





Let us know when you're coming from!

Mitigating Heat Islands

May 5, 2023

IG: Sustainable_Jersey | Twitter: @SJ_Program and @SJ_Schools | FB: @SustainableJersey | LinkedIn: sustainableiersey

Agenda

- Intro to heat islands and the Heat Island Assessment & Mitigation Plan action
- Newark heat islands; Implications on transit planning
- 1. Developing mitigation strategies
- 4. Tree planting in Trenton
- 5. Q&A







of NJ public school districts registered with Sustainable Jersey for Schools









What is a heat island?

Heat islands, also known as hotspots, are areas of land with higher **surface temperature** than surrounding areas.

They are primarily caused by lack of vegetation and the absorption of solar radiation.







Negative Impacts of the Heat Island Effect

CLIMATE CHANGE IMPACTS ON HUMAN HEALTH & COMMUNITIES

September 2022



- Public health: People with chronic health conditions become more vulnerable to heat-related illnesses → increase in hospitalizations, death
- Cost: Temperature is slow to decrease in evenings → cumulative cost of cooling homes, businesses, schools, and government buildings
- Infrastructure: Buildings, roads, bridges absorb extreme heat → structural damage; maintenance made more difficult

All of these negative impacts will be further exacerbated by **climate change**.

Heat Island Assessment & Mitigation Plan

Tier	Requirements	Points
Tier 1	Heat Island Assessment - Conduct a heat island assessment and, if present, evaluate hotspots' effects on residents and workers in the area. Share findings with the local planning board.	5
Tier 2	Heat Island Mitigation Plan - If hot spots are identified in the Heat Island Assessment, municipalities must develop recommendations in the form of a Heat Island Mitigation Plan to mitigate the heat island effect in relation to specific hotspots. Communities must demonstrate the involvement of relevant stakeholders in the development of heat island mitigation strategies, especially if they are related to vulnerable populations.	+5 (10 in total)
Tier 3	Plan Implementation - Municipalities must implement at least one recommendation in their Heat Island Mitigation Plan. A municipality can earn another 5 points if strategy implemented in Tier 3 directly reduces the impact of hotspots for vulnerable populations.	+5 (15 in total)



Heat Island Assessment and Mitigation Plan – Technical Guidance

A. Assessing Your Community's Hotspots (with screenshots)



Note: The example below analyzes hotspots near Sustainable Jersey's office. Sustainable Jersey is located at the Sustainability institute at the College of New Jersey in Ewing Township.

1. Open Sustainable Jersey's New Jensey Hart Island Map. Zoom to or search for your municipality.







Mitigating Heat Islands Session

2023 New Jersey Sustainability Summit 5/5/2023



Zenon Tech-Czarny, Principal Planner, Environmental Planning North Jersey Transportation Planning Authority

NJTPA Region

Bergen Essex Hudson Hunterdon Jersey City Middlesex Monmouth **Morris** Newark Ocean Passaic Somerset Sussex Union Warren





North Jersey Transportation Planning Authority

The Metropolitan Planning Organization for Northern New Jersey



STANDING COMMITTEES

Planning & Economic Development Committee Project Prioritization Committee Freight Initiatives Committee Regional Transportation Advisory Committee



City of Newark

Urban Heat Island Assessment

Prepared for the City of Newark Environmental Commission by Sustainable Jersey and the Sustainability Institute, The College of New Jersey

> November 1, 2017 (rev 2/15/2018)





Surface Temperature of the Newark area





Surface Temperature of Newark





Normalized Difference Vegetation Index (NDVI) Map





2010 Social Vulnerability





1. Newark Schools Stadium and Kasberger Field



NJTPA

2. University Hospital





3.60 Lister Ave



4. Central High School / Nat Turner Park and American History High School



5. Edison Parking



6. South Ironbound



Overview of Hot Spot Types

- Synthetic Turf Fields
- Dark Roofs
- Parking Lots / Large Areas of Asphalt
- Areas with Little Trees/Vegetation



Cooling Strategies and Actions

- Prepare for extreme heat events (Provide warnings, cooling centers, and access to air conditioning)
- Provide heat warnings or restrictions for existing fields and consider alternatives to existing Synthetic Turf fields
- Convert dark roofs to Cool Roofs or Green Roofs
- Plant more street trees
- Remove dark asphalt and add Cool Pavements and Green Infrastructure





Current Research





Maps of High-Intensity Heat and NJ TRANSIT Bus Routes





Newark Bus Ridership by Stop, High-Intensity Heat, and Tree Canopy



NJT

12th and Bergen in Newark







International Journal of Environmental Research and Public Health



Article Heat-Moderating Effects of Bus Stop Shelters and Tree Shade on Public Transport Ridership

Kevin Lanza 1,*0 and Casey P. Durand 2

- ¹ Michael and Susan Deli Center for Healthy Living, School of Public Health in Austin, The University of Texas Health Science Center at Houston, Austin, TX 79701, USA
- ² Michael and Susan Dell Center for Healthy Laving, Department of Health Promotion & Behavioral Sciences, School of Public Health in Houston, The University of Texas Health Science Center at Houston, Houston, TX 72000, USA; Coses: PDararddiuth Inter. edu
- Correspondence: Kevin L.Lanza@uth.tmc.edu

Abstract: Rising temperatures threaten the resilience of public transit systems. We determined whether has stop shelters and tree canopy surrounding bus stops moderated the effect of warm season temperatures on ridership in Austin, Texas, and whether shelters and trees were equitably distributed. For hus stops (n = 2273) of Capital Metropolitan Transportation Authority, boardings per bus were measured 1 April-30 September 2019. Air temperature data originated from the

Camp Mabey weather station. Tree canopy was calculated by cl imagery from the National Agriculture Imagery Program. Do median age, and bus commuters within census tracts of bus s American Community Survey. Using multilevel negative bins that shelters did not moderate the effect of high temperatures temperatures, each one percent increase in tree canopy was as in ridership compared to if there were no trees (1.7%) (p < 0.001) equitably distributed. Insignificant or modest effects of shelters temperatures may be attributed to the transit dependency of riwe recommend tree planting at bus stops to protect from riderst extreme heat.



Chatton: Lanas, K.: Darand, C.P. Heat-Moderating Effects of Has Stop Shefters and Tim Shade on Public Transport Rickenbig. Jul. J. Environ. Ros. Public Houlth 2023, 18, 463. https://doi.org/10.3390/jjerph 38020463

Keywords: public transit; climate change adaptation; resilien green infrastructure; built environment; temperature

- Temperature exhibited a negative association with ridership
- Trees at bus stops, not shelters, moderated the effect of extreme heat on ridership





Equity and Heat Vulnerability



Source: Yale Center on Climate Change and Health (YCCCH)



Thank You

Defining the Vision. Shaping the Future.



TRANSPORTATION PLANNING AUTHORITY

Zenon Tech-Czarny Principal Planner, Environmental Planning ztech-czarny@njtpa.org









Extreme Heat Resilience Action Planning

Sustainability Summit – Mitigating Heat Islands | May 5, 2023

Presented by Nathaly Agosto Filión, NJDEP Office of Climate Resilience



Photo: New Brunswick, NJ

EXECUTIVE ORDER 89: Establishes resilience positions, offices, and councils

Highlands Council "An Interagency Council on Climate Resilience (the "Interagency Council") is hereby established to coordinate the efforts of Executive Branch departments and agencies to develop and implement the Statewide Climate Change Resilience Strategy."

N.JSFDA

SCIENTIFIC REPORT

on Climate Change

nj.gov/dep/climatechange/data.html

Overview

- Comprehensive effort to synthesize the latest and most reliable scientific information on the current and predicted future impacts of climate change.
- The report is one component of the State's comprehensive strategy to both reduce emissions of climate pollutants that fuel global warming, and proactively plan and prepare for the climate impacts that New Jersey cannot avoid.





Nov. 2021: Updated Atlas 14 data; Extreme Event Precipitation Projections & Projection Tool



Sept. 2022: Climate Change Impacts on Human Health & Communities Addendum released



CLIMATE RESILIENCE

defined

The ability of social and ecological systems to absorb and adapt to shocks and stresses resulting from a changing climate, while becoming better positioned to respond in the future.



CLIMATE CHANGE RESILIENCE STRATEGY







https://www.nj.gov/dep/climatechange/resilience-strategy.htnjl
Resilience Action Plans

https://www.nj.gov/dep/climatechange /resilience-action-plans.html

3

NEXT STEP:

Resilience Action Plans

Serving as the two-year update to the Climate Change Resilience Strategy **Resilience Action Plans will be statewide,** detailing actions each agency will take to incorporate climate resilience into their policies, programs, and decision-making, consistent with the Strategy.

Each Resilience Action Plan will focus on a specific climate threat.

The first Plan will focus on extreme heat.

Agencies will work cooperatively to explore their respective work, identify gaps that exist, and coordinate action across State government to address those gaps.



EXTREME HEAT RESILIENCE ACTION PLAN



Why Extreme Heat Now?

- New Jersey is the 6th fastest warming state in the country.
- Summer temperatures in NJ in 2022 were the third hottest on record since 1895.
- High temperatures are associated with immediate and long-term health concerns, diminished air quality, and increased pressures on our food and water supply.

Of the ten hottest summers in NJ since 1895, all ten have occurred since 1999. Nine have occurred since 2005.







RESILIENCE ACTION PLANS

Extreme Heat & Public Health

CLIMATE CHANGE IMPACTS ON HUMAN HEALTH & COMMUNITIES



- The body's innate ability to cool itself can be outmatched by extreme heat.
- Excessive heat acts as a **threat multiplier**, leading to increased heat-related illnesses and mortality
- Children, the elderly, individuals with chronic health conditions, and people who work outside are the most vulnerable to extreme heat.

Overburdened communities are subject to the most severe consequences of climate change.

The combination of increased temperatures, precipitation, and humidity can lead to an increase in infectious disease spread. In this decade, climate change could result in a 55% increase in summer heat-related mortality and more than a doubling in mortality by the 2050s.

Under a high emissions scenario; compared to the 1990s. Source: NJ Scientific Report on Climate Change, 2020

Extreme heat impacts *every sector*.

INFRASTRUCTURE

- High temperatures can damage roadways and rail tracks as well as reduce the efficiency of powerlines.
- Electricity demand spikes during periods of extreme heat strain the power grid.

FOOD SUPPLY

- Rising temperatures affect the activity and spread of agricultural pests and weeds.
- An earlier spring and more frequent heat waves can disrupt crop cycles and cause harm to crops and livestock alike.
- Warmer temperatures are shifting fish populations northward, disrupting commercial fishing operations.

WATER SUPPLY & QUALITY

- High temperatures and intense storms create ideal conditions for harmful algal blooms.
- Extreme heat and more frequent droughts can impact the availability of potable water.

RESILIENCE ACTION PLANS

Each Resilience Action Plan will follow the same format.

Agencies have received guidance to ensure that the level of detail is sufficient.

The intent is for the Resilience Action Plans to create a mechanism in which to track and update the State's progress on its stated resilience actions.

Format

- Introduction
 - Purpose
 - Discussion of foundational documents
 - Scientific Report on Climate Change
 - Climate Change Resilience Strategy
 - Plan development process
- Topic Description
 - Overview
 - Statewide impacts
- State Actions
 - Action description
 - Detailed information table

Guidance

- Agencies are responsible for identifying their own relevant actions.
- Plans should make clear what actions an agency will take and why.
- Certain considerations will span across all topics and actions, including:
 - Environmental justice and equity
 - Funding
 - Research needs
 - Coordination



What Do the Actions Address?



Vulnerable Populations

- Access to air conditioning
- Energy reliability/ability to pay
- Outdoor workers
- Health/air quality



Built Environment

- Urban Heat Island
- Transportation system disruption
- Energy reliability
- Water supply



Natural Systems

- Forestry and Greening
- Crops and agriculture
- Wildfire
- Other species, habitats, and ecosystems



WHAT WILL THE ACTIONS ACCOMPLISH?

Increased education and awareness

Identification of vulnerable populations/infrastructure

Advanced scientific research/understanding

Retrofitted infrastructure (transportation and energy)

Improved coordination across agencies

Changes to state policy/standards to protect vulnerable populations

Green built environment and protection of existing tree canopy

Increased capacity in local communities

Resources funneled to underserved communities









Goal: Produce community-led resilience & adaptation action plans.

Funding is announced periodically on our website. Current and past projects include:

- 3 NGO grants
- 6 regional planning projects
- 8 municipal planning projects
- Online toolkit for municipalities







4. TRACK YOUR PROGRESS

RESILIENT NJ: LOCAL PLANNING FOR CLIMATE CHANGE TOOLKIT

Hightstown, NJ

https://resilient.nj.go

Indexes for Health, Socioeconomic, Environmental, & Climate Outreach Prioritization in Newark, NJ

Irena Gorski Steiner | January 2022

Three Stackable Indexes

Newark Climate Equity Index

Goal: City prioritization of community outreach efforts to advance climate justice.

For webinar recording, visit: <u>https://www.newarkgreenteam.org/projects-resources</u> Key data came from Newark Environmental Resources Inventory: <u>http://bit.ly/nwkeri2021</u> Map layers have been included in Nature Conservancy's "Newark Greenprint": <u>https://www.njmap2.com/development/newark/</u>



Health

Asthma
COPD
Coronary heart disease
Obesity
Mental Distress
Life expectancy

Socioeconomic

Black or African, Hispanic or Latino, & Indigenous folks Low-income household Less than high school education □Age-based vulnerability (>65 years old and <18) Unemployment Uninsured Renters Folks with disabilities No vehicle access Work outdoors Linguistic isolation

Environmental

□ Fine particulate matter (PM_{2,5}) air concentration Traffic proximity & volume Air toxics cancer risk Ground-level ozone air concentration Diesel particulate matter air concentration Distance to greenspace Limited access to healthy foods Proximity to hazardous sites Imperviousness Tree canopy cover Lead exposure risk index











Sustainable Jersey Heat Island Map

- Red areas are UHI hot spots; yellow/orange areas are moderate
- County-based analysis compiled into a statewide map
- Uses satellite imagery from one date
- Publicly available

Rutgers

Heat Vulnerability Index

- Scale (1-5) for degree of vulnerability
- Statewide analysis assess intersections of potential heat islands and vulnerable populations by Census Block Group
- Publicly available
- Compiles multiple indicators of vulnerability



NJDEP Heat/OBC Map

- Map of land surface temperatures
- Red areas are considered UHIs
- Statewide analysis
- Using map to support grant proposal development
- Compiles satellite imagery across several dates
- Not yet publicly available, will be uploaded as layer resource on the DEP's climate page soon



Sustainability Summit

Mitigating Heat Islands / Urban Forest Action May 5, 2023

Jay Watson, Co-Executive Director



"You can tell the quality of a neighborhood, just by counting the trees!"

NY Times article –



Projects and money!









"Rewilding" -Forest lots / Microforests – Miyawake Method-







Forest plazas and cooling stations









Parks





Street Trees









Tools, Technology and Maps





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TREE EQUITY SCORE



Treeequityscore.org

Find your score and help create Tree Equity in cities and towns across America.

Search for your town

TRENTON, NJ

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MAP

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Trenton

NJ Congressional District 12 07 Census Black Group 348210009802

Municipal report →

-

49 RANK 69th of 70 blockgroups in Tree Equity Score •

Score indicators



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NJ Congressional District 12 District report - Omopbext




























engage. protect. restore.

Protecting **New Jersey's** Land and Legacy.

In New Jersey, the most densely populated state in the U.S., it is critically important to protect our healthy soils for growing food and the natural lands that safeguard our drinking water, clean our air, sustain wildlife and provide places for people to enjoy the outdoors.

NJ Conservation Blueprint is a data-driven, interactive mapping tool made possible through a partnership of The Nature Conservancy, Rowan University, and the New Jersey Conservation Foundation, together with a collective of 21 conservation-focused groups, both governmental and non-profits.



OPEN A MAP

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WATER QUALITY

COMMUNITY **OPEN SPACE**





AGRICUTURE

ECOLOGICAL INTEGRITY







Asthma Rates Citywide



Zoomed in Centerville Asthma Rates



Zoomed in Centerville Tree Canopy

Single Headed Households with Children Households Without A Car O = Non-English Speaking ① Diversity Index Indicators of Potential Disadvantage (2018) 3 a Astfima 💿 Diabetes O Heart Disease Obesity O Physical Health O Mental Health Life Expectancy Physical Inactivity 0 Perceived Poor or Fair Health O Tree Canopy 😔 Shows areas with tree cover. This data was created from aerials and LIDAR from the 2013-2015 period.

Tree Canopy
Opacity
Tree Canopy Additional Points
O
Natural Land
O



COMMUNITY ASSETS

Tree planting opportunity ???



Maps



Figure 4: Authors Pressience



Figure 8: Tree Cover in Preserved Open Space and Aprog Trats



Ambassadors











Stewardship









Stewardship - Green Jobs!

o2 Arboriculture Skills



02.A Tree Career Pathways Unit

Key points and teaching suggestions Training session Arboriculture Industry · Exploin the potential correct paths in taboriculture career pathway - Demustify how to be successful in the industry breakdown · Provide greater postant for unbon forestry 3 hrs Halands Occupational Personality Types Halands Occupational Personality Types Disgram Realed's Occupational Personality Type: Operate in programme Introduction to · Discuss the history and principles of prooricalture arboriculture · Introduce pre-popyertices to the field of orborications . Exploin the importance of trees in forest acceptance 3 2-4 im Convers / What is an & Aurild? Attacked Continuetor Study Opilia: Introduction to Attackative Studieg Series Arbeituntum podents. Ibå inferdication resources Introduction to Registered · Exploin the structure of local apprentionship program [s] ovallable Apprenticeship Programs · Exploin the process of applying and starting as an apprentice, and assist with opplications as necessary 3 6-8 hrs < Make introductions to program staff and current opprentices. · Visit program siles Arbeild Apprenticientia sometime Introduction to tree-care · Make introductions to local employers, and outline career opportunities within COMPONIES. employers - Visit employer workhouses/offices O Shes







Thank You

Session slides will be available on sustainablejersey.com by 5/12.

Sustainable Jersey Underwriters and Sponsors



*Digital Schools Sponsor

Upcoming Events and Opportunities

FREE ENERGY TECHNICAL ASSISTANCE FOR SCHOOLS AND MUNICIPALITIES IN ELIZABETHTOWN GAS, NEW JERSEY NATURAL GAS, AND SOUTH JERSEY GAS SERVICE TERRITORIES

Free technical assistance to identify and apply for utility incentives and New Jersey's Clean Energy Program (NJCEP) incentives for energy efficiency audits and facility upgrades. This technical assistance is funded by Elizabethtown Gas, New Jersey Natural Gas, and South Jersey Gas.

For more information please visit: bit.ly/EnergyTAforMunisandSchools

2023 MUNICIPAL CERTIFICATION CYCLE

The next deadline to apply for certification is **May 12, 2023**. The final application deadline is **July 27, 2023**. View the full cycle timeline on the 2023 Certification Cycle page.

For more information please visit: bit.ly/MuniCertCycle

2023 SUSTAINABLE COMMUNITIES GRANT PROGRAM

Atlantic City Electric and Sustainable Jersey are pleased to offer **\$50,000** to support municipal environmental stewardship and resiliency projects in Atlantic City Electric's service territory. Municipalities are encouraged to work with local organizations on applications, which are due **June 29, 2023**. An informational webinar will be held on **May 15, 2023 from 1:00pm - 2:00pm**.

For more information please visit: http://www.bit.ly/SustainableCommunitiesGrantProgram

TRI-COUNTY SUSTAINABILITY GENERAL MEETINGS

This Sustainable Jersey Regional Hub will host virtual meetings on a variety of sustainability topics throughout the year. The next meeting is **May 31, 2023 from 7:00pm - 8:00pm**.

For more information please visit: http://www.bit.ly/Tri-CountySustainability

2023 SCHOOL CERTIFICATION CYCLE

The final deadline to apply for certification and Digital Schools Star Recognition is **June 15, 2023**. View the full cycle timeline on the 2023 Certification Cycle page.

For more information please visit: http://www.bit.ly/SchoolsCertCycle

TREES FOR SCHOOLS PROGRAM, TREE-PLANTING GRANTS FOR NJ PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES

The Trees for Schools program will provide **\$2.5 million** in grants to New Jersey public school districts, county colleges and state colleges and universities to fund the planting of trees on campuses across New Jersey. Competitive grants of **\$10,000 to \$500,000** will fund costs associated with planning, site preparation, trees, planting, watering, monitoring and related expenses over a three-year period. Applications are due on **July 13, 2023**, for spring 2024 plantings. An informational webinar will be held on **May 18, 2023 from 3:00pm - 4:30pm**. The Trees for Schools program is a collaboration of the New Jersey Department of Environmental Protection, The College of New Jersey and Sustainable Jersey.

For more information please visit: <u>bit.ly/TreesforSchools</u>

SUSTAINABILITY SUMMIT

