cycles of research, engagement, planning, action, and learning that happen over time.
- Minnesota is adapting to a climate that is and will continue to rapidly change. We are not adapting to a "new normal" that is steady, but rather to climate impacts that will continue to change, often unpredictably.
- Minnesotans experience the effects of climate change differently. We have different levels of exposure and

risk, different kinds of vulnerabilities, and unique capacities for resilience. These realities are shaped by our positions within systems of power that apportion status and resources based on race, gender, class, and geography.

- Successful climate adaptation efforts work across levels of government, agencies, and sectors. It includes official acts of government, the work of non-governmental organizations, and informal efforts in places and within distinct demographic communities.
- Climate adaptation work includes both discrete projects and ongoing processes. It can show up as a bonding proposal to reroute a road in flood plain or a tax expenditure that builds savings for low-income families. It could be the ongoing work of teaching science to sixth graders or the adaptive planning required to manage working lands over decades.

As resilience and adaptation work is being done with increasing frequency across Minnesota, five best practices are emerging as more common.

- Stakeholder engagement is central. Minnesota's best adaptation plans usually had the strongest, most-intensive, most diverse stakeholder engagement processes. The plan developed in Northfield stands out for this reason.
- Processes are data-driven; the data is transparent and democratized. Strong adaptation planning processes often use:
    - Hazard assessments to evaluate place-based climate risks. Look to Minnesota's 2019 State Hazard Mitigation plan for county-by-county examples.[39]
    - Vulnerability assessments to identify who exactly is more or less at risk of specific hazards. The Minnesota Department of Health created statewide health impact-specific assessments in 2014.[40] It evaluates five top hazards and maps the counties most at-risk for each.
    - Demographic information to analyze trends in vulnerability and to target solutions. Minnesota Compass, an online resource developed by Wilder Research is a leading example.[41] They have gone deeper than the U.S. Census to make data available about Minnesota's 26 largest cultural communities.
    - Mapping capacity is a preferred tool to relate hazards, vulnerabilities, and demographics in a more user-friendly way. The Metropolitan Council's Extreme Heat Map Tool and Localized Flood Map Screening Tool[42] are two strong examples in use in Minnesota.
- Equity analyses are used to understand systems. The most effective planning efforts aim to understand and to address inequities related to race, gender, language proficiency, income, and more. The Saint Paul Climate Action and Resilience Plan provides a good example of this kind of analysis.[2]
- Climate resilience and adaptation is paired with greenhouse gas mitigation. Minnesota's local climate action planning has focused mostly on cutting emissions. Cutting emissions is extremely important, but the best climate action planning recognizes that local governments also have unique roles in making progress on adaptation and resilience.
- Recommended solutions are both local and systemic. The best efforts, like the Mitigwaki idash Nibi: Climate Adaptation Plan for the Red Lake Band of Chippewa Indians,[43] feature specific, actionable recommendations with deadlines and, in a few cases, funding sources. Alongside these local recommendations the need for systemic change is also highlighted.

Minnesota Executive Branch Planning and Action

Minnesota's executive branch plays essential roles in climate adaptation through the work of individual agencies and through leading coordination across state government, levels of government, sectors, and with statewide public engagement. Currently, significant coordinated effort is growing throughout the executive branch, led by the work

of the Climate Change Subcabinet created by Governor Walz's Executive Order 19-37.[44] The report of its first year of work can be found in the Climate Change Subcabinet Update Report.[45] An overview of this overarching executive branch climate leadership can be found at Our Minnesota Climate.[46] The following are key executive branch agencies and the adaptation and resilience-related efforts that they lead:

- Minnesota Pollution Control Agency (MPCA):[47] MPCA leads the Governor's Climate Change Subcabinet. It has been the lead agency for the Interagency Climate Adaptation Team (ICAT),[3] which coordinates climate adaption work across agencies. The ongoing work of the ICAT is currently happening within the Resilience and Adaptation Action Team, a working group created by the Climate Change Subcabinet. MPCA administers Environmental Assistance grants which, in recent years, have supported local climate resilience and adaptation planning. It is the home agency for GreenStep Cities,[48] a public-private program that offers voluntary challenge, assistance, and recognition programs to cities to help them achieve sustainability (including climate resilience).

- Minnesota Department of Health (MDH) Climate and Health Program:[49] This program began in 2009 and has a mission of, "Protecting, maintaining, and improving the health of all Minnesotans through mitigating, preparing for, and adapting to climate change". The MDH Climate and Health Program has created a number of tools for use by practitioners of climate change adaptation with a focus on public health including: Climate and Health Regional Profiles[50] and a Heat Vulnerability in Minnesota Tool.[51]

- Minnesota Department of Transportation (MNDoT): MNDoT has a significant sustainability and public health program within the agency that aims to reduce emissions and build climate resilience[52] into the work of the agency.

- The DNR State Climatology Office[53] is responsible for managing, analyzing, and disseminating Minnesota climate information for the benefit of the state and its people and communities. The Office is part of the Minnesota DNR and housed at the University of Minnesota Department of Soil, Water, and Climate.

- Department of Homeland Security and Emergency Management (HSEM):[54] HSEM is a division of the Minnesota Department of Public Safety. It plays a key role in climate adaptation through its leadership of state hazard mitigation planning. It creates the Minnesota State Hazard Mitigation Plan, which includes Recommended Actions for Climate Change Adaptation.[39] Under federal law, states are required to have all-hazard mitigation plans updated and approved by the Federal Emergency Management Agency every five years. Minnesota's most recent was approved in 2019, and it has a significant climate adaptation focus.

- Minnesota Environmental Quality Board (EQB):[55] This executive branch board is made up of nine agency heads and eight citizen members. It plays an important role in climate adaptation and resilience through its coordinating role across agencies, its work in supporting and governing environmental review, and in engaging Minnesotans in important and complex environmental issues like climate change. The EQB publishes an Environment and Energy Report Card[5] every two years, with the most recent one released in 2019. In September 2020, the EQB published the 2020 State Water Plan: Water and Climate.[56] It's an excellent example of climate-adapted planning.

- Metropolitan Council (Met Council):[57] As the regional planning body for the Twin Cities metropolitan region, the Met Council also plays a key role in climate adaptation because it supports city comprehensive planning, including integrating adaptation and resilience into these plans.[58] It also has responsibilities for infrastructure and services for the regional economy including transit, wastewater treatment, regional parks, and affordable

housing. In 2014, the Met Council finished Thrive MSP 2040,[59] their once-per-decade regional plan which features climate adaptation and resilience throughout.

Minnesota Legislature's Role Climate Adaptation and Resilience

The state legislature plays an essential role in climate adaptation and resilience in Minnesota. The legislature passes policy changes to build resilience, invests in climate adaptation through the state budget, and helps build climate resilient infrastructure through regular passage of capital investment bills.

In 2019, both the House[60] and Senate[61] announced the creation of Climate Action Caucuses. In October 2020, the House Climate Action Caucus released a Minnesota House Climate Action Plan[62] with the following climate adaptation and resilience strategies:

- Create state and local climate adaptation plans that support tribal, county and municipal governments while prioritizing the needs of communities burdened by pollution and cumulative climate impacts.
- Invest in climate resilient infrastructure statewide to withstand extreme weather events, targeting under-resourced communities.
- Support Minnesota's fossil fuel workers and host communities so everyone thrives in a clean energy economy.

Tribal Climate Adaptation and Resilience

There are 11 federally recognized Native American tribes in Minnesota. These nations all face notable vulnerabilities in the face of a changing climate. As described earlier, tribes rely on the cycles of nature and natural resources as foundational cultural resources, so changes in these cycles have a significant impact on tribal culture. Tribes in Minnesota and beyond have stepped up with climate adaptation leadership. An essential part of climate adaptation planning and action for Native nations involves integrating traditional ecological knowledge and scientific ecological knowledge. Some key resources are:

- Great Lakes Indian Fish and Wildlife Commission (GLIFWC): This umbrella organization represents eleven Ojibwe tribes in Minnesota, Wisconsin, and Michigan who reserved hunting, fishing and gathering rights in the 1837, 1842, and 1854 Treaties. GLIFWC has led important climate adaptation efforts in these territories including the GLIFWC Climate Vulnerability Assessment.[63] GLIFWC also helped create Dibaginjigaadeg Anishinaabe Ezhitwaad: A Tribal Climate Adaptation Menu.[37]

Individual tribes in Minnesota have also undertaken climate adaptation planning and action including the following plans:

- Climate Change Vulnerability Assessment and Adaptation Plan: 1854 Ceded Territory Including the Bois Forte, Fond du Lac, and Grand Portage Reservations.[35]
- Mitigwaki idash Nibi: A Climate Adaptation Plan for the Red Lake Band of Chippewa Indians.[43]
- Population Vulnerability Assessment and Climate Adaptation Framework, released by the Leech Lake Band of Ojibwe.[64]

The following national-level resources also support climate adaptation work for and by tribes:

- The Tribal Climate Adaptation Guidebook[65] was released in November 2018, led by The Oregon Climate Change Research Institute and Adaptation International.
- The Bureau of Indian Affairs created the Tribal Resilience Program.
- Chapter 15: Tribes and Indigenous Peoples[66] is part of The Fourth National Climate Assessment of the U.S. Global Change Research Program.

Local Government Climate Adaptation Planning and Action

Local governments are at the forefront of climate adaptation planning and action - and for good reason. Local governments have firsthand responsibility for addressing climate impacts. And they have responsibility for land use planning and local infrastructure – like stormwater management and urban forests – both of which are essential for successful climate adaptation. Local governments across Minnesota have been leading on climate action planning, often driven by grassroots organizing or the work of elected leaders who are concerned about climate impacts.

Local government actions are currently a patchwork across the state. But there are ways to get an overall picture of climate adaptation and resilience work at the local government level. A blog post by the Great Plains Institute[67] discusses resilience and adaptation as part of city comprehensive planning in the metro area. As of September 2019, the following was true of the plans they inventoried:

- 11% of plans describe or complete a climate vulnerability analysis.
- 19% of plans have a chapter explicitly using the term "resilience" that is different from a sustainability chapter.
- 15% of plans integrate resilience in at least one section of the plan other than a resilience chapter.
- 17% of plans at least addressed the topic of climate action.

In 2019, ICAT did a Climate Adaptation Planning Survey of local units of government, tribal governments, and relevant state agencies.[68] It found that 24.5% of the 1088 government units invited to take the survey had at least one type of plan or planning effort that explicitly addressed climate adaptation or resilience, which is a low end of adaptation planning estimates in the state. Of the government units that responded to the survey, 75% of them were engaged in some kind of climate adaptation planning effort. This is up from 57% in a similar survey done in 2016.

There are also some centralized supports for local government climate adaptation and resilience work including:

- MPCA's GreenStep Cities program[48] and Environmental Assistance grants for community strategies to adapt to climate change.[69]
- Metropolitan Council's support for planning for climate resilience[56] as part of city comprehensive planning.

A full survey of the many local governments planning for and acting to build climate resilience is beyond the scope of this paper. Yet, there are some exemplary examples including the following:

- The City of Saint Paul adopted its Climate Action and Resilience Plan in 2019.[2]
- The City of Northfield adopted a Climate Action Plan in 2019 that includes a section on adaptation and resilience.[1]
- The Ramsey County 2040 Comprehensive Plan includes a chapter on resilience in the face of climate change.[70]

Notably, these local government climate adaptation and resilience planning efforts do not use a shared framework, set of tools, or funding source. Rather, they are a patchwork of efforts. With some concentrated effort at the state level, this patchwork could be strengthened into a stronger whole fabric.

Key Resources from the Federal Government and other States

By supporting emergency response and recovery, doing climate research, assisting local and state resilience efforts, and more – the federal government plays an essential role in climate adaptation and resilience. Some relevant and useful resources for climate adaptation in Minnesota are:

- US Global Change Research Program - 4th National Climate Assessment:[71] This report was released in 2018 and includes chapters relevant to climate adaptation and resilience.
- US Climate Resilience Toolkit:[72] This is an online resource to plan for and promote climate resilience in the United States led by a number of federal agencies.
- CDC Climate and Health program:[73] This program helps state, tribal, local, and territorial public health agencies

prepare for the health impacts of climate change. Minnesota is a grantee of its Climate-Ready States and Cities Initiative.[74]

- Northern Institute of Applied Climate Science:[75] This is a collaborative effort housed under the US. Forest Service Northern Research Station that does work in Minnesota.
- The Federal Emergency Management Agency (FEMA),[76] part of the Department of Homeland Security, is the main agency responsible for disaster preparedness, response, and recovery.
- The State of California has a large and well-coordinated state climate adaptation effort,[77] which includes a California Adaptation Planning Guide[78] to help local governments plan for climate impacts.
- The Wisconsin Initiative on Climate Change[79] is a collaboration led by the Wisconsin Department of Natural Resources and the University of Wisconsin that develops understanding of climate impacts and promotes better adaptation action in the state.

Resources for Including Equity in Climate Adaptation and Resilience

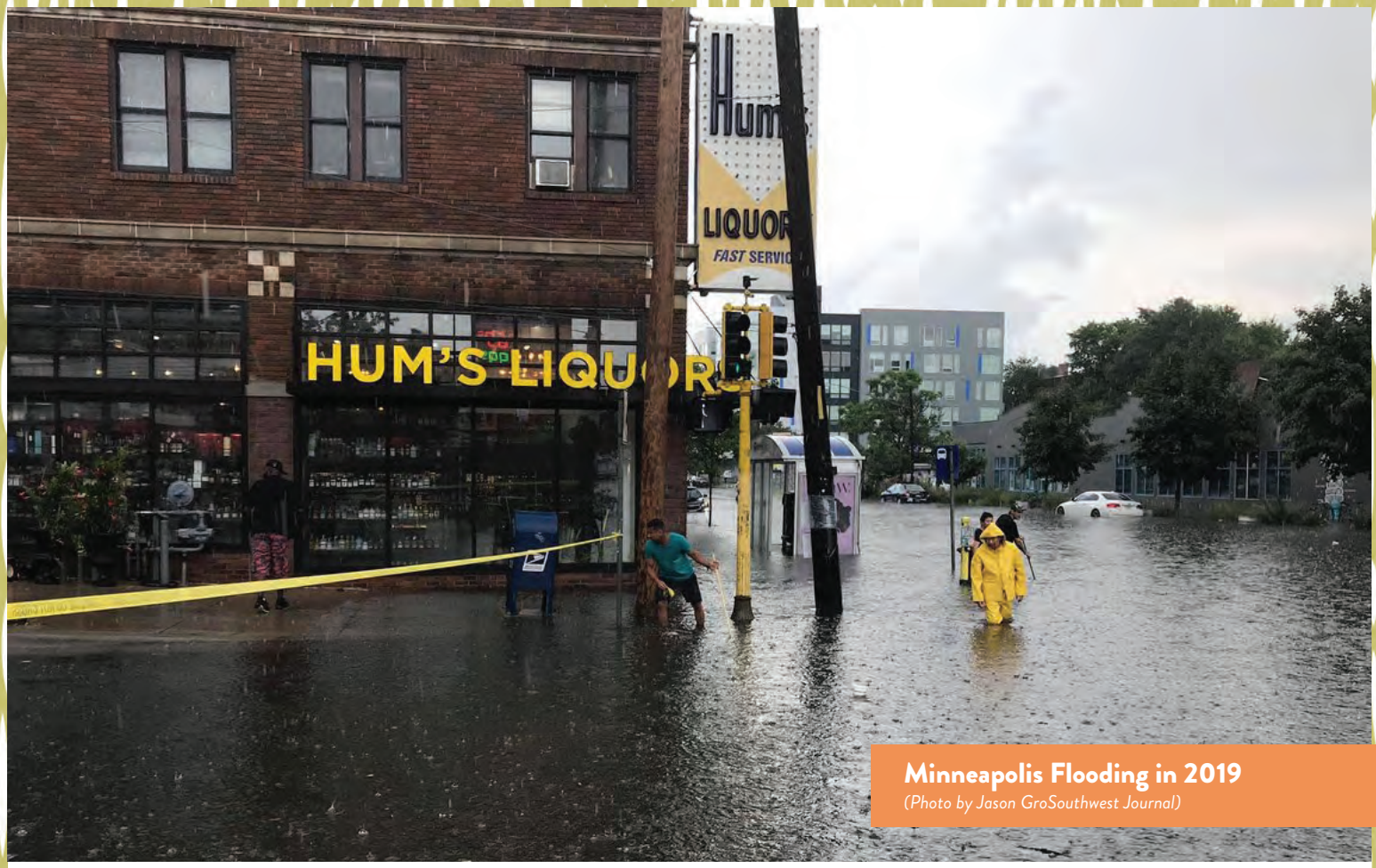
As described earlier, embedding equity in climate adaptation initiatives is essential for building resilience. Many of the following resources include an expansive understanding of resilience as the combination of greenhouse gas mitigation, climate adaptation, and democratic practice. A number of organizations have developed resources for how to make equity a priority focus. Here are some outstanding examples:

- Our Communities, Our Power: Advancing Resistance and Resilience in Climate Change Adaptation:[80] published by the National Association for the Advancement of Colored People.
- Mapping Resilience: A Blueprint for Thriving in the Face of Climate Disasters:[81] published by the Asian Pacific Environmental Network.
- Pathways to Resilience: Transforming Cities in a Changing Climate:[29] a report coming out of a convening that addressed the question, "What would a climate-resilience agenda need to include for it to be socially just?".
- Making Equity Real in Climate Adaptation and Community Resilience Policies and Programs: A Guidebook:[82] published by the Greenlining Institute.
- Toward Climate Resilience: A Framework and Principles for Science-Based Adaptation:[83] published by the Union of Concerned Scientists.
- Assessing the Potential Equity Outcomes of Maine's Climate Action Plan: Framework, Analysis and Recommendations:[84] completed by the Sustainability Center at the University of Maine.

Key Non-governmental Work in Minnesota

Much of the work needed to build adaptive capacity and resilience happens outside of (though often in partnership with) government. Non-government organizations can put people at the center of this work by tapping into community and cultural networks. The quality of local climate action plans often reflects the depth of their community engagement work. In addition, private groups continue to be a key partner for providing the consulting, technical, and design services necessary for climate adaptation and resilience planning. In Minnesota, the overall advocacy landscape on climate adaptation and resilience is still in development, which is a major reason for this white paper. However, there have been important efforts around climate adaptation beyond government.

- Center for Earth Energy and Democracy (CEED): CEED are state and national leaders on climate resiliency and environmental justice. They've created a Twin Cities Environmental Justice Mapping Tool[85] and are thought leaders on strategies to build more resilient and just cities.[86]
- Minnesota Climate Adaptation (MCAP): Based at the University of Minnesota, MCAP aims to inform, connect, and develop climate adaptation practitioners. They host the Minnesota Climate Adaptation Conference annually.
- Resilient Cities & Communities (RCC) builds on the work of the Alliance of Sustainability and Northland Sustainable Solutions. It engages communities of peer-learning stakeholders in regional networks committed



Minneapolis Flooding in 2019
(Photo by Jason GroSouthwest Journal)

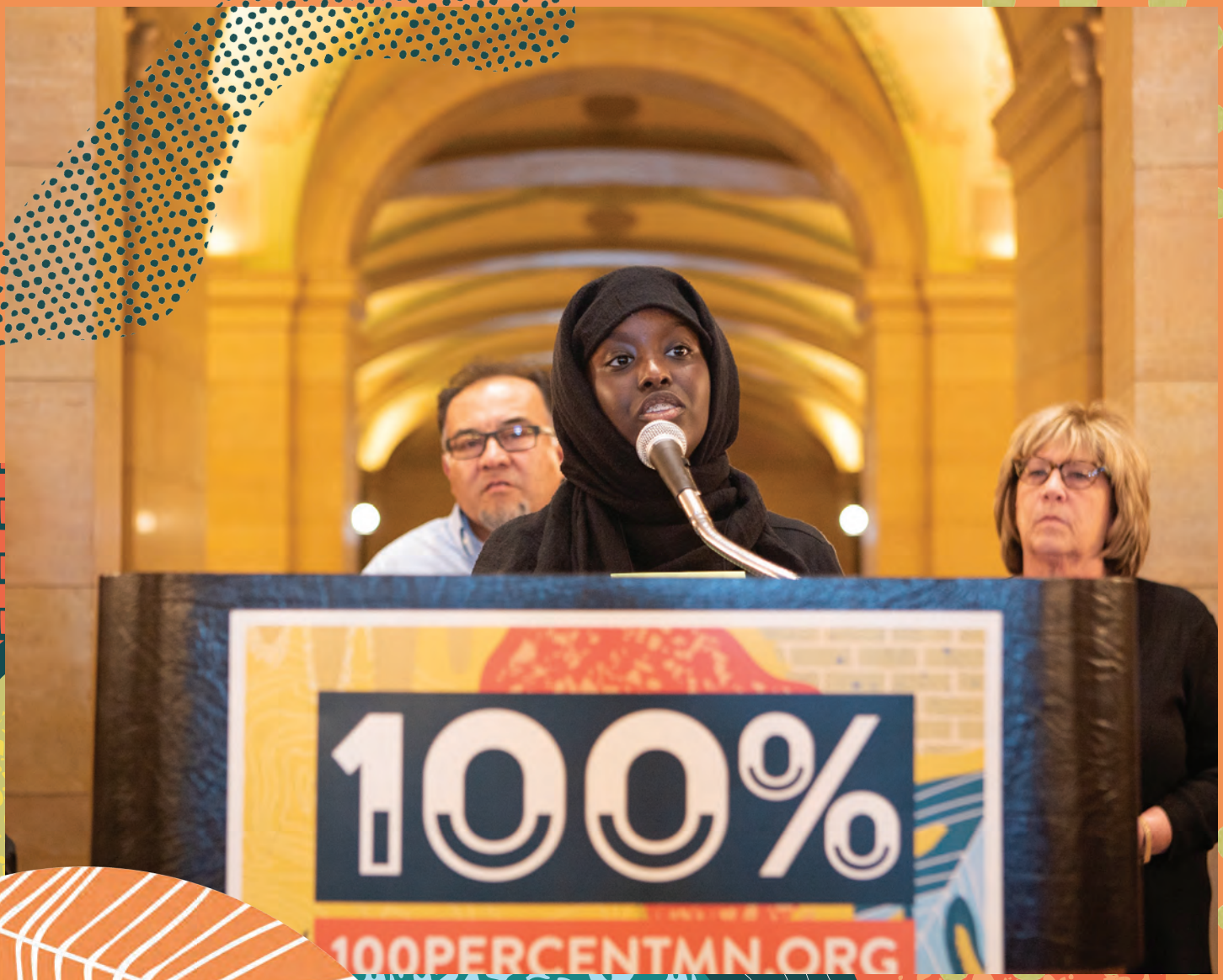
to developing the capacities of local leaders for equitable climate actions generating greater community resilience in the region.

- Consulting for Climate Planning: A number of for-profit and non-profit consultants offer services to help with climate adaptation/resilience planning including the Great Plains Institute, Orange Environmental LLC, and Pale Blue Dot LLC.
- Professional Associations: Professionals who help design and manage infrastructure – for example architects, planners, and engineers – play essential roles in climate adaptation. Professional associations for these groups have the potential to be major players in building adaptive capacity including groups like the Urban Land Institute of Minnesota (which has a network focused on community resilience) and the Minnesota Association of Floodplain Managers.

Climate Adaptation Resource Hubs

The following are comprehensive online resource hubs with examples of and information about many climate adaptation efforts:

- Adaptation Clearinghouse (powered by the Georgetown Climate Center): The Adaptation Clearinghouse is "An online database and networking site that serves policymakers and o thers who are working to help communities adapt to climate change."[87]
- The Climate Adaptation Knowledge Exchange (CAKE): CAKE is "a knowledge sharing platform featuring high-quality climate change adaptation case studies, tools, and resources spanning all phases of the adaptation process (assessment, planning, implementation, evaluation and monitoring)."[88]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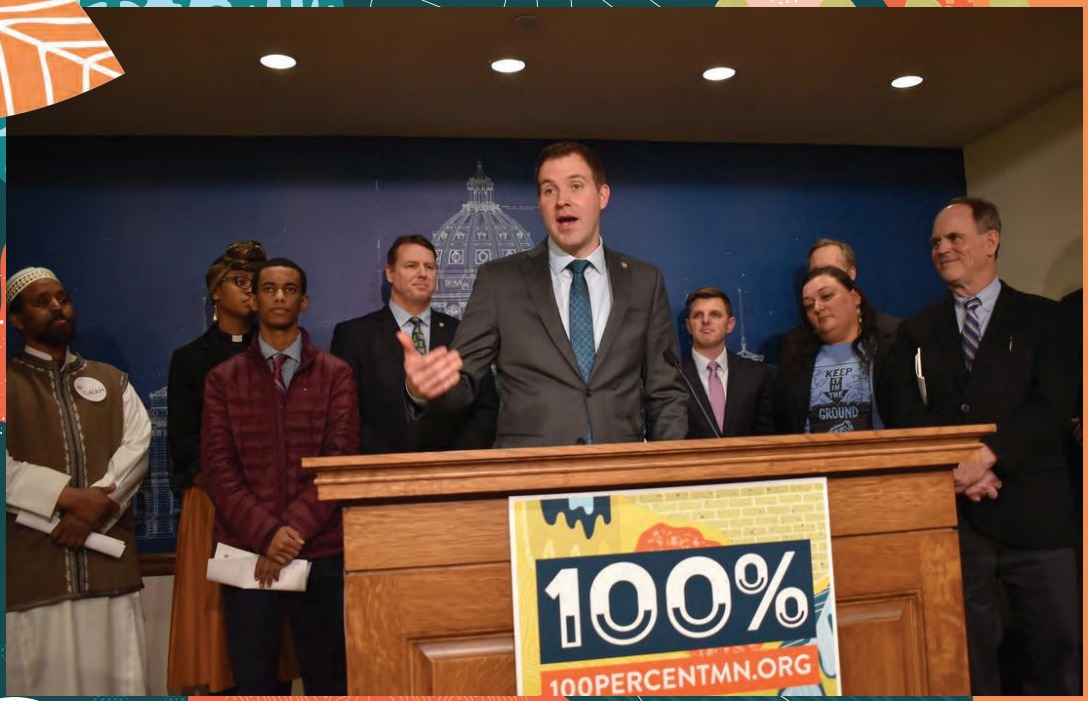
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Section 5: Gap Analysis

Taken together, the work we reviewed is a promising start. Communities, state agencies, local governments, planners, researchers, and NGOs have been doing thoughtful work within an emerging field where methodologies are still forming, data is incomplete, and basic definitions are still in flux. But more effective work is both needed and possible.

In this section, we point out ten areas for improvement. We do this by analyzing the gaps in practice that, if filled, would improve and accelerate Minnesota's progress on climate adaptation and resilience. This analysis serves as context for the state-level policy recommendations in Section 6.

- **Fund local planning:** By far, the most important gap is the absence of thorough climate planning at every level of government. Many state agencies and local governments have done quality climate plans, but, taken together, the efforts are still too little and too fragmented. This gap could be filled with the support and coordinating efforts of state government. Improving coordination, offering technical assistance, and providing data and mapping capacity will help communities across the state make faster, better-informed progress on building resilience.

- **Integrate equity analyses:** The ability of communities and families to adapt to our changing climate depends on their access to political recognition, social status, and financial security. Climate policy can play an important role reducing the underlying racial, gender, and economic disparities that leave too many Minnesotans vulnerable to climate change impacts. To accomplish this, those engaged in climate adaptation work need to have a clear-eyed analysis about how systems of power allocate status and resources unequally in Minnesota.

- **Build on existing adaptive capacity:** Successful climate adaptation planning requires an honest evaluation of risks and vulnerabilities. However, the work

is incomplete without an equally thoughtful inventory of assets and capacities. Often, Minnesotans who have experienced racial, gender, and economic disparities have also developed effective and instructive strategies to manage or overcome those inequalities. Their knowledge and experience should be made an essential foundation of future-oriented solutions.

- **Include acute shocks, chronic stresses, and cumulative impacts:** The scope of many climate adaptation/resilience plans is too narrow. Some are almost exclusively focused on disaster preparedness and response without taking into account slower-moving stresses like the growth of income inequality or changing biodiversity. Likewise, cumulative impacts, in which some communities face multiple, overlapping stresses like lack of affordable housing and higher pollution burdens, are not always included in planning.

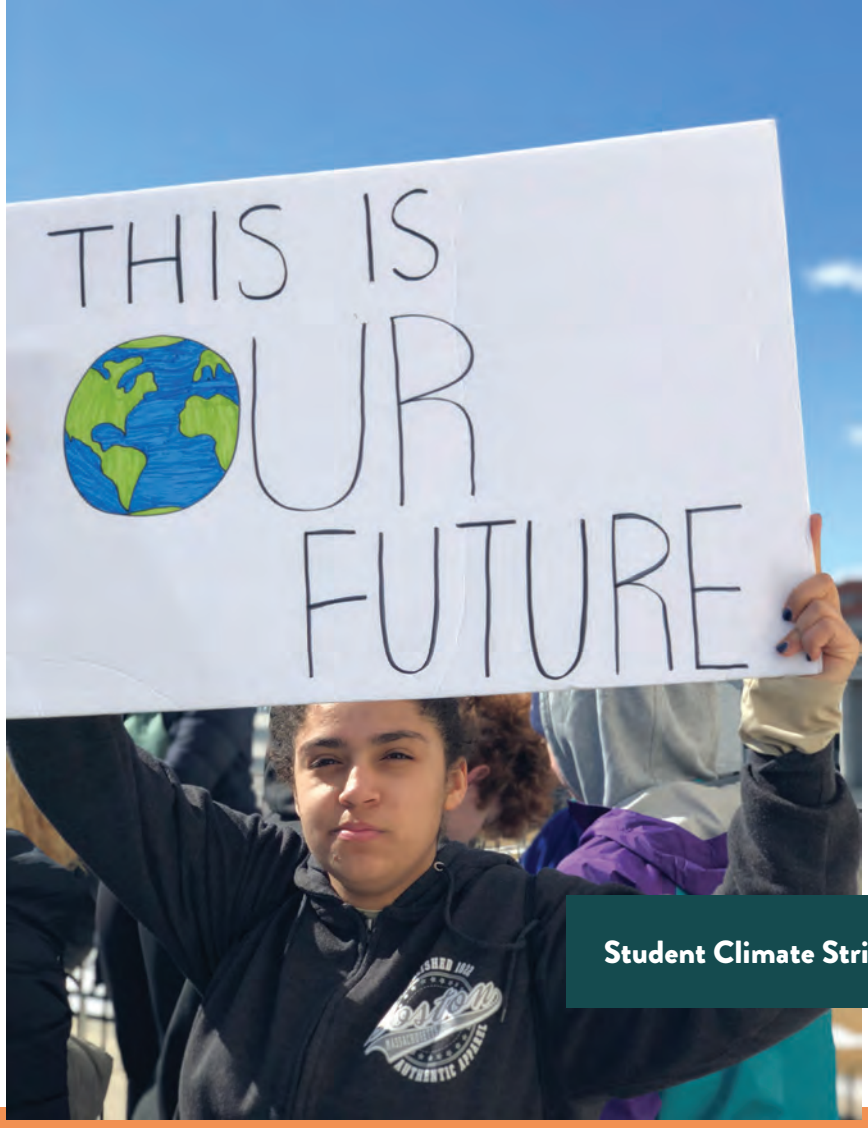
- **Include impacts from events outside of Minnesota:** Virtually no climate plans in Minnesota prepare for the interstate or international impacts of climate change. For example, the state's all-hazard mitigation plan includes an inventory of impacts within Minnesota, but little about how acute events in Canada, contiguous states, and more climate vulnerable U.S. states and territories will affect Minnesota.

- **Include human migration impacts:** Climate planning and plans do not yet fully explore the multi-dimensional challenges and opportunities Minnesota will face as climate change alters where people can and choose to live. Given Minnesota's northern climate and abundant freshwater, the state will likely see increasing in-migration from both within and outside of the United States.

- **Strengthen social cohesion:** Most local climate planning – with some standout exceptions like Saint Paul, Minneapolis, and Northfield – do not put the need to invest in community resilience in the foreground. All climate planning should include strategies to educate the public, build societal cohesion, and encourage civic participation. Communities with deeper relationships, more trust, and greater political capacity will be more resilient in the face of climate-driven crises, especially those that happen in tandem with demographic changes and economic stresses.

- **Prepare community leaders:** Community leaders need to be better equipped for both climate planning and for the disaster preparedness, crisis management, and contingency planning that climate change makes more urgent. The state could train elected officials, first responders, and essential workers so they are better prepared for crises that could feature infrastructure failures, misinformation and disinformation, threats to public safety, and a rocky transition to long-term recovery.

- **Manage systemic financial risks and impacts on public finances:** Little climate planning includes how the state can work with insurance companies,



Student Climate Striker at MN Capitol

investors, and traditional lending institutions to prepare for and respond to the risk of climate-driven catastrophes. Furthermore, the state does not have an analysis of how much climate change will cost Minnesotans for things such as increased disaster response, infrastructure replacement and upkeep, and more. Neither has the state fully grappled with who should be expected to pay these costs and cost tradeoffs for climate action and inaction.

- **Approach the work iteratively:** Climate change is an unfolding process that will play out and ramp up over time. Therefore, climate planning and action needs to be approached in an iterative way, meaning the work is ongoing and will require managing changing risks overtime, learning while acting, and protecting these processes from political interference.

Closing these ten gaps will require intentionality and persistence. But it's doable. Our state government could play a critical role in standardizing vocabulary, encouraging best practices, and assisting practitioners in order to improve the planning that's already happening across Minnesota.

Section 6: Climate Adaptation and Resilience State Policy Recommendations

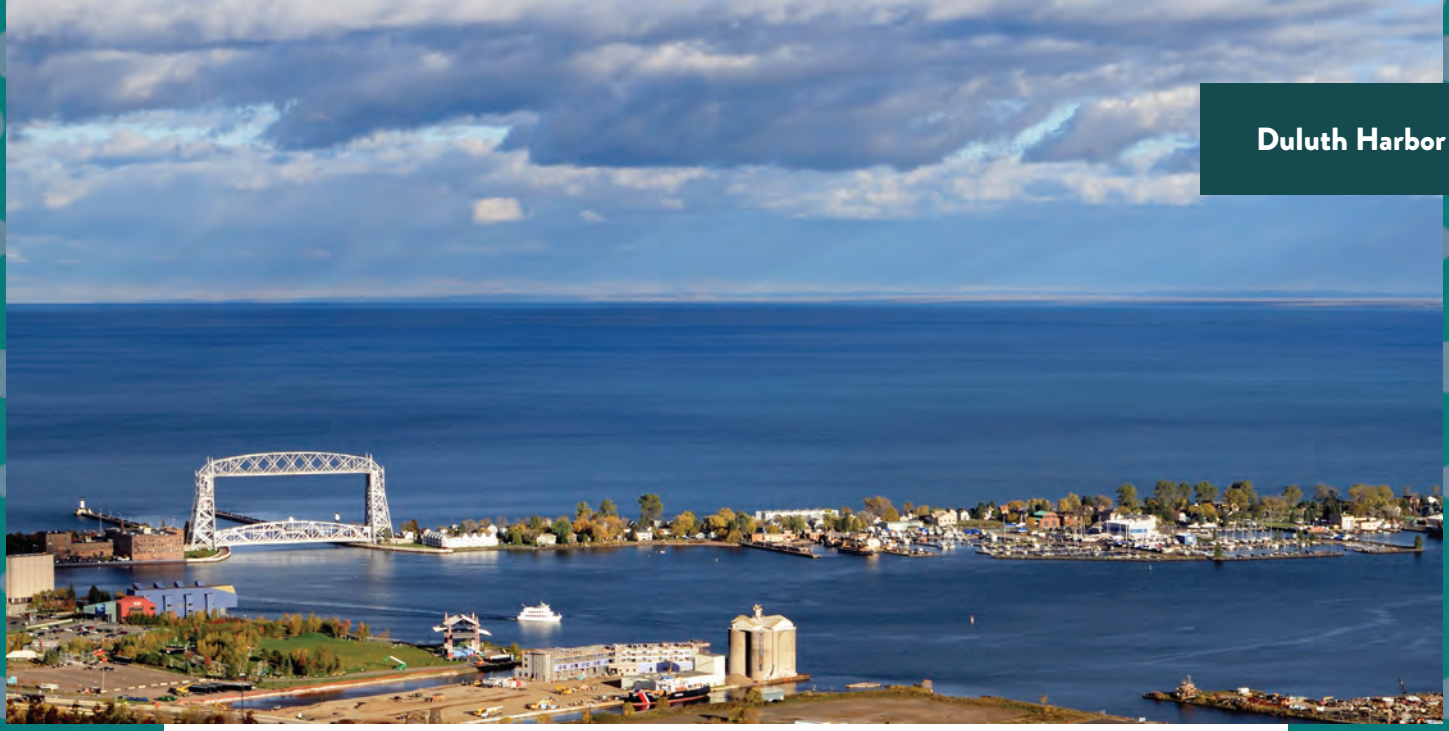
Based on the landscape analysis of climate adaptation and resilience in Minnesota, including our analysis of gaps in the field, we recommend enacting the following eight legislative policy proposals. By enacting these proposals, Minnesota will go a long way in partnering with communities across the state to build climate resilience.

Create a Climate Resilient Communities Division within the MPCA: To meet the needs of our communities, Minnesotans need a one-stop shop in state government to locate data, expertise, funding opportunities, and technical assistance on climate resilience and adaptation. A Climate Resilient Communities Division within the MPCA would meet this need. By consolidating staffing, knowledge, & relationships in one go-to place in state government, the division could a) coordinate interagency planning, b) provide support to local governments and other enterprises doing their own climate resilience and adaptation planning, c) make expanded data integration and mapping capacity available to the public, d) pilot a standard analytic framework for analyzing population vulnerabilities, climate risks, and community adaptive capacities, e) administer the Climate Resilient Communities Grant Program, and f) administer the GreenStep Cities Program.

Create a Resilient Communities Grant Program: A number of Minnesota cities are already leading the way on climate resilience and adaptation planning. However, to reach the scale of planning needed, local governments will need resources to drive the work in partnership with community. The Climate Resilience Division ought to administer an ongoing annual grant program that expands its existing Environmental Assistance grants. The program should be available to tribal governments, cities, counties, school districts, and public colleges and universities that want to do greenhouse gas mitigation and climate resilience and adaptation planning.

Create a Climate Resilient Communities Fund: Making sure communities across Minnesota are prepared for crises before they happen is an ongoing commitment. The planning, training, and solution implementation required will be locally based and iteratively developed. This work will take more than one planning grant to sustain - it will take multi-year, dedicated funding for implementation. We recommend the creation of a Climate Resilient Communities Fund, a multi-sourced fund dedicated for the protection of communities most at-risk of climate impacts.

Continue identifying Minnesota's climate vulnerabilities: Part of preparedness is knowing what needs to be protected. The State of Minnesota should evaluate the full range of climate vulnerabilities that Minnesotans face. This work includes a) evaluating risks to state-owned land and built infrastructure, b) analyzing acute and


Duluth Harbor

long-term public health risks, c) identifying gaps in local emergency preparedness systems, d) evaluating systemic financial risks, and e) supporting local governments who choose to do similar analyses of their own.

Expand, integrate, map, and make accessible small-area climate hazards and population adaptive capacity data: Getting high-quality, user-friendly data on climate hazards, their likelihoods, and the people they'll impact is a key step in every climate adaptation planning process. Minnesota communities have access to much of this data (and much of it was updated in the 2020 U.S. Census). However, the needed information is generated across diverse state agencies, governments, and academic disciplines. It can be hard to assemble and use in very localized planning.

To solve this, we recommend prioritizing, integrating, mapping, and making data on hazards, vulnerabilities, capacities, and demographics publicly available in user-friendly formats. We recommend these five actions:

1. Maximize access to certain climate hazard data at a sub-county level
2. Continue to disaggregate racial and ethnic demographic data state at a census tract level
3. Expand integrated modeling capacity for our most common climate hazards (beyond heat and flooding),
4. Pilot a state standard analytic framework for analyzing climate risks, population vulnerabilities, and community adaptive capacities
5. Create publicly available, user-friendly, a la carte mapping capacity that integrates climate hazard, public health, and adaptive capacity measures.

Create climate resilience training and certification programs: During the Covid-19 pandemic, we've learned a lot about essential workers. Many Minnesotans do the work of keeping our state safe and healthy. We have an opportunity now to prepare more of these workers as well as local elected leaders for future crises by training them on disaster preparedness and climate resilience. The State of Minnesota

should offer a climate resilience training and certification program for Minnesota's local elected officials, first responders, public employees, essential workers, disaster recovery workforce, and their unions. The program would train participants on disaster preparedness, local climate hazards, and the roles they are best positioned to play to prevent crises and prepare their communities.

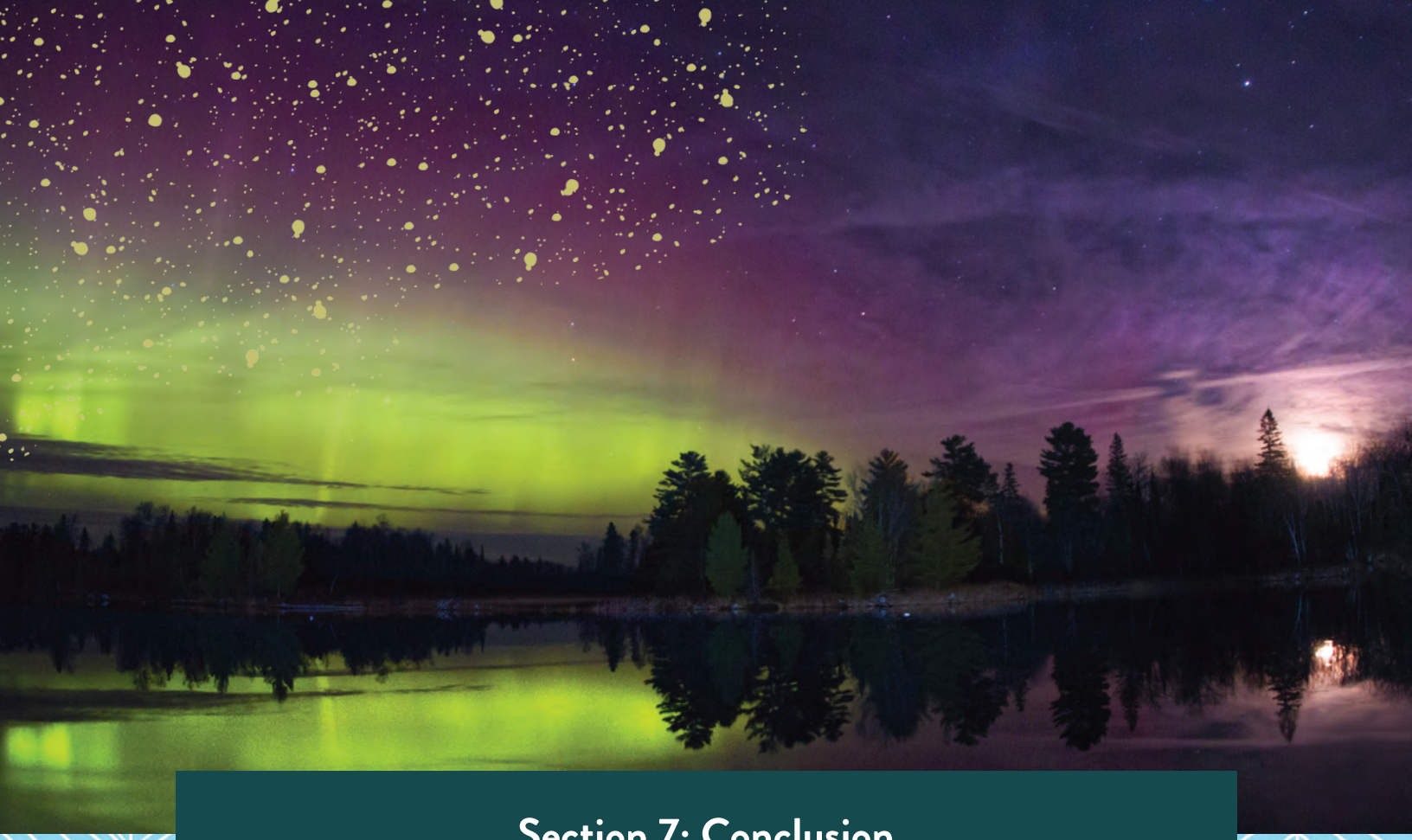
Strengthen Minnesota's fiscal preparedness: Since 2013 Minnesota has been a national leader on fiscal preparedness. After a decade of severe tax cuts and a crash of the national financial system, Minnesota created a fourth-tier income tax stabilizing the state's finances. Likewise, the state's Budget Reserve and Cash Flow Account have both served Minnesota well, making our state better prepared than most for the COVID-19 downturn of 2020. Going forward, the state should prepare for future disasters (both climate and non-climate related) by dedicating resources to the funds we use to manage risk, including Minnesota's Budget Reserve, the Disaster Contingency Fund, and the risk-management programs of the Rural Finance Authority.

Enact low-regrets greenhouse gas mitigation & climate adaptation policies as we go: While Minnesota invests in developing our capacity to plan for and respond to future climate hazards, it's also important to enact low-regrets strategies and learn-as-we-go. There are three types of low-regrets policy recommendations that Minnesota should prioritize in 2021-22.

1. **Climate Resilient Infrastructure Improvements:** State capital investment bills include many important contributions to adapting to climate change and building resilience. For example, water systems and flood mitigation programs can better prepare Minnesota communities for the extreme weather events expected to increase with climate change. These and additional adaptation projects should be supported by future state bonding bills.

2. **Policies That Increase Adaptive Capacity:** A wide-range of policy improvements will make all Minnesotans either less at-risk or better able to cope with change and crisis by building the economic, social, cultural, or democratic resilience of families and communities. These actions include policies that raise wages or build wealth for working people, improve housing, strengthen public health infrastructure, protect voting rights, or increase scientific literacy.

3. **Greenhouse Gas Mitigation Policies:** While not the focus of this white paper, climate resilience requires quickly reducing emissions to avoid the worst climate change impacts, particularly impacts beyond what communities can reasonably adapt to. We support a wide range of sector-by-sector GHG reduction policies focused on electricity, transportation, the built environment (commercial, industrial & residential buildings), agriculture, and manufacturing & waste. Ambitious emission reductions should continue to be enacted as adaptation strategies are planned, launched, and ramped up.



Section 7: Conclusion

As Minnesotans continue to feel the increasing impacts of a changing climate, many are showing they are ready and willing to take on these challenges. Even more, with the right policies and actions coming from state government, Minnesotans have what it takes to thrive through the climate change era.

This work is essential because both the fast-moving disasters and slow-moving stresses driven by a changing climate threaten things each of us loves about being a Minnesotan. Furthermore, without sustained, targeted action, climate change will make Minnesota's unacceptable disparities, particularly along lines of race, gender, class, or geography, even worse. At the same time, addressing the scale of our climate challenge with the ambition and urgency it demands, creates the opportunity for Minnesotans to come together in new ways, drawing from and showcasing our state's ingenuity and commitment to each other.

Our current legislative session is the right time to help Minnesotans build adaptive capacity, plan for climate adaptation, and grow our state's resilience in the face of climate change. Minnesotans are ready to step into a resilient, climate-adapted future with courage and boldness, together.

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What is the 100% Campaign?

The 100% Campaign is bringing Minnesotans together – people just like you – who believe we need an equitable clean energy future for everyone in our state.

With both organizational partners and individual endorsees, the 100% Campaign is grounded in the idea that "to change everything, we need everyone". We are organizing a cross-sector, statewide, multi-racial, intersectional campaign to build an equitable clean energy economy that works for everyone in Minnesota.

We believe that Minnesotans must act now to ensure our well-being for generations to come. To do that, we must:

- Transition to safe, clean, locally-made energy solutions at scale and as quickly as we can.
- Create solutions that work for all Minnesotans across race, gender, class, and place
- Encourage public & private investments, expand worker training, and create new energy solutions that save us money
- Strengthen all communities that are impacted by pollution or the transition away from fossil fuels

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