# Miami-Dade County
Extreme Heat Toolkit

Acknowledgements

We would like to thank our 2021 Equity, Diversity, and Inclusion (EDI) Fellow, Kelly Sophia Soluri, for her work on this project as well as the Urban Sustainability Directors Network (USDN) for supporting the EDI Fellowship program.

A special thank you to our many partners who contributed their expertise and time by sharing stories and resources for this toolkit. Individuals we interviewed are credited in the Contacts section.
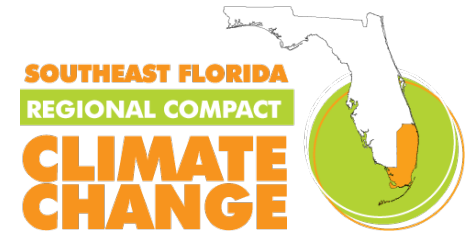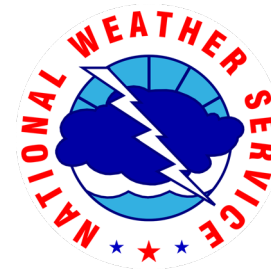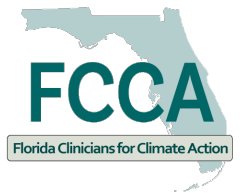
Extreme Heat in South Florida

In South Florida, a traditionally hot region, heat continues to present new challenges. The risks to human health and well-being due to extreme heat are increasing as a result of both past design choices in South Florida's development and the future of climate change[1]. We can expect the risks to human health and livelihoods[2] to become worse as both general urban heat and climate-driven extreme heat events become both more intense and less predictable in the future[3.].
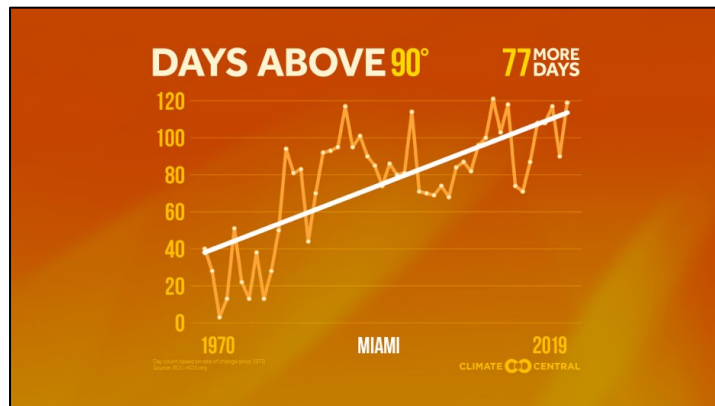
The number of days where temperatures exceed 90 degrees Fahrenheit has continued to increase over the last few decades.

Specifically, Miami-Dade's urban sprawl, like many other major metropolitan areas, has contributed to an overall increase in surface and air temperatures. The prevalence of concrete, asphalt, and other heat-absorbing surfaces throughout the region compounds the impacts of heat through the Urban Heat Island Effect[4], which in turn further raises temperatures that are already rising due to climate change. In addition, this increase in heat due to urbanization varies greatly throughout the region. Some communities even just a few blocks apart can experience hyper-local differences in heat depending on vegetation cover, access to air conditioning, and more[5]. Further, an individual's ability to cope with heat, or their vulnerability, varies with income, age and pre-existing health conditions[6].
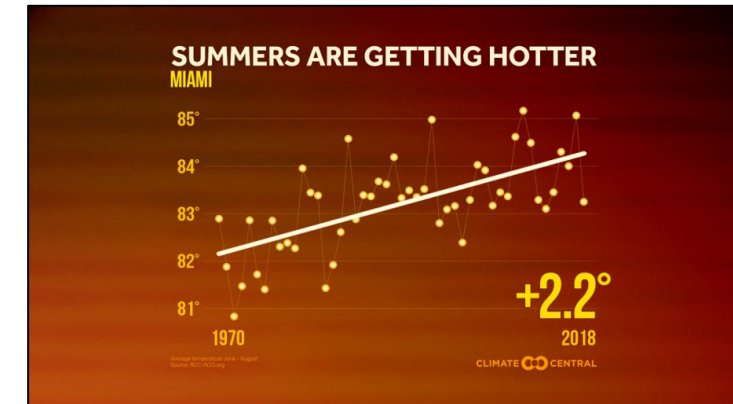

Not only is it hot more often, but also the peak temperature for summer days continues to get higher, increasing the intensity of heat.

Equity and history are essential to understanding the past and future of heat in Miami-Dade[7]. Areas with the worst heat outcomes are neighborhoods that were historically impacted by redlining - the discriminatory practice of denying services, amenities, funding, and housing on the basis of race or ethnicity. On the next page, you can see how this overlap appears when comparing maps which show surface temperature and historic redlining or "Neighborhood Grading" practices. Typically, neighborhoods which experiences historic redlining do not have many heat mitigation features like trees, parks, or well-maintained housing.

The result of this intersection is that communities with the least resources to adapt to heat also disproportionately experience the most intense heat impacts[8]. Within these communities, individual vulnerability varies significantly, with the most vulnerable groups including, but not limited to, elderly residents, children, pregnant persons, and people with pre-existing medical conditions. More broadly, it's critical that we prioritize efforts to reduce urban heat in those neighborhoods where both the vulnerability of individuals as well as community-scale heat challenges overlap and present the greatest risk.

*All referenced sources can be found on page 35.

Surface Temperature (°F)
01/05/21
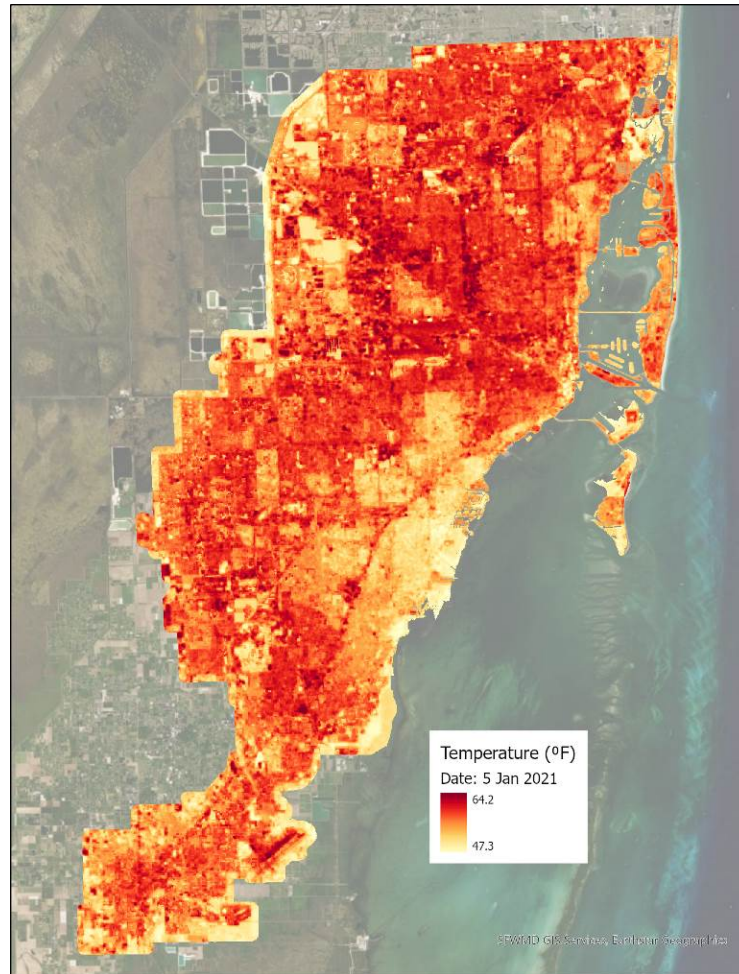
The map depicts surface temperature for Miami-Dade County as measured on 1/5/21 in degrees Fahrenheit, courtesy of the Miami-Dade County Tree Canopy Analysis. Heavily developed, inland areas experience higher temperatures upwards of 17 degrees hotter than coastal, more vegetated areas.

Home Owners' Loan Corporation Neighborhood Grading Map
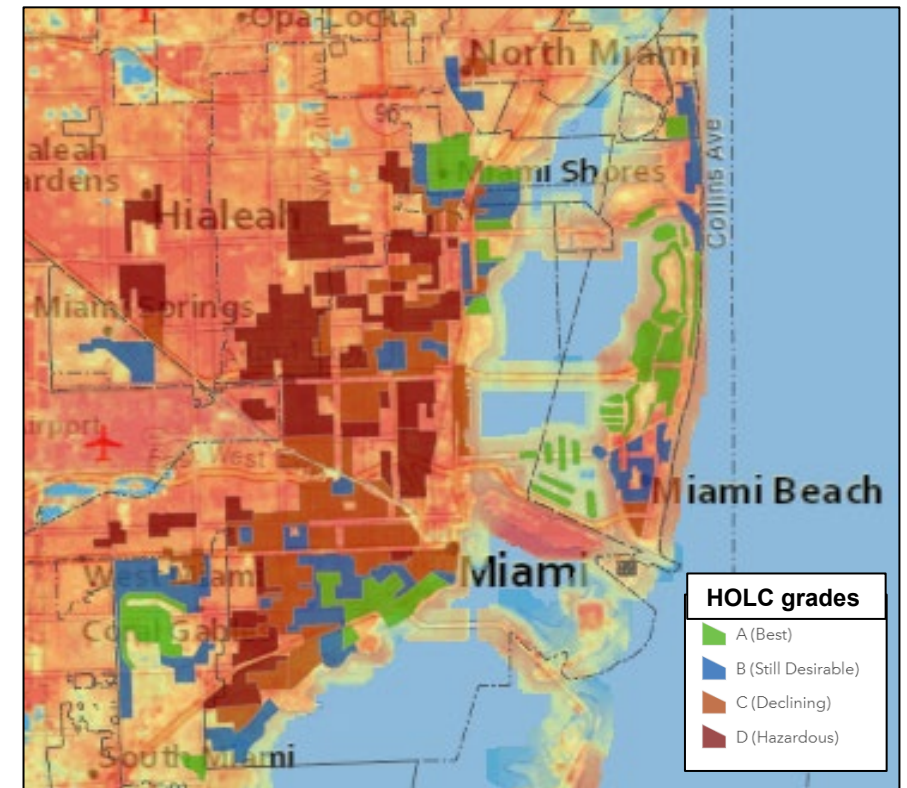
The federal Home Owners' Loan Corporation (HOLC) graded neighborhoods to reflect mortgage security in the 1930s and '40s. Highest graded areas were minimal risk for mortgage lenders when determining which areas were safe investments. Areas graded lowest were labeled hazardous[9]. This practice is called redlining. Neighborhoods receiving lower grades typically consisted of Black, Brown, Jewish, and working-class immigrant families. Effects from redlining linger. This map overlays HOLC neighborhood grades in the Cities of Miami and Miami Beach with maximum surface temperature (from the map on the left). Typically, areas graded "C" and "D" received less investment and may have less tree canopy and a higher percentage of industrial land uses and accompanying features like parking lots. Map courtesy of University of Richmond's Digital Scholarship Lab. Map data accessed 10/12/2021 at <<https://mdc.maps.arcgis.com/home/item.html?id=ef0f926eb1b146d082c38cc35b53c947>>.

Our process

Over the summer of 2019, the Office of Resilience conducted a series of community workshops and conversations to inform the Miami-Dade County Sea Level Rise Strategy. It became clear that our residents were also seeking solutions to adapt to extreme heat in addition to sea level rise. In response, our team committed to working closely with the newly appointed Chief Heat Officer to further Miami-Dade's efforts on extreme heat resilience.

From December 2020 to June 2021, the Office of Resilience worked with researcher Ludovica Martella to study the extreme heat network in Miami-Dade County. Building on that research, the team launched this project to create a solutions-based toolkit to explore policy, project, and programming options to adapt to extreme heat impacts we are feeling on the ground and mitigate future impacts.

Through conversations with many stakeholders and partners, we identified key tools to adapt to and mitigate impacts from extreme heat. We held **21 conversations** with the following groups:

- 7 community-based organizations
- 7 county and municipal staff
- 4 university partners
- 2 clinicians
- 1 national weather agency staff

Key issues identified included lack of data, the need for more and farther-reaching communications, and funding.

In the summer of 2021, Jane Gilbert was selected as the County's first-ever Chief Heat Officer. Her leadership gives visibility to the issue, coordinates County efforts on extreme heat under the Resilient305 Strategy umbrella, and identifies opportunities for targeted funding to projects and programs to reduce impacts from extreme heat.

Mayor Daniella Levine Cava and her team welcome the new interim Chief Heat Officer, Jane Gilbert, and Dr. Cheryl Holder, Task Force co-leader, to the County.

Guiding principles

Using the Miami-Dade County Sea Level Rise Strategy and Climate Action Strategy as models, we identified key principles that should guide County decisions, investments, and programs to increase extreme heat resilience.

Guiding principles:

- **Be equitable** by recognizing that historic discriminatory policies have led some residents to have fewer resources to adapt to climate change. Actions should be driven by inclusive engagement, fair policies, and direct investments to target these disparities.
- **Reduce environmental pollution** by not adding greenhouse gas emissions or other pollutants to our air and waterways. Actions should not be implemented at the expense of the environment and human health.
- **Make us safer** by helping the community adapt to extreme heat now while implementing long-term solutions to help mitigate future impacts. Actions should not increase vulnerability to other hazards.
- **Be flexible** and able to respond to changing conditions. Actions should be adaptable to future conditions.
- **Build with nature** by working with natural processes and natural materials to address extreme heat. Actions should implement green nature-based solutions when feasible.
- **Align with other County initiatives and plans** such as the Sea Level Rise Strategy, Climate Action Strategy, Comprehensive Development Master Plan, the Long-Range Transportation Plan, the Parks and Open Space Systems Master Plan, the Resilient305 Strategy and others. Actions should complement other long-term planning initiatives.

County park staff leading a group through a forested park. Our green and blue spaces serve as critical resources for mitigating the urban heat island effect and as important focal points where the community experiences and learns more about extreme heat.

Inventory of Extreme Heat Tools

This toolkit provides an overview to inform conversations and decision-making about extreme heat solutions. The icons below represent the suite of tools offered in this guide. They are split into three themed areas: Environment, Infrastructure, and Community Engagement. These themes were identified during partner engagement and discussion with the interim Chief Heat Officer.

The following pages explore each theme and include consideration of benefits and tradeoffs, a review of relevant tools, a case study, and a set of recommended next steps for Miami-Dade County to explore further. Ultimately, this guide is a stepping stone to the broader Heat Action Plan led by the Chief Heat Officer.

Environment

- Expand & Preserve Urban Tree Canopy
- Protect & expand habitat
- Green our playgrounds
- Depave
- Support community gardens
- Adapt Cooling Centers
- Enhance pedestrian and biker experience
- Implement the Better Bus Network
- Enhance public transportation services

Infrastructure

- Pilot innovative materials
- Scale weatherization program
- Enhance equitable access
- Prioritize affordable housing
- Implement active and passive cooling
- Shade Bus Stops
- Pilot innovative streetscapes
- Partner with schools
- Create Heat Health PSAs

Community Engagement
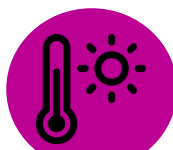
- Enhance Data on Health outcomes
- Establish Public/Private Partnerships
- Integrate Heat into Plans
- Complete Heat Action Plan
- Support regulations for workers' rights
- Communicate heat warnings/advisories
- Prioritize workforce education and training
- Create Neighborhood Heat Ambassador Program
- Develop & Maintain Networks
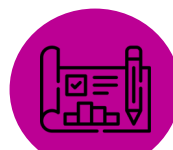
Environment

Increasing and preserving blue and green spaces can help us adapt to existing impacts from extreme heat while enhancing features we can use like shady streets and playgrounds, water access points, and community meeting spaces.

These tools are explored further on the following pages:

Expand & Preserve Urban Tree Canopy

Protect & expand habitat

Green our playgrounds

Depave

Support community gardens

Blue & Green Spaces

Benefits: Water views and access, parks spaces, and tree canopy help neighborhoods stay cool, can increase property values, enhance safety for pedestrians, cyclists, and motorists, and contribute to the physical and mental well-being of residents.
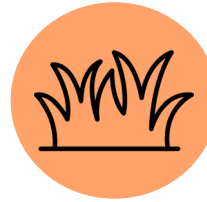
Tradeoffs: Plans should consider nature-based solutions in context to avoid climate gentrification and green-lining. Managers and policymakers should plan for changing conditions and adopt adaptive management practices, such as choosing the right plant or tree for the right place now and in the future.

Residents participate in a County event. Green spaces like the Deering Estate at Cutler provide a direct connection with the water and serve as meeting places and educational spaces to learn more about our landscapes and their relationship with heat.

Tool Options

A. **Expand the Urban Tree Canopy** by working with partners to support tree planting efforts, consult with urban foresters on planting methods and adaptive management, and update policies and regulations on landscape maintenance standards.

B. **Protect & expand habitat** through supporting and expanding the Environmentally Endangered Lands (EEL) program, restoring native habitats including wetlands, and providing resources for maintenance.

C. **Green & blue our playgrounds** by increasing natural shading with native fruit trees, layered vegetation around shared outdoor areas, and splashpads and other water features.

D. **Depave** applicable areas by removing impermeable surfaces and replacing with permeable materials, to reduce urban heat islands and improve water management in industrialized areas.

E. **Support community gardens** to improve the availability of fresh produce and provide environmental education.

Actions to Explore

A. **Review and draw lessons from the City of Miami and the City of Miami Beach's tree canopy preservation codes,** including Chapters 46 and 126 from the City of Miami Beach's Urban Forestry Master   Plan.

B. **Publish an updated Miami-Dade County urban tree canopy assessment** in collaboration with University of Florida and Florida International   University   (expected   Fall   2021).

C. **Accelerate work under Miami-Dade County's Million Trees Miami and Adopt-A-Tree programs** and with community-based organizations to identify additional public and private resources to accelerate tree planting efforts focusing on areas of highest need.

D. **Continue to work with the Parks, Recreation & Open Spaces Department** to implement projects in conjunction with the Miami-Dade Greenways, Trails, and Water Vision & the Water Recreation Access Plan (WRAP).

Case Study: Growing Green Playgrounds & Million Trees Miami

Miami-Dade County Parks, Recreation and Open Spaces is a leader in heat-safe operations and design. Efforts include heat training protocols for staff, adaptive shade plans, cooling features in parks, and adjustments in programming to limit heat exposure. In particular, the County's Growing Green Playgrounds improves safety and visitor experience in play spaces. In July 2021, the program planted 54 trees at Millers Pond Park to shade the playground, parking lot, and benches. The Million Trees program is also leading the way in collaborating with the private sector. They have forged partnerships with various corporations such as TDBank, FedEx, DHS, and many more. These private-public partnerships are important mobilize resources and action for climate resilience.

Infrastructure

Designing our buildings, transportation systems, and associated infrastructure like streets and bus stops to mitigate extreme heat can help us adapt to more frequent, hotter days while reducing impacts to our health and our environment.

These tools are explored further on the following pages:

Buildings Tools:

Pilot innovative materials

Adapt Cooling Centers

Prioritize affordable housing

Implement active and passive cooling

Scale weatherization program

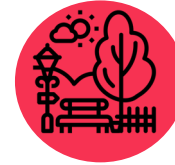Enhance equitable access

Transit Tools:

Shade Bus Stops

Enhance pedestrian experience

Implement the Better Bus Network

Enhance public transportation services

Pilot innovative streetscapes

Buildings

Benefits: Building design and materials impact physical and mental health and contribute to greenhouse gas emissions. Creating more sustainable buildings and enhancing existing structures to prioritize health and the environment helps reduce emissions and saves money over time.

Tradeoffs: Sustainable building materials and resilience retrofits can have a higher up-front cost which can be burdensome for low-income individuals looking to upgrade their homes. To be equitable, additional funding is needed to assist renters and homeowners with weatherization and other sustainability enhancements.

The Perez Art Museum incorporates sustainable design and materials, including passive cooling with outdoor spaces and awnings. It also provides views of the water to connect visitors to our natural spaces in Miami-Dade.

Tool Options

A. **Pilot innovative materials** such as cool pavements, adaptive shading plans, solar panel shading, experimental landscape architecture and other tools in collaboration with government and academic partners.

B. **Adapt Cooling Centers and Evacuation Shelters** with energy water redundancy and other emergency management retrofits to create a network of resilience hubs. To increase accessibility, mobile cooling centers with medical and hydration services can be deployed.

C. **Prioritize affordable housing** through an energy burden fund, A/C giveaways, and increased funding for maintenance, including A/C unit replacements. Invest in greener and cost efficient utilities for lower-income residents.

D. **Implement active and passive cooling** with foresters and architects to construct parks and playgrounds to cool off outdoor spaces and provide shade.

E. **Scale weatherization program** by expanding education to eligible residents and increasing funding for weatherization projects. Partner with community based organizations to expand services.

F. **Enhance equitable access** to water features such as stormwater parks, public pools, fountains, splashpads, and misters.

Transit

Benefits:Transit users often have few options to avoid direct heat exposure before or after rides. Efforts to reduce heat impacts associated with public transportation will help transit users more safely and comfortably navigate Miami-Dade's transit system.

Tradeoffs: Implementing heat mitigation features to streetscapes and transit experiences can involve complex considerations to maximize the effectiveness of shade and minimize maintenance concerns. Cooler materials are often more expensive than conventional approaches.

A transit rider waits for the bus under the shade tree. Shading bus stops and other outdoor areas like picnic tables and benches can reduce exposure to extreme heat and make the pedestrian experience healthier and more comfortable.

Tool Options

A. **Shade bus stops** through retrofits to shade throughout the day and supply stops with resources on extreme heat & pedestrian   safety.

B. **Enhance the pedestrian experience** by equipping multimodal and pedestrian lanes with natural shading from native plants and provide frequent hydration access. Support creation of separate bike   and   pedestrian   lanes   from   vehicle   lanes.

C. **Implement the Better Bus Network** to improve frequency of transit to decrease waiting times, enhance more first/last mile routes,   and   utilize   express   buses.

D. **Enhance public transportation services** to ensure that each mode of public transportation has efficient cooling for passenger comfort.

E. **Pilot innovative streetscapes** through natural and native landscapes, zoning methods, and resilient construction materials.

Actions to Explore

A. **Prioritize greening and shading bus stops** particularly in communities experiencing extreme urban heat.

B. **Support continued implementation of the Better Bus Network and Strategic Miami Area Rapid Transit (SMART) Plan** to cut down wait times for transit services.

C. **Continue to improve and expand pedestrian- and bicycle-oriented streetscapes** and multimodal transportation options.

D. **Work with Office of Emergency Management to explore and integrate heat risk and energy redundancy into facilities and operations**.

E. **Pass the Building Performance Ordinance** including benchmarking and energy mitigation.

F. **Pass a County Urban Heat Island Ordinance** to holistically address the causes and effects of extreme heat in the built environment.

Case Study: Shading Dade

The Florida International University and University of Miami-led study *Shading Dade* uses iButton sensors placed on streets and at parks to measure the heat on a hyperlocal scale to identify urban heat "hot spots" and investigate factors that reduce or increase heat. *Shading Dade* is a collaborative citizen science effort that features the participation of volunteers to assist with sensor deployment and other aspects of the project. The project has been ongoing since 2018 and still deploys iButton sensors. Shading Dade welcomes new volunteers - if you would like to participate, contact shadingdade@gmail.com or visit https://miamistories.net/.

Community Engagement

Communicating extreme heat impacts across our community can save lives and help us build stronger connections between the County, residents, and a variety of community partners. Deepening engagement with existing partners and expanding our networks helps us collaboratively identify, educate, and advance solutions to protect us from extreme heat.

These tools are explored further on the following pages:

Communications Tools:
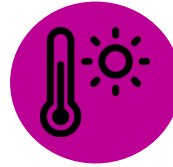
Partner with Schools

Create Heat Health PSAs

Prioritize workforce education and training

Enhance Data on Health Outcomes

Create Neighborhood Heat Ambassador Program

Communicate heat warnings/advisories

Engagement Tools:

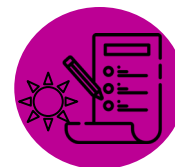Support regulations for workers' rights

Integrate Heat into Plans

Establish Public/Private Partnerships

Develop & Maintain Networks

Complete Heat Action Plan

Communications

Benefits: Clear, accurate, and consistent messaging around heat risks and solutions can ensure Miami-Dade County residents are equipped with the knowledge and resources to adapt and protect themselves.

Tradeoffs: The challenges associated with extreme heat are likely to continue to evolve as climate change continues to exacerbate changes to weather patterns and global temperatures. Communications around heat will need to continue to adapt to these changes and reach all of our residents.

Visitors interact with the Adrienne Arsht-Rockefeller Foundation Resilience Pod which provides information and resources on resilience-related topics like energy efficiency.

Tool options

A. **Partner with Miami-Dade County Public Schools to** implement shading procedures and trainings for PE teachers, students and student athletes. Pilot resilient materials in new construction of schools and play spaces.

B. **Create Heat Health PSAs** to make broad public communications and materials available to various vulnerable groups.

C. **Prioritize workforce education and training** on the risks of prolonged heat exposure and identification & response.

D. **Enhance Data on Health Outcomes** by sharing current heat data through accessible data repositories, reformatting heat data collection methods, and conducting a thorough analysis on existing data.

E. **Create Neighborhood Heat Ambassador Program** perhaps through expansion of Citizen Emergency Response Team (CERT) program to mobilize volunteers to conduct check-ins on vulnerable groups such as elderly residents living alone.

F. **Communicate heat warnings/advisories** and revisit metrics on heat thresholds.

Engagement

Benefits: Miami-Dade County knows residents are experts on heat in their own lives. Including their diverse experience in decisions will make sure solutions serve the most impacted communities.

Tradeoffs: Comprehensive engagement that includes all our communities' diverse values and perspectives can be a slow process. It is critical that adequate outreach and engagement opportunities are provided to our residents, particularly in communities historically or currently most impacted by extreme heat.

The County regularly collaborates with residents on resilience project planning in their neighborhoods and communicates about issues like extreme heat and sea level rise risks.

Tools

A. **Support regulations for workers' rights** by supporting mandatory safety procedures for professions laboring outdoors. Prioritize enforcement to protect lives and increase safety.

B. **Integrate Heat into Strategies and Plans** including as a hazard in the Local Mitigation Strategy.

C. **Establish Public-Private Partnerships** to collaborate and scale funding, reach and incentives for sustainability and heat initiatives.

D. **Develop & Maintain Networks** to create interdisciplinary solutions through knowledge sharing.

E. **Complete Heat Action Plan** to include a vulnerability analysis, stakeholder engagement, prioritization and timeline for initiatives, recommended funding/financing pathways, and a vehicle for tracking progress.

Actions to Explore

A. **Work within County and with local National Weather Service to increase messaging around heat risks** on daily hazard reports and explore updates to the heat advisory and warning thresholds.

B. **Work with healthcare partners to review coding practices** for heat related illnesses.

C. **Add heat as a focus area for Environmental Education Grants**.

D. **Conduct Heat Health Campaigns during summer months** to ensure residents are aware of best practices and upcoming heat events.

E. **Add extreme heat into other key County plans** including the Local Mitigation Strategy, long range capital planning, and current and future Adaptation Action Areas.

F. **Create a framework and process for Heat Action under the umbrella of Resilient305**.

G. **Build on public-private partnerships** such as the Extreme Heat Resilience Alliance.

H. **Explore new partnerships** with local nonprofit and community groups.

Case study: WeCount's ¡Que Calor!

Many residents in our County work outdoors including those who work on farms, at construction sites, or in delivery and logistics among many others. Their work is essential to our community as they provide food, protect our infrastructure, and improve our public safety. However, these professions disproportionately expose them to heat and make them susceptible to illnesses. The South Dade-based WeCount! works to protect the rights of agricultural and construction workers in the County. Their worker-led campaign *¡Que Calor!* seeks to implement and enforce common-sense job standards, including access to cool, clean water, shaded rest breaks, and heat illness education. *Que Calor!* develops leaders, promotes bottom-up civic engagement, and expands multilingual peer-to-peer education on the growing health risks of extreme heat in communities, including the workplace.

Contacts

Name	Role	Organization
Alexandra Ender	Program Manager	Dream in Green
Alissa Farina	Resilience Programs Manager Resilience and Sustainability	Division City of Miami Department of Resilience and Public Works
Alyssa Hernandez	Shading Dade Assistant Programs Coordinator	Florida International University
Amy Knowles	Chief Resilience Office	City of Miami Beach
Annie Lord	Director	Miami Homes for All
Caroline Lewis	Founder	The CLEO Institute
Claudia Navarro	Deputy Director	WeCount
Dr. Amy Clement	Professor and Shading Dade PI	University of Miami

Name	Role	Organization
Dr. David Woolsey	ER Doctor	Jackson Hospital
Dr. Jeffrey Bernstein	ER Doctor and toxicologist at Florida Poison Center	Jackson Hospital
Dr. Jen Posner	Professor	University of Miami
Dr. Joanna Lombard	Professor, School of Architecture / Public Health Sciences	University of Miami
Dr. Tiffany Troxler	Professor and Shading Dade PI	Florida International University
Elizabeth Wheaton	Director of Environment and Sustainability	City of Miami Beach
Esteban Wood	Policy & Civic Engagement Lead	WeCount
Jane Gilbert	Chief Heat Officer	Miami-Dade County

Contacts

Name	Role	Organization
Jonathon Klopp	Special Projects Coordinator for Climate Change Mitigation	Division City of Miami Department of Resilience and Public Works
Lauren Ordway	Senior Program Officer	The Institute for Sustainable Communities, Southeast Florida Regional Climate Change Compact
Kelly Sophia Soluri	2021 Urban Sustainability Directors Network Extreme Heat and Equity Fellow	University of Miami
Ludovica Martella	Extreme Heat and Equity Researcher	Independent Researcher
Melissa Baldwin	Director	Florida Clinicians for Climate Action
Miguel Soria	Assistant Director of Highway Engineering	Miami Dade County Department of Transportation and Public Works
Natalia Brown	Climate Justice Program Manager	Catalyst Miami

Name	Role	Organization
Olivia Collins	Program Manager	The CLEO Institute
Oscar Londono	Director	WeCount
Robert Molleda	Warning Coordination Meteorologist	National Weather Service
Russell Paez	Associate Director of U.S. Programs	The Institute for Sustainable Communities
Zelalem Adefris	Program Manager	Catalyst Miami
Miami-Dade County County Parks and Recreation and Open Spaces Department (PROS)		
Miami-Dade County Department of Transportation and Public Works (DTPW)		
Miami-Dade County Office of Emergency Management (OEM)		
Miami-Dade County Regulatory and Economic Resources Department (RER)		

References

1. Keellings, David, and Peter Waylen. "Increased Risk of Heat Waves in Florida: Characterizing Changes in BIVARIATE Heat Wave Risk Using Extreme Value Analysis." *Applied Geography,* vol. 46, 2014, pp. 90–97., doi:10.1016/j.apgeog.2013.11.008.

2. Shindell, Drew, et al. "The Effects of Heat Exposure on Human MORTALITY throughout the United States." *GeoHealth*, vol. 4, no. 4, 2020, doi:10.1029/2019gh000234.

3. Jones, Bryan, et al. "Future Population Exposure to US Heat Extremes." *Nature Climate Change*, vol. 5, no. 7, 2015, pp. 652–655., doi:10.1038/nclimate2631.

4. Stone, Brian, and Michael O. Rodgers. "Urban Form and Thermal Efficiency:How the Design of CITIES Influences the Urban Heat Island Effect." *Journal of the American Planning Association*, vol. 67, no. 2, 2001, pp. 186–198., doi:10.1080/01944360108976228.

5. Venter, Zander S., et al. "Hyperlocal Mapping of Urban Air Temperature Using Remote Sensing and Crowdsourced Weather Data." *Remote Sensing of Environment,* vol. 242, 2020, p. 111791., doi:10.1016/j.rse.2020.111791.

6. Ebi, Kristie L, et al. "Hot Weather and Heat Extremes: Health Risks." *The Lancet*, vol. 398, no. 10301, 2021, pp. 698–708., doi:10.1016/s0140-6736(21)01208-3.

7. Wilson, Bev. "Urban Heat Management and the Legacy of Redlining." *Journal of the American Planning Association*, vol. 86, no. 4, 2020, pp. 443–457., doi:10.1080/01944363.2020.1759127.

8. Hansen, Alana, et al. "Vulnerability to Extreme Heat and Climate Change: Is Ethnicity a Factor?" *Global Health Action*, vol. 6, no. 1, 2013, p. 21364., doi:10.3402/gha.v6i0.21364. https://www.tandfonline.com/doi/full/10.3402/gha.v6i0.21364

9. Robert K. Nelson, LaDale Winling, Richard Marciano, Nathan Connolly, et al., "Mapping Inequality," American Panorama, ed. Robert K. Nelson and Edward L. Ayers, accessed September 17, 2021, https://dsl.richmond.edu/panorama/redlining/[YOUR VIEW]