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## **Beyond Tree Planting in Urban Forest Climate Adaptation Actions**

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## Beyond Tree Planting in Urban Forest Climate Adaptation Actions

Forests in cities, and the communities that steward and benefit from them, face significant disruption due to climate change. It is now time to build the capacity in our institutions and in forested natural areas to help navigate multiple overlapping crises and systems change. This case study from Seattle, Washington provides perspective on how to mitigate climate change beyond tree planting.

### Keywords

urban forested natural areas, practitioner notes, network, urban forests, urban ecology, climate change, equity, diversity, Seattle WA

## CONTEXT

In the early 2010s, City of Seattle staff and community began to acknowledge both regional and localized impacts to urban forests tethered to changing climatic conditions (i.e. extended drought and elevated urban heat). Symptoms of decline showed up in ubiquitous ecosystem-supporting and culturally important tree species such as bigleaf maple (Betzen et al. 2021) and Western redcedar (Buhl et al. 2022). This and other impacts to ecological restoration success spurred staff to pursue research (Kim et al. 2012) and strategies (City of Seattle 2013a) that would meet urban forest restoration goals. Impacts to culturally important species, as well as the direct human climate impacts, such as extreme heat, is pointing towards solutions that acknowledge both the social and biophysical elements of urban forests.

The City of Seattle is heavily invested in the care and growth of urban forest lands. The Green Seattle Partnership, an effort to restore forested parklands citywide is nearing 20 years of operation, and the City of Seattle Urban Forest Management Plan (2020) endeavors for 30% average canopy cover citywide by the year 2037. Additionally, there is a growing mandate from updated tree policies (City of Seattle 2023a) to build adaptive capacity in support of healthy people, thriving environments, and vibrant communities.



*EarthCorps at Kubota Gardens Natural Area photo credit: Britt Lê, EarthCorps*

Evolving research (Kim et al. 2012) and policy direction suggested technical solutions like diversifying provenancing of seed could assist forests in adapting to a changing climate.<sup>1</sup> Ecological restoration strategies often prioritized utilizing local seeds grounded in the belief that

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<sup>1</sup> An action in the City of Seattle (2013a) Urban Forest Stewardship Plan (pg. 69) directed Departments to “Diversify seed sources for restoration and reforestation of urban forests in the region in order to adapt existing plant ecotypes to novel bioclimatic conditions in a changing climate.”

they are inherently suited to the specific environmental conditions of the locality (Broadhurst et al. 2008). Beyond a specific climate adaptation, such as building a tree species adaptive capacity, information and updates are coming from national (Crimmins et al., 2023) and regional climate assessments (Vogel et al. 2023) along with local observations.

This focus and research has also confirmed and brought awareness to what communities experience. Frontline impacts are increasingly documented as urban heat islands, variable seasonal precipitation, extended drought, sea level rise along Puget Sound and the Duwamish River Estuary (Hayward 2023), and extreme weather events like atmospheric rivers and landslides. These impacts exacerbate existing disparities in our community and require alternate tactics to adequately respond to and adapt to climate change. The spatial analysis completed to-date shows extreme disparities in exposure to heat (CAPA Heat Watch), and inequities in canopy coverage that exacerbate existing injustices relating to race and income (City of Seattle 2023d).

## **GOAL**

Climate change is a global problem; however, it is the impacts to the urban ecosystem, where most people in the world live, that have the most direct consequences for communities. Seattle seeks to participate in the global urban ecosystem restoration movement. In October 2023, the United Nations Environment Program selected Seattle as one of nineteen cities to join the Generation Restoration project (UNEP 2023). These larger scale endeavors are supported with local goals of canopy coverage, forest health, and reducing climate impact that we are attempting to address holistically; each effort works in tandem with the other intertwined goals.

## **APPROACH**

Our approach to this work is grounded in the environmental justice principles outlined in the City of Seattle Equity & Environment Agenda (n.d.) and focuses land care on priority neighborhoods with BIPOC community collaboration and is informed by race and social equity priorities (City of Seattle 2023b) tree canopy change (City of Seattle 2023c) and ground-level heat mapping data (CAPA Heat Watch 2020).

In 2020, an initial version of the Climate Change Vulnerability and Response in Seattle's Urban Natural Areas was published (Yadrick et al. 2020), highlighting existing knowledge and initial climate adaptation efforts. During the early days of the COVID-19 pandemic, regional partners formed the Forest Adaptation Network (Northwest Natural Resource Group 2022) to facilitate collaboration on forest adaptation projects regionwide. Urban natural areas were highlighted as part of Seattle Parks and Recreation Climate Resiliency Strategy (2022). The Strategy's action plan emphasizes priorities in connecting green and blue infrastructure, revegetation of shorelines, enhancing wildlife habitat, and Parks contribution to a resilient food system.



*Seattle Parks and Recreation Tribal Nations Gathering at Daybreak Star Indian Cultural Center  
photo credit: Lisa Ciecko*

In collaboration with the community, Seattle is experimenting with climate adaptation with no rush to scale. For forested natural areas, Resist - Accept – Direct (Schuurman et al. 2022) and other tactics include, but are not limited to:

- expanded seed provenancing;
- focus on ecological refugia where conditions will support species persistence;
- enhancing under-represented forest types;
- revising BMPs to reflect shifting strategies, including lengthening establishment of new vegetation, ecological thinning, and adjustments to weed control priorities;
- bio-cultural considerations such as re-integration of food systems & traditional ecological knowledge;
- communications & technology transfer through urban forestry communities of practice;
- workforce development which builds community resiliency;
- integrating extreme heat adaptation and mitigation with other public efforts;
- open discussion around the range of climate emotions or other collective traumas we experience; and,
- supporting programs that better address Indigenous, gender, youth, and elder-specific needs.

## **RESOURCES**

Without proper overarching policies, funding, and protection the vast benefits of natural areas could diminish, leading to a hotter and less livable city. There are, however, a myriad of supporting efforts in the Seattle area to leverage and align. Urban forest restoration goals have been acknowledged as a capital investment to advance climate change efforts in City of Seattle’s

Climate Action Plans (2013b) and more recently in the Annual Budget and Park District funding.<sup>2</sup> Meanwhile, the State of Washington launched the Washington Tree Equity Collaborative, aiming to expand canopy cover and promote healthier communities in urban areas where it is needed most (WADNR 2023). Made possible by President Biden's Inflation Reduction Act, in 2023, the U.S. Department of Agriculture's Forest Service recently awarded \$12.9 million to the City of Seattle to engage with environmental justice communities, plant and maintain trees as a nature-based solution to mitigate urban heat (Harrell 2023).

## KEY RESULTS

- 1) **Adaptation demands practical innovations derived from multiple knowledge systems:** Green Seattle Partnership's structure of community-centered ecological restoration provides space (and room for continued improvement) to develop genuine relationships with stakeholders and the community. We have successfully drawn information from a variety of local knowledge, Indigenous wisdom, and Western science, modifying and advancing ecological and community engagement practices. Not just climate science, Green Seattle Partnership is actively engaging with information from multiple disciplines, such as Indigenous scholars, peace studies, and urban ecosystem studies.
- 2) **Monitor:** In Summer 2022, Seattle Parks and Recreation partnered with 12 other cities in a nationwide study led by New York City-based Natural Areas Conservancy (Crown et al. 2022). The study examined the cooling potential of forests and green spaces. Top takeaways underscore how caring for urban natural areas is a vital way to disrupt elevated urban heat:
  - a) Natural areas land surfaces are the coolest: the maximum temperatures were lower across the board, sometimes by over 9° F;
  - b) Natural area forests provide cooler air temp than isolated trees in the landscape; and,
  - c) During the hottest time of day, more diverse forests were cooler than forests we wouldn't characterize as healthy.This monitoring builds on previous (CAPA Heat Watch) extreme heat assessments and informs future heat & forest monitoring efforts.
- 3) **Adaptation takes many strategies:** Textbook ecosystem services like shade from trees are always emphasized as a natural climate solution. But there is no single universal remedy for cooling. Care for climate and community shouldn't begin and end with stereotypical tree planting. For instance, warming temperatures unsettle the conditions needed to grow local food like fruit trees and culturally significant plants. One may inadvertently harm family food security and compromise social justice if we rely on a shade-tree-for-all strategy in every neighborhood. Climate resilience may also look like building and maintaining trails to improve safety, access, and creating a welcoming environment within forested parks. It can also look like youth and skills-training programs that prepare participants to work on the multi-generational effort to steward climate-ready urban forests.
- 4) **Communications & Technology Transfer:** Regional collaborations like the Forest Adaptation Network, Forest Health Watch and the Arbutus ARME have been critical for the Green Seattle Partnership's knowledge-building. These efforts have resulted in sharing

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<sup>2</sup> City of Seattle Open Budget can be found at <https://openbudget.seattle.gov/#!/year/2024>

information about tree health, collaborative research, region-wide experimentation, and the creation of better management practices related to assisted migration. We have used the available data to influence work on the ground. When we use the street-level heat data, the City's Racial and Social Equity Composite Index, and the City's most recent canopy cover change analysis, we begin to see where to prioritize investments to add/replace tree canopy and shade while also doubling down on establishment care, like providing adequate mulch and water.

## OPEN QUESTIONS

In June 2023, the UW Climate Impacts Group published *In the hot seat: Saving lives from extreme heat in Washington state*, which outlines specific, actionable guidance for short-term emergency response and long-term risk reduction. We have seen anchor institutions, such as Seattle Parks and Recreation, become *de facto* or intentional resilience hubs that deliver essential services and mutual aid to our neighbors. In the last few years, as we've lived through overlapping crises, we've also witnessed schools provide food to families. And we've watched libraries, pools, senior centers, community centers, and places of worship become cooling centers for clean-air relief during the season of wildfire smoke.

There has not been a single overarching climate forest climate adaptation strategy for Seattle or the Puget Sound region. This iterative and piecemeal approach has actually led to some success. The absolute best cooling tactics are built on trust and require thoughtfulness and community leadership. Residents are the authorities on where it's hottest and which solutions make sense for their community. A climate of care is more than shade. It's about seeding and embracing adaptation to change.

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## LITERATURE CITED

Betzen, J. J., Ramsey, A., Omdal, D., Ettl, G. J., & Tobin, P. C. (2021). Bigleaf maple, *Acer macrophyllum* Pursh, decline in western Washington, USA. *Forest Ecology and Management*, 501, 119681.

Broadhurst, L. M., Lowe, A., Coates, D. J., Cunningham, S. A., McDonald, M., Vesk, P. A., Yates, C. (2008). Seed supply for broadscale restoration: maximizing evolutionary potential. *Evolutionary Applications*, 1(4), 587–597.

Buhl, C., Fischer, M., & Goodrich, B. (2022). Investigating the Extent and Possible Causes of Western Redcedar Dieback throughout its Range: Evaluation Monitoring Project Report (WC-EM-20-02). Oregon Department of Forestry, Washington Department of Natural Resources, & USFS Forest Health Protection.

CAPA Heat Watch. (2020). 2021 Summary Report Heat Watch Seattle-King County. Retrieved

from <https://your.kingcounty.gov/dnrp/climate/documents/2021-summary-report-heat-watch-seattle-king-county.pdf>

City of Seattle. (n.d.). *Equity & Environment Agenda*. Seattle Department of Sustainability and Environment. Retrieved from <https://www.seattle.gov/documents/Departments/OSE/SeattleEquityAgenda.pdf>

City of Seattle. (2013a). Urban Forest Stewardship Plan. Seattle Department of Sustainability and Environment. Retrieved from [https://www.seattle.gov/Documents/Departments/Trees/Mangement/2013\\_Urban\\_Forest\\_Stewardship\\_Plan.pdf](https://www.seattle.gov/Documents/Departments/Trees/Mangement/2013_Urban_Forest_Stewardship_Plan.pdf)

City of Seattle. (2013b). Seattle Climate Action Plan. Seattle Department of Sustainability and Environment. Retrieved from [https://www.seattle.gov/Documents/Departments/Environment/ClimateChange/2013\\_CAP\\_20130612.pdf](https://www.seattle.gov/Documents/Departments/Environment/ClimateChange/2013_CAP_20130612.pdf)

City of Seattle. (2020). Urban Forest Stewardship Plan. Seattle Department of Sustainability and Environment. Retrieved from <https://www.seattle.gov/environment/sustainable-communities/urban-forestry/urban-forest-stewardship-plan>

City of Seattle (2022). Climate Resiliency Strategy. Seattle Parks and Recreation. Retrieved from <https://www.seattle.gov/parks/about-us/plans-and-reports/environment-plans-and-reports/climate-resiliency-strategy>

City of Seattle. (2023a). Seattle Municipal Code, Title 6, Chapter 305, Section 1219004. Retrieved from [https://library.municode.com/wa/seattle/ordinances/municipal\\_code?nodeId=1219004](https://library.municode.com/wa/seattle/ordinances/municipal_code?nodeId=1219004)

City of Seattle. (2023b). Seattle GeoData: Racial and Social Equity Composite Index Current. Retrieved from <https://data-seattlecitygis.opendata.arcgis.com/datasets/3a6bcc7fa4c14c4daabdb1cd8f329758/explore>

City of Seattle (2023c). Open Budget Seattle - Urban Forestry Green Seattle Partnership PRK732340. Retrieved from <https://openbudget.seattle.gov/#!/year/2023/capital/0/projecttitle/PRK732340/0/fundname?vis=lineChart>.

City of Seattle. (2023d). Tree Canopy Assessment: Final Report. City of Seattle Office of Sustainability & Environment and Vermont Spatial Analysis Lab. Retrieved from [https://seattle.gov/documents/Departments/OSE/Urban%20Forestry/2021%20Tree%20Canopy%20Assessment%20Report\\_FINAL\\_230227.pdf](https://seattle.gov/documents/Departments/OSE/Urban%20Forestry/2021%20Tree%20Canopy%20Assessment%20Report_FINAL_230227.pdf).

Crown, Crystal A., Clara C. Pregitzer, Jeffrey A. Clark, and Sophie Plitt. (2023). *Cooling Cities: Harnessing Natural Areas to Combat Urban Heat*. Natural Areas Conservancy, NY.



- Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. (2023). Fifth National Climate Assessment. U.S. Global Change Research Program, Washington, DC, USA.
- Harrell, B. (2023). Seattle Awarded \$12.9 Million to Plant Trees, Create Jobs, Advance Climate Justice, and Restore Forested Places Near Schools, Parks, and Low-Income Housing. September 18. Retrieved from <https://harrell.seattle.gov/2023/09/18/seattle-awarded-12-9-million-to-plant-trees-create-jobs-advance-climate-justice-and-restore-forested-places-near-schools-parks-and-low-income-housing/>.
- Hayward, Lisa (2023). Resilience on Seattle's Waterfront. University of Washington, Department of Environmental and Occupational Health Sciences, Interdisciplinary Center for Exposures, Disease, Genomics, and the Environment. Retrieved from <https://deohs.washington.edu/edge/blog/resilience-seattles-waterfront>.
- Kim, S.-H., Chung, U., Lawler, J. J., & Anderson, R. E. (2012). Assessing the Impacts of Climate Change on Urban Forests in the Puget Sound Region: Climate Suitability Analysis for Tree Species. School of Environmental and Forest Sciences, College of the Environment, University of Washington. Retrieved from [https://greenseattle.org/wp-content/uploads/2019/02/Climate-Change-Final-Report\\_optimized\\_reduced.pdf](https://greenseattle.org/wp-content/uploads/2019/02/Climate-Change-Final-Report_optimized_reduced.pdf).
- Northwest Natural Resource Group. (2022). Forest Adaptation Network. Retrieved from <https://www.nnrg.org/climateadaptation/forest-adaptation-network/>.
- Schuurman, G. W., Cole, D. N., Cravens, A. E., Covington, S., Crausbay, S. D., Hoffman, C. H., Lawrence, D.J., Magness, D. R., Morton, J. M., Nelson, E. A. & O'Malley, R. (2022). Navigating ecological transformation: Resist–accept–direct as a path to a new resource management paradigm. *BioScience*, 72(1), 16-29.
- United Nations Environment Program. (2023). World Cities Day: UNEP Announces 19 Cities to Restore Nature's Rightful Place in Urban Areas. United Nations Environment Programme. 31 October. Retrieved from <https://www.unep.org/technical-highlight/world-cities-day-unep-announces-19-cities-restore-natures-rightful-place-urban>.
- Vogel, J., J. Hess, Z. Kearl, K. Naismith, K. Bumbaco, B.G. Henning, R. Cunningham, N. Bond. (2023.) In the Hot Seat: Saving Lives from Extreme Heat in Washington State. Report prepared by the University of Washington's Climate Impacts Group, UW's Center for Health and the Global Environment, the Washington State Department of Health, the Office of the Washington State Climatologist, and Gonzaga University's Center for Climate, Society & the Environment. Retrieved from <https://cig.uw.edu/wp-content/uploads/sites/2/2023/06/CIG-Report-Heat-202-pages.pdf>.
- Washington State Department of Natural Resources. (2023). DNR and American Forests

Announce Statewide Partnership to Advance Tree Equity. 13 April. Retrieved from <https://www.dnr.wa.gov/news/dnr-and-american-forests-announce-statewide-partnership-advance-tree-equity>.

Yadrick Jr, M. T., Ciecko, L. A., Brinkley, W. R., & Mojzak, A. K. (2020). Climate Change Vulnerability and Response in Seattle's Urban Natural Areas. *Cities and the Environment (CATE)*, 13(1), 10.