Climate Communication Methods for Planners in Puget Sound, WA

Rachel Chen
UW MUP
April 14, 2023

Why is effective climate communication important?

- Community centered climate change is crucial to ensure adaptation is **supported and informed** by the community
- Planners play a large role in preparing cities for climate change
- Planners should be able to clearly communicate impacts and discuss climate change with communities to **establish shared knowledge base**
- Increases collaborative planning processes that **incorporate local knowledge**

Climate Communication Strategies

1. Use plain language and avoid technical jargon
2. Clearly define and contextualize terms used
3. Prioritize narrative forms of communication over complex scientific data
4. Know your audience and tailor your communications
5. Frame climate action to address the everyday concerns of your community
6. Emphasize benefits from acting now vs. the potential future losses from inaction
7. Focus on solutions to climate change that are being implemented
8. Provide specific, current, local examples of adaptation
9. Use simple visuals rather than complex data visualizations, but choose wisely
10. Present climate change as a local phenomenon that is currently happening
11. Incorporate opportunities to co-produce knowledge with your community

Use plain language and avoid technical jargon

- Shorter, simpler words
- Avoid technical jargon
- Explain what you are talking about in simple terms

Helps your communications be approachable for all knowledge levels

Clearly define and contextualize terms used

- i.e. carbon dioxide, carbon neutral - what kind of carbon are you referring to? What does carbon neutral mean?
- i.e. enhanced usually means to make something better, but enhanced global warming means it is getting worse
- i.e. climate change + global warming are often used interchangeably, but they have distinct meanings

Ensures your audience has a shared understanding of the subject at hand and combats misinterpretation

Prioritize narrative forms of communication over complex data

- Personal stories about climate change can help others think about how it has impacted them, too
- Hearing community stories can help planners learn how communities practice and understand adaptation

Emphasizes the human impact of climate change and appeals to the human experience

Know your audience and tailor your communications

- Avoid using words that are contentious in your community
- Emphasize how planning actions can foster safer communities, improve infrastructure, improve human health, or what your community cares most about

Increases the likelihood of achieving the goals of climate communication; communities could become more trusting of planning processes

Frame climate action to address everyday concerns of community

- Frame in terms of co-benefits i.e. improved or added greenspace, decreased air pollution, repair or replace aging infrastructure
- Explain how climate action will improve public health of community or mitigate disproportionate impacts

Allows communities to see how climate action will benefit them and draw connections between planning actions and their priorities

Emphasize benefits of acting now vs. potential losses of inaction

- Implementing climate friendly policies now saves a lot of money from paying for disaster recovery later
- Explain how changes are low-cost + easy to implement
- Co-benefits of immediate action i.e. increased greenspace + healthier communities vs. potential species extinction, etc.

Allows communities to view climate change action as a worthwhile endeavor

Focus on solutions that are being implemented

- Highlight existing mitigation efforts in your community i.e. Seattle City Light has been carbon neutral since 2005
- Celebrate accomplishments, i.e. achieving emissions reduction goals or increasing tree canopy

Shows that solutions to climate change are available and are already being implemented, we just need to accelerate and add to these efforts

Provide specific, current, local examples of adaptation

- Highlight existing adaptation efforts in your community, i.e. Seattle has implemented green stormwater infrastructure to help prevent stormwater runoff
- Review existing community goals or plans i.e. cooling centers or air conditioning assistance programs

Helps community members visualize what adaptation looks like and encourages them to join in existing efforts or help create new strategies

Use simple visuals rather than complex data, but choose wisely

- Images that show local solutions to climate change, local impacts, and are human-centered
- Tell new stories about climate change, show climate impacts or causes at scale

Aids in understanding of climate change without overwhelming audience, compels them to act rather than fear

Present climate change as a local phenomenon that is happening now

- Show imagery of local impacts i.e. South Park flooding in Seattle
- Present facts related to local climate changes rather than global impacts

Draws personal connection to climate change and helps people understand how they might be affected, or already have been

Incorporate opportunities to co-produce knowledge

- Participatory mapping i.e. explore with community how a road could be re-routed to avoid coastal flooding
- ASERT Model: incorporate learning activities at different stations that provide opportunities for community members to share their personal experiences and explore different local solutions

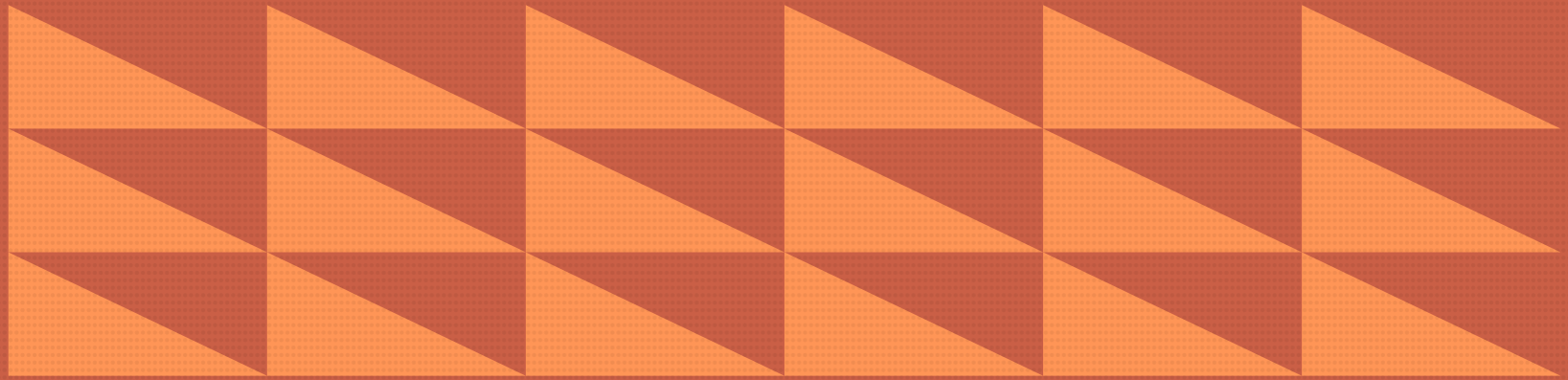
Creates hands-on learning environment for both you and your community, allows for greater collaboration

Final Thoughts

Community engagement surrounding climate change is not a one time occurrence, but rather should be done often as climate issues evolve in your community to ensure planning projects and policies are equitably distributed.

Heat Waves

What's causing them, how they relate to planning decisions, and how planners can discuss them more effectively with communities

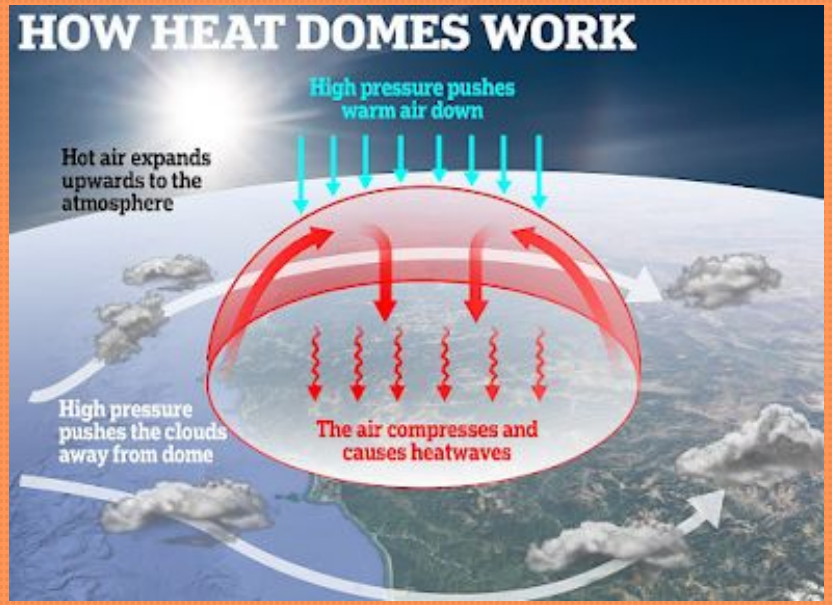


What is a heat wave?

a period of hot weather above historical averages for the area that lasts for two or more days (CDC)

Broom, J. (2015, July 9). *Heat-wave record tied, but unlikely to fall Friday*. The Seattle Times. https://www.seattletimes.com/seattle-news/heat-wave-record-tied-could-fall-tomorrow/

What causes heat waves?

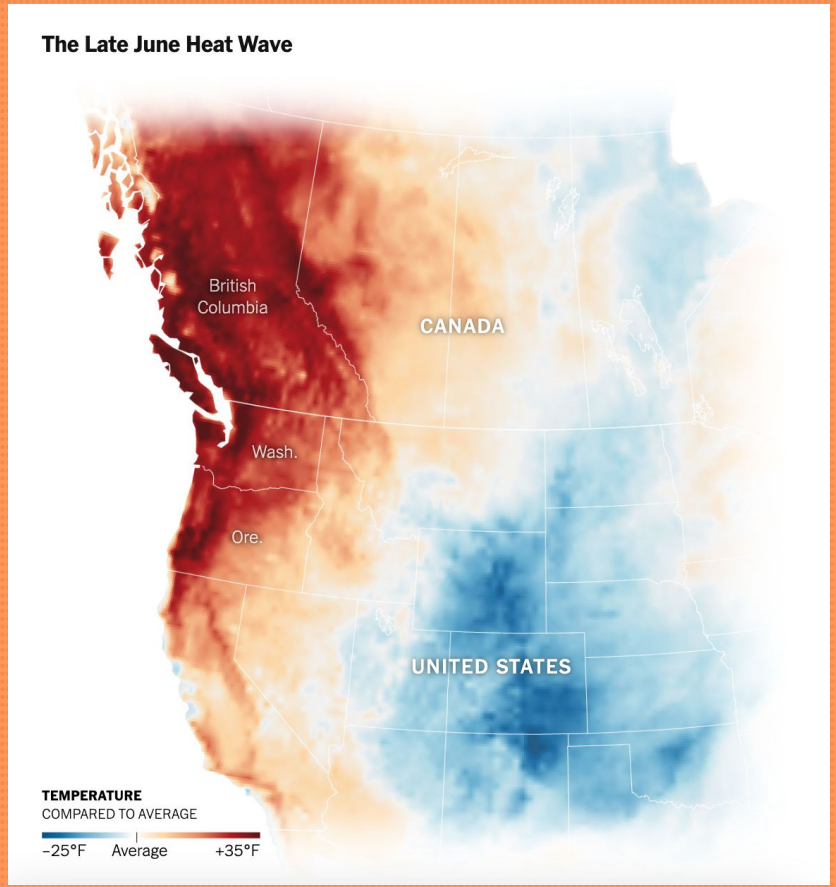


Sullivan, S. P. (2022, June 28). One year later, a look back at the Pacific Northwest's 2021 Heat Dome. *Northwest Wine Report*. https://www.northwestwinereport.com/2022/06/one-year-later-look-back-at-pacific.html

High pressure systems strengthen and remain in the atmosphere for multiple days

These systems push hot air down and:

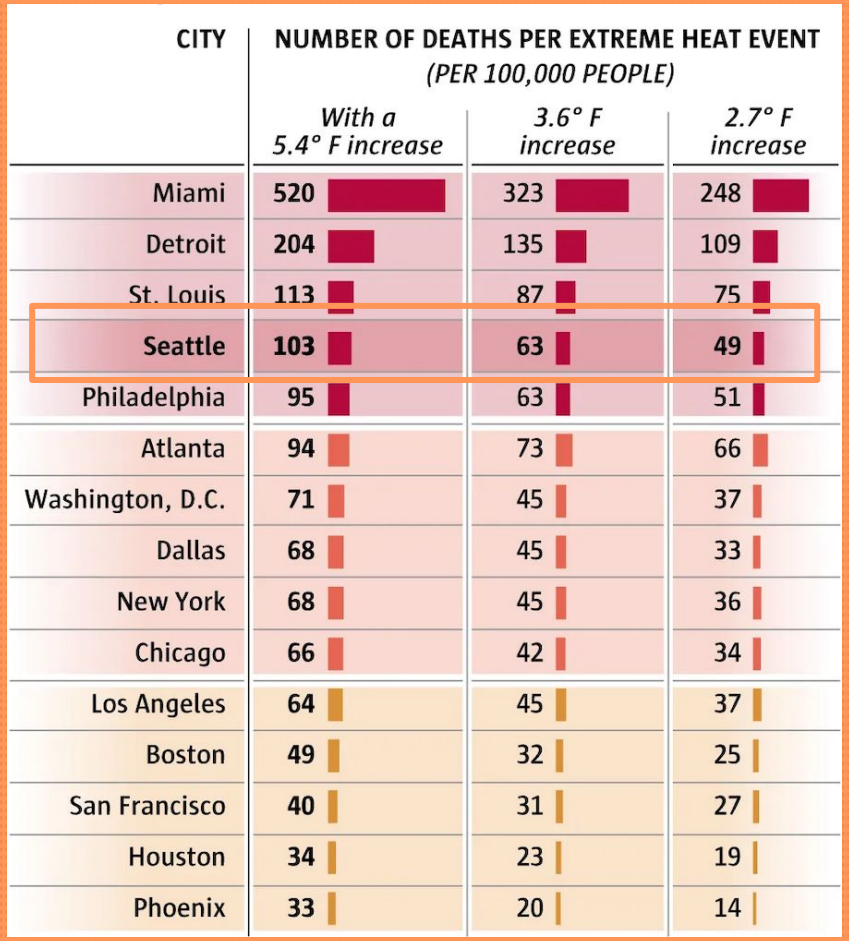
- Prevent heat from rising back to the atmosphere
- Trap hot air rising from the ground
- Minimize wind and cloud cover
- Prevent other weather systems from coming in



Climate Change + Heat Waves

- Increasing frequency, duration, and intensity of heat waves
- Changing seasonality
- Affecting more people annually as the Earth warms, 100 heat related deaths in Seattle 2021 (WA DOH)

Popovich, N., & Choi-Schagrin, W. (2021, August 11). Hidden Toll of the Northwest Heat Wave: Hundreds of Extra Deaths. *The New York Times*. https://www.nytimes.com/interactive/2021/08/11/climate/deaths-pacific-northwest-heat-wave.html



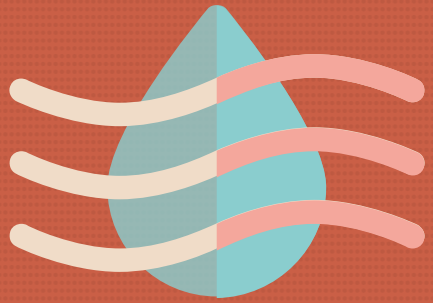
CITY	NUMBER OF DEATHS PER EXTREME HEAT EVENT (PER 100,000 PEOPLE)		
	With a 5.4° F increase	3.6° F increase	2.7° F increase
Miami	520	323	248
Detroit	204	135	109
St. Louis	113	87	75
Seattle	**103**	**63**	**49**
Philadelphia	95	63	51
Atlanta	94	73	66
Washington, D.C.	71	45	37
Dallas	68	45	33
New York	68	45	36
Chicago	66	42	34
Los Angeles	64	45	37
Boston	49	32	25
San Francisco	40	31	27
Houston	34	23	19
Phoenix	33	20	14

Bush, E. (2019, June 14). *Seattle unprepared for deadly heat waves made worse by global warming, researchers say*. The Seattle Times. https://www.seattletimes.com/seattle-news/environment/heat-waves-could-kill-hundreds-more-in-seattle-as-globe-warms-researchers-say/

Climate Change + Heat Waves

- Increasing frequency, duration, and intensity of heat waves
- Changing seasonality
- Affecting more people annually as the Earth warms, 100 heat related deaths in Seattle 2021 (WA DOH)

Humidity

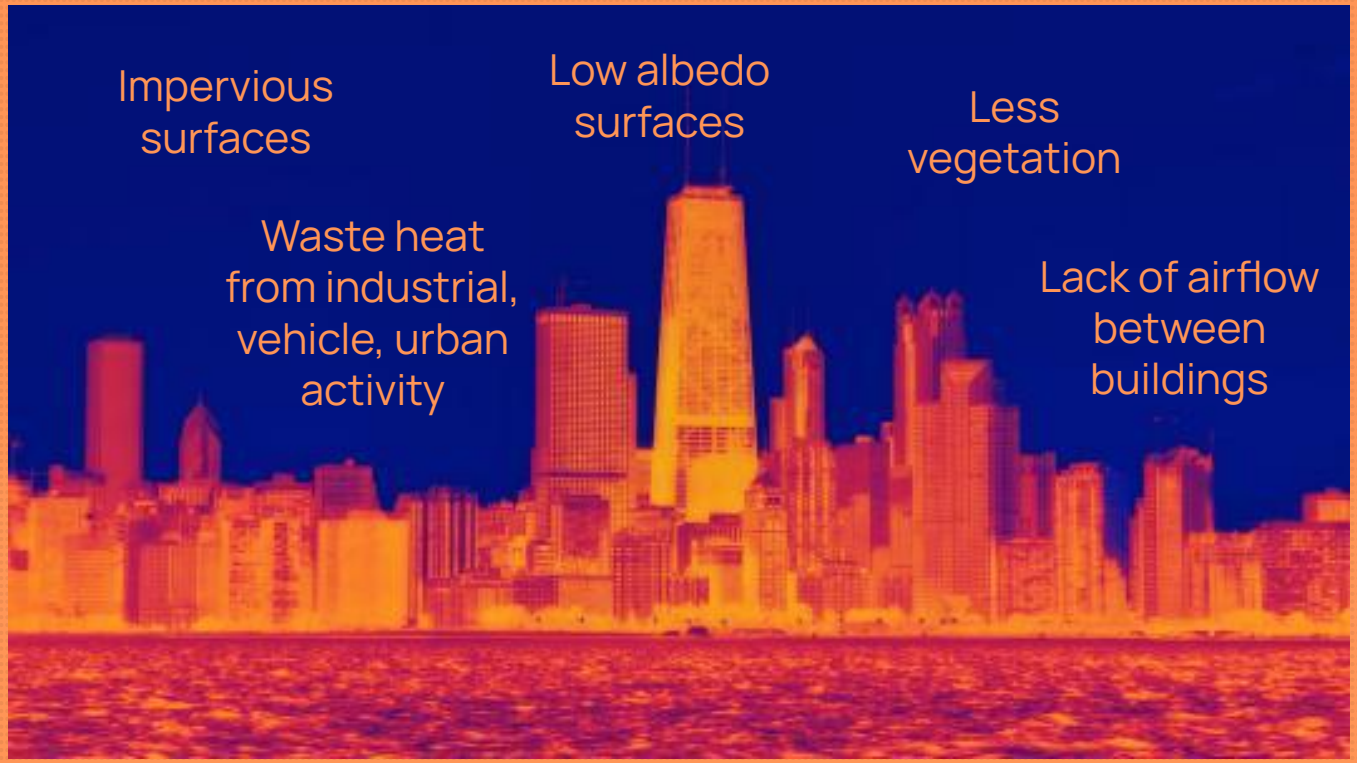


Increased global warming also increases the humidity of the air

- As the air warms, it can hold more water vapor
- For every degree of warming, water vapor increases 7%

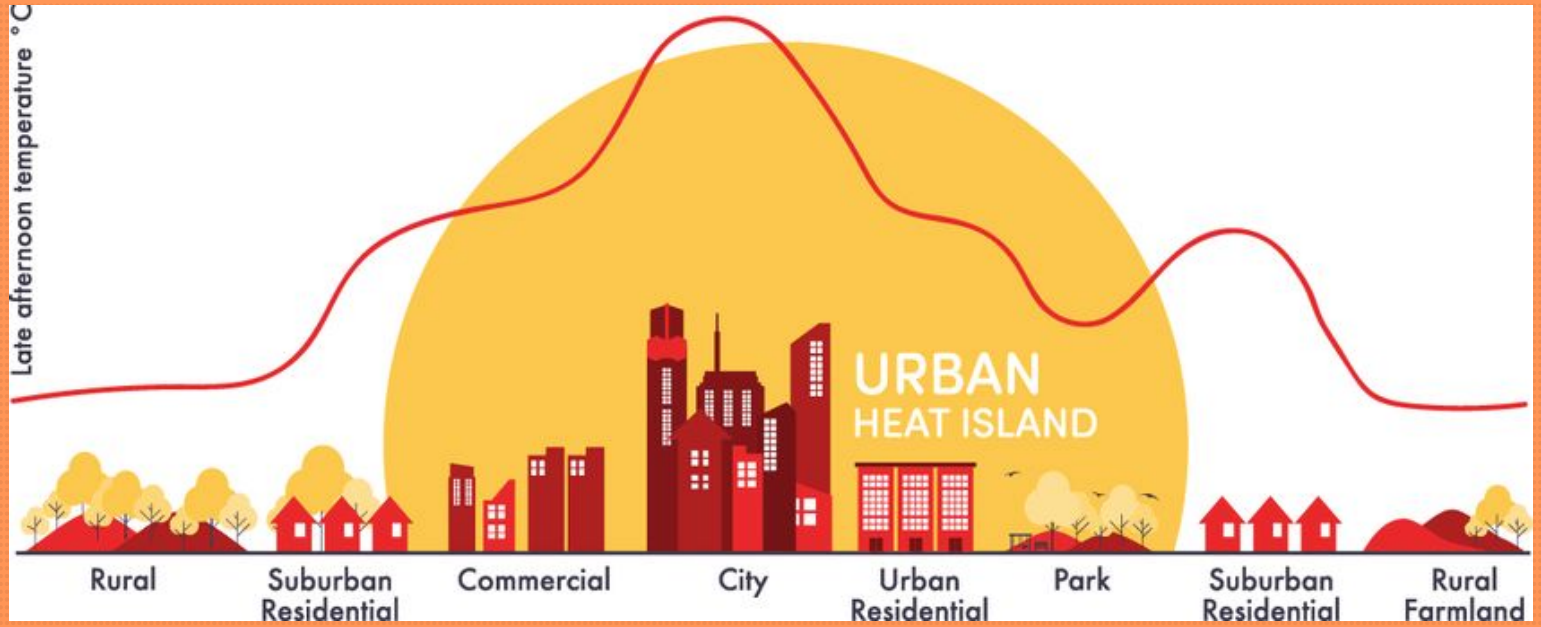
Exacerbates how high temperatures actually feel → wet bulb temperature: reports how hot it actually feels outside in terms of heat stress on the human body

Urban Heat Island Effect



Marathe, P. (2015, October 1). *Twenty years after '95: What climate change means for heat waves, cities and forecasting | Argonne National Laboratory*. https://www.anl.gov/article/twenty-years-after-95-what-climate-change-means-for-heat-waves-cities-and-forecasting

Urban Heat Island Effect



Fuladlu, K., Riza, M., & Ilkan, M. (2018, May 22). *THE EFFECT OF RAPID URBANIZATION ON THE PHYSICAL MODIFICATION OF URBAN AREA*. https://www.researchgate.net/publication/326316773_THE_EFFECT_OF_RAPID_URBANIZATION_ON_THE_PHYSICAL_MODIFICATION_OF_URBAN_AREA

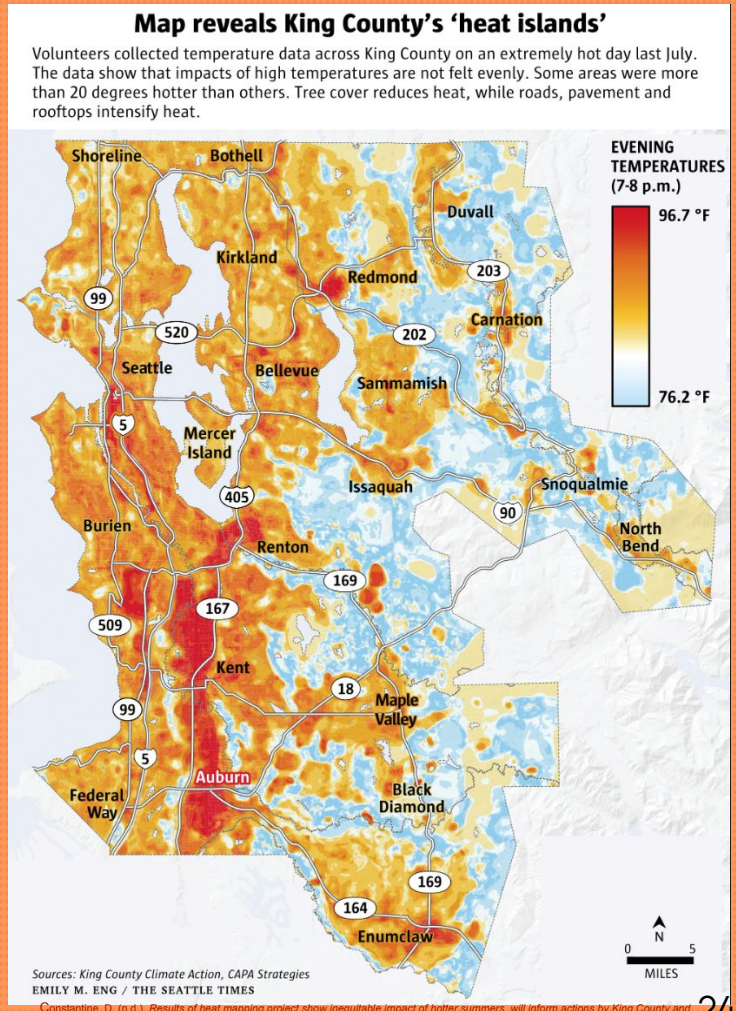
Temperatures in the city are several degrees warmer than rural counterparts due to abundance of impervious surfaces that absorb, rather than reflect heat

UHI + Heat Waves

Night time temperatures remain high as urban surfaces slowly release the heat they absorbed during the day

Previously redlined neighborhoods experience disproportionate impacts of human heat due to decades of disinvestment

Up to *12.6˚F warmer* than non-redlined neighborhoods

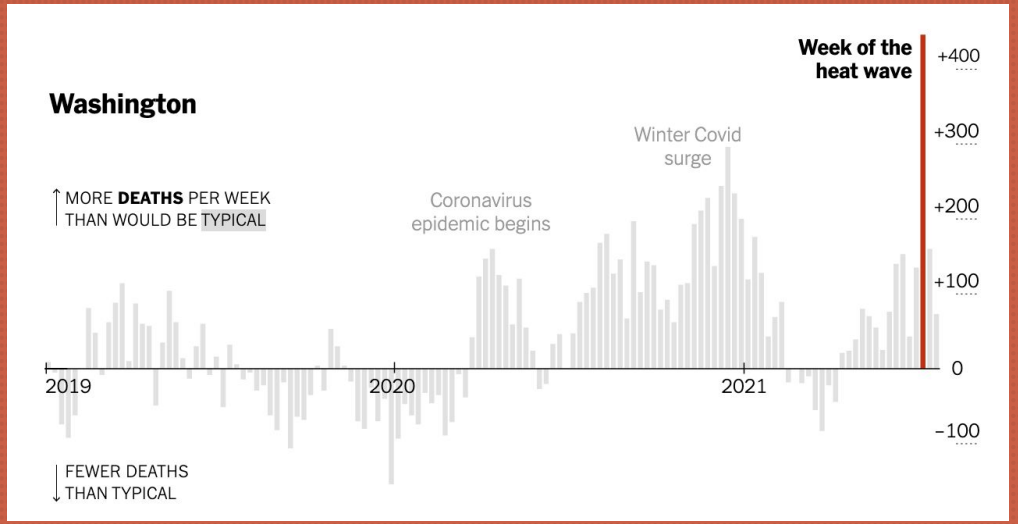


Constantine, D. (n.d.). *Results of heat mapping project show inequitable impact of hotter summers, will inform actions by King County and City of Seattle—King County.* Retrieved April 13, 2023, from https://kingcounty.gov/elected/executive/constantine/news/release/2021/June/23-heat-mapping-results.aspx

Impacts of heat waves in cities

Human Health

- Can cause heat related illnesses: heat stroke and heat stress, worsen existing health conditions, and in extreme cases: death



Popovich, N., & Choi-Schagrin, W. (2021, August 11). Hidden Toll of the Northwest Heat Wave: Hundreds of Extra Deaths. *The New York Times*. https://www.nytimes.com/interactive/2021/08/11/climate/deaths-pacific-northwest-heat-wave.html

Impacts of heat waves in cities

Built Environment

Can damage infrastructure i.e. roads, bridges, disrupt industry i.e. airlines, worsen air quality

Trooper Kelsey Harding [@wspd7pio]. (2021, June 28). *State Route 544 milepost 7 near Everson, Wa is currently closed. The asphalt roadway is buckling and unsafe for travel. WSDOT is advised and detours are currently being set up. BL https://t.co/5Yb9UYzbDc* [Tweet]. Twitter. https://twitter.com/wspd7pio/status/1409353691287592970

Impacts of heat waves in cities

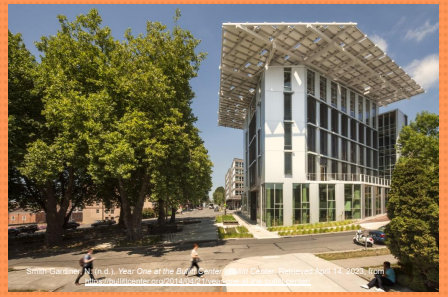
Energy Infrastructure

Can overload energy grid through increased air conditioning use, decrease efficiency of grid due to slower transmission, can cause brownouts/blackouts to prevent widespread grid failure

Portland Streetcar [@PDXStreetcar]. (2021, June 27). *In case you're wondering why we're canceling service for the day, here's what the heat is doing to our power cables. Https://t.co/EqbKUgCJ3K* [Tweet]. Twitter. https://twitter.com/PDXStreetcar/status/1409287314870837253

Urban Planning + Heat Wave Adaptation

Increase greenspace, tree cover, shade structures, green roofs, etc



Green buildings, improve wind circulation through street grid and building arrangement

Implement equitable heat management strategies and increase access to air conditioned spaces

Communication of heat impacts

LOCAL IMPACTS

What areas will be most affected? Which populations are most at risk?

LOCAL ACTION

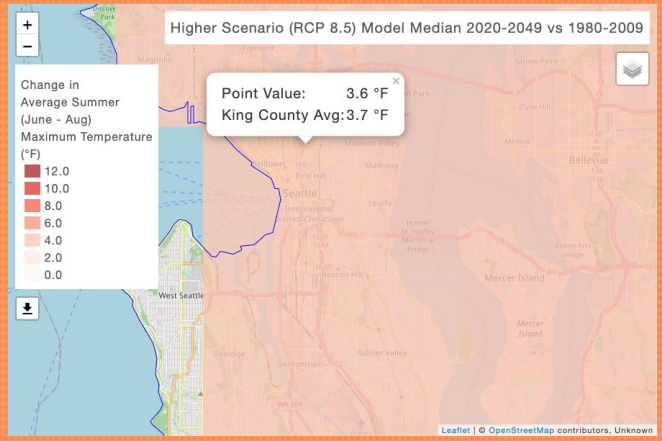
What is your city doing to mitigate and adapt to heat waves? What resources are available to residents?

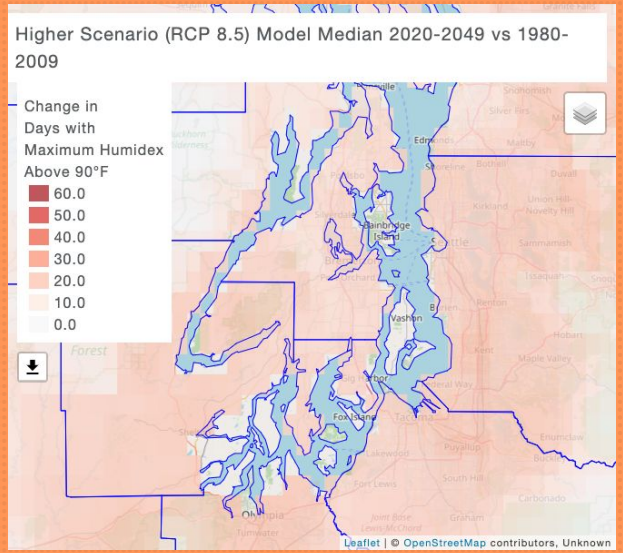
LOCAL KNOWLEDGE

How are communities adapting and how can planners assist in these efforts?

Local impacts

- Using CIG's Climate Mapping for a Resilient Washington Tool
- Seattle is expected to experience
  - A 3.6˚F increase in average summer maximum temperature by mid-century
  - An average of 14.7 days above 90˚F by mid-century



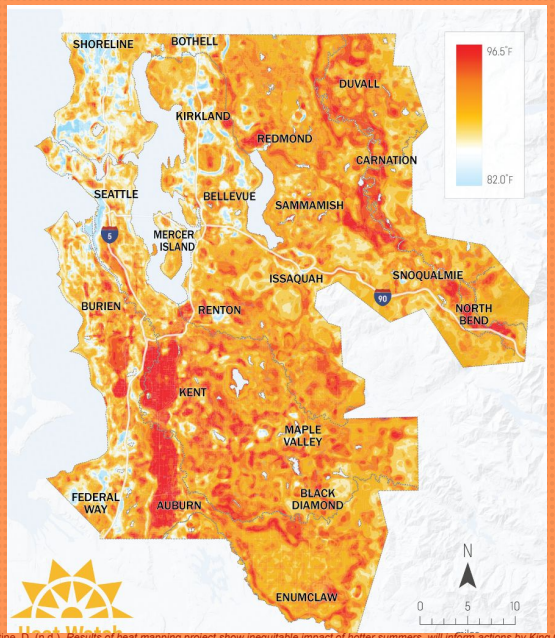


Raymond, C., & Rogers, M. (2022). *Climate Mapping for a Resilient Washington*. Prepared by the Climate Impacts Group, University of Washington, Seattle and Research Data & Computing Services, University of Idaho, Moscow. Retrieved April 8, 2023, from https://cig.uw.edu/resources/analysis-tools/climate-mapping-for-a-resilient-washington/

Local action

- Trees for Neighborhoods Program to help residents plant trees on their property
  - Since 2009, over 13,400 trees have been planted
- Seattle to develop first Extreme Heat Mitigation Strategy

Trees For Neighborhoods—Trees | seattle.gov. (n.d.). Retrieved April 13, 2023, from https://www.seattle.gov/trees/planting-and-care/trees-for-neighborhoods



Constantine, D. (n.d.). *Results of heat mapping project show inequitable impact of hotter summers, will inform actions by King County and City of Seattle—King County*. Retrieved April 13, 2023, from https://kingcounty.gov/elected/executive/constantine/news/release/2021/June/23-heat-mapping-results.aspx

Local knowledge

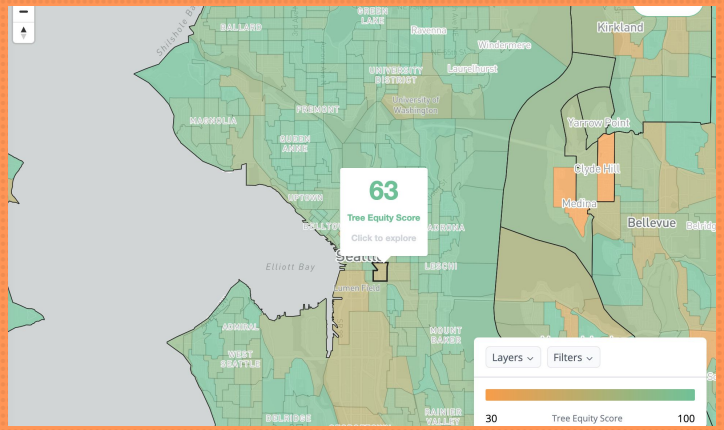
- Ask where people go when it is hot outside, what do they need in their community to supplement adaptation?
  - Air conditioning assistance programs, trees/greenspace, water features, something else?
  - Participatory mapping or other hands-on engagement

Cassidy, B. (n.d.). *Where to Beat the Record-Breaking Heat in Seattle Today*. Seattle Met. Retrieved April 14, 2023, from https://www.seattlemet.com/news-and-city-life/2021/06/where-to-cool-off-in-seattle-washington-heat-wave

Visualization Tools

- FEMA National Risk Index
- CDC Heat and Health Tracker
- CDC Future Heat Events and Social Vulnerability Map
- Washington Health Disparities Map

Tree Equity Score Mapper



https://treeequityscore.org/map/#11/47.6148/-122.3284

- Google Tree Canopy Viewer
- Tree Equity Score Mapper
- Climate Impacts Group Climate Mapping for a Resilient Washington

Heat waves are one important impact for Puget Sound planners to effectively communicate with community members.

Urban flooding is another impact that is increasing in frequency, duration, and intensity that planners should be able to effectively communicate.

Urban Flooding

What's causing it, how it relates to planning decisions, and how planners can better communicate the risks of flooding

Beekman, D., Lindlom, M., & Clarridge, C. (2022, January 7). *Record snow, serious flooding left Seattle area cut off from Washington state, country*. The Seattle Times. https://www.seattletimes.com/seattle-news/weather/record-snow-serious-flooding-left-seattle-area-cut-off-from-washington-state-country/

What contributes to urban flooding

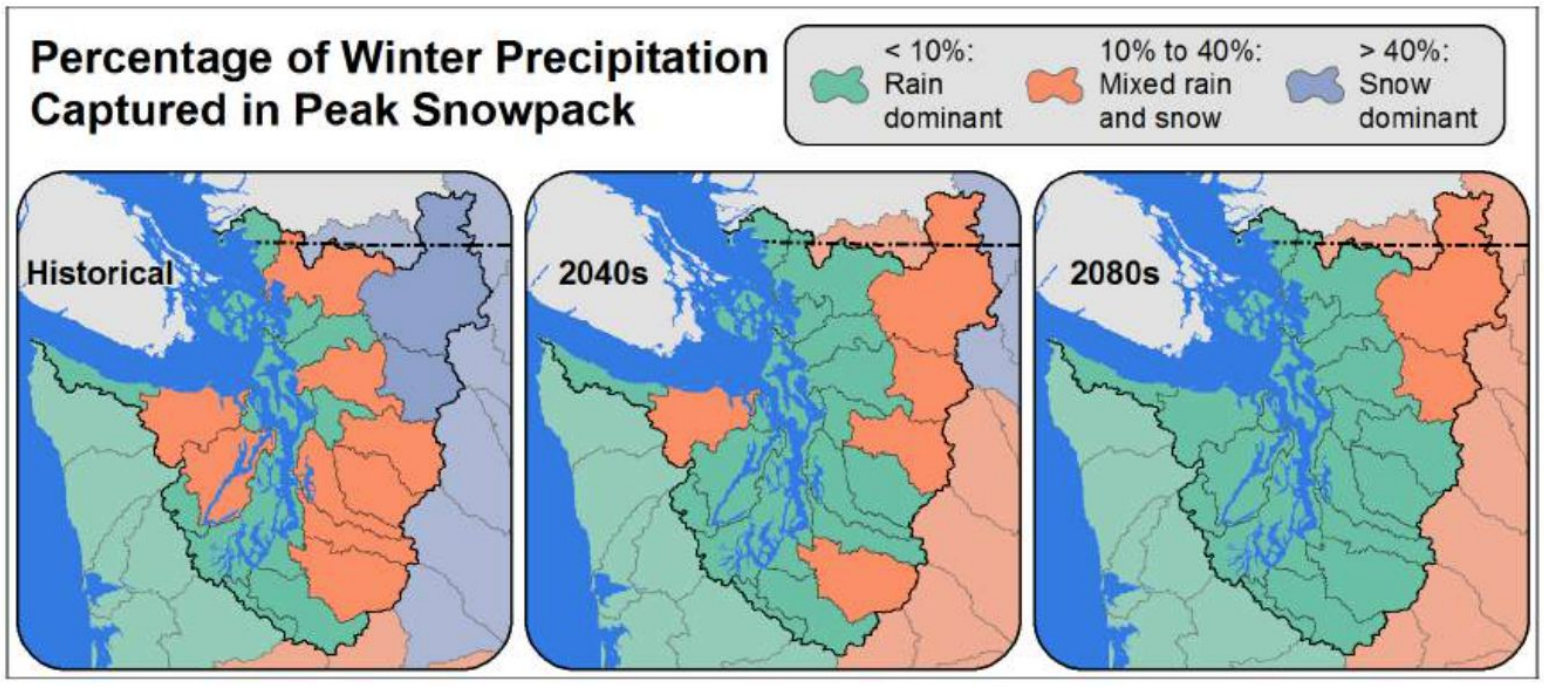
Source: Kim, G. (2022, December 27). 'We lost everything': Duwamish River gushes into Seattle homes. The Seattle Times. https://www.seattletimes.com/seattle-news/duwamish-river-floods-seattles-south-park-neighborhood/

- Increased annual precipitation
- Larger precipitation events
- Sea level rise
- Changes in streamflow
- Increase in impervious surfaces in cities
- Insufficient stormwater infrastructure
- Many more!

Climate change is shifting precipitation patterns

- Overall increase in annual precipitation
- More precipitation is falling as rain rather than snow
- With less snowpack, timing of runoff changes
  - More melting earlier in the year and less stream flow in the summer
  - PNW snow melting 10 days earlier on average

Puget Sound changes in precipitation patterns



Mauger, G. S., Casola, J. H., Morgan, R. L., Strauch, B., Curry, B., Busch Isaksen, T. M., Whitely Binder, L., Krosby, M. B., & Snover, A. K. (2015). *State of Knowledge: Climate Change in Puget Sound*. Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle. doi:10.7915/CIG93777D

Golden, H. (2021, December 3). Famously rainy Seattle breaks its fall rain record after a summer of extreme heat. *The Guardian*. https://www.theguardian.com/weather/2021/dec/03/famously-rainy-seattle-breaks-its-fall-rain-record-after-a-summer-of-extreme-heat

Wet gets wetter
dry gets drier

- With increased temperature, areas that already experience relatively high levels of precipitation are expected to experience even more precipitation, while drier areas will receive less precipitation.
- In Puget Sound, climate change will lead to an increase in overall precipitation and more intense precipitation events
  - Seattle fall-winter of 2021 saw 19in of rain, breaking record since 1945

- With every degree of warming, water vapor increases by 7%
- Atmosphere can hold more water, which means more water is now available for precipitation
- Additional water vapor in the atmosphere also leads to more warming because it is a greenhouse gas that traps heat in the atmosphere just like carbon dioxide or methane (positive feedback loop)

Global warming increases the amount of water vapor the atmosphere can hold

Positive Feedback Loop

1. Increased global temperature due to greenhouse gas emissions will lead to more water vapor being held in the atmosphere.

2. More water vapor in the atmosphere traps even more heat because it is a greenhouse gas.

3. More heat trapped in the atmosphere means more warming.

4. More warming leads to even more water vapor in the atmosphere, and the cycle continues

How urban planning influences flooding

- Development of cities has led to more impermeable surfaces like concrete, that don't allow for water to infiltrate into the soil as well
- During heavy rains, this leads to surface runoff and potential flooding
- More runoff overwhelms drainage pipes which can overflow during large precipitation events, causing flooding

Kent, J. (2022, December 27). *Seattle neighborhoods flooded following heavy rain, king tide.* KOMO. https://komonews.com/news/local/heavy-rain-strong-wind-king-tides-seattle-flooding-urban-city-flood-south-park-winter-weather-pacific-northwest-washington-storm-rains?photo=1

Impacts of flooding in cities

Trees and other greenery can be damaged

Drainage systems can be overwhelmed with too much rain

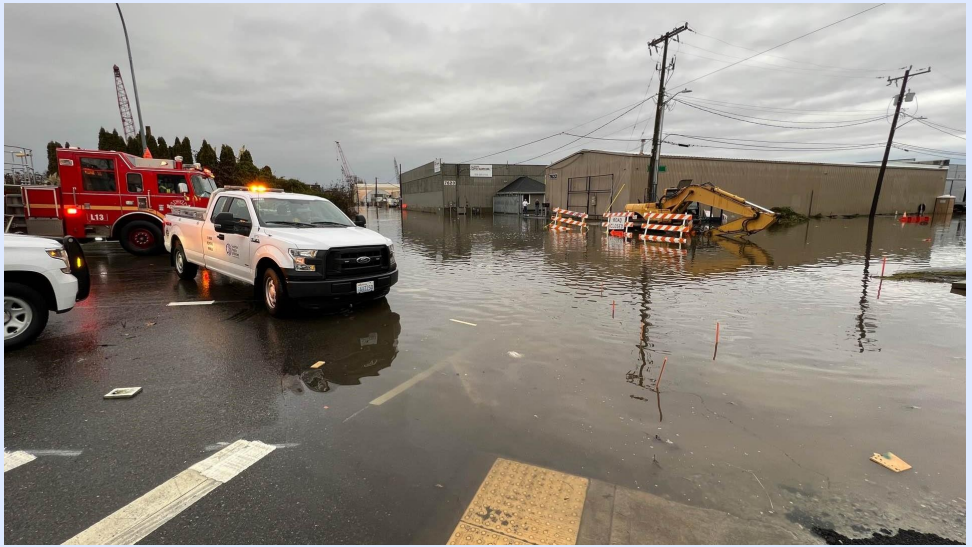
Stormwater runoff can increase water pollution

Infrastructure and other critical services can be interrupted or damaged

Flooding can damage property + in extreme cases cause loss of life

South Park, Seattle Flooding Winter 2022-3

Source: Kim, G. (2022, December 27). 'We lost everything': Duwamish River gushes into Seattle homes. The Seattle Times. https://www.seattletimes.com/seattle-news/duwamish-river-floods-seattles-south-park-neighborhood/



King 5 Staff. (2022, December 10). *Storm impacts: Homes, businesses flooded across western Washington.* King5.Com. https://www.king5.com/article/weather/timeline-severe-winds-flooding-western-washington/281-f0d623ad-3e3c-4b57-8567-c35b9a779969

Erosion + Landslides

- Large precipitation events can lead to erosion and the destabilization of slopes that can lead to landslides and other geologic hazards.
- Large property loss, potential loss of life, can worsen water quality as stormwater picks up sediment and pollutants

D'Angelo, B. (2022, January 8). *Landslide destroys Seattle home, injures 2 people.* WPXI. https://www.wpxi.com/news/trending/landslide-destroys-seattle-home-injures-2-people/T6ZBCLNJ4FCXHKJQFYOTJUH5PY/

Recurrent flooding

- Occurs in coastal areas during high tide
- Sea level rise, storm surges, or heavy precipitation can all increase flooding risks
- Some infrastructure and communities will be more affected than others i.e. stormwater infrastructure, roads near the coast, etc.

Urban Planning + Flooding Adaptation

King County FLOOD ALERT

Early Warning Systems

County-wide alerts, prioritize assistance for low income and high risk neighborhoods.

Ensure people know what resources are available to them i.e. evacuation centers, guidance on what to do before, during, and after floods

City of Seattle. (n.d.). *High Point Natural Drainage System (NDS) Project—Utilities | seattle.gov*. Retrieved April 14, 2023, from https://www.seattle.gov/utilities/neighborhood-projects/high-point-natural-drainage-system

Green Stormwater Infrastructure

Permeable pavement, bioswales, bioretention ponds, green roofs, tree cover, etc.

i.e. High Point neighborhood in Seattle

2020 Updates to Seattle's Floodplain Development Regulations

1. The elevation that the first floor of a new structure must be built at to keep the first story above anticipated flood levels
2. Structures must be engineered to withstand wind from anticipated storms
3. Structures must be engineered to withstand flood waters should anticipated flood levels be exceeded

Zoning and Natural Buffers

Prohibits new development in known flood plains (FEMA), but increase flood zones to include sea level rise estimates if appropriate.

Increase natural buffers and improve vegetation along riverbanks

COMMUNICATE:

local impacts

what areas and who will be affected?

local action

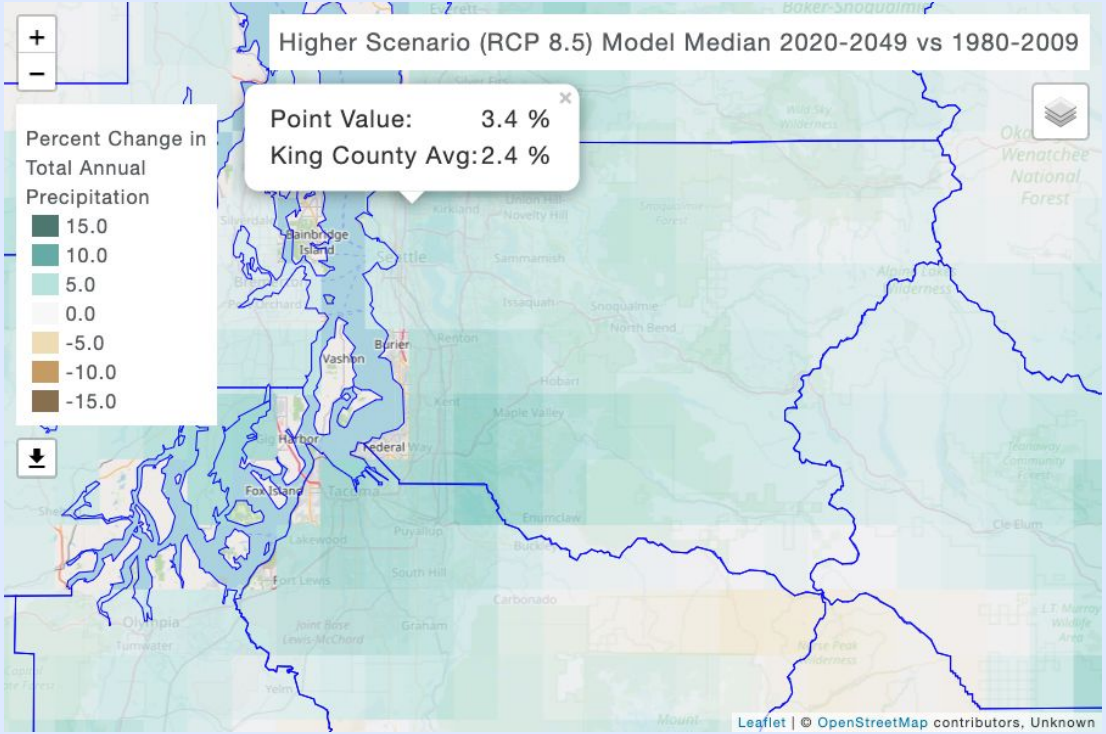
what is being done? What resources are available?

local knowledge

how are communities adapting?

Local impacts

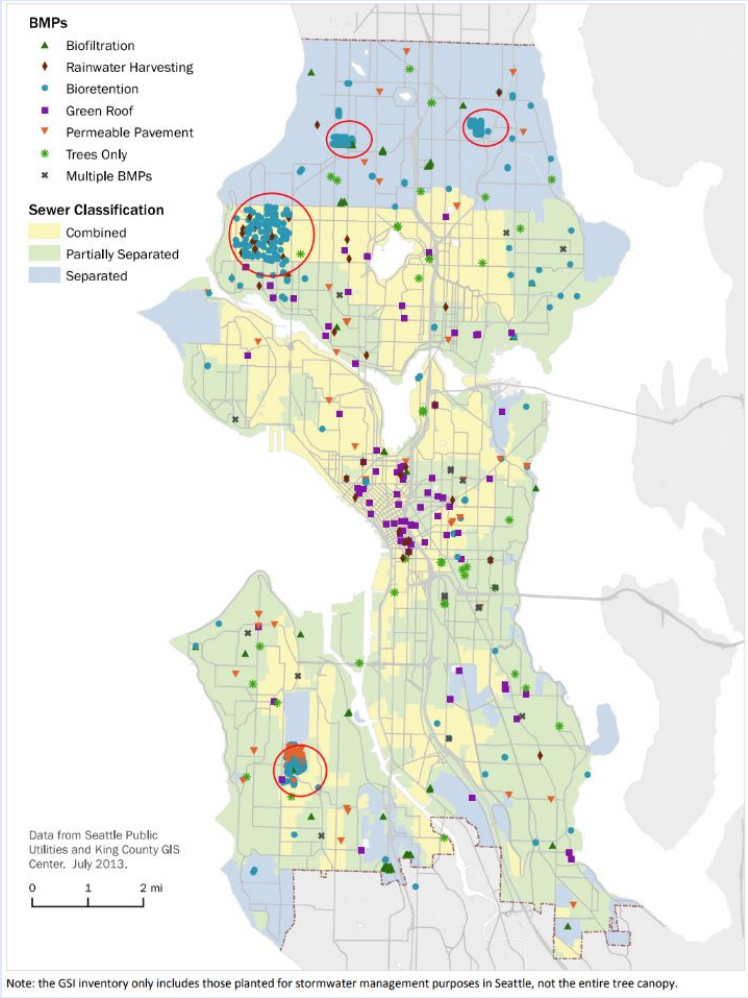
- King County is expected to experience an average of 2.4% increase in precipitation by the mid-century
- Show clear images and maps vs. data projections



Raymond, C., & Rogers, M. (2022). *Climate Mapping for a Resilient Washington*. Prepared by the Climate Impacts Group, University of Washington, Seattle and Research Data & Computing Services, University of Idaho, Moscow. Retrieved April 8, 2023, from https://cig.uw.edu/resources/analysis-tools/climate-mapping-for-a-resilient-washington/

Local action

- Seattle currently manages 465 million gallons of stormwater annually, goal of managing 700 million gallons per year
- RainWise Program in King County assists people with building rain gardens on their property



Note: the GSI inventory only includes those planted for stormwater management purposes in Seattle, not the entire tree canopy.

United States Environmental Protection Agency. (2017). Expanding the Benefits of Seattle's Green Stormwater Infrastructure. https://www.epa.gov/sites/default/files/2017-03/documents/seattle_technical_assistance_010517_combined_508.pdf

Local knowledge

- Participatory mapping in the Duwamish to understand community's vision for the Duwamish Valley
- Resulted in Duwamish Valley Action Plan incorporating goals such as improving natural filtration and reducing flooding risks

Duwamish River Cleanup Coalition. (2009). *Duwamish Valley Vision Map & Report.* https://seattle.gov/documents/departments/environment/environmentalequity/duwamish-valley-vision-report-2009.pdf

Visualization Tools

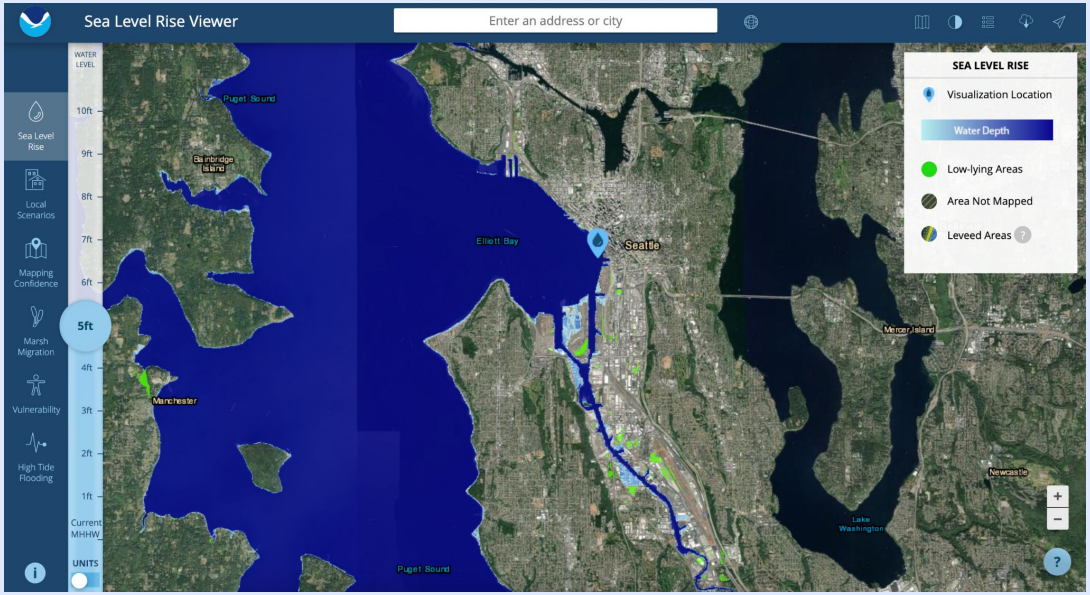
Tides and Currents

- NOAA Tides and Currents Map
- NOAA Inundation Dashboard

Floodplain

- FEMA National Flood Hazard Layer
- Climate Central Coastal Risk Screening Tool

NOAA Sea Level Rise Viewer

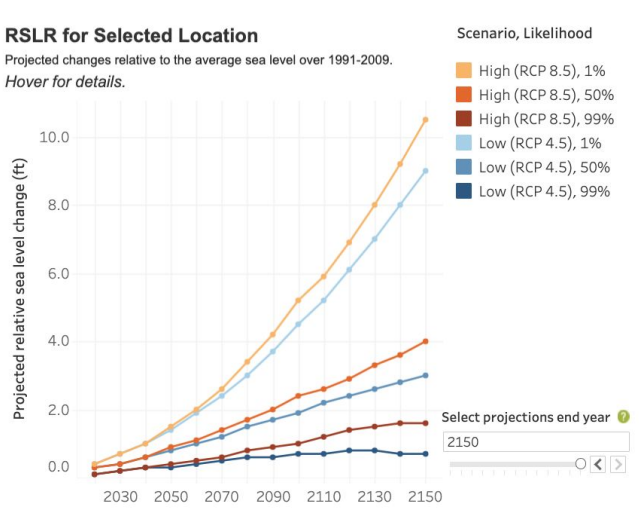


NOAA. (n.d.). *Sea Level Rise Viewer*. Retrieved April 14, 2023, from https://coast.noaa.gov/digitalcoast/tools/slr.html

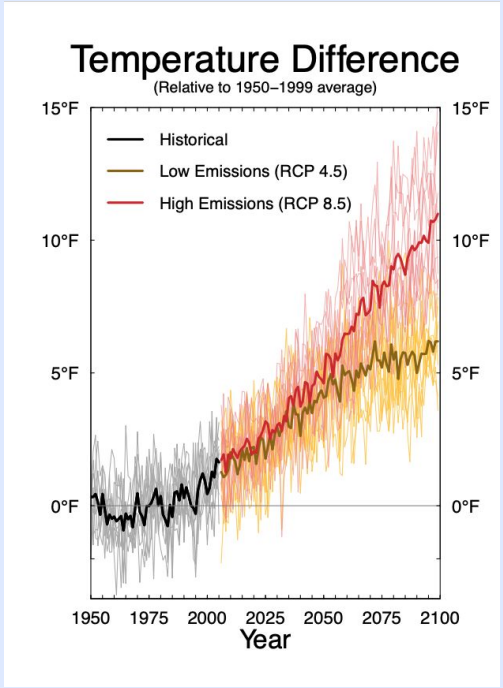
Sea Level Rise

- Climate Impacts Group SLR Visualization Tool
- NOAA SLR Viewer (shown above)
- Seattle Public Utilities SLR Mapper
- Climate Central Coastal Risk Screening Tool

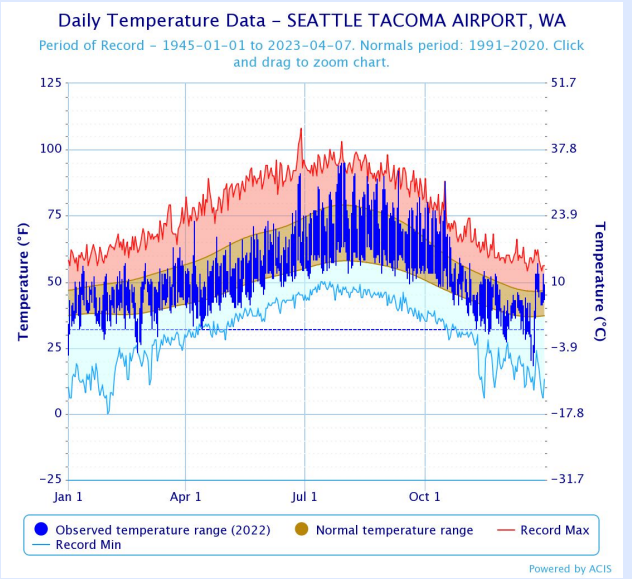
Images commonly look like this but these can be hard for people to understand! Try using the visualization tools listed in the Toolkit to more clearly show local impacts + projections.



Lavin, P., Roop, H.A., Neff, P.D., Morgan, H., Cory, D., Correll, M., Kosara, R., and Norheim, R., 2019. Interactive Washington State Sea Level Rise Data Visualizations. Prepared by the Climate Impacts Group, University of Washington, Seattle. Updated 7/20.



Mauger, G. S., Casola, J. H., Morgan, R. L., Strauch, B., Curry, B., Busch Isaksen, T. M., Whitely Binder, L., Krosby, M. B., & Snover, A. K. (2015). *State of Knowledge: Climate Change in Puget Sound*. Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle. doi:10.7915/CIG93777D



US Department of Commerce, N., & National Weather Service. (n.d.). *NOW Data—NOAA Online Weather Data*. NOAA's National Weather Service. Retrieved April 15, 2023, from https://www.weather.gov/wrh/Climate?wfo=sew

Thank you!

Rachel Chen
rachel.chen217@gmail.com

Link to Survey:
https://forms.gle/kDiE6vGtQ2RMDnRx6