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# Environmental Justice

Session 6: Green Space, Blue Space, and Sky



# Journaling Exercise

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- What outdoor place is your favorite and how does being in that place make you feel?
- How does that favorite place smell, feel (emotionally), and what do you touch?
- What is your favorite thing about the sky?
- What is your favorite time of day or time of year? Does your favorite outdoor place or sky look distinct during that time?



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**01**

**Blue, Green, Grey  
Space & Sky**



# What is Green Space?

- Outdoor terrestrial spaces with vegetation
- Green spaces can look vastly different depending on the ecosystem and whether it is urban or rural
- Green space is a home for flora and fauna (plants & animals)
- Green space is used by people – humans are a terrestrial species

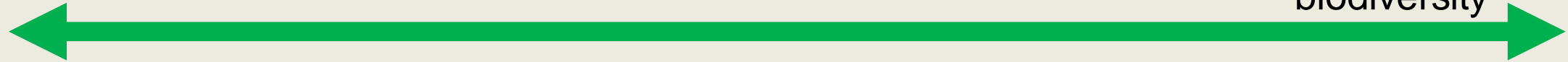


# Green Space Gradient

Green spaces can fall on a gradient from natural wildlands with little human influence to completely person-made parks & gardens

natural relatively pristine  
ecosystem

person-made  
park/garden with less native  
biodiversity



Mill Ends Park, OR – world's smallest park

# Green Space Quality

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Green spaces can vary in quality, quality questions may include:

- How much vegetation is there?
- Is the vegetation native?
- Does it support pollinators, herbivores, & carnivores?
- Is the space polluted? For example, brown fields (former industrial/commercial site w/ contamination)
- Is the space accessible to the community?
- Does it have the infrastructure for use and recreation?

Brownfield cleanup in Lawrence, MA



Photo from Groundwork Lawrence

# What is Blue Space?

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- Outdoor freshwater or saltwater habitat, wetlands, and estuaries (i.e., river meets ocean)
- Blue spaces can look vastly different depending on the ecosystem (lake, river, stream, ocean, wetland, estuary, etc.)
- Blue space is often a home for fauna and photosynthetic organisms (animals, algae, dinoflagellates, etc.)
- Although humans are a terrestrial species, we use blue space for many things
- Blue space often has well defined borders, whereas, green space can have more transitional zones with the built environment



# Natural Light, Sky, and Night

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When considering the quality of outdoor spaces, we must also consider:

- Is there access to sky and natural light? (i.e., not shaded by buildings, etc.)
- Is there access to night? (i.e., not washed out by artificial light & light pollution)



# What is Grey Space?

- We will use *grey space* to refer to outdoor spaces that are made of artificial and man-made materials
- Grey spaces dominated by cement, asphalt, artificial lights, etc.



Spaces can also fall on a gradient from:  
Natural outdoor world -> built environment outdoors -> built environment indoors

# Natural-to-Built Environment Gradients

natural world ↔ built environment outdoors ↔ built environment indoors



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**02**

# **The Environmental Justice Connection**



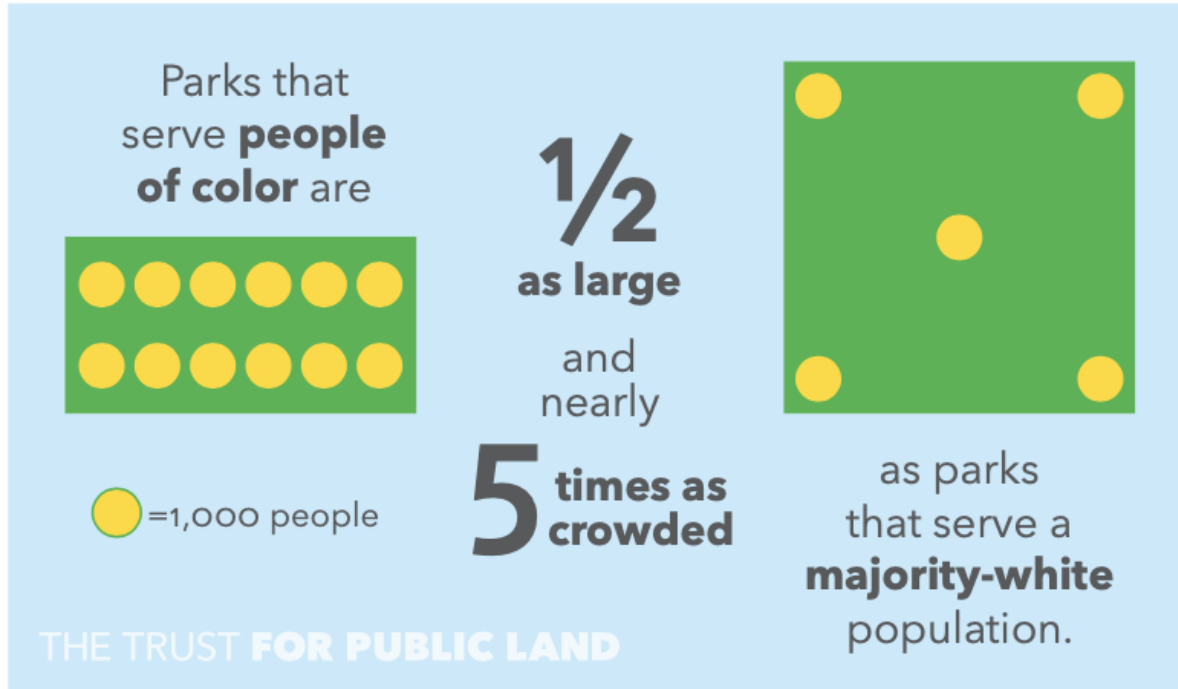
# Natural Spaces & EJ (historical context)

- The natural world has always been important for indigenous peoples around the world
- Theft and forced ownership of natural lands has been a weapon of colonization
- Colonization and industrialization has resulted in major changes to ecosystems that shaped the distribution and quality of green & blue spaces we see today
- Timelines differ around the world, but settler-colonialism & exploitation-colonialism has occurred globally and has impacted natural spaces around the world
- Indigenous people around the world are fighting to stop exploitation of the land



A LandBack mural in Vancouver, British Columbia. Photo: [Ted McGrath](#)

# Natural Spaces & EJ (today)



THE  
TRUST  
**FOR**  
**PUBLIC**  
**LAND**



ISTOCK USER CREATIVE-FAMILY

Outdoor activists who advocate for marginalized communities say that the history of park development is tied up with the history of white supremacy.

# Climate Gentrification

- Climate and eco-gentrification occurs when the greening or rewilding of an area for climate adaptation/mitigation leads to displacement of residents
- Typically people of color and low income families are displaced due to increase in housing prices

The dangers of eco-gentrification: what's the best way to make a city greener?




▲ The High Line has raised property prices, forcing many small businesses and middle-income residents out of the area. Photograph: Mark Lennihan/AP

**With upwards of 5 million visitors each year, the popularity of New York's High Line has created difficulties for local residents and small businesses. So is there a better way of introducing nature into our cities?**

# Eco-Gentrification


Eco-gentrification also occurs when green and blue space is privatized or utilized in a way that increases property values and displaces community members with wealthier residents or tourists







**THESE BEACHES AREN'T FOR SALE**

**PUERTO RICANS PROTEST PRIVATIZATION OF PUBLIC BEACHES**

**Puerto Ricans Protest Privatization Of Public Beaches**

 **NBC News** ✓  
9.96M subscribers

**Subscribe**

 3.7K   Share 

<https://youtu.be/Vxk64GEZ7g0?si=l09lwdk19l1Bh9PZ>

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**03**

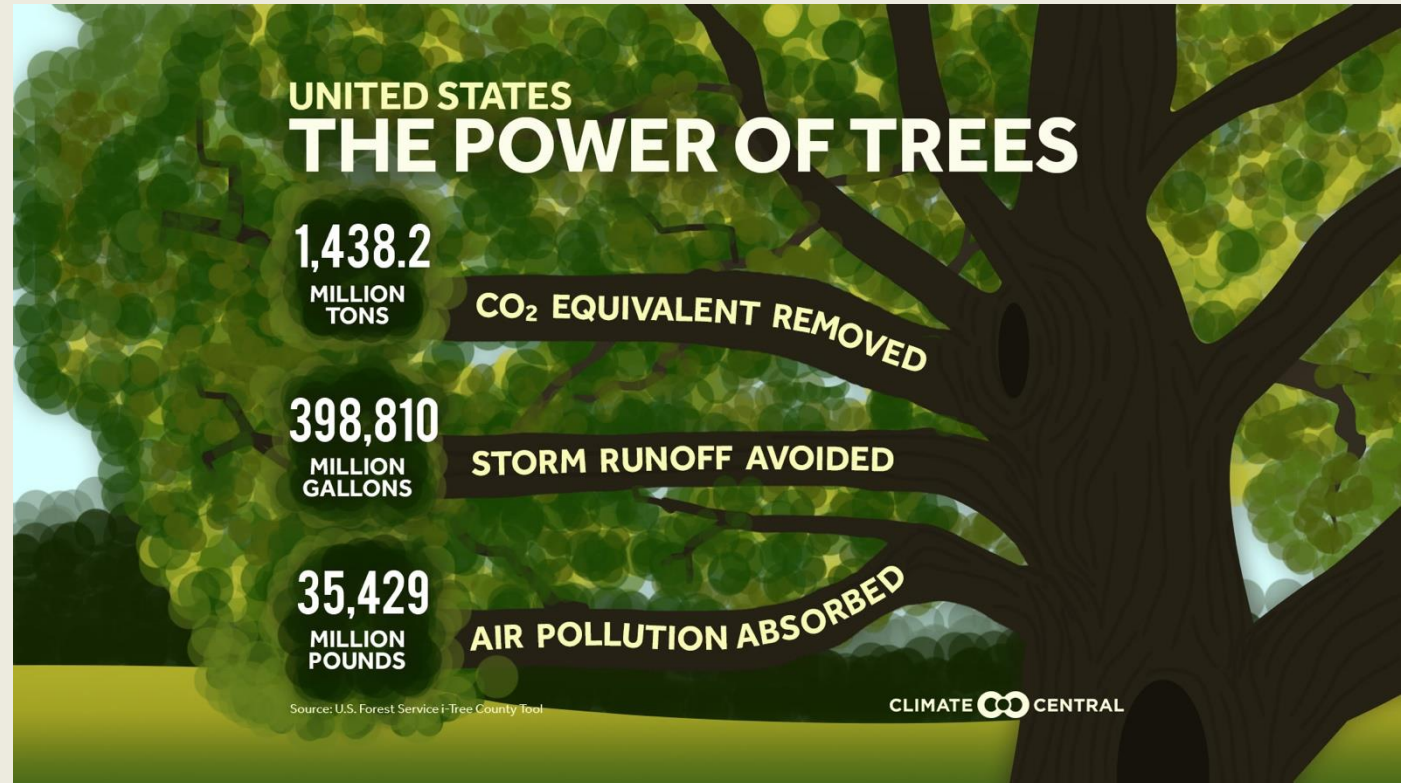
# **Benefits of Green Space, Blue Space & Sky**



# Green Space Benefits

## Physical and Biological Benefits:

- Carbon Sequestration & Oxygen production
- Buffer from rains and major player in the water cycle
- Absorb & intercept air pollution
- Integral part of the food web, primary producers at the base of the food web
- Helps buffer from extreme heat



Infographic reflects annual values

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The following table shows the top five media markets for each of these benefits:

| Rank | CO <sub>2</sub> equivalent removed<br>(millions of tons) |      | Storm runoff avoided<br>(millions of gallons) |        | Air pollution absorbed<br>(millions of pounds) |     |
|------|--|------|---|--------|--|-----|
| 1    | Shreveport, LA   | 33.7 | New York, NY                                  | 18,156 | Little Rock, AR                                | 825 |
| 2    | Little Rock, AR  | 31.6 | Atlanta, GA                                   | 16,912 | Spokane, WA                                    | 769 |
| 3    | Jackson, MS  | 28.1 | Boston, MA                                    | 16,823 | Shreveport, LA                                 | 764 |
| 4    | Atlanta, GA  | 25.1 | Portland, OR                                  | 10,447 | Seattle, WA                                    | 632 |
| 5    | Raleigh, NC  | 22.2 | Seattle, WA                                   | 9,541  | Albuquerque, NM                                | 621 |

Table from Climate Central 2018 report, The Power of Trees.

Measured air pollutants include ground-level ozone, PM2.5, PM10, carbon monoxide, nitrogen dioxide, and sulfur dioxide. Values are annual.

*“Tree leaves also absorb airborne pollutants and intercept particulate matter, helping reduce the throat irritation, asthma, and even premature death that these pollutants may cause. By annually removing over 35 billion pounds of these pollutants in the continental U.S., trees prevent over half a million cases of acute respiratory symptoms each year.”*

**- Climate Central 2018 report, The Power of Trees.**



# Green Space Benefits

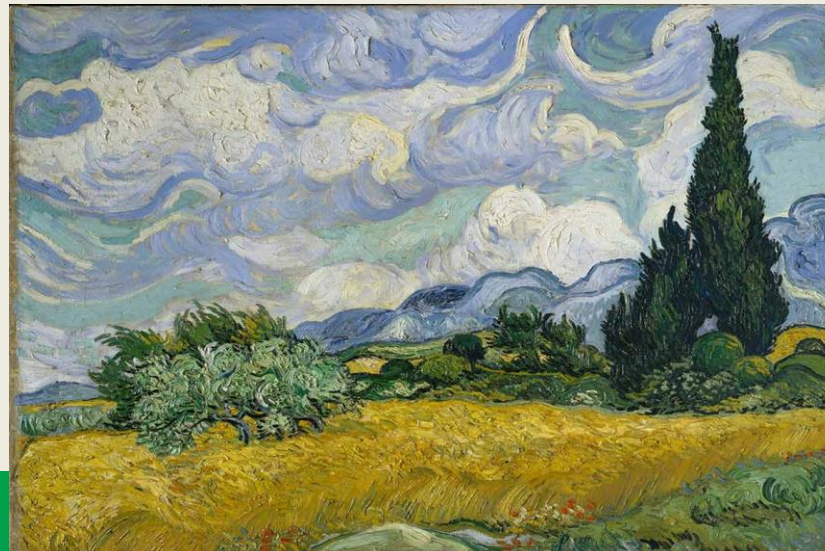
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## Community & Wellbeing:

- Communal spaces
- Many green spaces have cultural importance
- Spaces for physical activity and recreation
- Spaces and inspiration for the creation of art
- Improve wellbeing and learning



Playing outside, especially in unstructured activities, helps kids develop physically and emotionally. (iStock photo by Getty Images) - Stanford Health



# Green Space Benefits

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The  
Guardian

## Bird and birdsong encounters improve mental health, study finds

**Research suggests visits to places with birdlife could be prescribed by doctors to improve mental wellbeing**



# Wellbeing

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According to the World Health Organization (WHO):

*“Well-being is a positive state experienced by individuals and societies. Similar to health, it is a resource for daily life and is determined by social, economic and environmental conditions.*

*Well-being encompasses quality of life and the ability of people and societies to contribute to the world with a sense of meaning and purpose. Focusing on well-being supports the tracking of the equitable distribution of resources, overall thriving and sustainability. A society’s well-being can be determined by the extent to which it is resilient, builds capacity for action, and is prepared to transcend challenges”*



Playing outside, especially in unstructured activities, helps kids develop physically and emotionally. (iStock photo by Getty Images) - Stanford Health

# Fresh Air Classrooms

- Improved learning
- Fosters environmentally conscious students
- Improved behavior
- Can help with physical, emotional, and cognitive development



# Blue Space Benefits

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## Physical and Biological Benefits:

- Drinking water – freshwater and groundwater
- Buffer from heat
- Marine & freshwater ecosystems are critical food sources



| Catch from a pink salmon fishery.

PHOTOGRAPH BY MICHAEL MELFORD, NATIONAL GEOGRAPHIC

# Blue Space Benefits

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## Community & Wellbeing:

- Cultural importance & significance
- Physical activity and recreation
- Inspiration for art



Photo Ocean Image Bank/ Fabrice Dudenhofer



Photo: Creative Commons / Katsushika Hokusai

# Blue Space Benefits

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## Community & Wellbeing:

- Cultural importance & significance
- Physical activity and recreation
- Inspiration for art



<https://www.topic.com/gift-of-the-whale>

# Green & Blue Space Buffer from Heat-Related Mortality

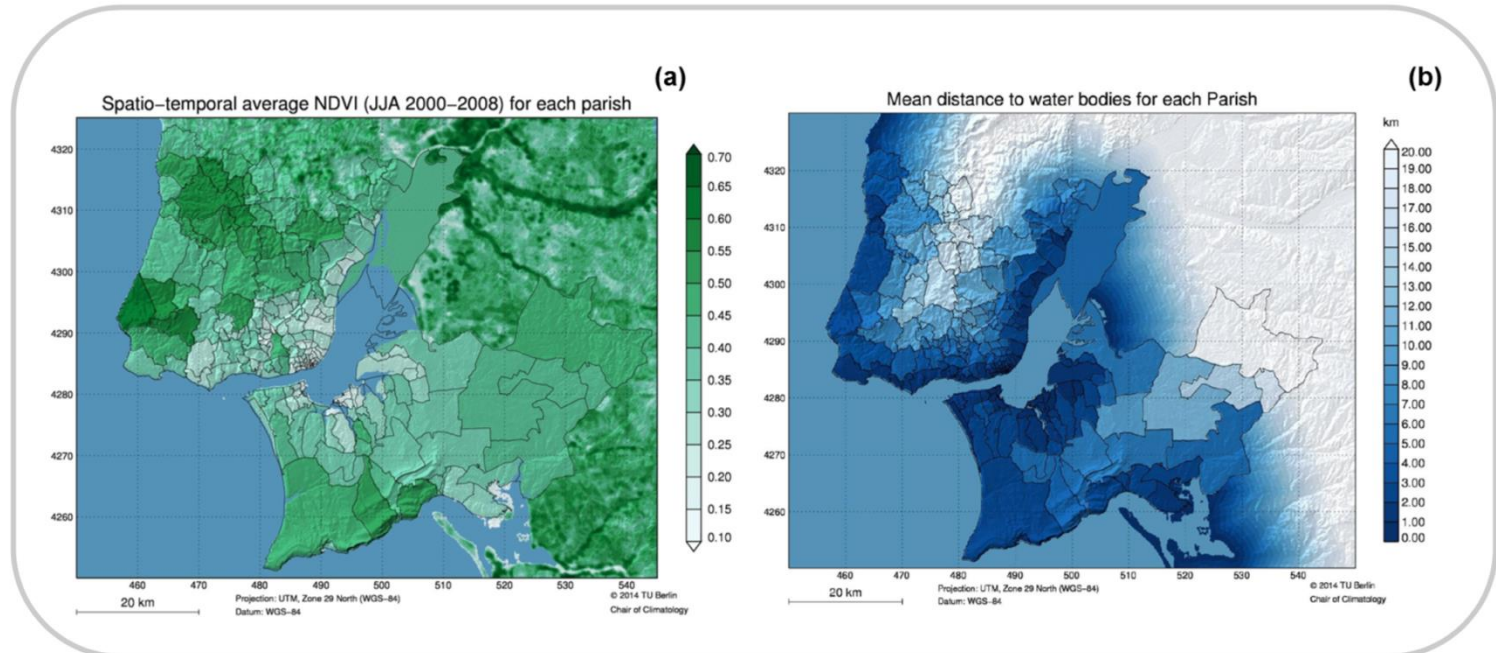
Modification of Heat-Related Mortality in an Elderly Urban Population by Vegetation (Urban Green) and Proximity to Water (Urban Blue): Evidence from Lisbon, Portugal.

Burkart K, Meier F, Schneider A, Breitner S, Canário P, Alcoforado J, et al. [Environmental health perspectives \(2015\)](#)

Maps show:

(a) Normalized difference vegetation index (**NDVI**)

(b) Distance to water bodies

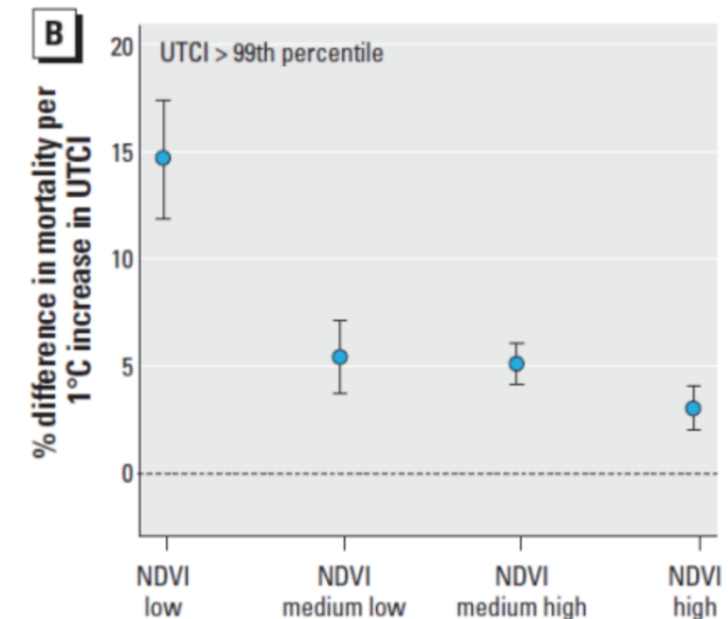
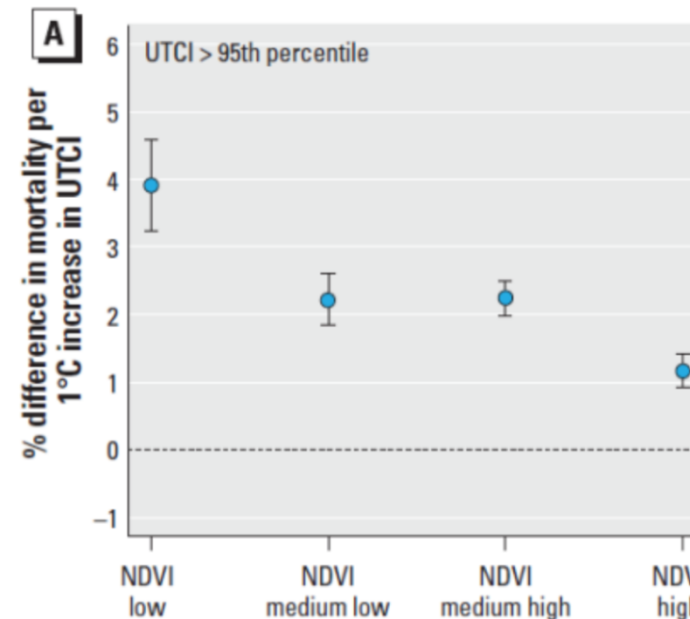


# Green & Blue Space Buffer from Heat-Related Mortality

- UTCI = Universal Thermal Climate Index, assessment of the outdoor thermal environment in biometeorological applications
- Difference in mortality increase among those > 65 years of age with a 1°C increase in UTCI above the 95th (A) and 99th (B) percentiles
- Green spaces buffer from heat related mortality in people > 65 yrs.

## Urban green and heat-related mortality\*

\*adjusted for trend, age, urban density, socioeconomic status

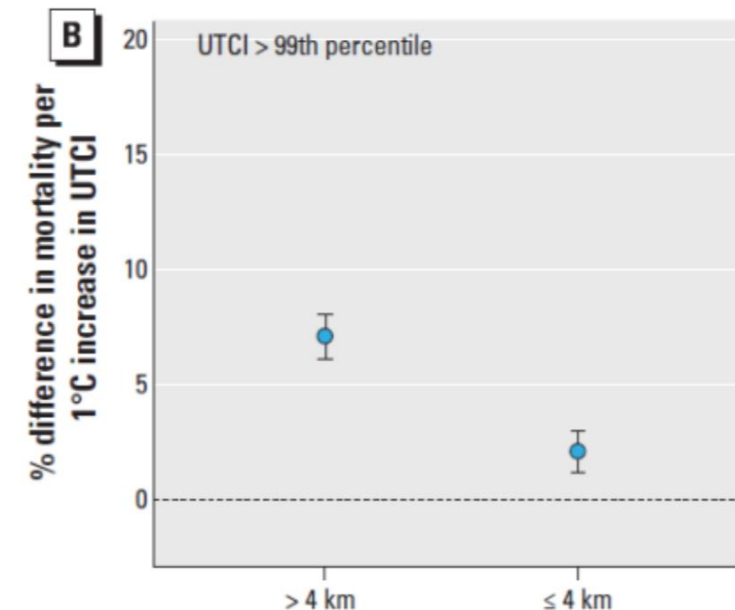
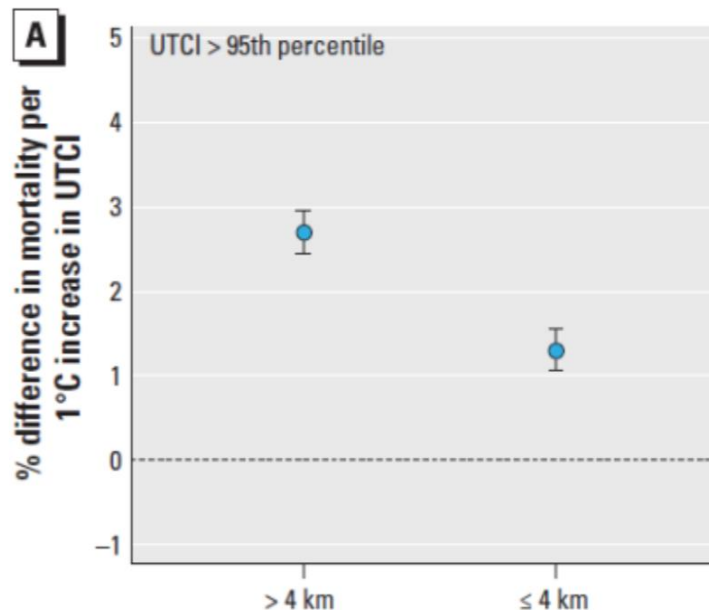


# Green & Blue Space Buffer from Heat-Related Mortality

- Difference in mortality increase among those > 65 years of age with a 1°C increase in UTCI above the 95th (A) and 99th (B) percentile with a distance of > 4 km and ≤ 4 km to the Atlantic Ocean and Tagus Estuary with 95% confidence intervals.
- Water bodies buffer from heat related mortality

## Urban water and heat-related mortality\*

\*adjusted for trend, age, urban density, socioeconomic status



# Access to Natural Light, Sky, & Night

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## Benefits:

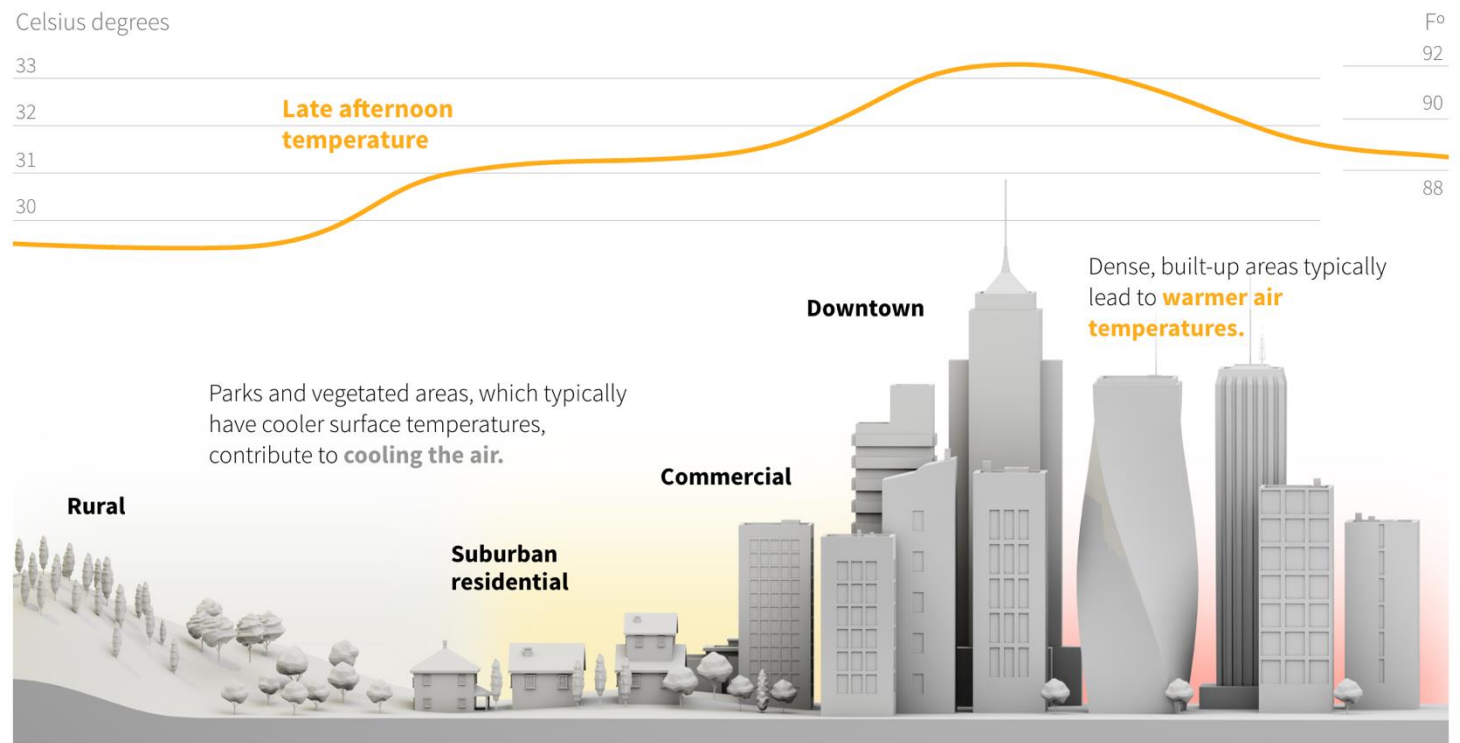
- Circadian rhythm entrainment (access to daylight)
- Sleep (access to nights free of artificial light-at-night)
- Bioluminescent organisms
- Inspiration for the creation of art



# The Problem with Grey Space

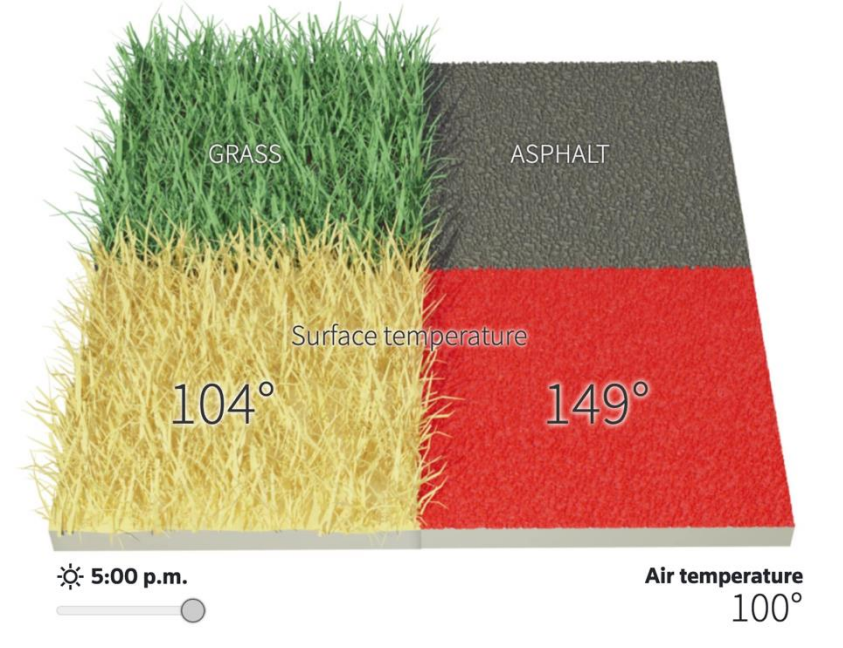
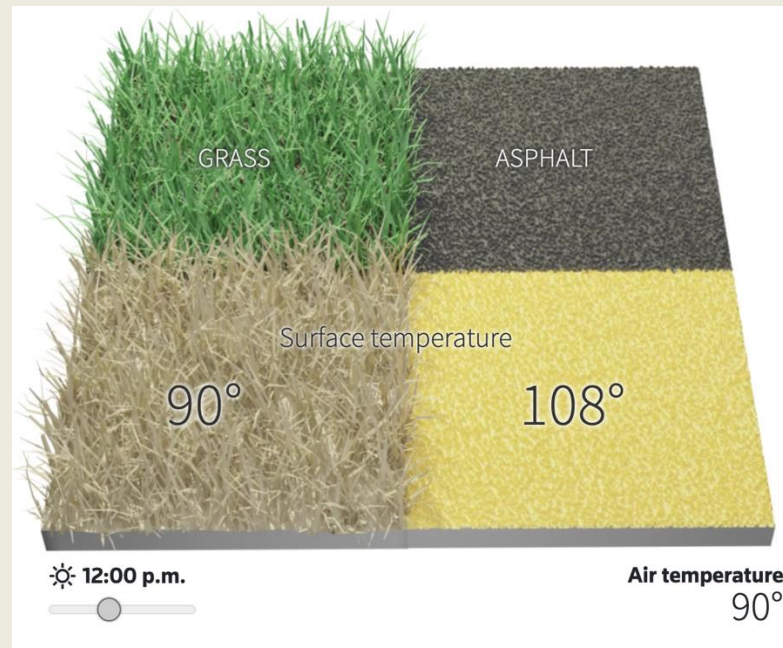
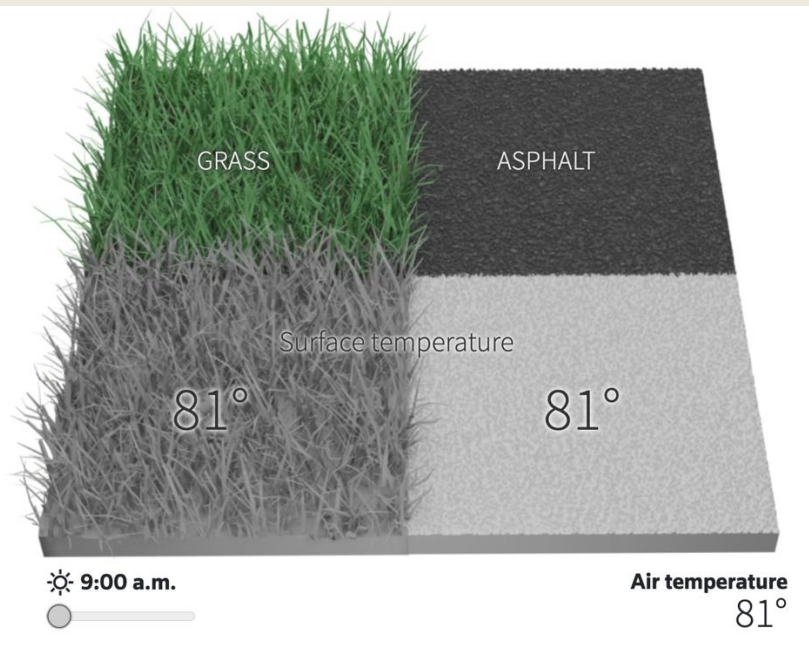
- Cement and asphalt absorb heat and contribute to **urban heat island** and lack of cooling at night
- Vehicle emissions, building emissions, cement production, and deforestation are a **significant contributor of CO2 in the atmosphere** (a greenhouse gas) driving climate change
- Roads and buildings often aren't built with health and wellbeing in mind
- Outdated infrastructure is not resilient against new climate conditions and extreme weather events

Reuters (2023), *The Floor is Lava*



# The Problem with Grey Space

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# The Problem w/ Grey Space: Climate Change

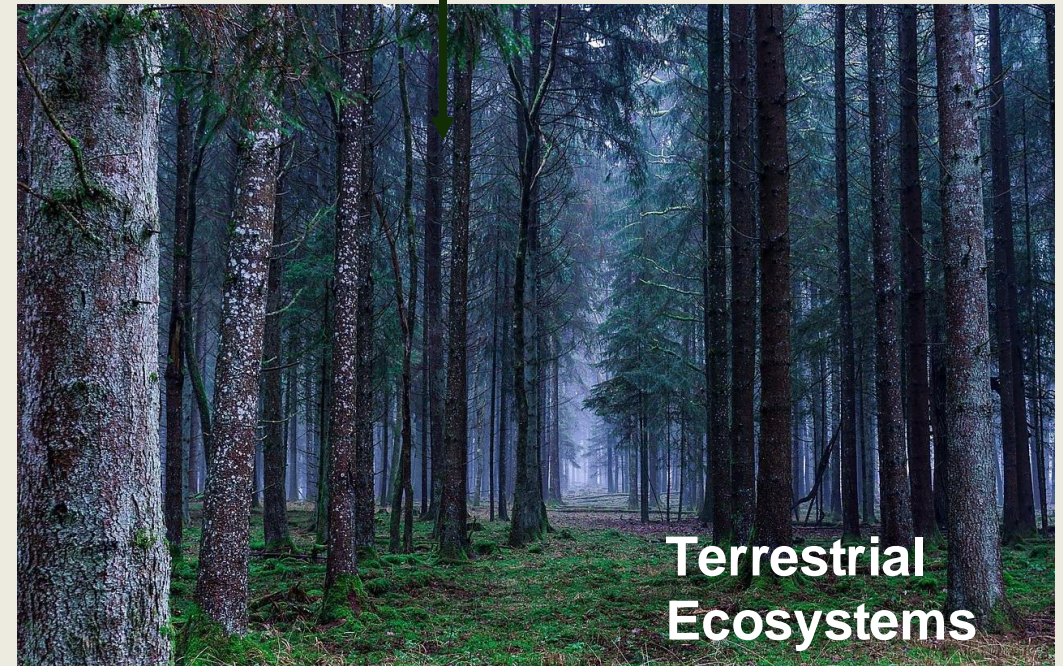
## Greenhouse Gases: **555 x 10<sup>9</sup> tons of Carbon**



240 GtC

155 GtC

160 GtC



IPCC AR5 WGI  
report pg. 12

# The Problem w/ Grey Space: Climate Change

## Greenhouse Gases: $555 \times 10^9$ tons of Carbon



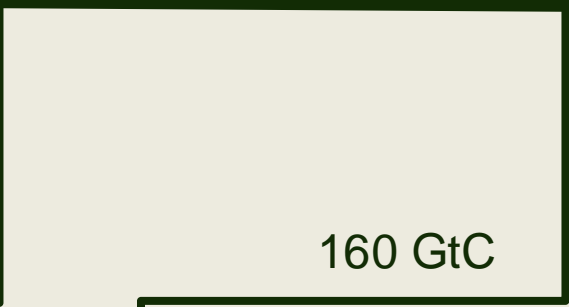
Burning fossil fuels

Cement production

Deforestation

Other land use changes

**$555 \times 10^9$  tons of Carbon**



Global Warming

Ocean Acidification

Carbon Sequestration

# What Can We Do?

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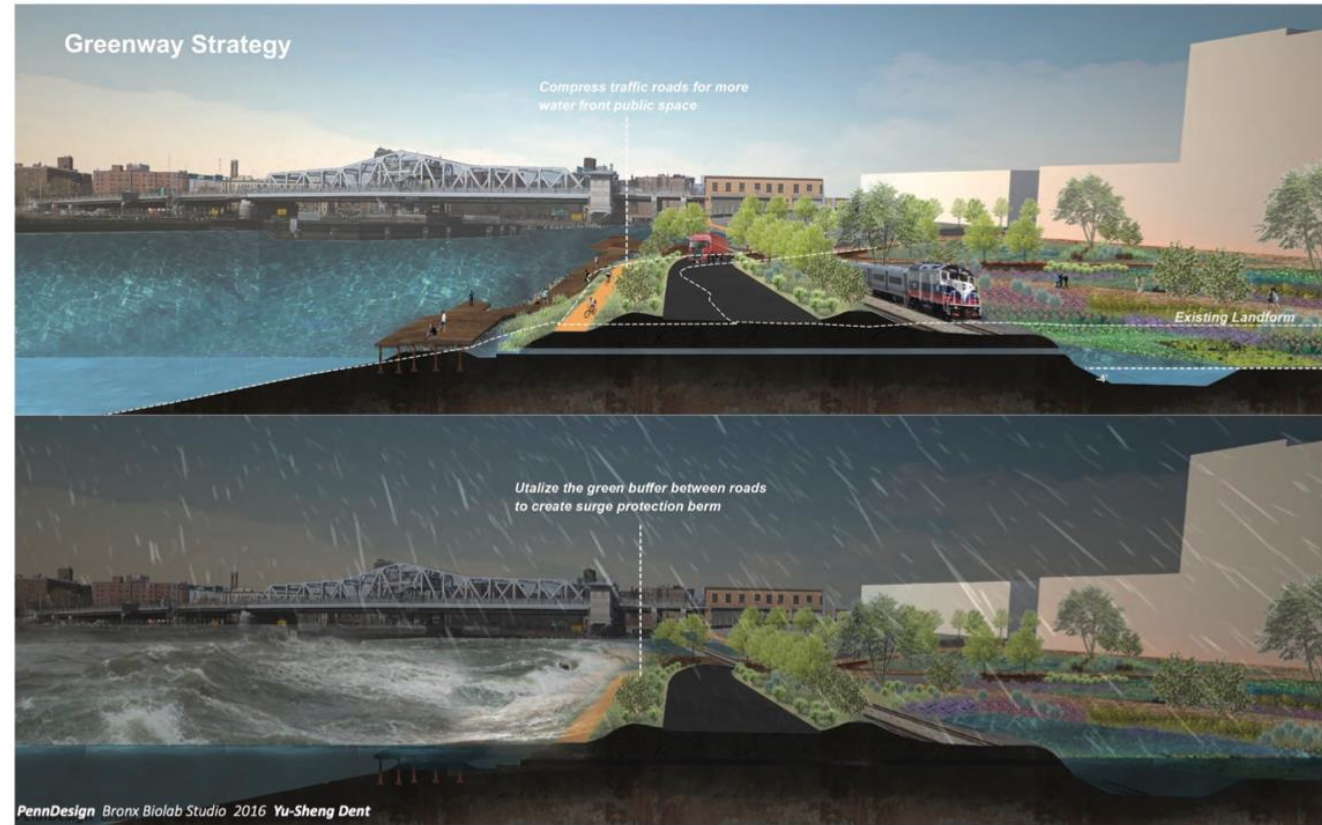
- Protect our existing green and blue spaces
- Fight for equal access
- Fight for high quality green & blue spaces
- Rewilding & climate adaptation
- Policies to protect against eco-gentrification
- Living buildings
- Get outdoors
- Environmental stewardship

Our response to the planetary crises (climate change, biodiversity loss, and pollution) is the greatest global health opportunity of the 21<sup>st</sup> Century



Community gardens in Detroit being used to battle food apartheid & promote environmental stewardship

# Design Spaces



**Figure 3.** Rendering of the waterfront plan in the South Bronx obtained from South Bronx Unite. As illustrated, by revitalizing the waterfront, not only can more public green and blue space be available to disadvantaged communities, but the “green buffer” can offer surge protection during extreme weather events.<sup>198</sup>

# Group Assignment

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- Tap into your inner child and....
- Design an Environmentally Just Playground for 125<sup>th</sup> Street
- Consider green space, blue space, and sky
- Consider access for all ages and wellbeing
- How might you assess the needs of the community?
- Turn in 3-5 slides detailing your playground design (hand drawings or digital)