[4 regional vision statements](https://metrocouncil.org/Council-Meetings/Committees/Committee-of-the-Whole/2023/02-01-23/Info-Item-2050-RDG-Vision.aspx)

**TITLE**

# Introduction

As the effects of climate change become more widely felt, one of the outcomes that we will experience in the metro/MN is extreme heat. Heat is already affecting our residents’ wellbeing and will continue to do so at a higher rate. According to the Minnesota Department of Health (MDH), an extreme heat day is a day that has a heat index over the 90th percentile of the baseline heat index from 1979-2019. In 2019, every county in the metro area had [8 extreme heat days](https://data.web.health.state.mn.us/hot_weather); this number is only expected to increase.

Extreme heat events are becoming increasingly common due to climate change. Dr. Laalitha Surapaneni, an assistant professor of internal medicine at University of Minnesota Medical School, says she has always been aware of extreme heat, having grown up and studied in South India. When she moved to Minnesota, a place historically much colder than South India, Dr. Surapaneni explained, “I went to public health school, and halfway across the world, I still see patients here who are suffering the health impacts of extreme heat, and climate change in general.” Even here in Minnesota and the metropolitan area, residents are dealing with extreme heat. Minnesotans are uniquely vulnerable to the effects of extreme heat. “Northern Midwesterners have the least heat awareness scores of everyone in the country,” said Dr. Surapaneni.

When we plan for and design our cities, there are usually other considerations before thinking about extreme heat, and by doing so makes us more susceptible to it. Landscape architect Mo Convery says “extreme heat is never the first problem we’re trying to solve,” However, many of the solutions that we use to mitigate pollution, etc. are also interventions to mitigate the effects of heat….

\*\*Video of Laalitha/patient telling her story

# Our Region is Equitable, Inclusive, and Welcoming →equity lens,***a call to action***

### Our quality of life is high by national standards but not all communities share in this. We envision a future where inequities and injustices have been eliminated and all residents and newcomers feel welcome, included, and empowered.

### Overview

Due to disparate resources and the creation of microclimates, not all residents experience the impacts of heat and extreme heat equally. Wealthier families have access to air conditioning in their homes and workplaces, and extreme heat is not typically something that weighs on their mind. Additionally, wealthier neighborhoods have older trees that provide a better shade canopy creating a cooler microclimate, due to... Neighborhoods in industrial areas experience a prevalence of concrete that traps heat, making them hotter both in the day and throughout the night. One St. Paul resident remarked, “I know how impossible it is to get good sleep when you have hot kids.”

However, access to air conditioning does not necessarily solve the heat problem. Many individuals, although they have air conditioning, do not have the financial means to run it. During the summer families and individuals often have to make tough decisions of whether to run their AC or make other necessary purchases. In the winter, we know the dangers of living without proper heating which has led to the Minnesota Cold Weather Rule, banning utilities to disconnect residential heat. No similar standard is in place during the summer when the heat can be equally deadly.

### Mutual Aid & Equity

Residents in Minnesota have spotted the gaps in the existing systems and have been working to fill them. Ad hoc mutual aid groups have started to help support their neighbors in need. Several summers ago two Met Council employees worked together to provide air conditioning units to those in need. Rachel, a Senior Transportation Planner who lives in a wealthier neighborhood in St. Paul, put a call out to neighbors asking if anyone had spare air conditioning units that they were no longer using. Ashley, a colleague of Rachel’s, then connected the air conditioning units to families and individuals who needed them in her less wealthy neighborhood.

Many residents that they were helping had moved during the cooler months and were unaware of how hot their new home would be. Renters particularly struggled with being able to access cooling because their leases included restrictions on window air conditioning units due to landlord concerns about water or safety. Even if renters own air conditioning units and move them to a new home the windows might not accommodate that size or style unit. Landlords in renovated buildings have opted for casement or swing windows which don’t allow for traditional air conditioners. The portable air conditioning alternative is more expensive and harder to find used. To offer assistance to folks in those situations Ashley and Rachel did direct fundraising to get new portable units.

Rachel reported that access to transportation was also a contributing factor for those who did not have access to air conditioning. Air conditioning units are heavy and unwieldy to transport for those who rely on public transportation this simply might not be possible to transport home. The risk of breaking the unit or not being allowed to bring it on the bus is a risk that some don’t want to take. “To try and bring an air conditioner home on the bus is difficult. I think for the average person that's not an option.” said Rachel.

Mutual aid is important and citizens taking it upon themselves to redistribute critical resources builds connection and community cohesion. However, it is a glaring example of how governments are failing citizens. Rachel says, “landlords should provide air conditioning and we should publicly support them doing it, because especially with climate change, we've reached the point that not having air conditioning would be like providing housing without heat, which we wouldn't allow and state law prevents.”

### Social Cohesion

Extreme heat can be deadly when folks are isolated but it can also create opportunities for community building. One of the many ways that metro families cool off is by utilizing one of our many local lakes, while some go to parks with lots of shade and greenspace. These can be opportunities for residents to interact with others outside their typical networks, ultimately building stronger community connections.

Children are particularly vulnerable to heat because they are unable to regulate their body temperature in the same way that adults are. During times of extreme heat this can be very dangerous. Parents have to navigate the kids' needs to use up their energy without overheating. One parent in St Paul discussed how she likes to take her family to the wading pools in Minneapolis. She said ”the Minneapolis wading pools are actually like two feet of water and sometimes some fountains but it's enough for a little kid to sit down up to their chin basically and actually cool off.” She also stated that she wished that St. Paul had more free options for families to enjoy and that more of the lakes had better water quality for safer enjoyment.

### Energy Policy & Inequity (the gap)

* Connection; coordination of benefits/aid
* human -centered support
* Solutions focused and advocating for policy change
  + Discuss efficiency and emissions

Government programs do exist to help with weatherization. In Minnesota most people think about weatherization as a way to help during the cold months but insulation and improvements to the building envelope also help keep buildings cool on hot days. However, during the summer months there are not a lot of resources available outside some county assistance programs which help people with extreme heat.

Minnesota receives funding from two federal programs to help low income families with the high cost of energy. Due to funding cycles at the federal level Minnesota’s programs generally run from October 1st to May 31st. The timing of these programs leads to the funding starting to be distributed in the winter and usually running out by spring. Because of this there is a perception in Minnesota that these are winter programs; though other states primarily use the funding in the summer to address heat. These two programs are the Department of Energy’s Weatherization Assistance Program (WAP) and The Department of Health and Human Services’ Low Income Home Energy Assistance Program (LIHEAP).

Minnesota typically receives around $106.2 million in LIHEAP funding. LIHEAP has two components: one is the assistance for utility bills and the other is weatherization. Families receive around $500 to a maximum of $1400 in assistance for heating bill assistance. LIHEAP and WAP are both restricted by federal income guidelines, which is 200% of poverty or coincide with the state's guidelines, but not to exceed 60% of the state median income. According to Catherine Fair, Executive Director at Energy CENTS Coalition, “The federal government does not fund the state to serve everyone, at least in a meaningful way that would actually lower their energy burden. I think we're serving what maybe an average of 125,000/126,000 households and depending on the program year that the estimates were collected. anywhere from 500,0000 to 660,000 households eligible.” LIHEAP and WAP only “serve one in five households that are eligible, and then a subset of that population is who is getting weatherization assistance.”

In order to help bridge the funding gap multi year block grants from the state are critical. Local and county governments can also add additional funding to weatherization. Making more funding available which isn’t restricted by federal law would also help residents without social security numbers which are required for federally funded programs. Additionally funding would also allow for weatherization programs to run year round. Federal funding can vary, creating multi year block grants can help cover gaps and allow for better planning for how to spend funds.

**“You know, you have the cold weather rule protection, you don't have to pay your whole bill, you just pay what you can and they can't shut you off. And you know, you never want somebody freezing in their house. But extreme heat has caused more fatalities than deaths due to cold.”**

The Cold Weather Rule protects residents from utility disconnection during the winter months, no similar rule protects from disconnection during hot weather. However, if a county declares an extreme heat event then the consumer protections preventing disconnection apply, but there are no conversations about reconnecting customers during those events. When disconnections happen this can cause a crisis for low income families. Catherine told a story from when she was helping with energy assistance and getting a call from a mom of three kids who “got home from work and the lights and refrigerator in her apartment are shut off, and she just got groceries with the one time a month that she gets food stamps, so everything in her refrigerator went bad.” She went on to say that, “access to utility services - consistent utility services - is a basic need.”

Programs like CENTS help utility customers access funding that utilities are required to distribute for energy efficiency programs. Utility funded programs don’t have federal income restrictions and can be used to help low income families and individuals that could not be help through other programs. These programs are critical in helping reduce energy burden, or the percent of income used to cover utilities, by funding part or all the cost of more energy efficient bulbs and appliances. It is easier for homeowners to access programs such as these because they have the ability to authorize changes in their home. Renters also have the ability to access this funding which landlords can use to improve the efficiency of their properties. It can be a slightly longer process for renters because of the added hurdles to get landlord approval. Catherine also stated that landlord investments in weatherization and energy efficiency “does follow the housing market. We had a lower uptick in participation during the pandemic.”

Existing policy examples from around the region

graph of increasing heat over X amount of years

# Our Communities are Healthy, Safe, and Vibrant → public health angle (extreme heat threatens quality of life)

The wellbeing of our region depends on the strength and inclusiveness of our economy as well as the quality, safety, and reliability of our public services. We envision a future where all our region’s residents can **live healthy, productive, and rewarding lives with a sense of security, agency, and wellbeing**.

* **Repeat: we are uniquely vulnerable to extreme heat**
* **If we want people to live healthy ….We need to address extreme heat.**
* **economic stability as it relates to public health**
  + **SDOH and compounding factors**
  + **Outdoor workers and extreme heat standards**
  + **Asthma Story**
* **Built environment as it relates to public health**

Heat is the leading weather-related killer in the US, with more than 11,000 Americans having died from heat-related causes since 1979, according to the Center for Disease Control (CDC); however, it is likely this figure is an underestimation given comorbidities from heat. People who are exposed to extreme heat can suffer from illnesses such as heat exhaustion, dehydration, and heat stroke; high temperatures can also contribute to deaths from strokes, heart attacks, and other forms of underlying cardiovascular disease. Additionally, increasing numbers in acts of violence and aggression are associated with high heat. As Dr. Kristi White, a behavioral psychologist and assistant professor of medicine at the University of Minnesota Medical School, explains, “As it gets hotter, we see people become more aggressive and violent towards others, and it's predicted that aggression and violence and conflict are going to increase as our world continues to get hotter.”

The metropolitan region is uniquely vulnerable to the various health consequences of extreme heat, given the low heat awareness among Upper Midwesterners and the increasing number of high heat days. Per the Minnesota Department of Health, in the past two decades there have been 14,779 heat-related emergency department visits, 1,619 heat-illness hospitalizations, and 75 heat-related deaths in the state. Extreme heat has had, and will continue to have, a considerable impact on the health and lives of Minnesotans and the residents of the metropolitan region.

However, the impacts of extreme heat are not experienced equally and are often exacerbated by other compounding factors that leave many residents in much more vulnerable positions. Dr. Surapaneni claims, “the biggest line throughout my practice has been that climate change is a health equity issue.” She believes that centering the social determinants of health is key to addressing the health inequities brought on by extreme heat. “Social determinants of health” are defined by the CDC as nonmedical factors that influence health outcomes, such as economic policy, racism, and climate change. When asked what factors compound the health impacts of extreme heat, she explains, “the two main things that I’ve seen play out are the built environment as well as economic stability,” citing the example of a patient she had a couple of summers ago.

Her patient was asthmatic and had an asthma attack due to the summer heat. The asthma attack was so severe that it ended up triggering a heart attack as well. She lived downtown in an urban heat island and hadn’t been able to fill her three medications for her asthma. By the time she was getting discharged, she left with five medications. Dr. Surapaneni describes the difficulties these barriers pose to medical care: “Even though we had given her assistance to fill a month’s supply, it felt like we were putting her right back into that environment that, at least in part, triggered her asthma attack and her heart disease in the first place.”

Dr. Surapaneni explains that many of her patients have little control over their home or work environments and are therefore unable to implement most of the preventative measures that she advises. There are often instances where people who live in urban heat islands must choose between using their air conditioner or paying for their medications, or for food. In some situations, Dr. Surapaneni has been able to work with hospital social workers to prescribe air conditioning units to patients with health conditions that put them at high risk during extreme heat events. This action would legally require a patient’s landlord or building owner to provide an AC unit to that patient, and would keep the AC from being shut off by the utility company. While this acts as a solution, it is very individualized and cannot be widely implemented. Situations like these, Dr. Surapaneni explains, illustrate the importance of systems in social determinants of health and, therefore, patient health outcomes. This understanding is echoed by Dr. Kristi White who claims that we must address health equity issues at the systemic level, not solely the individual, if we are to build adaptation plans that do not leave certain communities behind.

By highlighting her experiences treating outdoor workers, Dr. Surapaneni also spotlights the instrumental role that the built environment plays in exacerbating the impacts of high temperatures through the urban heat island effect. Gloria Iacono, an urban farmer in Minneapolis, described the temperatures of summer 2022 as “relentless,” saying her main strategy to beat the heat was to get up early and be finished with all of her work by 11a.m. or 12p.m. Gloria’s experience stresses Dr. Surapaneni’s claim that the lack of outdoor worker heat standards is one of the main issues the metropolitan region and the state needs to address. She gives the example of California which has created statewide outdoor heat standards that require workers to be within two minutes of access to drinking water and a bathroom, as well as take a specified break each hour. Dr. Surapaneni argues for the metropolitan region to implement better nature-based solutions for urban heat islands and high risk communities that improve residents’ adaptive capacity by making the region’s cities and rural areas as cool as possible.

### Media/Chart: People more affected by high heat exposure with quote: “These are all barriers that impact medical care.” -Dr. Laalitha Surapaneni

\*\* SDOH - MDH map overlays

\*\*Sliding map showing extreme heat → race and/or low income by census block. Similar to map in Growing Shade

# We Lead on Addressing Climate Change → for this, it would be adapting (preparing) for a hotter future

Our region leads on the critical issue of climate change. We envision a future where we have eliminated or mitigated greenhouse gas emissions and have adapted to ensure that our communities and systems are resilient

* **Why we build connections between humans & nature (built and natural env). building between community and nature**
  + **Macro work w/ env**
  + **Standards and design stuff**
  + **Microclimates (a science and an art)/heat (cool) inertia/ sinks (site level interventions) -> ties into “western”/colonized history in next B4. Long term solutions…**
  + **Parking lots**
  + **Parks, trees (meh), and water features**
  + **Green roofs**
  + **Solutions OTHER than planting trees (more tools available such as policy interventions and design standards)**

## Overview

We know the urban heat island effect is immensely related to how we build and use land. Buildings and pavement that absorbs more heat, coupled with less green spaces that act as cooling systems result in urban pockets with higher and unequal heat impacts for those who live there. How we’ve built our cities is the reason why extreme heat exists within them, which means, there are ways to build ourselves out. Decisions that are being made have long and sometimes unintended consequences for city dwellers, and it can have serious impacts on how a community is set up to withstand extreme climate conditions.

“We’ve really created all of this,” Mo says, “from the patterning of our buildings, to how we design for people to move around the city, and how much green space is allotted to certain people but not others.” Mo Convery is a Landscape Architect at Confluence, an urban design and planning firm with offices in many large cities around the midwest. She brings her background of respiratory health into her role when designing urban spaces.

The newly updated extreme heat map tool gives precise locations of where heat is excessively collected throughout the metro. Most hotspots are located along transportation corridors and areas with large amounts of impervious surfaces that have no or small amounts of tree canopy. This tool can help planners explore the impacts of extreme heat and how the built and natural environment affects land surface temperature. Moreover, it now can and should be viewed from both a macro and micro perspective when considering policy and implementation strategies. Taking a systems thinking-approach to heat mitigation strategies is crucial given the intersectionality of the problem. Mo thinks about her work from both perspectives, from planning large scale projects with the Minneapolis Parks and Recreation Board, to selecting trees that have high pollution absorption rates for sites closer to highways. “When you bring it down to the human level [like a city block], you have to think about what can best go there,” says Mo, “from tree spacing and shade structure considerations, to types of concrete versus none - these are all things planned at the site level that can create a really important microclimate and impacts how we experience our built environment.” It's important that we develop plans for our communities to be resilient in a changing climate, and there should be more emphasis on thinking about how planning efforts can improve the experience of those who use the space.

## Urban Greening/Built Infrastructure Interventions

Cities around the world are realizing the benefits of integrating green interventions/methods into our infrastructure that ultimately helps their communities thrive. This often involves thinking about how to build with—rather than against—nature, and how climate-resilient infrastructure can generate a wealth of co-benefits for citizens. “From a design perspective, we think a lot about the preservation of mature trees, selecting native plantings, transitioning away from turf and hardscape installations, and utilizing stormwater runoff in ways that have benefits for both the built and natural environment and how people interact with it.”

We need design standards that reflect our changing climate.

DESIGN (WATER): There’s more than one way to address extreme heat and climate change through how we build our cities that have intersecting benefits. The city of Philadelphia uses stormwater landscapes, or green stormwater infrastructure to not only help curb extreme heat, but also to improve air quality and human health, provide habitat, and overall positively changing quality of life for their residents.[[1]](#footnote-1) Here in Minnesota, we’re rightly proud of our urban lakes and rivers in the metro, but there’s still lots we can do to improve how we manage, or don't manage them. The Ford Site Redevelopment also showcases innovative ways in which green infrastructure can create multipurpose solutions through water design. XXX add more detail about Ford site XXX. Adjacent to stormwater but still water-related is the concept of splash pads as a form of direct relief for residents during extreme heat days. Rachel quote about lack of wading pools/splash pads? (Alice mentions this earlier).

DESIGN (BUILDING): Other methods of design can be utilized to combat extreme heat such as green roofs, which happen to be a high currency intervention. Green roofs atop urban buildings not only act as natural coolers, but they also reduce air pollution, increase biodiversity, mitigate stormwater runoff, increase life spans of traditional roofs [sometimes by 40 years!], and function as natural insulators which reduces building energy costs. “They’re very dependent on what building they're a part of, but they’re great in Minnesota in that they also provide thermal insulation in the winter, so they’re great all year round. I think green roofs are very feasible here,” Mo says, “And new products are continuously being developed that make green roof installations easier for both small and large scale implementation.”

The city of Eden Prairie has started installing green roofs on all new park buildings, along with garden plots, rain barrels, and low-mow grass. It’s the first project in the state to reach the ‘Advanced’ level of the Minnesota Green Path Certification.[[2]](#footnote-2) Other cities such as Denver have passed ordinances that require new buildings and additions to new buildings greater than 25,000 square-feet to have a cool roof while complying with at least one other Green Building requirement….XX add more about this ordinance and transition into regulation XXX

\*\*examples of green infrastructure? Other cool LEED examples in the metro?\*\*

\*\*add map of green roofs in the metro if we know where they all are (possibly to showcase there aren’t that many and encourage more?)\*\*\*

REGULATION: The challenge Mo faces, other than the fact that extreme heat is never the first thing people think about, is how she can be progressive with her designs while also being realistic. “From a design perspective, you have many city, state, and federal standards that you have to follow,” Mo states. These are notably in place for a reason, but if current standards and regulations haven’t been revised to consider extreme weather conditions in locations that are uniquely vulnerable such as the metro region, this makes it harder to create safe and resilient spaces that can serve multiple purposes. “For example, design standards in the southwest are built around extreme heat considerations such as building surfaces that reflect heat and certain types of concrete that don't absorb as much heat,” Mo says, “We should be looking to these southwest cities or even California to implement those kinds of standards here.” XX add more narrative about midwest states regulations around extreme heat? XX

REGULATION: Another opportunity for developing regulations at the site level is thinking about how much impervious surface can and should be used on a site. “One of the largest areas of heatsink air we see is from large parking lots.” Many parking standards around the metro don’t take into consideration the magnitude of their heat impact, and things such as vegetation aren’t required in planning design. “While considering vehicular movement, there are still ways we can break up these areas that mitigate extreme heat.” According to Mo, most large scale retail parking lots have been designed with the “black-friday” mass consumer in mind and are often only 30% full on the average day. Communities such as St. Louis Park and Eden Prairie have or are working to implement parking lot enforcements that prevent the overbuilding or parking and incorporate more green space to reduce the heat island effect.[[3]](#footnote-3)

Building off of this…..tree trenches…

* “Putting actual money to having tree trenches, so the trees that we do plant in cities can actually grow. Which is, by the way, like $30,000 per tree. Like it's not a small thing, but like under understanding like, how, how good tools that we have like what we actually need to implement them.”-Mo

Use connection of high currency interventions and hospital gardens to move on to B4???

# We Protect and Restore Natural Systems → reducing temperature hot-spots; integrating built/natural environment

Our region has world class parks and abundant natural resources. We envision a future where natural systems are increasingly protected, integrated, and restored to ensure a high quality of life for our growing region.

* **The importance of building connections between the built & natural environment. Mental (kristi- eco anxiety, gloria - social cohesion, conversation, community building) and physical benefits (green space from hospital windows).**
* **Sacrifice zones - populations have dealt with extreme heat, CC, pollutants, for generations. Forced to be resilient**
* **HOW DO WE END**

### Overview

High currency interventions > connect to Mo’s section\*

People are actually doing the work, even if we don’t see them, in the face of our society not changing

Human-Nature Connections and Mental/Physical Health Benefits

Dr. Kristi White, who researches environmental stress and how it impacts one’s psychological wellbeing, explains, “There's vast literature that shows exposure to pleasant natural environments is associated with all kinds of improvements to psychological and physiological health… So doing things like spending time in nature or community gardening have been shown to be very beneficial and have a direct impact on important biomarkers like lowering cortisol levels, lowering blood pressure, improving A1C for people with diabetes, and mental health benefits like improving self esteem, lowering anxiety, and lowering stress and depression.” Hospitals around the world are beginning to plant on-site gardens to promote their patients’ recovery, not only through the simple benefits of viewing nature, but through social cohesion and education as well. Kristi exemplifies the hospital gardens as a means to demonstrate growing solutions that function to increase human-nature benefits and connections, all while creating more resilient and sustainable communities in the process.

Gloria Iacono, an agricultural farmer and consultant at the Four Sisters Urban Farm, also works to bridge this gap between people and the natural world by supporting social engagement and urban biodiversity. Four Sisters Urban Farm in Minneapolis’s East Phillips neighborhood is a project working in collaboration with the native American Community Development Institute to transform three lots into an urban farm, providing the community with a place to connect, learn, and restore health and well being. “I work to facilitate connections between people in the community and nature,” she explains, describing how our physical connection to the living world benefits both personal and community health and wellbeing.

Gloria’s work naturally includes building social cohesion at the community level by using green methods/practices/infrastructure. “What inspires me about this work and the culture of growing things is how inherently collaborative it is,” Gloria says, “Sharing a common goal, such as caring for the plants, really makes people want to help one another.” The visibility of a community garden, for example, can reach many people when it comes to stewardship and re-building relationships with nature. “These gardens are a way to reframe and reimagine our urban spaces to not be so human-centered,” she says.

Sacrifice Zones & Inequity in Nature Access

Western culture’s identity of humans and nature being separate is a narrative we must change. Viewing the natural world as separate from humans has led us to forget the importance of incorporating nature, big or small, into our built environment. Gloria Iacono expresses that we can find inspiration in the Native philosophy of understanding ourselves as a part of nature, as opposed to being in charge of it and developing blindly without considering how built and natural worlds can work in tandem. \*\*Too often we think we need to travel *to* nature instead of seeing it all around us.

This notion, however, cannot be discussed without acknowledging the injustices that do exist between our built and natural environments. Though St. Paul and Minneapolis park systems have a long standing ranking as “Best in the Nation” by The Trust for Public Land’s ParkScore Index,[[4]](#footnote-4) racial disparities permeate the metro region through how and where we build these parks/nature. In this context, we must also look to repair harm that the colonial agenda has caused, particularly for communities that have been deemed less worthy.

Dr. Kristi White asserts, “We wouldn’t have climate change as we know it today if we didn’t view certain communities as worthy of sacrifice.” These marginalized communities, or “sacrifice zones,” historically have been overly-burdened with living in more harmful environments due to redlining, toxic waste or chemical plant siting, and less green spaces and vegetation. For example, Dr. White mentions, “There are certain communities where there is greater exposure to toxic waste and pollution, and asthma and cancer rates are higher in those communities because of increased exposure.” Gloria Iacono testifies to this, giving the example of the East Phillips neighborhood, a sacrifice zone, where she lives and works. “East Phillips in general is a low income community, overburdened by pollution, and we have the asphalt plant nearby,” she shares, pointing to the increased rates of asthma and other health conditions experienced by the neighborhood. The worsening health conditions in these frontline communities, along with decreasing social cohesion, have striking impacts on one’s ability to withstand extreme heat events.

While extreme heat is a relatively more recent concern for the metropolitan area, communities in sacrifice zones have been dealing with the impacts of extreme heat and climate change impacts for generations. Indigenous and other frontline communities who have had their land and livelihood threatened by extractive practices and environmental degradation have been dealing with the mental health impacts of these environmental changes for decades. People often experience these impacts through solastalgia, the distress that one gets by the environmental change that impacts people who directly connect to their home environment. Dr. White explains that “it can manifest differently for people and different experiences just like other types of grief and loss.” For indigenous communities who have deep connections to the land, similar to a familial connection, the loss or destruction of those places can be felt very similarly to grieving for a family member. Although climate anxiety is a newer concept for many people, for those living in sacrifice zones it shows up through historical trauma and intergenerational stress.

Building Access to Nature

* Ellen: micro climate?
* Biodiversity: climate benefits and human benefits (gloria?)
* Canada example: doctors prescribing national park passes
* Other existing policy examples?
* Edina travel vouchers\*\*

Communities in sacrifice zones have been forced to be resilient in the face of climate change and extreme heat, without systemic support. “Marginalized folks have always had to be really adaptive… So I’m continuously inspired by the resiliency of the folks in this community and Native folks,” says Gloria, when discussing her work in the East Phillips neighborhood. For example, part of Gloria’s work in addition to creating human-nature connections and food sovereignty, includes rebuilding the cultural knowledge that has been lost to colonization. This is just one example of why weaving nature into our built environment, along with protecting current natural areas and resources, is key to promoting residents’ physical, mental, and cultural wellness in addition to mitigating the impacts of extreme heat.

**“If we want to be responsible stewards for our own health and for the health of future generations, as well as for other species that we share this home with, we have to make some pretty significant changes**.” -Dr. Kristi White

“Things are very clearly out of balance,” says Kristi, “But we can look at high currency interventions that work for both humans and the environment, and also serve multiple purposes beyond that.” \*Using built infrastructure as a means of promoting healing at the community level\* “My dream is to one day see hospitals across the globe using their built infrastructure symbiotically with the natural environment for both human and planetary benefits, hitting on several benefits all at the same time with one thing.”

In urban areas with limited space and a low priority to build nature into our growing communities, we should look to utilize the concept of microclimates in our local planning efforts. Gloria quotes environmental author Robin Wall Kimmerer, saying, “Life attracts life,” pointing out how facilitating nature and its growth creates more biodiversity, enabling our spaces to be more adaptive to extreme heat. She explains that these microclimates built through urban agriculture and other green spaces, such as pocket parks\*, can transform what is a barren heat island into a vibrant space again.

Recommendations:

* More access to land for green spaces, such as urban ag; more access to water to care for said spaces:
  + “Having access to space for long periods of time has been a barrier… not being able to access the same space over and over again, you can’t do things like plant cover crops and manage the soil… access to water can be a big barrier and is definitely something that needs to be thought about before initiating any sort of urban agriculture project.” -Gloria

Conclusion

IMPORTANT QUOTES

* “When I say high currency interventions, these are the ones that hit on multiple things at once, or that are multi-level solutions. **So not only are they co-benefit solutions, in that they help both humans and the environment, but they serve multiple purposes through that intervention as well, for example, community gardening and having hospital-based gardens. The reason that I view these as high currency interventions is because they function to help with food insecurity; they can teach people about growing food; the food that's grown on the hospital site can be used for a food pantry, for a teaching kitchen, for nutritional education for patients; and it also is a means of building community cohesion, and getting people to come together for a shared purpose. So I love this idea of community gardening or hospital-based gardening, healing gardens, and hospital farms because they - in addition to the human benefits of providing community cohesion and education and access to vegetation; exposure to pleasant natural environments, which can improve stress, and decrease depression and anxiety; and provide an opportunity for physical activity of people are tending the garden - can also, depending on where the garden is sited, if it's on a rooftop or near an air intake, lower the ambient temperature around the air intake, which then reduces how much energy the building uses and decreases the energy usage of the building. It can also be, depending on what is grown in the garden, an urban pollinator stop to provide important ecological resources for other species who are trying to live in and navigate through the urban environment.** So I like this idea of using our built infrastructure that's already there, like the hospital systems as a means of promoting healing, but more at the community level. **One of my dreams is to one day see hospitals across the globe using their built infrastructure symbiotically with the natural environment for both human and planetary benefits, hitting on several of those interventions and benefits all at the same time with one thing**.”
* “When I'm talking to patients directly, in terms of thinking about what are some of the strategies, it's really trying to limit your exposure to the heat during the hottest part of the day, doing what you can to keep your environment cool, and trying to find access to places where they can get protection and relief from the heat.” -Dr. Kristi White

## Public Health

* “One of the things I'm asking patients about is, ‘what's their plan for staying cool during times of extreme heat,’ and, ‘how does that involve other people? What's this like?’ It might be a safety plan or who are you going to be in contact with to make sure that you're remaining safe, and helping people and their medical providers adapt their care plan to prepare for things like heat waves, and part of it involves not being isolated, right, having that connection and some of that community cohesion is really important. Another way that this shows up in clinical practices, given that I'm a clinical health psychologist, is the majority of the patients I treat have complex, complex medical pictures. **I specialize in cardiometabolic diseases, and also have a deep passion for promoting health equity, so I'm thinking a lot about how these structural barriers and medical illnesses place some of my patients at greater risk of heat related illness, or exacerbation of their health condition during extreme heat. So let's say I have someone who lives in a community that's been subjected to marginalization and also has diabetes. One of the things that can happen with diabetes is it can affect thermoregulation, or how our bodies regulate its temperature, because of the microvascular complications associated with the illness. You combine this with living in an area that has less vegetation and tree canopy and greater exposure to the urban heat island effect, and you get this significant amplification of risk to that person's physical and mental health. And so part of it involves not only how, at the individual level, can we make a plan so that you are connecting to other people and staying safe and healthy, but also, what are some of the things that we need to do as health professionals to advocate at the systemic level so that the environments that our patients are operating in are not placing them at this increased risk of worsening their mental and physical health concerns?**” Dr. Kristi White
* “Something that I've really tried to advocate for is how we can promote green health care practices. One of the things about healthcare is that it's incredibly carbon intensive, and it generates a ton of waste. **So if we are, through the practice of healthcare, contributing to the very problems that we're trying to treat, there's a little bit of an ethical dilemma there.** And so one of the things that I've continued to advocate for is how we can change how we do the business of healthcare, so that it contributes to healing as opposed to contributing to some of these environmental concerns that are exacerbating health problems.” -Dr. Kristi White
* “I'm a clinical health psychologist, which means I focused on the interface between physical and mental health, with a particular emphasis on health promotion, disease prevention, chronic disease management, and helping people adapt to the stress of living with medical illness coping with injury adjusting to change in their medical status, that sort of thing. So **there's a lot of focus on understanding that mind-body behavior, environment, context connection.** **And I grew up academically as a stress researcher looking at how stress impacts our health, both from a direct physiological response perspective, and then also how we cope, and how that might affect our health, that kind of perspective.** So I'm, I've always been an environmentalist at heart. I was on litter patrol in elementary school and environmental books are my favorite as a kid. But it really wasn't until my second year of grad school in 2006, that **I identified a way to merge my clinical scholarly and environmental interests by thinking about how climate change is an environmental stressor, and that that has an impact on both our mental and physical health. So to kind of think about the connection that I draw between mental health and climate change is really kind of from that perspective of stress and health and thinking about environmental stress on kind of a global scale.**” -Dr Kristi White
* “...it occurred to me that **I was becoming an expert in helping people make meaningful health behavior change**, right. So how can we help motivate people into making meaningful behavior changes to change the trajectory of their health outcomes? And **so it occurred to me that as someone who is developing expertise in helping people make a meaningful change to their behaviors, I had a unique role that I could play in addressing climate change because we can kind of think about it as like a collective health behavior, but more on a planetary scale, given that climate change is really a Human Behavior Driven problem, at least climate change as we know it today.** And so I felt sort of a sense of responsibility and inspiration to kind of think about **how do we both understand how the environment and how climate change is impacting our health and how can we make some changes to adjust to that, but then also, how can we make changes to better take care of the environment as well? So having this sort of reciprocal relationship and symbiotic relationship with the environment to try to create a better sense of balance because things are very clearly out of balance?** **And if we want to be responsible stewards for our own health and for the health of future generations, as well as for other species that we share this home with, we have to make some pretty significant changes**.” -Dr Kristi White
* “So for some people, it's showing up as anxiety about the future, having difficulty planning and without sort of a more certainty about what the future is going to look like. There's a lot of uncertainty around what am I going to do for my career? What choices am I going to make in terms of starting a family? Does it make sense to start a family? Is it ethical to do that? **There are lots of questions that younger folks are really grappling with that older generations had the privilege of knowing and not having to really worry about or think about.**” -Dr. Kristi White
  + “It's a kind of privilege to be able to check out and not have to worry about some of these things because it doesn't directly impact [them].” -Dr. Kristi White
* “...extreme heat affects us both psychologically and physiologically. I mean, it's a type of environmental stressor. It affects our sleep, it's associated with worse mental health outcomes. We see an increase in emergency mental health services with increased temperatures. And there are some psychiatric medications that affect the body's ability to regulate its temperature. So some people who are taking certain psychotropic medications are at greater risk of heat related illness during heat waves. It can impair our cognitive functioning. **And one of the things that I'm most concerned about is we see a relationship between heat and aggression and violence. And so as it gets hotter, we see people become more aggressive and violent towards others. And it's predicted that aggression and violence and conflict is going to increase as our world continues to get hotter.** And so that's definitely something that is on my radar as a behavioral health professional.” -Dr. Kristi White
* “**Solastalgia is the distress that we get by the environmental change that impacts people while they're directly connected to their home environment. And it can manifest differently for different people and different experiences just like other types of grief and loss.** So it might arise more slowly as the environment changes and we lose our ability to participate in beloved activities. **For some indigenous communities who really experienced that connection to the land, much like one would experience that connection to family, the loss of those personally important places and destruction of the land that they feel a deep bond and connection to can be felt very strongly similar to grieving the loss of a family member.** And then other people in other situations, it might arise really quickly, like after a natural disaster. **A personal example of this is that I love waterfalls. Waterfalls and trees are kind of the ways that I connect with nature myself. And this past summer, Minnehaha Falls dried up and it was this beloved place that I would often go to for a sense of restoration and connection to nature and stress relief. But going there and seeing it slowly dry out and then be reduced to a trickle and then to nothing was this experience for me where something that was typically a source of stress relief and restoration became a source of loss and grief.” -Dr. Kristi White**
* **“We don't want to gaslight people into thinking that they need to be well adjusted to a toxic system. Being upset and concerned about this is appropriate and is warranted and is not a mental health condition… So if you’re grappling with some of these questions and these concerns when you're entrenched in the space of dealing with one of the most existential threats of our time, it's going to be overwhelming at times… I really advocate as a mental health professional to not over-pathologize normative, adaptive stress responses.” -Dr. Kristi White**
* “But then there are other communities who have been dealing with the mental health impacts of climate change for far longer. So you know, **communities that live in sacrifice zones, frontline communities, indigenous communities, who have had their land and livelihood threatened by some of the extractive practices and environmental degradation practices have been dealing with the mental health impacts of these environmental changes for generations. And so, for some people, it's kind of showing up as this sort of historical trauma or an intergenerational stress and for others, it feels a little bit newer**.” -Dr. Kristi White
* “We know the health impacts of climate change and extreme heat affects everyone but it doesn't affect everyone the same. Communities of color, indigenous communities, communities that have been subjected to marginalization all are at greater risk and are disproportionately impacted by climate change and the health effects of climate change. **Some of the ways that this manifests too is with environmental injustice. There are communities that have been designated as worthy of sacrifice. So this is where waste or pollution or toxic citing of certain plants get placed, or, you know, there's less political power disenfranchisement, disempowerment. And so when we think about where do the risks get diverted? It's into these communities, right.**” -Dr. Kristi White
* “But I think what's really important and an important shift that we're seeing happen is recognizing that we're sometimes inappropriately applying individual solutions to systemic problems, systemic level problems, right and recognizing the importance of thinking from a systems perspective and what are the structural and environmental and systemic determinants of these mental and physical health outcomes that we need to address at a more upstream level as opposed to thinking about assigning the responsibility to individuals, right?” -Dr. Kristi White
* “**We think about how climate change exacerbates these health inequities that are rooted in structural racism. And we can see that things like extreme heat, for example, that tends to be worse in historically redlined neighborhoods is still having an impact on the health of those communities. Today, there are certain communities where there is greater exposure to toxic waste and pollution, and asthma and cancer rates are higher in those communities because of the increased exposure.**” -Dr. Kristi White
* ​​”**I want to make sure to call out systemic racism and European colonialism as significant driving factors in creating and perpetuating environmental injustice. It's pretty clear that we would not have climate change as we know it today if we didn't view certain communities and groups of people as worthy of sacrifice. So these kind of systemic injustices and mindsets and policies and practices that are fundamental to how our society works, are very much driving factors that play a huge role in creating those injustices and inequities, and we need to address things at that level, too, if we're going to make some adaptation plans that are going to not leave certain communities behind.**” -Dr. Kristi White

## Urban Greening

“I think Minneapolis-St. Paul metro is so far ahead of so many cities in terms of their available GIS data for impervious-pervious surfaces.” -Mo

“Not all trees are the same as our wonderful plant-people know, certain trees are better than others for heat regulation, just given their size of the canopy or you know, how they work and function. So those are kind of those big scale systems that we look at when we think about planning projects. And then from a site perspective, it really becomes more about those how you create those micro climates. So how are you blocking sun? Are you using shade structures? Are you using trees?”-Mo

* [DNR Native Trees](https://files.dnr.state.mn.us/assistance/backyard/treecare/best-yard-trees-changing-climate.pdf)
  + Selecting native plants

“Stormwater I think we're seeing some really progressive work around how stormwater is used, used in the site and not necessarily hiding it but making it visible through either a water feature or dry bed, something like that, but we also know that water when it evaporates, has a cooling effect. It's one of the great lessons learned of very beautiful designs from like the 1400s of how they use water to create those micro climates. But we can also do it for multiple reasons like it cools but it's also an environmental feature.” -Mo

“One of the other things that they found is that you don't just plant a tree you plant trees and very specific geometric relationship to each other. And then you planted understory at three tiers. So you have ground cover, you have shrubs, and then you have trees, so you're basically like hitting pollution at different levels based on the size of the particulates.”- Mo

“So the thing that comes to mind is requiring a certain amount of like structural soil per tree. So going back to that tree trenching, which urban trees will survive better, they'll grow thrive. That's not a requirement, like the city of Minneapolis just comes out and puts these poor little stubby trees in like a tiny little bed like the size of the planting areas that are required versus the size of the road. All of those things are set in standards that I think could could be done in a way if your main motivation is to do more cooling for a city they can be looked at differently.”-Mo

* Dr. Surapaneni: “[We need] better nature-based solutions for urban heat islands and high risk communities, whether that’s improving green space in urban heat islands or reflective paint.”

1. <https://e360.yale.edu/features/with-a-green-makeover-philadelphia-tackles-its-stormwater-problem> [↑](#footnote-ref-1)
2. Photo and info from : <https://www.swnewsmedia.com/eden_prairie_news/news/community/green-neighborhood-unveils-playground/article_3b3299c2-9979-583c-a79b-5f33ca3ff707.html> [↑](#footnote-ref-2)
3. <https://www.publichealthlawcenter.org/sites/default/files/inline-files/ExtremeHeat-Memo.pdf> [↑](#footnote-ref-3)
4. <https://www.tpl.org/parkscore/rankings> [↑](#footnote-ref-4)