The Struggle to Increase Tree Cover in US Cities

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Urban tree cover plays a vital role in our communities, from mitigating heat islands to improving air quality and improving public health. However, disparities in tree distribution exist in historically marginalized communities who often have little to no trees, further increasing environmental and social inequalities (Chiang, 2023; Kondo et al., 2020). Expanding tree cover requires collaboration among multiple stakeholders, including residents, advocacy groups, nonprofits, businesses, local governments, and federal agencies. These efforts are shaped not only by human actors but also by non-human elements such as policies, funding structures, technology, and even the trees themselves (Arbor Day Foundation, 2024; USDA, 2023).

Actor-Network Theory (ANT) provides a framework for understanding how urban tree-planting initiatives are shaped by relationships between human and non-human actors. Actor-Network Theory challenges the traditional distinction between social and technological factors, instead emphasizing how networks of actors, both human and material, come together to influence sociotechnical outcomes (ScienceDirect, 2024; Wikipedia, 2024). This paper applies ANT to analyze how urban forestry efforts succeed or fail based on the interactions among policymakers, community organizations, funding mechanisms, and environmental constraints.

An Overview of Actor-Network Theory

Actor-Network Theory (ANT) was developed by Bruno Latour, Michel Callon, and John Law as a way to understand how networks of diverse entities interact to shape outcomes. In ANT, both human and non-human actors (or "actants") are treated as participants in the network, influencing each other in complex ways (ScienceDirect, 2024; Wikipedia, 2024). Rather than

viewing technology, policy, or nature as passive elements, ANT examines how they play an active role in shaping social phenomena.

ANT is particularly useful for analyzing urban forestry because it allows us to see how different stakeholders, like government agencies, nonprofits, businesses, community groups, funding programs, GIS mapping tools, and the trees themselves, contribute to the success or failure of tree canopy expansion efforts. By applying ANT, we can better understand how these entities interact and how urban greening initiatives emerge, stabilize, or face resistance within complex urban systems.

Actors and Actants

Expanding urban tree cover requires the coordination of multiple actors, both human and material. First is government agencies and includes all three levels, local, state, and federal. Each tier creates policies and laws that impact where trees can and cannot be planted, which trees can be cut down and which cannot. They also are responsible for allocating funding for urban tree planting initiatives. Competing land use priorities/limitations and budget constraints impact this initiative by limiting their success (City Council, 2023; City of Fort Collins, n.d.). These sorts of impacts can be seen in the current DOGE cuts to the U.S. Forest Service budget by the current administration (Palombo, 2025).

Second, and one of the most important actors, are community advocacy groups, non-profits, and environmental organizations. Nonprofits like the Arbor Day Foundation and American Forests contribute funding, expertise, and logistical support for large-scale urban forestry projects (Arbor Day Foundation, 2024; American Forests, 2024). While groups like Reforest Richmond and Trees Virginia help raise awareness and support in local communities

and lobby to the local governments to “invest” in urban forestry projects (Reforest Richmond, n.d.; Trees Virginia, 2023). They all play a critical role in addressing tree equality by targeting historically marginalized communities that have lower tree canopy coverage. These organizations also conduct research on the ecological benefits of urban trees, create strategic planting plans, and collaborate with government agencies and businesses to implement initiatives effectively. Nonprofits also help bridge financial gaps, allowing tree-planting programs to continue in areas where government funding is limited. By working alongside local communities and volunteer groups, these organizations strengthen community engagement and improve the long-term sustainability of urban forestry efforts.

The third actor is businesses and other members of the private sector. Urban neighborhoods and other residential areas are not the only areas impacted by lack of proper tree cover. Local businesses are more likely than not to support urban forestry projects, because they recognize benefits of shaded commercial areas for customer engagement and property values. Public-private partnerships can enhance funding opportunities for urban greening projects (Aimery, 2024) when government spending is lacking.

The fourth actant is modern technology and data driven urban planning. With technologies available like GIS (Geographic Information Systems), AI, remote sensing technologies, and even google maps/earth are able to identify gaps in urban tree cover and prioritize planting efforts. These material or non-human actors influence decision making to most, if not all, human actors involved by providing both visual and quantitative data that shape urban forestry policies and projects (Szantoi et al., 2012).

The last and most important actant are the trees themselves. They provide shade, influences air quality, and impact infrastructure (Bajwa, 2023; Podyma, 2022). Beyond their

physical benefits, trees actively shape social and policy discussions, as their presence, or absence, can affect neighborhood development, economic investment, and environmental health. In urban environments, trees require human interaction for planting, pruning, and disease management, further reinforcing their connected role in urban forestry networks (Frontiers in Ecology and Evolution, 2021). In some cases, tree selection can determine the ecological resilience of an urban canopy, as climate change calls for the adaptation of more heat and drought resistant species to maintain long-term sustainability.

Case Studies

Looking at specific efforts, the Tree Equity program by American Forests, St. Paul's Frogtown Green initiative, and Minneapolis' City Trees Program are excellent examples. Actor-Network Theory shows how these initiatives succeed by aligning actors like residents, government, nonprofits, and trees themselves, but also have similar challenges that can disrupt these networks.

Case 1: Tree Equity Program

American Forests enrolls partners through the $50 million Tree Equity Catalyst Initiative and Fund, aiming for 100 cities to achieve Tree Equity by 2030, planting 500 million trees (Tree Equity). The American Forests program uses the "Tree Equity Score," a GIS tool that prioritizes planting trees in low-canopy areas (American Forests, 2024). This helps ensure that investments in tree planting are directed to the most underserved communities. It incorporates workforce development initiatives, training individuals from underserved communities for careers aimed at tree care. The initiative involves multilevel actors, federal agencies, local governments, and non-profits. They also face challenges like securing funds, addressing policy barriers, and long-term

maintenance of newly planted trees. This program highlights how trees act as the non-human agents that influence socioeconomic and environmental factors, aligning human actors' interests toward equitable urban forestry.

Case 2: Frogtown Green

Frogtown Green is a resident led environmental initiative in St. Paul's Frogtown neighborhood to address tree coverage inequalities. Frogtown has the fewest amount of trees than any other neighborhood in St. Paul and is one of the most diverse communities. Having started in 2009, the organization set out to plant 1,000 trees by 2025 and hit the target ahead of schedule. However, interacting with absent landlords and keeping up with the maintenance for the trees has posed challenges. These challenges threaten the impact the trees have had on the community. Trees influence property values, urban planning, and the local climates. While the actors, landlords, residents, and policy makers, determine their placement and maintenance.

Case 3: City Trees Program

Minneapolis has operated a cost sharing tree planting program since 2006, enrolling residents and businesses as active participants in the initiative. By providing low-cost trees through a lottery system, the program encourages community participation in urban greening efforts and makes it more accessible for all. Trees not only offer shade and reduce energy bills but also increase property values and promote environmental sustainability. The program's success relies on continued municipal support and incentives to maintain public interest and ensure the long-term health of the urban forest. Residents, local business, local government agencies, and the trees themselves function as the actors and actants. The government's initiative to include both residents and businesses to participate in the program are influenced by factors

such as property values, environmental awareness, and available incentives. On the other hand, the presence of trees affects the local climates, energy consumption, and the health of the local neighborhoods.

Counterarguments

The Actor-Network Theory is a valid framework for analyzing the relationships involved with urban forestry. However, some might argue that on a smaller level it can overlook certain things when looking at it from a broader level.

Actor-Network Theory's focuses on localized networks and how they may fail due to issues unique to that localized network. For example, systemic racism has influenced tree cover distribution and is evident if you drive through any city, Richmond is a great example of that. Historically, redlining, gerrymandering, and urban planning policies have led to the disparity in tree cover. While ANT can map the network the relationships between stakeholders, it cannot explicitly account for the historical socioeconomic factors that are the initial cause and continuation of the inequality. Without the historical context, ANT sees all the actors and actants as equal players in the local network.

Another critique of the ANT approach overcomplicates the non-human actors, including trees, climate, soil, etc. Other traditional frameworks, like a cost-benefit analysis or environmental assessments, already provide the tools to evaluate urban forestry without the need to think of trees as "actants." Decisions in urban forestry are more often dependent upon policies and funding rather than a network of relationships between human and non-human actors.

Conclusion

Despite the potential benefits of urban forestry, actor-networks often face destabilization due to conflicting interests, resource limitations, and social resistance. Limited financial resources can weaken connections between actors and actants, preventing projects from moving forward or sustaining long-term maintenance efforts (One Tree Planted, n.d.). Complex regulations and zoning laws can limit tree-planting initiatives, requiring negotiation between advocacy groups and government agencies (City Council, 2023). Some urban residents oppose tree-planting efforts due to concerns about maintenance, property values, or obstructed views. The recent vandalism of newly planted trees in St. Paul (Nace, 2024) highlights the need for community engagement and education to ensure public support. Additionally, pushback against tree-planting initiatives in low-income neighborhoods, as reported in the Star Tribune (2024), underscores the social challenges that must be addressed.

Applying ANT to urban forestry efforts reveals how networks of human and non-human actors must be carefully constructed and maintained to achieve sustainable greening initiatives. Strengthening the relationships between policymakers, community advocates and organizations, businesses, and technology can create more resilient urban forestry programs. It also highlights the importance of recognizing trees and environmental factors as active participants in the network. Ensuring proper maintenance, acknowledging climate change, and selecting resilient tree species can enhance long-term success (Skirble, 2024).

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