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Resilience Justice and Community-Based Green and Blue Infrastructure

Craig Anthony Arnold

Resilience Justice Project Researchers

RESILIENCE JUSTICE AND COMMUNITY-BASED GREEN AND BLUE INFRASTRUCTURE

CRAIG ANTHONY (TONY) ARNOLD*
& RESILIENCE JUSTICE PROJECT RESEARCHERS**

INTRODUCTION

The environmental conditions of marginalized communities, particularly low-income communities of color,[1] make those communities

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* Boehl Chair in Property and Land Use, Professor of Law, Affiliated Professor of Urban and Public Affairs, Director of the Resilience Justice Project, and former Chair of the Center for Land Use and Environmental Responsibility, University of Louisville. Visiting Scholar, UCLA School of Law, Fall 2016. Portions of this Article were supported with funding or other resources from the Surdna Foundation, The City Project, the University of Louisville Boehl Chair Endowment Funds, the University of Louisville Brandeis School of Law, the University of Louisville Department of Urban and Public Affairs, and UCLA School of Law. The authors thank participants in the following events for their helpful comments on presentations about parts of the research presented in this Article: 2017 Green Economy Symposium at the University of Missouri Kansas City Law School; 2017 Brigham-Kanner Property Rights Conference at William & Mary Law School; 2018 University of Louisville Sustainability Scholars Roundtable; 2018 Online Workshop for Environmental Law Scholarship; 2019 National Association of Olmsted Parks and American Society of Landscape Architects Conference on The Olmsted Effect: Shaping the Future Through Landscapes; 2019 Environmental Scholars Summer Works-in-Progress Workshop; 2019 Ecological Society of American Annual Meeting Symposium Session on Improving Environmental Decision-Making Through Integrated Governance, Public Engagement, and Translational Approaches; 2019 University of Antwerp Law School Symposium (Antwerp, Belgium); Nova University School of Law Permanent Seminar on the State and Study of Law (SPEED) (Lisbon, Portugal); 2020 Florida Gulf Coast University Diversity and Inclusion Lecture Series; and 2020 World Urban Parks International Webinar on Urban Parks, Urban Futures—A Path Towards Recovery, Equity, Wellbeing, Social Justice, and Resiliency. This Article is dedicated to the memory of the late Robert Garcia, JD, Founding Director of The City Project, Los Angeles, CA, and a national leader in civil rights law, urban planning, environmental justice, health equity, and park equity.

** The following researchers have worked on this project as a Fulbright Scholar, graduate research assistants, Resilience Justice Fellows, or public-service interns with the University of Louisville Resilience Justice Project, and their current affiliations are listed in Appendix B of this Article: Ra'Desha Williams; Holden Pederson; Andrew Schuhmann; Audrey Ernstberger; Tiago de Melo Cartaxo; Connor Cafferty; Taylor Gore; James Mains; Kirk Mattingly; Leanna Banda-Cruz; Payton Klatt; Elizabeth Roseman; Elijah Beau Eisert; John Garvey; Henna Khan; Pierce Stevenson; Charles Michael Szot; Tim Mok; Briana Lathon; Luisa Trujillo; Henry Nieberg; Frank Bencomo-Suárez; Christine Calacsan; Lauren Freeman; Taylor Ichinose; Demitri Johnson-Cantu; Margaret Lawrence; Natalie Nassar; Lauren Neal; Sarah Pennington; Maximillian Schweiger; Margaret Sites; and Logan Wood.

[1] Throughout this Article, the term "low-income communities of color" will be used as

disproportionately more vulnerable to major disturbances and changes, such as climate change, health crises, pollution releases, disasters, economic shocks, and social and political upheaval.[2] Many of the most important movements for justice with respect to environmental conditions, including environmental justice,[3] disaster justice,[4] and climate justice,[5] are connected to broader movements for racial and social justice, asserting that Black and Brown lives matter. These movements seek to confront, dismantle, and reform systems of racism, colonialism, and structural inequality.[6]

In particular, low-income communities of color have inequitably less and worse green and blue infrastructure, such as parks and green spaces, trees, restored waterways, biotic stormwater controls, food gardens, and wetlands.[7] In general, "green and blue infrastructure" is a public-policy

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shorthand phrasing to refer to geographic communities, particularly neighborhoods and groupings of neighborhoods, in which a substantial percentage of the residents are Black, Indigenous, or People of Color ("BIPOC") and in which the poverty rate is significantly higher than the area median or in which the median income is significantly lower than the area median. Most, although not all, of the examples that are used in this Article are urban neighborhoods in which a majority of the residents are Black/African American and/or Latino/Hispanic.

[2] *See, e.g.*, Sheila R. Foster, *Vulnerability, Equality, and Environmental Justice*, *in* THE ROUTLEDGE HANDBOOK OF ENVIRONMENTAL JUSTICE 136, 136–48 (Ryan Holifield et al. eds., 2018); RESILIENCE, ENVIRONMENTAL JUSTICE AND THE CITY 1–2 (Beth Schaefer Caniglia et al. eds., 2017); Emmanuel F. Boamah & Craig Anthony (Tony) Arnold, *Assemblages of Inequalities and Resilience Ideologies in Urban Planning*, *in* RACIAL JUSTICE IN AMERICAN LAND USE (Craig Anthony (Tony) Arnold et al. eds., forthcoming 2021) (on file with the author).

[3] *See, e.g.*, LUKE W. COLE & SHEILA R. FOSTER, FROM THE GROUND UP: ENVIRONMENTAL RACISM AND THE RISE OF THE ENVIRONMENTAL JUSTICE MOVEMENT (2000).

[4] *See, e.g.*, Robert R.M. Verchick, *Disaster Justice: The Geography of Human Capability*, 23 DUKE ENV'T L. & POL'Y F. 23 (2012).

[5] *See, e.g.*, David Schlosberg & Lisette B. Collins, *From Environmental to Climate Justice: Climate Change and the Discourse of Environmental Justice*, 5 WILEY INTERDISC. REVS.: CLIMATE CHANGE 359 (2014); Brian Tokar, *On the Evolution and Continuing Development of the Climate Justice Movement*, *in* THE ROUTLEDGE HANDBOOK OF CLIMATE JUSTICE 13, 13 (Tahseen Jafry ed., 2019).

[6] *See, e.g.*, sources cited *supra* notes 2–5. *See also* Leon Sealey-Huggins, *'The Climate Crisis is a Racist Crisis': Structural Racism, Inequality and Climate Change*, *in* THE FIRE NOW: ANTI-RACIST SCHOLARSHIP IN TIMES OF EXPLICIT RACIAL VIOLENCE 99, 100–01 (Azeezat Johnson et al. eds., 2018); Malini Ranganathan & Eve Bratman, *From Urban Resilience to Abolitionist Climate Justice in Washington, D.C.*, 53 ANTIPODE 115 (2019).

[7] *See, e.g.*, JENNIFER WOLCH ET AL., PARKS AND PARK FUNDING IN LOS ANGELES: AN EQUITY-MAPPING ANALYSIS, *in* URB. GEOGRAPHY 3 (2013); Nik Heynen et al., *The Political Ecology of Uneven Urban Green Space: The Impact of Political Economy on Race and Ethnicity in Producing Environmental Inequality in Milwaukee*, 42 URB. AFFS. REV. 3 (2006); Lauren C. Abercrombie et al., *Income and Racial Disparities in Access to Public Parks and Private Recreation Facilities*, 34 AM. J. PREVENTATIVE MED. 9 (2008); Christopher G. Boone et al.,

term that refers to the biotic and aquatic conditions on which communities depend, and is considered roughly equivalent to the more business-oriented term "natural capital" and the more science-oriented term "ecosystem services."[8] Having disproportionately lower quantities and quality of green and blue infrastructure makes low-income communities of color more vulnerable and less resilient to disasters, pollution, climate change, and health stressors, than residents in higher-income White neighborhoods.[9] For example, neighborhoods having too few parks and trees have higher rates of asthma and obesity and poorer mental and physical health among Black and Latino children.[10] Low-income neighborhoods and neighborhoods

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Parks and People: An Environmental Justice Inquiry in Baltimore, Maryland, 99 ANNALS ASS'N AM. GEOGRAPHERS 767 (2009); Shawn M. Landry & Jayajit Chakraborty, *Street Trees and Equity: Evaluating the Spatial Distribution of an Urban Amenity*, 41 ENV'T & PLAN. A 2651 (2009); Sharon Moran, *Cities, Creeks, and Erasure: Stream Restoration and Environmental Justice*, 3 ENV'T JUST. 61 (2010); James Salzman et al., *The Most Important Current Research Questions in Urban Ecosystem Services*, 25 DUKE ENV'T L. & POL'Y F. 1, 5 (2014); Megan Horst et al., *The Intersection of Planning, Urban Agriculture, and Food Justice: A Review of the Literature*, 83 J. AM. PLAN. ASS'N 277 (2017).

[8] Salzman et al., *supra* note 7, at 3 (referring to both green infrastructure and ecosystem services as commonly used terms); Vierikko Kati & Niemelä Jari, *Bottom-up Thinking—Identifying Socio-Cultural Values of Ecosystem Services in Local Blue-Green Infrastructure Planning in Helsinki, Finland*, 50 LAND USE POL'Y 537, 537 (2015) (using "green and blue infrastructure" "bluegreen infrastructure" and "ecosystem service" interchangeably to refer to the support that nature provides to society). *See also* Robert Costanza & Herman E. Daly, *Natural Capital and Sustainable Development*, 6 CONSERVATION BIOLOGY 37, 38 (1992) (referring to ecosystems as natural capital that produce a flow of ecosystem services); Carlos H. Betancourth, *Eco-Infrastructures, Feedback Loop Urbanisms and Network of Independent Zero Carbon Settlements*, *in* ECO-CITY PLANNING: POLICIES, PRACTICE AND DESIGN 51, 75–76 (Tai-Chee Wong & Belinda Yuen eds., 2011) (referring to both green and blue infrastructures and eco-infrastructures interchangeably); Zahra Ghofrani et al., *A Comprehensive Review of Blue-Green Infrastructure Concepts*, 6 INT'L J. ENV'T & SUSTAINABILITY 15, 17–18 (2017) (describing green infrastructure and articulating a concept of blue-green infrastructure that incorporates green infrastructure but with greater integration with aquatic ecosystem networks and services).

[9] *See, e.g.*, Brent Yarnal, *Vulnerability and All That Jazz: Addressing Vulnerability in New Orleans After Hurricane Katrina*, 29 TECH. SOC'Y 249 (2007); W. Neil Adger & P. Mick Kelly, *Social Vulnerability and Resilience*, *in* LIVING WITH ENVIRONMENTAL CHANGE (W. Neil Adger et al. eds., 2001); Verchick, *supra* note 4; Bruce C. Mitchell & Jayajit Chakraborty, *Urban Heat and Climate Justice: A Landscape of Thermal Inequity in Pinellas County, Florida*, 104 GEOGRAPHICAL REV. 459 (2014); Foster, *supra* note 2; R. Dean Hardy et. al, *Racial Coastal Formation: The Environmental Injustice of Colorblind Adaptation Planning for Sea-Level Rise*, 87 GEOFORUM 62 (2017); Andrea Cortinez-O'Ryan et al., *Could Severe Mobility and Park Use Restrictions During the COVID-19 Pandemic Aggravate Health Inequalities? Insights and Challenges from Latin America*, 36 CADERNOS DE SAÚDE PÚBLICA 1 (2020).

[10] *See, e.g.*, ROBERT GARCÍA & AUBREY WHITE, THE CITY PROJECT, HEALTHY PARKS, SCHOOLS, AND COMMUNITIES: MAPPING GREEN ACCESS AND EQUITY FOR THE LOS ANGELES REGION

of color are more vulnerable to urban heat island effects, heat waves, and heat-related deaths due to disproportionately less trees, vegetation, and green spaces.[11] Low-income neighborhood residents typically do not receive the benefits of green and blue infrastructure policies that are designed to mitigate and prevent urban flooding,[12] even though low-income people of color are substantially more likely to live in flood-prone areas.[13]

Public policies to remedy unequal green and blue infrastructure in low-income neighborhoods of color often fail because inequality and racism are deeply embedded in social systems and institutions. Top-down government decisions to create new green and blue infrastructure in these neighborhoods often fail to build neighborhood social capital (i.e., cooperation, trust, problem-solving, networks), empower the marginalized and oppressed residents, and address community-defined needs.[14] New green and blue infrastructure either are neglected and degraded over time or displace existing residents through green gentrification, when new green and blue infrastructure stimulate external investment and land-development in the neighborhood, driving up property values and rents and driving out the low-income residents of color as their neighborhoods become whiter and wealthier.[15] The interconnected environmental, economic,

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(2006); Gina S. Lovasi et al., *Children Living in Areas with More Street Trees Have Lower Prevalence of Asthma*, 62 J. EPIDEMIOLOGY & CMTY. HEALTH 647 (2008); Bethany B. Cutts et al., *City Structure, Obesity, and Environmental Justice: An Integrated Analysis of Physical and Social Barriers to Walkable Streets and Park Access*, 69 SOC. SCI. & MED. 1314 (2009).

[11] *See, e.g.*, G. Darrel Jenerette et al., *Ecosystem Services and Urban Heat Riskscape Moderation: Water, Green Spaces, and Social Inequality in Phoenix, USA*, 21 ECOLOGICAL APPLICATIONS 2637 (2011); Bill M. Jesdale et al., *The Racial/Ethnic Distribution of Heat Risk-Related Land Cover in Relation to Residential Segregation*, 121 ENV'T HEALTH PERSPS. 811 (2013); Mitchell & Chakraborty, *supra* note 9; Ganlin Huang & M. L. Cadenasso, *People, Landscape, and Urban Heat Island: Dynamics Among Neighborhood Social Conditions, Land Cover and Surface Temperatures*, 31 LANDSCAPE ECOLOGY 2507 (2016).

[12] *See, e.g.*, Lisa Reyes Mason et al., *Urban Flooding, Social Equity, and "Backyard" Green Infrastructure: An Area for Multidisciplinary Practice*, 27 J. CMTY. PRAC. 334 (2019).

[13] *See, e.g.*, Neil Debbage, *Multiscalar Spatial Analysis of Urban Flood Risk and Environmental Justice in the Charlanta Megaregion, USA*, 28 ANTHROPOCENE 1, 2 (2019).

[14] *See, e.g.*, Mark Pelling, *Participation, Social Capital and Vulnerability to Urban Flooding in Guyana*, 10 J. INT'L DEV. 469 (1998); MANUEL PASTOR, BUILDING SOCIAL CAPITAL TO PROTECT NATURAL CAPITAL: THE QUEST FOR ENVIRONMENTAL JUSTICE 77–97 (Island Press 2003); Sheila R. Foster, *The City as an Ecological Space: Social Capital and Urban Land Use*, 82 NOTRE DAME L. REV. 527 (2006); Melanie McDermott et al., *Examining Equity: A Multidimensional Framework for Assessing Equity in Payments for Ecosystem Services*, 33 ENV'T SCI. POL'Y 416 (2013); Jessica D. Garrison, *Seeing the Park for the Trees: New York's "Million Trees" Campaign vs. the Deep Roots of Environmental Inequality*, 46 ENV'T & PLAN. B: URB. ANALYTICS & CITY SCI. 914 (2019).

[15] *See, e.g.*, Melissa Checker, *Wiped Out by the "Greenwave": Environmental Gentrification*

social, and political vulnerabilities of marginalized neighborhoods make them less resilient to shocks of all types, including well-intended but unjust government policies and investments.

Co-governance of green and blue infrastructure, in which government agencies and grassroots neighborhood groups share decision-making authority and management responsibilities,[16] offers systemic reform both to improve the community's green and blue infrastructure and to empower low-income communities of color and build their resilience. This Article proposes a co-governance approach to seeking more equitable and community-based green and blue infrastructure in communities that have been marginalized by racism, structural poverty and inequality, colonial structures, pervasively unequal environmental, economic, social, and political conditions, and disproportionate vulnerabilities. A co-governance approach

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and the Paradoxical Politics of Urban Sustainability, 23 CITY & SOC'Y 210 (2011); Sarah Dooling, *Sustainability Planning, Ecological Gentrification and the Production of Urban Vulnerabilities*, *in* CITIES, NATURE AND DEVELOPMENT: THE POLITICS AND PRODUCTION OF URBAN VULNERABILITIES 101 (Sarah Dooling & Gregory Simon eds., 2012); Isabelle Anguelovski, *From Toxic Sites to Parks as (Green) LULUs? New Challenges of Inequity, Privilege, Gentrification, and Exclusion for Urban Environmental Justice*, 31 J. PLAN. LITERATURE 23 (2016); JUST GREEN ENOUGH: URBAN DEVELOPMENT AND ENVIRONMENTAL GENTRIFICATION (Winifred Curran & Trina Hamilton eds., Routledge 2017); Daniel Immergluck & Tharunya Balan, *Sustainable for Whom? Green Urban Development, Environmental Gentrification, and the Atlanta Beltline*, 39 URB. GEOGRAPHY 546 (2017); Juliana A. Maantay & Andrew R. Maroko, *Brownfields to Greenfields: Environmental Justice Versus Environmental Gentrification*, 15 INT'L J. ENV'T RSCH. & PUB. HEALTH (2018); Hamil Pearsall, *New Directions in Urban Environmental / Green Gentrification Research*, *in* HANDBOOK OF GENTRIFICATION STUDIES 329 (Loretta Lees & Martin Phillips eds., Edward Elgar Publishing 2018); Ana Terra Amorim Maia et al., *Hidden Drivers of Social Injustice: Uncovering Unequal Cultural Ecosystem Services Behind Green Gentrification*, 112 ENV'T SCI. & POL'Y 254 (2020); Galia Shokry et al., *Understanding Climate Gentrification and Shifting Landscapes of Protection and Vulnerability in Green Resilient Philadelphia*, 31 URB. CLIMATE 1 (2020).

[16] *See, e.g.*, John Ackerman, *Co-Governance for Accountability: Beyond "Exit" and "Voice,"* 32 WORLD DEV. 447 (2004); Diana Mitlin, *With and Beyond the State—Co-Production as a Route to Political Influence, Power and Transformation for Grassroots Organizations*, 20 ENV'T & URBANIZATION 339 (2008); Peter Somerville & Nathan Haines, *Prospects for Local Co-Governance*, 34 LOC. GOV. STUD. 61 (2008); Alex Aylett, *Participatory Planning, Justice, and Climate Change in Durban, South Africa*, 42 ENV'T & PLAN. A 99 (2010); Sheila R. Foster & Christian Iaione, *The City as a Commons*, 34 YALE L. & POL'Y REV. 281 (2015). Christian Iaione, *The CO-City: Sharing, Collaborating, Cooperating, and Commoning in the City*, 75 AM. J. ECON. & SOCIO. 415 (2016); Natalie Marie Gulsrud et al., *Innovative Urban Forestry Governance in Melbourne?: Investigating "Green Placemaking" as a Nature-Based Solution*, 161 ENV'T RSCH. 158 (2018); COLETTE COPIC ET AL., ENVIRONMENTAL GENTRIFICATION IN CHICAGO: PERCEPTIONS, DILEMMAS AND PATHS FORWARD, 32–33 (Loyola U. Chi. ed 2020); Helen Toxopeus et al., *How 'Just' Is Hybrid Governance of Urban Nature-Based Solutions?*, 105 CITIES 1 (2020).

differs in certain ways from more government-oriented reforms, such as more equitable distribution of government-provided infrastructure, improved participatory processes for government decision-making, and legal accountability of the government for discriminatory decisions.[17] A co-governance approach also differs from typical approaches for devolving power from the public to private sectors, including public-private partnerships, community-provided infrastructure as a commons, and government support for private infrastructure having community benefits.[18]

Moreover, new co-governance structures must not only hybridize institutions of government-managed and community-managed resources,[19] but also be characterized by "resilience justice": systems-oriented principles and tools of racial justice, neighborhood empowerment, and community resilience.[20] Government resources and authority are needed but should be integrated with bottom-up organizing and power. The concepts and framework of resilience justice are based on syntheses of over 300 studies of community resilience, as well as principles of human-capabilities/community-capacities justice and environmental justice.[21]

Part I of this Article describes what green and blue infrastructure are and their general benefits and specific contributions to the adaptive

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[17] *See infra* Part III.

[18] *See infra* Part III.

[19] On the distinctions between control and management of environmental resources by the government and as a commons, *see generally* ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990).

[20] *See, e.g.*, Keith Shaw, *"Reframing" Resilience: Challenges for Planning Theory and Practice*, 13 PLAN. THEORY & PRAC. 308 (2012); Diane Archer & David Dodman, *Making Capacity Building Critical: Power and Justice in Building Urban Climate Resilience in Indonesia and Thailand*, 14 URB. CLIMATE 68 (2015); Skye Dobson, *Community-Driven Pathways for Implementation of Global Urban Resilience Goals in Africa*, 26 INT'L J. DISASTER RISK REDUCTION 78 (2017); Gina Ziervogel et al., *Inserting Rights and Justice into Urban Resilience: A Focus on Everyday Risk*, 29 ENV'T & URBANIZATION 123 (2017); Craig Anthony (Tony) Arnold, *Adaptive Law*, *in* RESEARCH HANDBOOK ON CLIMATE DISASTER LAW (Edward Elgar Publishing 2018); BARBARA B. WILSON, RESILIENCE FOR ALL: STRIVING FOR EQUITY THROUGH COMMUNITY-DRIVEN DESIGN (Island Press 2018); Boamah & Arnold, *supra* note 2 (forthcoming).

[21] *See, e.g.*, CRAIG ANTHONY (TONY) ARNOLD, FAIR AND HEALTHY LAND USE: ENVIRONMENTAL JUSTICE AND PLANNING (APA Plan. Advisory Serv. 2007); JOHN M. ALEXANDER, CAPABILITIES AND SOCIAL JUSTICE: THE POLITICAL PHILOSOPHY OF AMARTYA SEN AND MARTHA NUSSBAUM (Ashgate Publishing 2008); Spiros Gangas, *From Agency to Capabilities: Sen and Sociological Theory*, 64 CURRENT SOCIO. 22 (2016); Anke Fischer & Annie Mckee, *A Question of Capacities? Community Resilience and Empowerment Between Assets, Abilities and Relationships*, 54 J. RURAL STUD. 187 (2017); Sheila A. Foster, *Vulnerability, Equality, and Environmental Justice: The Potential and Limits of Law*, *in* THE ROUTLEDGE HANDBOOK OF ENVIRONMENTAL JUSTICE 136 (2017).

capacities of communities.[22] Part I also summarizes and synthesizes the abundant literature on the disproportionately less and worse green and blue infrastructure in low-income communities of color, and the impacts on community capacities and vulnerabilities. Part II articulates the concept and principles of resilience justice by which green and blue infrastructure policy generally and co-governance reforms specifically should be evaluated. Part III describes the concept and features of co-governance, contrasting it with other governance responses to green and blue infrastructure inequities. Part IV features several case studies of co-governance arrangements for green and blue infrastructure in particular low-income communities of color in the sense that at least some elements of co-governance characterize these governance arrangements. These case studies illuminate not only the promise of co-governance of community-based green and blue infrastructure but also the barriers to and limits of co-governance arrangements, particularly in light of resilience-justice goals. Part V reflects on what will be needed to create and implement co-governance structures for community-based green and blue infrastructure that will advance resilience justice. The Article concludes with suggestions for future research and governance reforms.

I. GREEN AND BLUE INFRASTRUCTURE

A. Definition

Green and blue infrastructure is composed of the biotic and aquatic aspects of human environments on which human communities and economies depend.[23] Indeed, all human communities and economies depend

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[22] The phrase green and blue infrastructure will be used as both singular form (referring to one type or manifestation) and plural form (referring to multiple types or manifestations).

[23] The term "green and blue infrastructure," sometimes called "green-blue infrastructure" or "blue-green infrastructure," reflects the fact that many of the most significant of nature's services to human communities have biotic, aquatic, or hybrid biotic-aquatic characteristics, such as hydrological functions provided by trees and vegetation and the biotic features of waterways and wetlands. *See, e.g*, Iwona Wagner et al., *The Blue Aspects of Green Infrastructure*, 4 SUSTAINABLE DEV. APPLICATIONS 145 (2013) (analyzing the relationships between green infrastructure and blue infrastructure by adopting and using the term "green and blue infrastructure" throughout the publication); Taneha K. Bacchin et al., *Green-Blue Multifunctional Infrastructure: An Urban Landscape System Design New Approach*, 13TH INT'L CONF. ON URB. DRAINAGE (2014) (Conference paper using the term "green-blue infrastructure" throughout the paper to refer to stormwater management infrastructure with both biotic and aquatic elements); Dagmar Haase, *Reflections About Blue Ecosystem Services in Cities*, 5 SUSTAINABILITY WATER QUALITY & ECOLOGY 77, 77–83 (2015) (describing

on green and blue infrastructure, such as parks, trees, waterways, wetlands, and many other biotic and aquatic aspects of our environments.[24] The foundation of the concept of green and blue infrastructure is that nature, organized in the form of ecological systems (or ecosystems), provides valuable services to human society, economies, and communities.[25] Scientific experts and academics tend to refer to these services as "ecosystem services," and leaders in public policy, business, and environmental conservation often refer to the ecosystems as "natural capital."[26] As

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"urban blue ecosystem services" and using the term "blue-green infrastructure" to express the nexus between aquatic ecosystem services and green infrastructure); Kati & Jari, *supra* note 8 (using the term "green and blue infrastructure" to define urban ecosystem services, but also using the term blue-green infrastructure in the title and abstract); others use the term "green infrastructure" to refer to both green and blue infrastructure. *See, e.g.*, Alexandra D. Dunn, *Siting Green Infrastructure: Legal and Policy Solutions to Alleviate Urban Poverty and Promote Healthy Communities*, 37 B.C. ENV'T AFF. L. REV. 41, 46–53 (2010) (describing "green infrastructure" with both biotic and aquatic functions); M. Demuzere et al., *Mitigating and Adapting to Climate Change: Multi-Functional and Multi-Scale Assessment of Green Urban Infrastructure*, 146 J. ENV'T MGMT. 107 (2014) (using the term "green urban infrastructure" to refer to both green and blue infrastructure in urban areas). For uses of the term "blue infrastructure" by itself, *see, e.g.*, Johanna Deak & Eivor Bucht, *Planning for Climate Change: The Role of Indigenous Blue Infrastructure, with a Case Study in Sweden*, 82 TOWN PLAN. REV. 669 (2011) ("[T]he term 'indigenous blue infrastructure' is used to refer to the hydrological structures existing prior to settlement and to the hydrological formations originating from sustainable urban land use. Although it can be argued that the latter do not constitute a 'natural' component in the landscape, they can be regarded as indigenous hydrological blue infrastructure due to their neutral and/or mitigating effect on the residual primary hydrological cycle."); P.E.T. Edwards et al., *Investing in Nature: Restoring Coastal Habitat Blue Infrastructure and Green Job Creation*, 38 MARINE POL'Y 65, 65 (2013) ("The term 'blue infrastructure' refers to the coastal and near shore habitats that provide the physical matrix for ecological functions, which in-turn provide important services and ecological benefits to society.").

[24] *See generally* MARK A. BENEDICT & EDWARD T. MCMAHON, GREEN INFRASTRUCTURE: LINKING LANDSCAPES AND COMMUNITIES (Island Press 2006). For the dependence of human communities and economies generally on ecosystems and their services, *see* NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS (Gretchen C. Daily ed., 1997); Robert Costanze et al., *The Value of the World's Ecosystem Services and Natural Capital*, 367 NATURE 253 (1997); Costanza & Daly, *supra* note 8, at 137.

[25] *See* Foster, *supra* note 2.

[26] For major books using the term "ecosystem services," *see, e.g.*, J.B. RUHL ET AL., THE LAW AND POLICY OF ECOSYSTEM SERVICES (2007); THE JUSTICES AND INJUSTICES OF ECOSYSTEM SERVICES (Thomas Sikor ed., 2013); ECOSYSTEM SERVICES IN AGRICULTURAL AND URBAN LANDSCAPES (Steve Wratten et al., eds., 2013). For major books using the term "natural capital," *see, e.g.*, THOMAS PRUGH ET AL., NATURAL CAPITAL AND HUMAN ECONOMIC SURVIVAL (2d ed. 1999); MARK TERCEK & JONATHAN ADAMS, NATURE'S FORTUNE: HOW BUSINESS AND SOCIETY THRIVE BY INVESTING IN NATURE (2013); DIETER HELM, NATURAL CAPITAL: VALUING OUR PLANET (2015). A book using both terms is NATURAL CAPITAL: THEORY AND PRACTICE OF MAPPING ECOSYSTEM SERVICES (Peter Karevia et al. eds., 2011).

ecosystems are altered or destroyed, the stock of society's natural capital and the services they provide are diminished.[27]

The term "green and blue infrastructure" is more commonly used in public policy formulation and implementation and other arenas of human governance and management of the environment.[28] Perini contends that the term "green infrastructure" was first used in a report to the Governor of Florida in 1994[29] and that in Europe the broader term "green and blue infrastructure . . . is increasingly used to designate all strategies targeted to increase urban resilience to climate change, improving the coping, adaptive and mitigation strategies within cities."[30] The term implicitly acknowledges that the extent to which ecosystems support human communities and economies depends on human choices about preserving, managing, and even creating biotic and aquatic systems in our environments to provide ecosystem services.[31] Human societies and communities have been altering, and continue to alter, natural ecosystems for centuries or longer, and we must decide the extent to which our infrastructure will be green and blue (i.e., biotic and aquatic, using natural processes) or grey (i.e., concrete, metal, stone, human-engineered synthetic materials, using artificial processes).[32]

Most forms of green and blue infrastructure fall into one of eight major categories:

- Trees and forests;
- Vegetation, wildlife, and wildlife habitat;

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[27] *See* RUHL ET AL., *supra* note 26, at 17.

[28] *See, e.g.*, Salzman et al., *supra* note 7, at 3 (noting that city officials and the public often use terms like green infrastructure or specific types of green and blue infrastructure, instead of the term ecosystem services).

[29] *See* Katia Perini & Paolo Sabbion, *Green and Blue Infrastructure in Cities*, *in* URBAN SUSTAINABILITY AND RIVER RESTORATION: GREEN AND BLUE INFRASTRUCTURE 3, 4 (2017).

[30] *Id.* at 5.

[31] *Id.* at 4.

[32] *See generally* Craig Anthony (Tony) Arnold et al., *The Social-Ecological Resilience of an Eastern Urban-Suburban Watershed: The Anacostia River Basin*, 51 IDAHO L. REV. 29, 29 (2014) (describing alteration and destruction of green infrastructure, the rapid and extensive development of grey infrastructure, and environmentalist trend towards ecological restoration of green and blue infrastructure in the Anacostia River watershed from European settlement to the present); Jonathan D. Rosenbloom, *Fifty Shades of Gray Infrastructure: Land Use and the Failure to Create Resilient Cities*, 91 WASH. L. REV. 93, 317 (2018) (discussing the forces that have led to gray infrastructure replacing green infrastructure, as well as increasing opportunities for new and restored green infrastructure in cities).

- Parks and recreational lands;
- Biotic infiltration and retention of stormwater;
- Waterways, wetlands, and watershed lands;
- Agricultural lands and soils, including produce gardens and orchards;
- Open space, corridors, and linkages; and
- Oceans, marine systems, and coastal lands.[33]

Society-serving and economy-supporting green and blue infrastructure can occur in rural, wilderness, and other sparsely inhabited environments, such as farmland,[34] grasslands,[35] large forests,[36] and oceans.[37] However, many of our institutions' decisions about the provision and management of green and blue infrastructure arise in human settlements, such as metropolitan areas, cities, towns, villages, and neighborhoods.[38] In well-populated environments, past and ongoing alterations of lands, waters, and natural environments threaten communities' natural capital and require collective intervention to conserve this natural capital.[39] Moreover, many systems of green and blue infrastructure are humanly engineered or restored.[40] Engineered elements of green and blue infrastructure, such as rain gardens, bioswales, constructed wetlands, parks, and most trees on developed lands, use biotic and aquatic features and natural processes, but were placed or installed in their locations by people.[41] Restoration of green and blue infrastructure remedies degradation of natural systems by restoring either historic ecological conditions or revitalizing the system with improved ecological functions; restoration

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[33] These eight major categories were derived by this Article's authors from a synthesis of twenty-six diverse publications on green and blue infrastructure listed in Appendix A of this Article. The literature contains hundreds, even thousands, of publications on green and blue infrastructure (and variants), yet the authors' continued reading of and use of this literature has not revealed any major gaps or inaccuracies in the eight major categories.

[34] *See* Harpinder Sandhu & Steve Wratten, *Ecosystem Services in Farmland and Cities*, *in* ECOSYSTEM SERVICES IN AGRICULTURAL AND URBAN LANDSCAPES 3, 8–10 (Steve Wratten et al., eds., 2013).

[35] *See generally* Osvaldo E. Sala and José M. Paruelo, *Ecosystem Services in Grasslands*, *in* NATURE'S SERVICES 237, 237–52 (Gretchen C. Daily, ed. 1997).

[36] *See generally* Norman Myers, *The World's Forests and Their Ecosystem Services*, *in* NATURE'S SERVICES 215, 215–35 (Gretchen C. Daily, ed. 1997).

[37] *See generally* Charles H. Peterson & Jane Lubchenco, *Marine Ecosystem Services*, *in* NATURE'S SERVICES 177, 177–94 (Gretchen C. Daily, ed. 1997).

[38] *See generally* Salzman et al., *supra* note 7.

[39] *See id.* at 6.

[40] Sandhu & Wratten, *supra* note 34, at 7.

[41] *See* Arnold et al., *supra* note 32, at 65.

to historic conditions is often an exercise in futility, given the inherent dynamics of ecosystems.[42]

B. Benefits

Green and blue infrastructure affect the resilience and vulnerabilities of human communities to cross-system disturbances and changes, because human communities are part of dynamic, complex, and nested sets of social-ecological systems in which tree canopy, wetlands functionality, stream quality, amount of green space, and the like affect many conditions and functions of human communities.[43] Green and blue infrastructure provide aquatic services and benefits to communities, including: (1) filtering pollutants from waterways and stormwater runoff; (2) slowing or holding stormwater runoff; (3) moderating and retaining floodwaters; (4) contributing to the hydrologic cycle, including evapotranspiration; (5) recharging groundwater supplies and aquifers; (6) supporting fisheries and aquatic species generally; (7) cleaning and replenishing water supplies for public drinking water, business and industrial operations, and agriculture; (8) and regulating the impacts of oceans, tides, and storms on

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[42] *See, e.g.*, *id.*, at 73, 79 (noting the impossibility of returning to historic stream flows and conditions in the Anacostia River under even the most aggressive restoration and green-infrastructure strategy; describing problems in restoring wetlands to historic conditions to unalterable effects of urbanization; and yet also noting the potential for improved ecological health and function from adaptive restoration projects); Lance H. Gunderson et al., *Escaping a Rigidity Trap: Governance and Adaptive Capacity to Climate Change in the Everglades Social Ecological System*, 51 IDAHO L. REV. 127, 136–49 (2014) (critiquing plans to restore Florida Everglades to historic conditions by noting the ecosystem's need to adapt to climate change and other disasters).

[43] *See, e.g.*, Kati & Jari, *supra* note 8, at 537 (discussing effects of green and blue infrastructure on the adaptive capacities, vulnerabilities, and resilience of social ecological systems in urban communities); Trisha L. Moore, *Stormwater Management and Climate Change: Vulnerability and Capacity for Adaptation in Urban and Suburban Contexts*, 138 CLIMACTIC CHANGE 491, 491 (2016) (presenting study results showing the role of green stormwater infrastructure in reducing vulnerability and increasing adaptation to climate change); Craig Anthony (Tony) Arnold et al., *Cross-Interdisciplinary Insights Into Adaptive Governance and Resilience*, 22 ECOLOGY & SOC'Y 14, 14 (2017) (synthesizing resilience studies of six North American water basins with particular attention on feedback-loop effects of human alterations of ecosystems on social, political, institutional, and environmental conditions and functions), especially Figure 1); Perini & Sabbion, *supra* note 29, at 3–7 (recommending green and blue infrastructure as a means of increasing urban resilience and reducing vulnerability to climate change); Shokry et al., *supra* note 15, at 2 (discussing green and blue infrastructure as a highly favored policy and planning tool for building resilience to climate change and disasters, producing many co-benefits to human communities).

coastal lands.[44] For example, wetlands prevented $625 million in property damage in the American Northeast from Superstorm Sandy,[45] a fact that should have been and should be highly relevant to communities in Texas, Florida, and the Caribbean that were hit hard by hurricanes in 2017.[46] New and restored green and blue infrastructure in the Anacostia River watershed in Washington, DC, and Maryland, has greatly improved conditions in the Anacostia River, which was once among the nation's most degraded rivers.[47] The U.S. Environmental Protection Agency has identified green and blue infrastructure as an important set of tools for communities to build resilience to drought.[48]

Green and blue infrastructure also improve the air quality and climate of human communities by: (1) filtering air pollutants; (2) moderating air temperatures; (3) reducing urban heat island effects; (4) sequestering greenhouse gases; (5) and providing shade.[49] The production of food supplies, especially locally grown, fresh, and healthy foods, and the renourishment and conservation of soils depend on well-functioning green and blue infrastructure throughout communities, not just in rural agricultural zones.[50] Wildlife in and near human communities need natural habitat in order to survive and thrive.[51]

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[44] *See* Dunn, *supra* note 23, at 46; Perini & Sabbion, *supra* note 29, at 5–6; Kati & Jari, *supra* note 8, at 537; Zander S. Venter et al., *Green Apartheid: Urban Green Infrastructure Remains Unequally Distributed Across Income and Race Geographies in South Africa*, 203 LANDSCAPE & URB. PLAN. 103889, 1 (2020) (summarizing studies of benefits of green infrastructure).

[45] *See* Siddharth Narayan et al., *The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA*, 7 SCI. REPS. 9463 (2017).

[46] *See, e.g.*, Sophie Hares, *Cities Urged to Invest in Flood Protection now for a Safer, Cheaper Future*, REUTERS (Sept. 7, 2017), https://www.reuters.com/article/us-global-floodsinfrastructure-analysis/cities-urged-to-invest-in-floodprotection-now-for-a-safer-cheaper-future-idUSKCN1BI2F7 [https://perma.cc/GQB8-KE9J].

[47] *See generally* Arnold et al., *supra* note 32.

[48] *See Green Infrastructure: Build Resiliency to Drought*, EPA, https://www.epa.gov/green-infrastructure/build-resiliency-drought [https://perma.cc/3R5E-6T54] (last visited Mar. 26, 2021).

[49] *See* Dunn, *supra* note 23, at 47; Landry & Chakraborty, *supra* note 7, at 2652 (describing the many benefits of urban trees and vegetation); Venter et al., *supra* note 44, at 1 (summarizing studies of benefits of green infrastructure).

[50] *See* Dunn, *supra* note 23, at 52–53; Alessio Russo et al., *Edible Green Infrastructure: An Approach and Review of Provisioning Ecosystem Services and Disservices in Urban Environments*, AGRIC. ECOSYSTEMS ENV'T (2017) at 53–66; Venter et al., *supra* note 44, at 1 (summarizing studies of benefits of green infrastructure).

[51] *See* Dunn, *supra* note 23, at 48; Erik Andersson et al., *Reconnecting Cities to the Biosphere: Stewardship of Green Infrastructure and Urban Ecosystem Services*, 43 AMBIO

Parks, open space, waterways, and other recreational areas facilitate physical activity among community members, outdoor play by children and youth, pedestrian activity (e.g., walking, running, cycling for recreation and/or transportation), water sports (e.g., paddling, swimming, wading), community gatherings, and the creation and maintenance of friendships and social networks.[52] The amount of neighborhood green space has been correlated to the rate of childhood obesity among neighborhood children.[53] More broadly, natural environments and human interactions with nature contribute to mental, emotional, and physical health, as well as child development and identity formation.[54] For example, walks in wooded settings show substantial improvements in cortisol levels, sympathetic nerve activity, blood pressure, heart rate, mood, and anxiety levels, in comparison to walks in hardscape urban environments.[55] However, even merely observing nature in urban settings or from indoor locations has been shown to improve physiological and psychological health.[56]

Green and blue infrastructure create a sense of place within communities and increase social cohesion and positive interaction.[57] One study

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445, 447–48 (2014); Venter et al., *supra* note 44, at 1 (summarizing studies of benefits of green infrastructure).

[52] *See* Jennifer R. Wolch et al., *Urban Green Space, Public Health, and Environmental Justice: The Challenge of Making Cities 'Just Green Enough,'* 125 LANDSCAPE & URB. PLAN. 234, 235–36 (2014); Dunn, *supra* note 23, at 47–50; Venter et al., *supra* note 44, at 1 (summarizing studies of benefits of green infrastructure).

[53] *See* Janice Bell et al., *Neighborhood Greenness and 2-Year Changes in Body Mass Index of Children and Youth*, 35 AM. J. PREVENTATIVE MED. 547–53 (2008).

[54] *See generally* PETER H. KAHN, JR., THE HUMAN RELATIONSHIP WITH NATURE: DEVELOPMENT AND CULTURE (1999); CHILDREN AND NATURE: PSYCHOLOGICAL, SOCIOCULTURAL, AND EVOLUTIONARY INVESTIGATIONS (Peter H. Kahn, Jr. & Stephen R. Kellert eds., 2002); IDENTITY AND NATURE: THE PSYCHOLOGICAL SIGNIFICANCE OF NATURE (Susan Clayton & Susan Opotow eds., 2003); RICHARD LOUV, LAST CHILD IN THE WOODS: SAVING OUR CHILDREN FROM NATURE-DEFICIT DISORDER (2005); FLORENCE WILLIAMS, THE NATURE FIX: WHY NATURE MAKES US HAPPIER, HEALTHIER AND MORE CREATIVE (2017); Gina Schellenbaum Lovasi et al., *Children Living in Areas with More Street Trees Have Lower Prevalence of Asthma* 62 J. EPIDEMIOLOGY & CMTY. HEALTH 647–49 (2008) (presenting data on correlation between neighborhood street trees and lower rates of childhood asthma); Landry & Chakraborty, *supra* note 7, at 2652 (describing the many benefits of urban trees and vegetation); Kirsten M. M. Beyer et al., *Exposure to Neighborhood Green Space and Mental Health: Evidence from the Survey of the Health of Wisconsin*, 11 INT'L J. ENV'T. RES. PUB. HEALTH 3453–72 (2014) (presenting study results of effects of exposure to neighborhood green space on mental health).

[55] *See* WILLIAMS, *supra* note 54, at 23.

[56] *See* KAHN, *supra* note 54, at 13–14.

[57] *See* Dunn, *supra* note 23, at 47–50; Landry & Chakraborty, *supra* note 7, at 2652 (describing the many benefits of urban trees and vegetation); Venter et al., *supra* note 44,

of diverse stakeholder perceptions of urban streams and parks in Helsinki, Finland, showed that residents, infrastructure managers, and politicians held forty-seven sociocultural values associated with these green and blue infrastructure.[58] Schwarz et al. report that the amount of coverage of the urban tree canopy "has been associated with improved aesthetics, noise reduction, and stronger social cohesion and community empowerment."[59] Natural features on or near residential or commercial properties increase property values.[60] Finally, countless studies have identified green and blue infrastructure as a set of critically important tools for mitigating and adapting to climate change.[61]

C. Inequities

Despite the importance of green and blue infrastructure, many empirical studies show that low-income communities of color in the United States routinely have disproportionately less quantity, worse quality, thinner or more uneven spatial distribution, and/or limited access to green and blue infrastructure than do other communities in the region,[62] including:

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at 1 (summarizing studies of benefits of green infrastructure). Kati & Jari, *supra* note 8, at 537 (referring to water bodies and aquatic infrastructure as "highly valued by citizens for offering specific places for recreation, restoration, relaxing and for nature enjoyment or education").

[58] *See* Kati & Jari, *supra* note 8, at 543 (Tables 1, 2, and 3).

[59] Kirsten Schwarz et al., *Trees Grow on Money: Urban Tree Canopy Cover and Environmental Justice*, 10 PLOS ONE, 2015, at 2.

[60] *See, e.g.*, Megan Heckert & Jeremy Mennis, *The Economic Impact of Greening Urban Vacant Land: A Spatial Difference-in-Differences Analysis,* 44 ENV'T & PLAN. A 3010 (2012); Dan Immergluck, *Large Redevelopment Initiatives, Housing Values and Gentrification: The Case of the Atlanta Beltline*, 46 URB. STUD. 1725 (2009); Landry & Chakraborty, *supra* note 7, at 2652 (describing the many benefits of urban trees and vegetation). Perini & Sabbion, *supra* note 29, at 6 (citing several studies about how green and blue infrastructure "can help to preserve or increase property values").

[61] *See, e.g.*, Stuart R Gaffin et al., *Adapting to Climate Change Through Urban Green Infrastructure*, 2 NATURE CLIMATE CHANGE 704 (2012); Yaser Abunnasr & Elisabeth M. Hamin, *The Green Infrastructure Transect: An Organizational Framework for Mainstreaming Adaptation Planning Policies*, 2 RESILIENT CITIES 205, 205–17 (2012) (studying and developing climate-adaptation planning methods for green and blue infrastructure at neighborhood, area, city, and regional scales, beyond site-specific scales); Moore, *supra* note 43, at 491; Perini & Sabbion, *supra* note 29, at 3–7 (commending green and blue infrastructure as a means of urban resilience and adaptation to climate change).

[62] *See generally* Viniece Jennings et al., *Emerging Issues in Urban Ecology: Implications for Research, Social Justice, Human Health, and Well-Being*, 39 POPULATION & ENV'T 69, 70 (2017).

- Tree canopy and pervious v. impervious surfaces in urban areas throughout the United States and Puerto Rico;[63]
- Urban tree canopy in 37 U.S. cities;[64]
- Urban tree canopy in Baltimore, MD, Los Angeles, CA, New York, NY, Philadelphia, PA, Raleigh, NC, Sacramento, CA, and Washington, D.C.;[65]
- Street trees in Tampa, FL;[66]
- Urban tree cover in Miami-Dade County, FL;[67]
- Parks and park funding in Los Angeles, CA;[68]
- Parks, recreational space, and park access in Los Angeles, CA;[69]
- Green space in Milwaukee, WI;[70]
- Park acreage in Baltimore, MD;[71]
- Access to public parks and private recreational facilities in Maryland;[72]
- Vegetated land cover in Baltimore, MD;[73]
- Wildlife habitat, biodiversity, and urban ecosystem conditions;[74]
- Tree planting in Atlanta, GA, Detroit, MI, Indianapolis, IN, and Philadelphia, PA;[75]

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[63] Lara Cushing et al., *The Racial/Ethnic Distribution of Heat Risk-Related Land Cover in Relation to Residential Segregation*, 121 ENV'T HEALTH PERSP. 811, 811–12, 814 (2013).
[64] Dexter Locke et al., *Residential Housing Segregation and Urban Tree Canopy in 37 US Cities*, SOCARXIV (2020).
[65] Schwarz et al., *supra* note 59, at 2.
[66] Landry & Chakraborty, *supra* note 7, at 2651.
[67] Joan Flocks et al., *Environmental Justice Implications of Urban Tree Cover in Miami-Dade County, Florida*, 4 ENV'T. JUST. 125, 127, 129 (2011).
[68] WOLCH ET AL., *supra* note 7, at 3.
[69] GARCÍA & WHITE, *supra* note 10.
[70] Heynen et al., *supra* note 7, at 6–7.
[71] Boone et al., *supra* note 7, at 767 (This study also found that Blacks lived in closer walking proximity to parks than Whites did, even though Whites had access to much greater park acreage.).
[72] Abercrombie et al., *supra* note 7, at 13.
[73] Huang & Cadenasso, *supra* note 11, at 2514.
[74] Simone Des Roches et al., *The Ecological and Evolutionary Consequences of Systemic Racism in Urban Environments*, 369 SCI. 1 (2020).
[75] Sarah Mincey et al., *Is Planting Equitable? An Examination of the Spatial Distribution of Nonprofit Urban Tree-Planting Programs by Canopy Cover, Income, Race, and Ethnicity*, 49 ENV'T. & BEHAV. 1, 6, 16 (2016).

- Tree planting in Milwaukee, WI;[76] and
- Green stormwater infrastructure in Philadelphia, PA.[77]

Inequities in green and blue infrastructure by communities' race, ethnicity, and socioeconomic composition have been found in nations other than the United States.[78]

Moreover, existing green and blue infrastructure in low-income communities of color, such as parks and urban streams, are less well maintained, receive fewer and lesser investments of public and private resources, and are less likely to be restored to the levels of green and blue infrastructure in whiter and wealthier communities.[79] People of color and low-income people typically live farther away from—and lack transportation access to—major regional green spaces, such as national or state parks or forests, than do White and higher-income people, or lack access to safe and usable parks.[80] Other studies reveal structural and persistent barriers to meaningful participation by people of color and low-income people in policy making, implementation, and management decisions regarding the green and blue infrastructure that affect their communities.[81]

A 2020 study undertaken by the University of Louisville Resilience Justice Project and six of this Article's co-authors[82] have evaluated three measures of green and blue infrastructure in the neighborhoods falling into the 20% most marginalized neighborhoods in the Tampa, FL, urban area (Hillsborough County) and Louisville, KY, urban area (Jefferson

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[76] Harold Perkins et al., *Inequitable Access to Urban Reforestation: The Impact of Urban Political Economy on Housing Tenure and Urban Forests*, 21 CITIES 291, 295–96 (2004).
[77] Shokry et al., s*upra* note 15, at 12.
[78] *See, e.g.*, Mark Ferguson et al., *Contrasting Distributions of Urban Green Infrastructure Across Social and Ethno-Racial Groups*, 175 LANDSCAPE & URB. PLAN. 136, 145 (2018); Venter et al., *supra* note 44, at 1.
[79] *See, e.g.*, WOLCH ET AL., *supra* note 7, at 3; Moran, *supra* note 7, at 66; Shokry et al., *supra* note 15, at 17; Sharon Moran, *Stream Restoration Projects: A Critical Analysis of Urban Greening*, 12.2 LOC. ENV'T. 111–28 (2007); April Baptiste et al., *Revitalizing Urban Waterway's Community Greenspace: Streams of Environmental Justice*, 6 PROC. OF THE FÁBOS CONF. ON LANDSCAPE & GREENWAY PLAN. art. 19 (2019).
[80] *See, e.g.*, GARCÍA & WHITE, *supra* note 10, at 3; Diana García-Montiel et al., *Uneven Access and Underuse of Ecological Amenities in Urban Parks of the Río Piedras Watershed*, 19 ECOLOGY & SOC'Y 26 (2014).
[81] Rebekah Breitzer, *Institutional Roadblocks to Achieving Environmental Justice Through Public Participation: The Case of CSO Control in US Cities*, METROPOLITICS (Jan. 24, 2018), http://www.metropolitiques.eu/Institutional-Roadblocks-to-Achieving-Environmental-Justice-Through-Public.html [https://perma.cc/9TAF-LCAS].
[82] Arnold, Eisert, Garvey, Khan, Stevenson, and Szot.

County, which is also known as Louisville Metro), and compared them to the median of each measure for the neighborhood's urban area.[83] Marginalized neighborhoods were defined as locally predefined neighborhoods that were in the top quintile for at least three of the following five conditions associated with neighborhood marginalization and vulnerability: (a) most percentage of residents of color; (b) highest poverty rate; (c) highest unemployment rate; (d) lowest median household income; and (e) lowest rates of voting in the last general election.[84] The three measures of green and blue infrastructure are:

- tree density (higher percentage for the neighborhood means more green and blue infrastructure);
- park acreage per 1,000 residents (higher percentage for the neighborhood means more green and blue infrastructure); and
- percentage of neighborhood area that is impervious surface (lower percentage for the neighborhood means more green and blue infrastructure, such as vegetation, undeveloped lands and soils, and biotic and aquatic stormwater controls).[85]

As illustrated by Tables 1 and 2, low-income neighborhoods of color in Tampa and Louisville generally have less green and blue infrastructure than the median for their urban area. In Tampa, of the twenty-one marginalized neighborhoods studied, seven were below median for all three measure of green and blue infrastructure, six were below median for two measures, six were below median for one measure, and only two neighborhoods were at or above median for all three measures.[86] In Louisville, of the fifteen marginalized neighborhoods studied, all neighborhoods were below median for at least two measures of green and blue infrastructure, and thirteen neighborhoods were below median for all three measures of green and blue infrastructure.[87]

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[83] *Id.*
[84] *Id.*
[85] *Id.*
[86] *See infra* Table 1.
[87] *See infra* Table 2.

TABLE 1

Tampa Bay Area: Green & Blue Infrastructure in Low-Income Neighborhoods of Color

Neighborhoods	Tree Density	Public Park Acreage per 1,000 Residents	Impervious Surface %
Florence Villa/Beasley/Oak Park	22%	0	41%
College Hill	38%	0	36%
Drew Park	18%	0	58%
East Side Commercial	N/A	1.77	N/A
East Tampa Business & Civic	32%	0.90	40%
East Ybor Historic	16%	0	58%
Grant Park	35%	1.68	36%
Highland Pines	26%	7.60	40%
Live Oaks Square	44%	0	31%
North Tampa Community	36%	0	40%
Northeast Community	42%	0	29%
Northview Hills	29%	0	36%
Old West Tampa	25%		49%
Rivergrove	46%	0	21%
Sulphur Springs	41%	4.67	37%
Tampa Heights	31%	5.39	40%
Terrace Park	32%	3.45	39%
University Area	29%	0	41%
University Square	36%	8.84	37%
Woodland Terrace	53%	2.82	22%
Ybor City	33-36%	5.07	45-42%
City of Tampa Average	36.62%	3.55	37%

TABLE 2

Louisville Area: Green & Blue Infrastructure in Low-Income Neighborhoods of Color

Neighborhoods	Tree Density	Public Park Acreage per 1,000 Residents	Impervious Surface %
Algonquin-Park Hill	12%	1.93	69%
Bashford Manor	23%	0.00	46%
California	13%	1.84	76%
Central Business District	8%	23.74	84%
Jacobs	22%	2.38	43%
Merriwether-St Joseph-Fairgrounds	2%	0.00	58%
Oakdale	29%	4.55	41%
Parkland	23%	0.00	51%
Portland	25%	0.87	46%
Russell	21%	0.72	54%
Shawnee	35%	39.79	31%
Shelby Park	19%	5.01	68%
Smoketown Jackson	16%	0.58	66%
South Louisville	13%	0.89	65%
Wilder Park	29%	0.70	44%
City of Louisville Average	37%	21.32	22%

These patterns are part of larger complex systems of racism and inequality in American society that create greater vulnerabilities and

harms for low-income communities of color and undermine these communities' resilience and adaptive capacities. A pervasive pattern that this Article's authors have discovered through qualitative case-study synthesis while working on several resilience-justice analyses with community-based groups in low-income communities of color and government agencies in California, Florida, and Kentucky, as part of the University of Louisville Resilience Justice Project, is that unequal green and blue infrastructure conditions intersect with and are reinforced by other unequal conditions and public policies.[88] In particular, the lack of adequate green and blue infrastructure both contributes to and fails to mitigate disproportionate exposure to pollutants, natural disaster risks and impacts, climate change risks and impacts, health inequities, food insecurity, and inequality.[89] For example, a study of Pinellas County, Florida, showed that areas with higher percentages of people of color or poverty had higher urban heat effects and greater vulnerability to climate change and heat waves,[90] which can be reduced or mitigated with trees, vegetation, green spaces, green roofs, wetlands, and restored waterways. Unequal and inadequate neighborhood conditions of green and blue infrastructure reinforce and are reinforced by patterns of residential racial, ethnic, and class segregation that have been created by centuries of discriminatory laws, policies, and practices, including racial zoning, redlining, racially restrictive covenants, exclusionary zoning policies and regulations, lack of sufficient public investment in fair and affordable housing, and unchecked private-market discrimination.[91] For example, a recent study of 108 U.S. cities shows that nearly all formerly redlined neighborhoods experienced significantly higher land surface temperatures than non-redlined areas, due to a relatively high proportion of impervious surfaces in comparison to tree canopy.[92]

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[88] *Id.*

[89] *See generally* Jennings et al., *supra* note 62.

[90] Mitchell & Chakraborty, *supra* note 9, at 476.

[91] *See generally* RICHARD ROTHSTEIN, THE COLOR OF LAW (2017) (one of the most significant works in this area); Robert Bullard, *Residential Segregation and Urban Quality of Life*, *in* ENVIRONMENTAL JUSTICE—ISSUES, POLICIES, AND SOLUTIONS 76 (1995) (key works on the inter relationships among land use policies and institutions, environmental harms and burdens, unequal neighborhood infrastructure, and residential racial and ethnic segregation include this work and the following in this footnote); ARNOLD, *supra* note 21, at vi; DORCETA TAYLOR, THE ENVIRONMENT AND THE PEOPLE IN AMERICAN CITIES, 1600S–1900S: DISORDER, INEQUALITY, AND SOCIAL CHANGE 4 (2009); DORCETA TAYLOR, TOXIC COMMUNITIES: ENVIRONMENTAL RACISM, INDUSTRIAL POLLUTION, AND RESIDENTIAL MOBILITY 4 (2014).

[92] Jeremy S. Hoffman et al.*, The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas*, 8 CLIMATE 12 (2020).

Moreover, some have argued that the neoliberal political economy treats green and blue infrastructure as an amenity or commodity available only to those who can afford it, thus tying the persistently unequal environmental conditions of marginalized neighborhoods with persistent, unequal, and racist systems of poverty, unemployment, housing insecurity, and barriers to accumulation of wealth.[93]

When government entities (or sometimes nonprofit organizations ("nonprofits"), private developers, or public-private partnerships) finally seek to remedy these inequalities by investing in, building, improving, or restoring green and blue infrastructure in low-income communities of color, the result frequently is the cruelest and most community-damaging inequality of all: green gentrification and displacement. The literature on green gentrification and displacement has increased substantially in recent years,[94] documenting and analyzing many notorious examples, including: the Anacostia area of Washington, D.C.,[95] the Atlanta Beltline Project,[96] the Harlem neighborhood in New York City,[97] Philadelphia's watershed and stormwater green infrastructure,[98] and community gardens

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[93] *See, e.g.*, Heynen et al., *supra* note 7, at 3–25; Immergluck & Balan, *supra* note 15, at 546–62; Linda Shi, *Beyond Flood Risk Reduction: How Can Green Infrastructure Advance Both Social Justice and Regional Impact?*, 2 SOCIO-ECOLOGICAL PRAC. RSCH. 311, 311–20 (2020).

[94] *See, e.g.*, Brett Williams, *Gentrifying Water and Selling Jim Crow*, 31(1) URB. ANTHROPOLOGY & STUDS. OF CULTURAL SYS. & WORLD ECON. DEV. 93 (2002); Sarah Dooling, *Ecological Gentrification: A Research Agenda Exploring Justice in the City*, 33.3 INT'L J. URB. & REG'L RSCH. 621–39 (2009); Checker, *supra* note 15; SARAH DOOLING, CITIES, NATURE AND DEVELOPMENT: THE POLITICS AND PRODUCTION OF URBAN VULNERABILITIES, 101 (Gregory Simon ed., 1st ed., 2012); Jennifer R. Wolch et al., *Urban Green Space, Public Health, and Environmental Justice: The Challenge of Making Cities 'Just Green Enough,'* 125 LANDSCAPE & URB. PLAN. 234, 234–44 (2014); Isabelle Anguelovski, et al., *Assessing Green Gentrification in Historically Disenfranchised Neighborhoods: A Longitudinal and Spatial Analysis of Barcelona*, 39.3 URB. GEOGRAPHY 458–91 (2018); Immergluck & Balan, *supra* note 15, at 546–62; Maantay & Maroko, *supra* note 15; Hamil Pearsall, *New Directions in Urban Environmental / Green Gentrification Research*, *in* THE HANDBOOK OF GENTRIFICATION STUDIES (Edward Edgar Publishing, 2018); Alessandro Rigolon & Jeremy Nemeth, *We're not in the Business of Housing: Environmental Gentrification and the Nonprofitization of Green Infrastructure Projects*, 81 CITIES 71 (2018); Sarah Fox, *Environmental Gentrification*, 90 UNIV. COLO. L. REV. 803, 823 (2019); Ranganathan & Bratman, *supra* note 6, at 1–23; Ana Terra Amorim Maia et al. *Hidden Drivers of Social Injustice: Uncovering Unequal Cultural Ecosystem Services Behind Green Gentrification*, 112 ENV'T SCI. & POL'Y 254–63 (2020); Shokry et al., *supra* note 15.

[95] Williams, *supra* note 94; Ranganathan & Bratman, *supra* note 6.

[96] Immergluck & Balan, *supra* note 15.

[97] Checker, *supra* note 15.

[98] Shokry et al., *supra* note 15.

in Brooklyn, New York.[99] New parks and greenways, restored waterways, major new tree-canopy or biotic stormwater controls, and the like, tend to make the neighborhood more attractive to financial investment, land development or redevelopment, and an influx of new residents who can afford higher property or rental values.[100] As a result, low-income residents, many of whom are people of color, are displaced, and the neighborhood becomes whiter and wealthier.[101] Low-income communities of color are especially vulnerable to green gentrification and displacement, because they lack the economic resources, political power, and social opportunities to resist the displacement effects of new green and blue infrastructure investments or adapt and transform in ways that sustain the essential character and structure of their community.[102] Green gentrification and displacement exemplifies the racism, inequality, and injustices deeply embedded in complex social-environmental-institutional systems and the need for the concept and tools of resilience justice.

II. RESILIENCE JUSTICE

A. Definition

Resilience justice is a conceptual way of framing: (a) analyses of the unequal adaptive capacities and vulnerabilities of marginalized communities to disturbances, shocks, and changes, and (b) proposed reforms to governance systems and public policies that will remedy inequalities in community conditions and capacities, and improve community resilience.[103] It is concerned with community resilience in communities that

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[99] Maantay & Maroko, *supra* note 15.
[100] *See* sources cited *supra* note 15.
[101] *Id.*
[102] *Id.*
[103] *See, e.g.*, Mark Pelling & Chris High, *Understanding Adaptation: What Can Social Capital Offer Assessments of Adaptive Capacity?*, 15 GLOBAL ENV'L CHANGE 308, 314 (2005); Keith Shaw, *Reframing Resilience: Challenges for Planning Theory and Practice*, 13 PLAN. THEORY & PRAC. 308, 309–10 (2012); Cathy Wilkinson, *Urban Resilience—What Does It Mean in Planning Practice?*, 13 PLAN. THEORY & PRAC. 319, 323 (2012); Diane Archer & David Dodman, *Making Capacity Building Critical: Power and Justice in Building Urban Climate Resilience in Indonesia and Thailand*, 15 URB. CLIMATE 68, 68–78 (2015); Bruce E. Goldstein et al., *Narrating Resilience: Transforming Urban Systems Through Collaborative Storytelling*, 52 URB. STUDIES 1285 (2015); Skye Dobson, *Community-Driven Pathways for Implementation of Global Urban Resilience Goals in Africa*, 26 INT'L J. DISASTER RISK REDUCTION 76 (2017); Ziervogel et al., *Inserting Rights and Justice into Urban Resilience: A Focus on Everyday Risk*, 29 ENV'T & URBANIZATION 123, 123–38 (2017); Craig Anthony

have been marginalized by oppression and subjugation, discrimination, barriers to equal power and resources in society, and structural inequality:

> The systemically unequal vulnerabilities and capacities of human communities are among the greatest challenges to the pursuit of justice in society. Marginalized and oppressed communities often have fewer resources and less social and political power to adapt to disturbances and changes than other communities do. As a result, they are disproportionately vulnerable to decline and collapse from disturbances and changes, whether from climate change, environmental disasters, infrastructure failures, economic shocks, political upheaval, or social unrest.[104]

Thus, resilience justice is meant to be both a critical and constructive way of thinking about both systemic injustice and the resilience of marginalized and oppressed communities. It might focus on any or all of the following: (1) environmental, economic, social, and political community conditions and capacities; (2) public policies and governance institutions that affect marginalized communities; and (3) cross-system forces and effects on marginalized communities, ranging from systemic racism to climate change, and many others.[105]

Community resilience is the capacity of a community to adapt to disturbances while retaining its core functions and structure and to thrive in an environment characterized by change through capacity building.[106]

(Tony) Arnold, *Adaptive Law*, *in* THE RESEARCH HANDBOOK ON CLIMATE DISASTER LAW (Edward Elgar Publishing, 2018); BARBARA BROWN WILSON, RESILIENCE FOR ALL: STRIVING FOR EQUITY THROUGH COMMUNITY-DRIVEN DESIGN (Island Press, 2018); Alex A. Moulton & Mario R. Machado, *Bouncing Forward After Irma and Maria: Acknowledging Colonialism, Problematizing Resilience and Thinking Climate Justice*, 6 J. EXTREME EVENTS (2019); Ranganathan & Bratman, *supra* note 6, at 115–37; Joseph Wenta et al., *Enhancing Resilience and Justice in Climate Adaptation Laws*, 8 TRANSNAT'L ENV'T L. 89, 89–118 (2019); Boamah, Frimpong & Arnold, *Assemblages of Inequalities and Resilience Ideologies in Urban Planning*, *in* RACIAL JUSTICE IN AMERICAN LAND USE (Cambridge University Press, forthcoming 2021).

[104] Craig A. (Tony) Arnold, *Resilience Justice*, 1 (2019) (unpublished Working Paper of the University of Louisville Resilience Justice Project) (on file with the author).

[105] Arnold et al., *supra* note 32.

[106] Adapted from the general definition of systemic resilience in BRIAN WALKER & DAVID SALT, RESILIENCE THINKING: SUSTAINING ECOSYSTEMS AND PEOPLE IN A CHANGING WORLD 1 (2006) and an integrated definition of community resilience in Fikret Berkes & Helen Ross, *Community Resilience: Toward an Integrated Approach*, 26 SOC'Y & NAT. RES. 5, 7 (2013).

Vulnerability is generally considered to be the functional opposite of resilience or adaptive capacity[107]: "a condition, encompassing characteristics of exposure, susceptibility, and coping capacity [to disturbances, shocks, and changes], shaped by dynamic historical processes, differential entitlements, political economy, and power relations, rather than as a direct outcome of a perturbation or stress."[108] Thus, a community with high vulnerability is characterized by conditions and capacities that increase the probability that disturbances or cross-system changes will cause undesirable transformations in the community. The University of Louisville Resilience Justice Project has synthesized over three hundred studies of community resilience and/or vulnerability to identify ninety variables across eighteen categories that are relevant contributors to low community resilience and high community vulnerability, and green and blue infrastructure is one of the eighteen categories.[109]

A resilient community is one that has four different types or dimensions of resilience:

(1) The community has the strength to resist unwanted disturbances and changes (maintenance of function);
(2) The community has the recovery capacity to bounce back from shocks and disasters (return to function);
(3) The community has the flexibility to adapt to changing conditions (evolution of function); and
(4) The community has the transformative capacity to use disturbances and changes to restructure itself in desired ways (transformation of function).[110]

All four types of resilience are desired, depending on the circumstances and type of disturbance or change (e.g., resistance to discrimination and oppression; bounceback from a flood incident; adaptation to changing climate patterns; transformation in response to new investments of resources).

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[107] *See generally* Fiona Miller et al., *Resilience and Vulnerability: Complementary or Conflicting Concepts?*, 15 ECOLOGY & SOC'Y 11 (2010).
[108] *Id.* at 3.
[109] *See generally Scholarly Publications*, UNIV. LOUISVILLE CTR. FOR LAND USE & ENV'T RESPONSIBILITY, https://louisville.edu/landuse/publications [https://perma.cc/6BCW-RECW] (last visited Mar. 26, 2021).
[110] ARNOLD, *supra* note 21, at 171–72. *See* Simin Davoudi, *Resilience: A Bridging Concept or a Dead End?*, 13 PLAN. THEORY & PRAC. 299 (2012).

B. Conceptual Foundations

Resilience justice has some part of its foundations in systems thinking and the science of systemic resilience.[111] Human communities are complex, dynamic, adaptive systems that affect and are affected by other environmental, social, and institutional systems through cross-system feedbacks.[112] Surprise disturbances, unprecedented new conditions, and even evolutionary changes in basic system elements and functions can produce sudden, rapid transformations, and even collapse, of communities.[113] Any concept of justice must necessarily consider the relevance of resilience thinking to how and why communities undergo substantial systemic changes, as illustrated by Hurricane Katrina's impacts on low-income Black, Latino, and Asian neighborhoods in New Orleans in 2005,[114] the collapse of aspects of Puerto Rican communities during and after Hurricane Maria in 2017,[115] the vulnerabilities of residents of low-income neighborhoods of color to socioeconomic housing market shocks.[116]

However, resilience isn't a sufficient foundation in itself. The central focus of much of resilience thinking, as both an empirical science and as

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[111] Three of the classic works on this topic are C.S. Holling, *Resilience and Stability of Ecological Systems*, 4 ANN. REV. ECOLOGY & SYSTEMATICS 1, 9 (1973); PANARCHY: UNDERSTANDING TRANSFORMATIONS IN HUMAN AND NATURAL SYSTEMS (Lance H. Gunderson & C.S. Holling eds., 2002); and BRIAN WALKER & DAVID SALT, RESILIENCE THINKING: SUSTAINING ECOSYSTEMS AND PEOPLE IN A CHANGING WORLD (2006). Two books that are representative of the many publications seeking to explore the linkages between social-ecological resilience and legal systems are SOCIAL-ECOLOGICAL RESILIENCE AND LAW (Ahjond S. Garmestani & Craig R. Allen, eds., 2014) and PRACTICAL PANARCHY FOR ADAPTIVE WATER GOVERNANCE: LINKING LAW TO SOCIAL-ECOLOGICAL RESILIENCE (Barbara Cosens & Lance Gunderson, eds., 2018). For a discussion of evolutionary cross-system dynamics among ecosystems, social systems, and governance institutions, *see* Arnold et al., *supra* note 32, at 32–35 (developing the Institutional–Social Ecological Dynamics Framework).

[112] *See generally* Berkes & Ross, *supra* note 106, at 7.

[113] *See generally* JARED DIAMOND, COLLAPSE: HOW SOCIETIES CHOOSE TO FAIL OR SUCCEED (2005).

[114] *See, e.g.*, Karen J. Leong et al., *Resilient History and the Rebuilding of a Community: The Vietnamese American Community in New Orleans East*, 94 J. AM. HIST. 770, 770 (2007); Yarnal, *supra* note 9, at 249; Lance H. Gunderson, *Ecological and Human Community Resilience in Response to Natural Disasters*, 15 ECOLOGY & SOC'Y 18 (2010); Kevin F. Gotham & Richard Campanella, *Coupled Vulnerability and Resilience: The Dynamics of Cross-Scale Interactions in Post Katrina New Orleans*, 16 ECOLOGY & SOC'Y 12 (2011).

[115] *See, e.g.*, Alex A. Moulton & Mario R. Machado, *Bouncing Forward After Irma and Maria: Acknowledging Colonialism, Problematizing Resilience and Thinking Climate Justice*, 6 J. EXTREME EVENTS (2019).

[116] *See, e.g.*, Rolf Pendall et al., *Vulnerable People, Precarious Housing, and Regional Resilience: An Exploratory Analysis*, 22 HOUSING POL'Y DEBATE 271 (2012).

a normative policy or social goal, is unfortunately not on justice and injustice. As Boamah and Arnold point out, resilience justice is a critical and socially transformative concept that is a contrast to the two more popular concepts of resilience: (1) eco-resilience, which is primarily concerned with the resilience of ecosystems that have been altered or are under stress in social-ecological systems; and (2) structural resilience, which is primarily concerned with building strength, flexibility, and bounceback capacity in existing human systems, such as built environments, legal and governance institutions, and economies.[117] These resilience concepts have been rightly critiqued as conservative concepts supporting the perpetuation of a neoliberal, unjust, and oppressive status quo and forcing marginalized and oppressed communities either to accept the inevitability of systemic disruptions and harms or to develop their own self-sufficient adaptations to these disruptions.[118] As Boamah and Arnold write, though:

> [R]esilience justice, if properly framed as a political-ideological concept, serves to (1) illuminate power relationships and the social construction of inequality and risk; (2) engage people and institutions with deep structural "issues of justice, fairness, and legitimacy"; (3) facilitate grassroots self-organizing of oppressed groups like slum dwellers in Africa; and (4) give voice to the experiences of subordinated communities with vulnerability and adaptation. In commenting on "progressive community-led environmental initiatives," Shaw writes that "resilience should be viewed as having the potential to develop as a more radical and transformational agenda that opens up opportunities for political voice, resistance, and challenging power structures and accepted ways of thinking."[119]

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[117] Boamah & Arnold, *supra* note 2 (forthcoming).

[118] *See, e.g.*, Idowu Ajibade, *Can a Future City Enhance Urban Resilience and Sustainability? A Political Ecology Analysis of Eko Atlantic City, Nigeria*, 26 INT'L J. DISASTER RISK REDUCTION 85 (2017); Ksenia Chmutina et al., *Unpacking Resilience Policy Discourse*, 58 CITIES 70, 70–74 (2016); Libby Porter & Simin Davoudi, *The Politics of Resilience for Planning: A Cautionary Note*, 13 PLAN. THEORY & PRAC. 299, 310 (2012); Moulton & Machado, *supra* note 115; Ranganathan & Bratman, *supra* note 6, at 120.

[119] Boamah & Arnold, *supra* note 2 (forthcoming) (citing Mark Pelling & Chris High, *Understanding Adaptation: What Can Social Capital Offer Assessments of Adaptive Capacity?*, 15 GLOB. ENV'T CHANGE 308, 314 (2005); Cathy Wilkinson, *Urban Resilience: What Does it Mean in Planning Practice?*, 13 PLAN. THEORY & PRAC. 319, 323 (2012); Skye Dobson, *Community-Driven Pathways for Implementation of Global Urban Resilience Goals in Africa*, 26 INT'L J. DISASTER RISK REDUCTION 78, 78 (2017); Bruce E. Goldstein et al., *Narrating*

Thus, in the concept of resilience justice, community resilience is defined, at least in substantial part, by the pursuit and achievement of justice amid conditions of disturbance and change, including resistance to injustice, empowerment of marginalized communities, and critique of—and opposition to—systems of racism, colonialism, structural inequality, and oppression.[120]

Resilience justice is concerned with interlinked systems that create many different inequitable disturbances to, and vulnerabilities among, marginalized communities, including disproportionate environmental harms, disaster risks and events, and climate-change impacts. In this sense, the resilience justice concept builds on the concepts of environmental justice, disaster justice, and climate justice, but goes beyond them to encompass all threats, not just specific ones.[121]

Resilience justice is also concerned with systemic reform that eliminates the oppression of marginalized communities by dominant groups and communities, building on neo-Progressive anti-domination theory that views income inequality, political influence, and discrimination as issues of structurally unequal power and socially unjust domination of some groups by other groups.[122] "According to anti-domination theory, justice is not achieved through individual rights (remedial justice), the politics of pluralism (procedural justice), or (re)distribution of goods and resources (distributive justice), but in reform of institutions and social structures that create and perpetuate structural inequality and domination."[123]

Despite taking a critical perspective on systems and structures of inequality, racism, colonialism, and oppression, the concept of resilience justice is centered in the importance of community capacity building, grassroots organizing and activism, community empowerment, and the value of marginalized communities' strengths and capacities to adapt and transform in ways they desire. In this sense, concepts of agency and community self-organizing are as important as structural forces and systemic effects beyond the community's control.[124] The human capabilities

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Resilience: Transforming Urban Systems Through Collaborative Storytelling, 52 URB. STUD. 1285, 1298 (2015); Keith Shaw, *Reframing Resilience: Challenges for Planning Theory and Practice*, 13 PLAN. THEORY & PRAC. 299, 309–10 (2012)).

[120] *See* Keith Shaw, *Reframing Resilience: Challenges for Planning Theory and Practice*, 13 PLAN. THEORY & PRAC. 299, 306 (2012).

[121] *See, e.g.*, Foster, *supra* note 2, at 136–48; Verchick, *supra* note 4, at 24; ROSEMARY LYSTER, CLIMATE JUSTICE AND DISASTER LAW 104 (2015).

[122] *See* K. SABEEL RAHMAN, DEMOCRACY AGAINST DOMINATION 3 (2017).

[123] Boamah & Arnold, *supra* note 2 (forthcoming).

[124] *See* Fikret Berkes & Helen Ross, *Community Resilience: Toward an Integrated Approach*, 26 SOC'Y & NAT. RES.: AN INT'L L. J. 5, 11 (2013).

concept of justice, developed by Amartya Sen and Martha Nussbaum, is an important theoretical foundation for resilience justice: "neither equality in the distribution of resources nor contextually-subjective values are adequate bases for a theory of social justice; instead, social justice should be defined by the conditions that support essential human capabilities to function."[125] The human capabilities idea of justice has been extended and reconceptualized to a community capacities idea of justice by considering the ways in which individual human capabilities to function and determine their future are shaped by and occur within the context of social and geographic communities.[126]

C. Features

While the University of Louisville Resilience Justice Project has assessed resilience justice in several dozens of low-income communities of color in California, Florida, and Kentucky over the past four years, the authors of this Article have used qualitative synthesis methods and critical analyses to identify several important features of a resilience-justice approach to increasing equitable community resilience and reducing vulnerabilities to disturbances and changing conditions in marginalized communities.[127] These features are listed here and applied in this Article to address the problems of inequitable green and blue infrastructure in low-income neighborhoods of color:

(1) Green and blue infrastructure are essential to community resilience and adaptive capacities in an ever-changing world of unprecedented surprises and shocks (e.g., disasters, climate change, economic shocks, socio-political upheaval, health crises, etc.), and most low-income communities of color in

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[125] Boamah & Arnold, *supra* note 2 (forthcoming) (citing AMARTYA SEN, DEVELOPMENT AS FREEDOM 56 (Macat Library ed. 1999); MARTHA C. NUSSBAUM, WOMEN AND HUMAN DEVELOPMENT: THE CAPABILITIES APPROACH 3 (Cambridge ed. 2000); JOHN M. ALEXANDER, CAPABILITIES AND SOCIAL JUSTICE: THE POLITICAL PHILOSOPHY OF AMARTYA SEN AND MARTHA NUSSBAUM (2008).

[126] *See, e.g.*, Spiros Gangas, *From Agency to Capabilities: Sen and Sociological Theory*, 64 CURRENT SOCIO. 22, 23–24 (2016); Mario Biggeri et al., *Local Communities and Capability Evolution: The Core of Human Development Processes*, 19 J. HUM. DEV. & CAPABILITIES 126, 126–29 (2018); Claudia Eger et al., *Gender and Capacity Building: A Multilayered Study of Empowerment*, 106 WORLD DEV. 207, 208 (2018).

[127] Arnold, *supra* note 104, at 2–6.

the United States have unequal and inadequate green and blue infrastructure. Societal and policy attention to the distribution of, access to, types of, quality of, and needs for green and blue infrastructure in marginalized communities is central to environmental justice, disaster justice, and climate justice, as well as resilience justice.

(2) Community conditions and infrastructure of all types—environmental, economic, social, political, and health—are necessary for community resilience but are disproportionately worse and less in low-income communities of color due to unjust public policies and institutions, including laws and governance structures. Systemic racism, structural inequality, colonialism, and patterns of marginalization and oppression—not mere policy mistakes—are driving forces of resilience injustice.

(3) Systemic reforms of governance institutions and public policies are needed in order to make marginalized communities more resilient and to address the injustices and vulnerabilities that undermine their adaptive capacities and their opportunities to thrive in a changing world. Reforms to public policies addressing some aspects of the complex interconnected systems that affect marginalized communities' resilience must be integrated with reforms to public policies that address other aspects of these systems, such as integration of green and blue infrastructure policies with governance reforms, affordable housing policies, and tools for addressing economic conditions and vulnerabilities.

(4) Empowerment of marginalized communities and their residents is essential to building community capacities and remedying the deep and pervasive inequalities in power and resources that produce resilience injustice. Some of the tools of empowerment include neighborhood-based grassroots organizing, social and political activism, political engagement, grassroots leadership development, and attention to building social capital within the community. Social capital includes cooperation,

trust, social networks, information sharing, and collective problem-solving.[128] While top-down government resources, policies, and authority are needed to address unequal community conditions and vulnerabilities, they must be integrated with bottom-up organizing, capacity building, and power.

(5) Governance processes for making and implementing public policies should be inclusive, not merely participatory[129]: policy-making and policy-implementation processes should actively seek out, include, and engage low-income neighborhoods of color in power-sharing arrangements. When possible, governance arrangements for community infrastructure, especially green and blue infrastructure, should be transformed to co-governance structures in which the government shares power, resources, and responsibilities with community-based groups and neighborhood residents.

(6) Low-income neighborhoods of color are especially vulnerable to gentrification and displacement, including green gentrification and displacement. Investments in new, restored, or improved infrastructure, especially green and blue infrastructure, must be accompanied from the earliest stages with policies, tools, and institutional structures to prevent displacement of low-income people and people of color. This includes the creation of community land/housing trusts, pacing of neighborhood improvements, and connecting neighborhood-specific

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[128] On the importance of social capital to community resilience and/or racial and social justice, *see, e.g.*, Mark Pelling, *Participation, Social Capital and Vulnerability to Urban Flooding in Guyana*, 10 J. INT'L DEV. 469, 470 (1998); Manuel Pastor, *Building Social Capital to Protect Natural Capital: The Quest for Environmental Justice*, *in* NATURAL ASSETS: DEMOCRATIZING ENVIRONMENTAL OWNERSHIP 77 (James K. Boyce & Barry G. Shelly, eds., 2003); Pelling & High, *supra* note 119, at 310; Sheila R. Foster, *The City as an Ecological Space: Social Capital and Urban Land Use*, 82 NOTRE DAME L. REV. 527, 580 (2013). *But see* Stephanie M. Stern, *The Dark Side of Town: The Social Capital Revolution in Residential Property Law*, 99 VA. L. REV. 811, 811 (2013) (exploring how social capital and public policies facilitating the development of social capital contributed to racial segregation and group polarization).

[129] *See* Kathryn S. Quick & Martha S. Feldman, *Distinguishing Participation and Inclusion*, 31 J. PLAN. EDUC. & RSCH. 272, 272 (2011).

housing affordability and supply policies and programs to improvements in neighborhood green and blue infrastructure.

III. CO-GOVERNANCE

Co-governance, as used in this Article, is shared governance power between governmental entities and communities. Co-governance devolves power to local communities and empowers communities and their residents by giving them meaningful control and influence over governance decisions.[130] Co-governance is structured for shared governance responsibilities and powers in ways that differ from top-down hierarchical governance structures and bottom-up self-governance structures.[131] Co-governance is one of the forms of "hybrid" or collaborative governance of green and blue infrastructure, though some treat the term co-governance as a synonym for informal governance and management through collaboration among multiple stakeholders.[132] Co-governance can be contrasted with market-driven public-private partnerships and networked stakeholder governance in which organized interests are included in addressing particularly complex problems involving competing interests.[133] Co-governance directly involves citizens in governance in interactive and responsive structures.[134] Co-governance, with its framing of people as active participants in governance with shared rights and responsibilities, has been contrasted with "market bureaucracy" that frames people as clients, consumers, and individual rights-holders.[135]

Co-governance blurs the lines between state and society, engaging the public in actual government decision-making and governance processes.[136] Co-governance goes beyond mere co-production, in which community residents and organizations help the government to provide public services and infrastructure, and mere external accountability mechanisms, in which community residents use community organizing, litigation, activism, and public pressure to hold the government accountable from the

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[130] Ben Palmquist, *Equity, Participation, and Power: Achieving Health Justice Through Deep Democracy*, 48 J.L. MED. & ETHICS 393, 398 (2020).
[131] *See* Somerville & Haines, *supra* note 16, at 62–63.
[132] *See, e.g.*, Alfred R. Light, *The Intergovernmental Relations of Water Policy and Management: Florida-Holland Parallels*, 23 TUL. ENV'T L. J. 279, 297–302 (2010).
[133] *See* Toxopeus et al., *supra* note 16, at 102846.
[134] *See* Light, *supra* note 132, at 297–302.
[135] Palmquist, *supra* note 130, at 396.
[136] *See* Ackerman, *supra* note 16, at 451.

outside.[137] For example, community forums, in which community residents express their views about policy matters, are not co-governance in themselves, nor are community management of government services and infrastructure.[138] Co-governance aims for the higher rungs on Arnstein's ladder of citizen participation: citizen power, not the tokenism of mere consultation.[139] Nonetheless, some scholars argue that bottom-up co-production of services and infrastructure are in reality mechanisms of community empowerment and political engagement in governance processes.[140]

Participatory governance systems, including co-governance, are fundamentally about power and the empowerment of the people and the marginalized, not merely instrumental use of the public or the marginalized by the government and powerful interests.[141] Co-governance requires "devolving real power to communities, developing neighbourhood democracy, and ensuring a genuinely equal partnership with communities rather than one in which the local authority is the dominant partner."[142] Co-governance holds government accountable in ways that elections, the transparency of government actions, and government-controlled participatory processes cannot: because institutionalized structures of shared power between government and citizens forces government officials of all types—elected and non-elected—to act accountably to the people's voices.[143] Many traditional participatory processes allow for the public to express themselves but lack the means by which government officials are held accountable to incorporate this input into government decisions; the voices of the marginalized, in particular, "are often left speaking into a void."[144]

Co-governance for community-based green and blue infrastructure in marginalized communities best advances justice, as well as legitimacy and effectiveness in building community resilience, when community residents participate through deliberations and decision-making that shapes public policies and government actions.[145] Co-governance is a means to "elevate ordinary people's voices," hold government accountable through critique, and "engage in the co-creation of sociopolitical life," and has been

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[137] *Id.*
[138] Somerville & Haines, *supra* note 16, at 67, 70.
[139] *See* Sherry R. Arnstein, *A Ladder of Citizen Participation*, 35 J. AM. INST. PLANNERS 24, 25 (2019).
[140] *See, e.g.*, Mitlin, *supra* note 16, at 339.
[141] *Cf.* Aylett, *supra* note 16, at 102–04.
[142] Somerville & Haines, *supra* note 16, at 62.
[143] Ackerman, *supra* note 16, at 448–49.
[144] *Id.* at 447.
[145] *Cf.* Archon Fung, *Varieties of Participation in Complex Governance,* PUB. ADMIN. REV. (Special Issue) 66, 74 (2006).

associated with the Black freedom movement, economic democracy, and cooperative alternatives to traditional capitalism and neoliberal policies.[146]

Features of a justice-driven model of co-governance are:

(1) Equitable distribution of power among groups and communities and equitable inclusion of marginalized communities;
(2) Social-movement mobilization of marginalized communities;
(3) Democratization of control and power that promotes participation to the maximum amount possible;
(4) Empowerment of communities and individuals through participatory governance structures and processes;
(5) Institutionalization of participatory governance structures and processes; and
(6) Accountability to the public and to the rights of individuals with meaningful legal and political powers of enforcement.[147]

Co-governance emphasizes the facilitation of "community agency," the power of place-based communities to define and seek their own futures, even while recognizing and addressing the effects of structural forces and systems on communities.[148] In the community-agency perspective on co-governance, public policy should focus on community capacity building, particularly in marginalized communities, and should embrace the contribution of "community ideas, energy, social capital, and local knowledge" to policy making and implementation.[149]

One form of co-governance is the creation of resident councils at local or neighborhood levels that: (a) emerge out of a mix of bottom-up and top-down institutional reform; (b) have formal authority to make decisions that shape public policy or government action; (c) not only hold the government accountable but are also held accountable by the government; (d) use broad community organizing and engagement mechanisms to maximize

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[146] Etienne C. Toussaint, *Dismantling the Master's House: Toward a Justice-Based Theory of Community Economic Development*, 53 U. MICH. J.L. REFORM 337, 410–11 (2019).
[147] Palmquist, *supra* note 130, at 397–98.
[148] Robyn Eversole, *Community Agency and Community Engagement: Re-Theorising Participation in Governance*, 31 J. PUB. POL'Y 51, 51–52 (2011).
[149] *Id.*

local residents' participation; and (e) scale up to higher levels of multi-neighborhood, citywide, or regional co-governance arrangements for policies and actions that go beyond neighborhood scales.[150] Melbourne, Australia's urban forestry strategy developed a citywide neighborhood-based co-governance structure by going beyond initial government consultations with members of the public and creating demographically representative citizen review panels, neighborhood-scale deliberative workshops with high participation rates, online forums and exchanges with community members, engagement with social medial and news media, and collaborative tree-plantings.[151] A different model is the kind of co-governance envisioned by the participatory budgeting system, in which all individuals in a governance jurisdiction, not community-based organizations in specific marginalized neighborhoods or socio-geographic communities, share budget decision-making authority with government officials.[152]

The creation, implementation, and evolution of co-governance systems among government and residents of low-income communities of color for green and blue infrastructure differ significantly from other types of governance reforms to address inequities in green and blue infrastructure. On one end of the spectrum are reforms that aim to change how the government makes policy decisions about green and blue infrastructure: (1) the government's targeted increased investment in and provision of green and blue infrastructure in low-income communities of color: a sort of distributive justice or equity-oriented redistribution of resources; (2) the government's changes to policy making and implementation procedures to facilitate or allow greater participation by historically marginalized and excluded people, including residents of low-income communities of color: a sort of procedural justice or participatory reform; and (3) the government's responses to legal actions, such as civil rights, human rights, and environmental litigation, aiming to hold the government accountable to legal duties and rights that protect marginalized people and communities and to seek remedies for past legal violations: a sort of remedial justice or law-driven set of reforms. All of these approaches to green and blue infrastructure are top-down or government-driven responses to inequities, centering power in the government and measuring success by

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[150] Ackerman, *supra* note 16, at 451–52, 54–55, 59.
[151] Gulsrud et al., *supra* note 16, at 161–63.
[152] *See* Colin Crawford, *Our Bandit Future: Cities, Shantytowns, and Climate Change Governance*, 36 FORDHAM URB. L.J. 211, 244–49 (2009). For an earlier scholarly assessment of participatory budgeting in Brazil as a form of co-governance, *see* Ackerman, *supra* note 16, at 451–52.

quantities and conditions of green and blue infrastructure, funds invested, and numbers of people who share their opinions with government decision makers. They do far too little to empower low-income people of color and their communities, build social capital in these communities, and equitably restructure the governance systems and power arrangements in society that have resulted in the unequal vulnerabilities and capacities of marginalized communities. In the context of ecosystem services (i.e., green and blue infrastructure), McDermott et al. argue that distributive equity and procedural equity must be integrated with what they call "contextual equity," which is about shared power and control with and by those who have been excluded or disfavored by existing institutions.[153]

On the other end of the spectrum are reforms that devolve power from government to nongovernmental actors in order to tap into private-sector financing, resources, and expertise and to engage businesses, civil-society organizations, and individuals in contributing to collective goals: (1) public-private partnerships in which the government partners with business entities and/or nonprofit organizations to create, operate, maintain, and/or govern green and blue infrastructure; (2) private provision and maintenance of green and blue infrastructure, often on private property, achieved through government's regulatory mandates and/or government assistance (resources) or incentives; and (3) community created and managed "commons" of green and blue infrastructure, such as nongovernmental neighborhood parks and green spaces, community gardens, stream cleanup projects, and the like. As responses to inequities in green and blue infrastructure, these essentially neoliberal approaches are woefully inadequate and instead perpetuate and worsen the systemic inequalities and injustices that harm and burden low-income communities of color.

As governance power is shifted to businesses and civil-society nonprofit organizations that aren't necessarily community-based or community-governed, public power over green and blue infrastructure is being concentrated in the private hands of elites, higher-income Whites, and professionals/experts, not in the hands of people of color and low-income people who live in the marginalized communities that have been suffering from less and worse green and blue infrastructure. Even though fully community-provided and community-governed commons, such as neighborhood-controlled parks, waters, and the like, might superficially seem like empowerment of marginalized communities, this is essentially government "offloading" of all responsibilities, costs, liabilities, and risks for green and blue infrastructure onto communities that have vastly less

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[153] McDermott et al., *supra* note 14, at 420–21.

resources, legal and political authority, and capacities than the government. The inequities that must be addressed result from government investments of public resources, legal and governance authority, expertise, and policy commitments in green and blue infrastructure that disproportionately benefits White and higher-income communities. The resources, ideas, local/lay expertise, social capital, and governance legitimacy of low-income communities of color must be combined with the public resources, legal and governance authority, expertise, and policy commitments if we are to see major transformations and resilience justice in green and blue infrastructure governance. Co-governance systems and structures create these combinations of top-down and bottom-up power and resources.

The restoration and revitalization of the Los Angeles River offers a prime example of how other equity reforms, without co-governance, fail to achieve resilience justice and end up disproportionately harming low-income communities of color.[154] A set of four similar plans for restoring and revitalizing the notoriously concrete-lined and degraded Los Angeles River and its riparian zone have been developed by the four entities with jurisdiction over various parts of the Los Angeles River in Los Angeles County: the City of Los Angeles, the County of Los Angeles, the State of California, and the U.S. Army Corps of Engineers.[155] Much of the impetus for these plans and/or their implementation came from collaborative activism among environmentalists, such as Friends of the Los Angeles River, and grassroots community groups in low-income Black, Latino, and Asian neighborhoods, such as The City Project.[156] One of the primary goals has been to bring substantial new parks, green spaces, and restored riparian and aquatic environments to park-poor marginalized neighborhoods, a distributive equity policy reform.[157] The planning processes included substantial input from residents and community leaders in low-income neighborhoods of color throughout Los Angeles County—a procedural equity reform.[158] However, the plans included goals about increasing property values and promoting economic and land development, and the governments turned to the international architectural design form of Gehry Partners and other major economic and business interests to guide the restoration's design, finance, and implementation phases.[159] A

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[154] This case study and all of the facts in this paragraph are synthesized in Boamah & Arnold, *supra* note 2 (forthcoming).
[155] *Id.*
[156] *Id.*
[157] *Id.*
[158] *Id.*
[159] *Id.*

coordinating entity was created that includes some environmental and community groups, but the relevant governance power is really exercised by the massive number of government agencies that are involved in this major initiative, as well as powerful private interests.[160] Many neighborhoods along the Los Angeles River are already experiencing gentrification and displacement, as people of color move out, median income levels rise, and the neighborhoods become not only greener but also whiter.[161] The failure to design an overall co-governance structure for the restoration and revitalization of the Los Angeles River that provides sufficient empowerment to marginalized low-income communities of color has meant that the injustice of infrastructure inequities is shifting to the injustice of green gentrification and displacement, as policies for eco-resilience (ecosystem restoration) and neoliberal structural resilience (economic and land development) are crowding out policies for resilience justice (making sure new and restored green and blue infrastructure benefit low-income people of color).

The Los Angeles River example offers some cautions not only about government-centric and market-centric "solutions" to green and blue infrastructure inequities but also to the misuses and inadequacies of co-governance arrangements. New participatory and co-governance structures do not always empower the marginalized, and can perpetuate power disparities by providing new governance forums for the powerful to manipulate and exploit.[162]

Co-governance is not a panacea to address resilience injustices or green and blue infrastructure inequalities, and the structure and implementation of co-governance arrangements affect whether it will produce more equitable outcomes. The use of co-governance systems for green and blue infrastructure throughout a local jurisdiction can increase overall green and blue infrastructure but inequitably distribute it to wealthier and more powerful communities that participate more in co-governance arrangements, favor scientific expertise over community-resident values, and subsidize private actors and interests as democratic transparency and accountability is reduced.[163] Even when co-governance arrangements for green and blue infrastructure are targeted to marginalized and vulnerable communities, top-down arrangements are less just and inclusive than bottom-up arrangements and both competing

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[160] Boamah & Arnold, *supra* note 2 (forthcoming).
[161] *Id.*
[162] Aylett, *supra* note 16, at 101.
[163] *See generally* Toxopeus et al., *supra* note 16, at 6–11.

visions of the community's needs and unequal participatory capacities can perpetuate inequalities among the residents of these marginalized communities.[164] Despite the promise of co-governance between governmental entities and marginalized communities, efforts at creating such co-governance arrangements often fall short when government officials don't want to give up traditional governance processes, legal institutions, or dominant ways of framing policy and resource issues, as has been the case in co-governance systems created between indigenous First Nations and territorial and federal governments in Yukon, Canada.[165]

The involvement of nonprofit organizations in co-governance arrangements isn't a guarantee of resilience or justice for marginalized communities. Co-governance of community-based green and blue infrastructure is not merely a set of partnerships between governmental entities and nongovernmental organizations ("NGOs") or nonprofits.[166] NGOs and nonprofits may be considered more or less community-based, depending on their scale (e.g., neighborhood organization versus regional environmental group), the degree to which professional staff and experts dominate the organizations' activities and contributions to governance, and the extent to which the NGOs and nonprofits organize, facilitate, and defer to the grassroots power and voices of community residents. NGOs and nonprofits do not turn a governance system into co-governance or build marginalized communities' resilience and justice merely by being a conduit for the input of community residents. Nonetheless, NGOs and nonprofits play critically important roles in community organizing and empowerment, facilitation of community participation and voices, and providing supporting expertise, information, and resources to help marginalized communities to achieve their goals.

Government exploitation of co-governance arrangements is a concern. Co-governance structures can be means by which the government and powerful interests exercise coercion and regulation over low-income communities of color, reshaping those communities to advance neoliberal and racialized policy goals that hurt or displace community residents, prevent residents from holding government officials accountable, and displace real community power with mere co-governance rhetoric.[167] Ackerman

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[164] *Id.* at 8.

[165] Nicole J. Wilson, *Querying Water Co-Governance: Yukon First Nations and Water Governance in the Context of Modern Land Claim Agreements*, 13 WATER ALTERNATIVES 93, 93–94 (2020).

[166] The term "NGOs" is used more in international and non-U.S. settings than in U.S. cities and neighborhoods, where the term "nonprofits" is still more frequently used.

[167] *See generally* Aaron Roussell, *Policing the Anticommunity: Race, Deterritorialization,*

warns against participatory processes and co-governance arrangements that are merely means of government cost-reduction and responsibility-reduction: co-governance "suddenly appears to be 'practical' and attractive when governments can offload service delivery to NGOs and community groups or convince local residents to donate volunteer labor or materials."[168] Residents of low-income neighborhoods of color have expressed concerns that co-governance arrangements could be merely ways by which the government offloads its responsibilities for and costs of green and blue infrastructure to organizations and residents in marginalized neighborhoods lacking sufficient resources.[169] Moreover, the relationships between co-governance in the sense of shared power in policy making, planning, and production of green and blue infrastructure and comanagement in the sense of ongoing operational management of the green and blue infrastructure and implementation of policies are not clear, reflecting how differentiation in roles and responsibilities can mask fluid, evolving power relationships and structures.[170] In addition, co-governance and participatory governance systems are not tightly self-contained and do not observe neat boundaries between other forms of engagement with governance, including conflict and resistance to power, as well as collaboration, rational communication, and sharing of power.[171]

Creation of local co-governance requires both the development of neighborhood-scale governance capacity and city-scale (or the scale of whatever the unit of government is) institutional change.[172] Co-governance processes "should be institutionalized to integrate them with other mechanisms of governance so as to give participatory processes real power to shape broader decisions, operations, and outcomes and to provide institutional support such as legal mandates, financing, training, technical assistance, and enforcement mechanisms."[173] Ackerman writes that co-governance arrangements should be institutionalized in government plans, new government structures, and laws, and that it is important for both community activists and government officials to expend the political

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and Labor Market Reorganization in South Los Angeles, 49 L. & SOC'Y REV. 813 (2015) (discussing 20-year study of community policing programs in South Los Angeles).

[168] Ackerman, *supra* note 16, at 447.

[169] *Cf.* Roussell, *supra* note 167, at 816.

[170] *See generally* Märit Jansson et al., *The Governance of Landscape Management: New Approaches to Urban Open Space Development*, 44 LANDSCAPE RSCH. 952 (2019).

[171] Aylett, *supra* note 16, at 100–03.

[172] Somerville & Haines, *supra* note 16, at 62, 64.

[173] Palmquist, *supra* note 130, at 398.

capital to overcome barriers to creating or amending legislation to establish or authorize co-governance structures.[174]

Adopting a "rights-based approach" that envisions the city as a commons in which all have a "right to the city," Iaione and De Nictolis write "co-governance of urban essential resources can be adopted as an urban policy strategy to transition away from the current urban governance paradigm, based on public-private partnerships, towards co-governance which is based on shared, collaborative, polycentric governance, and public-commons or public-private-commons partnerships."[175] Foster and Iaione, in writing of the city as a commons, seek to redefine urban governance as a collaborative and socially and economically inclusive process of co-designing the city and redistributing power.[176] In particular, Foster and Iaione call for a fundamental restructuring of the city and its governance structure to facilitate a form of co-governance that is envisioned as devolved collaborative governance in "The City as a Commons":

> The idea of the state as a facilitator—a relational state—is part of the move from a "command and control" system of governance to what we call "urban collaborative governance," a system which at its core redistributes decision making power and influence away from the center and towards an engaged public. The facilitator state creates the conditions under which citizens can develop collaborative relationships with each other, and cooperate both together and with public authorities, to take care of common resources, including the city itself as a resource. Further, if the city itself is a shared resource, then a strong collaborative system of decision making should also nudge towards re-distributing some of the assets of the city to support differently-situated individuals and communities within the city.[177]

This arrangement shifts power from government to networks of residents and citizens to co-design the city in ways that are more socially and economically inclusive, yet raises concerns about how such a system might

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[174] Ackerman, *supra* note 16, at 459.
[175] Christian Iaione & Elena de Nictolis, *Urban Pooling*, 44 FORDHAM URB. L.J. 665, 666–67, 688.
[176] *See generally* Foster & Iaione, *supra* note 16, at 334–48.
[177] *Id.* at 334.

be exploited by strong networks of the powerful and wealthy, without a strong city government and other institutional safeguards to check private power, redistribute resources, and address inequalities and injustices.[178]

In considering the potential for—and limits to—co-governance arrangements to enhance resilience, justice, and green and blue infrastructure conditions in low-income communities of color, as well as to transform city governance systems, it is important to explore examples of such arrangements involving marginalized communities. The following section discusses several case studies in the United States that illuminate some of the issues that must be addressed when designing and implementing co-governance of community-based green and blue infrastructure for resilience justice in marginalized and oppressed communities.

IV. CO-GOVERNANCE CASE STUDIES

A. The Urban Parks Movement in Los Angeles, CA

The Baldwin Hills Parks, Rio de Los Angeles State Park, and Los Angeles State Historic Park are collections of parks that were preserved as a result of community-based organizations suing the government and then developing partnerships for park development and management.[179] The creation of these parks through legislative victory is known as the "Urban Parks Movement" and has garnered international notoriety.[180] The Urban Parks Movement has focused on the creation and revitalization of these parks as a way to rectify the environmental injustice of minorities not having equal access to public parks and greenspace.[181] The inequities of park access led to concerns for public health and quality of life.[182] The collective community actions have led to many triumphs like "the passage of the State of California Urban Park Act (2001), dedicated to financing the "acquisition and development of parks, recreation areas and facilities in the neighborhoods currently least served by park and recreation providers."[183] Since 2001, more than "$87 million dollars has

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[178] Robert García & Ramya Sivasubramanian, *Environmental Justice for All: Struggle in Baldwin Hills and South Central Los Angeles*, 46 CLEARINGHOUSE REV. 374, 377 (2012).
[179] GARCÍA & WHITE, *supra* note 10, at 4.
[180] *Id.*
[181] *Id.*
[182] *Id.*
[183] Jason Byrne et al., *The Park Made of Oil: Towards a Historical Political Ecology of the Kenneth Hahn State Recreation Area*, LOC. ENV'T 1, 6 (2007). *See also Urban Park Act of*

been spent purchasing and transforming former brownfield sites into new city parks and greenspaces."[184]

1. The Baldwin Hills Parks

Presently, there are three parks, overseen by the Baldwin Hills Conservancy, in the Baldwin Hills neighborhood: Kenneth Hahn State Recreation Area (including the Baldwin Hills Scenic Overlook), Ladera Park, Jim Gilliam Park.[185] These parks are colloquially called "The Baldwin Hills Parks."[186] These parks were made possible by the collaborative efforts of nonprofit organizations, local shareholders, local politicians, and grassroots organizations.

The Baldwin Hills community has been the subject of environmental injustice since the twentieth century and into the twenty-first.[187] Baldwin Hills community is, environmentally and demographically, a diverse area of Los Angeles. The Baldwin Hills area is a minority-majority community where "people of color make up 79.6% of Baldwin Hills' population, compared to the 72.5% in the county as a whole. [. . .] 30.2% of the residents live in poverty."[188] A cross section of the population reveals an intermingling of African American, Latino, and non-Hispanic White communities.[189] The historic lack of parks and environmental degradation through oil extraction in this area is due to years of racial discrimination in land-use planning by Los Angeles.[190]

The first park to be preserved in the Baldwin Hills neighborhoods was the Kenneth Hahn State Park.[191] Funding for the Baldwin Hills park site began in 1975.[192] In 1983 a 138 acre park, the Hahn Recreation area, was officially opened.[193] Since then, the Baldwin Hills Conservancy was established to "acquire and direct the management of public lands within

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2001, CAL. DEP'T PARKS & RECREATION, https://www.parks.ca.gov/?page_id=22294 [https://perma.cc/C2U8-HULC] (last visited Mar. 26, 2021).

[184] Byrne et al., *supra* note 183, at 6.

[185] *Parks in the Baldwin Hills*, BALDWIN HILLS PARKS, http://www.baldwinhillspark.info/parks.html [https://perma.cc/SGH8-8VZG] (last visited Mar. 26, 2021).

[186] *Id.*

[187] Byrne et al., *supra* note 183, at 11–12, 33–34.

[188] García & Sivasubramanian, *supra* note 178, at 374.

[189] *Id.*

[190] *Id.* at 374–75.

[191] Byrne et al., *supra* note 183, at 20, 25–26.

[192] *Id.* at 26.

[193] *Id.*

the Baldwin Hills area of Los Angeles County."[194] While the creation of the Kenneth Hahn State park was a victory for the Baldwin Hills area, nonprofits and grassroots organizations have defended Baldwin Hills over the years by preventing environmentally degrading projects.[195]

The City Project, a policy and legal advocacy nonprofit organization, represented the Concerned Citizens of South Central Los Angeles in efforts to stop a power plant and garbage dump and preserve the budget for the park.[196] The lawsuit, which formed the genesis of preserving the park, was a legal challenge to the oil drilling on either side of the park that released "uncontrolled emissions of noxious gas."[197] The basis of the community challenge to the oil drilling was that the County's environmental impact report and oil drilling regulations fail to provide adequate health and environmental safeguards in a community that already experiences environmental discrimination.[198] The community efforts, which involved "Concerned Citizens 'represented by the City Project', Culver City, Community Health Council, Citizens coalition for Safe Community, and private attorneys" ultimately forced a settlement with the oil company limiting drilling locations and noise levels, while requiring frequent environmental justice assessments air-quality monitoring and a study of fracking in the area.[199] It is the "most regulated oil field" in the nation.[200]

This challenge, and victory, followed other attempts to install environmentally degrading projects.[201] The state proposed installing an emergency power plant in the middle of the Baldwin Hills parks in 2001; in 2003, the city proposed the installation of a garbage dump in the same area.[202] In 2005, Governor Schwarzenegger proposed eliminating the Baldwin Hills Conservancy and downgrading the parks in Baldwin Hills to local parks to save money.[203] This proposal occurred simultaneous to

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[194] *Welcome*, STATE OF CAL. BALDWIN HILLS CONSERVANCY, http://bhc.ca.gov/ [https://perma.cc/VGB9-MMLB] (last visited Mar. 26, 2021).
[195] Byrne et al., *supra* note 183, at 34.
[196] *The City Project: Leading the Greening of Disadvantaged Neighborhoods*, CMTY. PARTNERS, https://communitypartners.org/success-story/city-project [https://perma.cc/Y4R2-Y82D] (last visited Mar. 26, 2021).
[197] Press Release, Natural Resources Defense Council Inc., Agreement Reached to Reduce Urban Oil Drilling in Los Angeles (July 6, 2011), https://www.nrdc.org/media/2011/110706-0/ [https://perma.cc/NB32-VJ94] (last visited Mar. 26, 2021).
[198] *Id.*
[199] García & Sivasubramanian, *supra* note 178, at 376.
[200] *Id.*
[201] *Id.* at 375–76.
[202] *Id.* at 375.
[203] *Id.*

a state proposal for a new state-funded Sierra Nevada Conservancy that would "serve disproportionately white and wealthy rural areas."[204] Time and again bottom-up participation has forced the protection and maintenance (by the government) of the Baldwin Hills Parks.

2. Río de Los Angeles State Park at Taylor Yard

Río de Los Angeles State Park at Taylor Yard is the site of a former rail yard. The City Project worked with Anahuak Youth Sports Association, community residents, and the Coalition for a State Park at Taylor Yard to stop a commercial development in favor of the 40-acre Río de Los Angeles State Park as part of the greening of Los Angeles River in Northeast Los Angeles.[205] Initial opposition from the California Department of Parks and Recreation against active recreation at the Taylor Yard, collapsed under community pressure.[206] The litigation strategy included focusing on the failure to prepare an environmental impact report.[207] Eventually, the developer "sold an area known as Parcel D to the State of California for a 40-acre park that will be part of a 130-acre park."[208] The plans included: soccer fields, a running track, natural parkland, a picnic area, bike paths, and an amphitheater.[209] In January 2005, the groundbreaking for the state park in Taylor Yard took place.[210] The State contributed $5.5 million for soccer fields and youth services as a part of the Los Angeles River and the federal government awarded $3 million for the River Revitalization Plan.[211]

This park, and the Los Angeles State Park are actually a "part of a larger vision for urban parks, recreational and cultural resources, and ecological restoration activities in the Los Angeles area."[212] The plan, which is still in stages of proposal and advocacy, includes "a Heritage Parkscape—like the Freedom Trail in Boston—that will link the Cornfield,

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[204] *Id.*
[205] GARCÍA ET AL., HEALTHY PARKS, SCHOOLS AND COMMUNITIES: GREEN ACCESS AND EQUITY FOR LOS ANGELES COUNTY, POLICY REPORT 23 (2011).
[206] *Id.*
[207] ARNOLD, *supra* note 21, at 112.
[208] *Id.*
[209] *Id.*
[210] Press Release, Cal. Dep't Parks and Recreation, Groundbreaking for New Park at Taylor Yard, Bulldozers Ready to Roll (Jan. 13, 2005), http://www.parks.ca.gov/pages/712/files/011305.pdf [https://perma.cc/5H7Y-L5DZ].
[211] *Id.*
[212] ARNOLD, *supra* note 21, at 112.

Taylor Yard, and the Los Angeles River with 100 other cultural, historical, recreational, and environmental resources in the heart of Los Angeles."[213] Restoration of the Los Angeles River is a key element to this plan.[214] It is an "ecologically and culturally vital focal place for the entire region."[215] Much of the river in this area was concreted and fenced, not resembling public natural resource.[216] "Greening" the river was an important aspect of the plan and received "substantial public funding by all levels of government for park acquisition and development."[217] Today, the park's natural wetlands have been restored, creating green space for local wildlife and residents alike.[218] The wetlands in the Río de Los Angeles Park, while operating as a recreational site, also manages stormwater.[219] It mitigates stormwater runoff through "constructed repurposed wetlands as a natural filtration system to reduce pollution."[220]

3. The Los Angeles State Historic Park

The Los Angeles State Historic Park is in one of Los Angeles's most culturally, historically, ethnically diverse, yet park-poor communities.[221] The park is a downtown, 32-acre open space, positioned between Chinatown on the west and the Los Angeles River on the east.[222] This space was originally called the "Cornfields."[223]

"Southern Pacific purchased Cornfields in the late 1800s and used the land as a freight depot and railroad switch yard until the late 1990s."[224] In 2001, the Los Angeles Mayor and City Councilmember Mike Hernandez solicited "one of the nation's largest real estate developers,

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[213] *Id.*
[214] *Id.*
[215] *Id.*
[216] *Id.*
[217] *Id.*
[218] *Rio de Los Angeles State Park State Recreation Area*, CAL. DEP'T OF PARKS & RECREATION, https://www.parks.ca.gov/?page_id=22277 [https://perma.cc/6PL6-3FGF] (last visited Mar. 26, 2021).
[219] CHRISTOPHER ECONOMIDES, GREEN INFRASTRUCTURE: SUSTAINABLE SOLUTIONS IN 11 CITIES ACROSS THE UNITED STATES 11 (2014).
[220] *Id.*
[221] GARCÍA ET AL., *supra* note 205, at 15–16, 26; ARNOLD, *supra* note 21, at 112.
[222] GARCÍA ET AL., *supra* note 205, at 15.
[223] *Id.* at 113; ARNOLD, *supra* note 21, at 112.
[224] SOPHIA CHENG, COMMUNITY ORGANIZING IN LOS ANGELES CHINATOWN: HISTORICAL CASE STUDY OF THE CORNFIELDS 42 (2013).

Majestic Realty Co., to purchase the land."[225] The Majestic's plan for the land included "$80 million project[s] for four buildings totaling 909,200 square feet. At least half of the buildings would be warehouses, and the rest would be light manufacturing, such as food processing, which would create 1,000 new jobs."[226] The Mayor, also solicited $12 million in federal loans from the Department of Housing and Urban Development to supplement the deal.[227]

The Chinatown Yards Alliance, a "multiracial coalition of over 30 neighborhood civil rights and environmental organizations,"[228] was the force behind the dissemination of this plan. Initially, community residents expressed hostility towards the vision of the area becoming a public park, but "a consensus and an effective broad-based coalition soon emerged."[229] The development of the Chinatown Yards Alliance is credited to the Friend of the Los Angeles River and its founder Lewis McAdams.[230] The Chinatown Yards Alliance sued Majestic and bought the land from the company for $30 million supplied by the state of California.[231]

The Chinatown Alliance was represented by the environmental law firm, Chatten-Brown & Carstens. Legal action against Majestic took place "on two fronts—an environmental complaint on the state level and a civil rights complaint on the federal level."[232] The civil rights complaint cited environmental inequity as the right violated. The lawsuit also represented plaintiffs from a wide range of races and interest.[233] Friends of the LA River, National Resources Defense Council, and Environmental Defense represented environmentalists; the Chinese Consolidated Benevolent Society represented the immigrant Chinese Community; Concerned Citizens of South Central L.A. represented African Americans; and the Northern Renaissance Corporation was a local Asian-owned business.[234] California State Parks acquired jurisdiction over the thirty-two acre stretch.[235]

Eventually, the U.S. Department of Housing and Urban Development "announced that it would withhold promised subsidies of $12

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[225] *Id.*
[226] *Id.*
[227] *Id.* at 42–43.
[228] *Id.* at 43.
[229] ARNOLD, *supra* note 21, at 112–13.
[230] CHENG, *supra* note 224, at 43.
[231] *Id.*
[232] *Id.* at 44.
[233] *Id.* at 45.
[234] *Id.*
[235] *Id.* at 47.

million until a full environmental impact report had been prepared."[236] As litigation raged on, city political leadership gave way with a new election in which all major candidates "announced their support for a park at the Cornfield."[237] Finally, a settlement between city officials and this alliance and the developer was reached, by which Majestic would abandon its proposed warehouse in favor of selling it to the State of California to be a state park.[238]

When the Chinatown Yard Alliance prevailed against the land developers, the *Los Angeles Times* called the community victory "a heroic monument" and a "symbol of hope."[239] In 2010, however, ten years after the struggle began, the California Department of Parks and Recreation still had not completed the park.[240] The environmental impact statement process began in 2011 and construction of the park began in 2013.[241] Today, the battle is for more public art in the park that will reflect the "struggles, hopes, and triumphs of the generations who have entered Los Angeles," the dreams of the community, and the purpose of the park.[242]

4. The Urban Parks Movement in Context

The Urban Parks Movement, which required sophisticated cooperation between diverse and significant amounts of allies, stands as an example of how grassroots and other community-based organizations can force government change and subsequent partnership with strategically applied community pressure. As Anne Taufen Wessells argues in her article *Place-Based Conservation and Urban Waterways: Watershed Activism in the Bottom of the Basin*, place-based interests that link diverse groups in efforts to save a common place, may be the avenue to overcome utilitarian and political-interest driven outcomes.[243] As she notes, it is extremely

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[236] ARNOLD, *supra* note 21, at 112.
[237] *Id.*
[238] *Id.*
[239] Robert García, *L.A. State Historic Park: A Deserted Railroad Yard is Transformed Yet Unfinished*, KCET (Feb. 23, 2012), https://www.kcet.org/history-society/l-a-state-historic-park-a-deserted-railroad-yard-is-transformed-yet-unfinished [https://perma.cc/MLC3-N5AG].
[240] CHENG, *supra* note 224, at 48.
[241] *Id.* at 50.
[242] García et al., *Public Art in the Public Park: People, Place, and Power in the Los Angeles State Historic Park*, CTR. FOR L. IN THE PUB. INT. (June 3, 2005), https://web.archive.org/web/20170423060349/https://www.cityprojectca.org/pdf/publicartpublicpark.pdf [https://perma.cc/4KUK-93YC].
[243] Anne T. Wessells, *Place-Based Conservation and Urban Waterways: Watershed Activism in the Bottom of the Basin*, 50 NAT. RES. J. 539, 555–56 (2016).

difficult to leash individual interests to a common cause, especially when the self-interest of participating stakeholders may drive the advocacy for a particular place.[244]

B. Joint Use/Shared Use Programs in Los Angeles, CA

In 2010, The Los Angeles County Department of Public Health, with the support from a CDC initiative, launched a two-year project to improve the overall health of marginalized communities by providing a better environment for nutrition, exercise, and wellness.[245] This led to the creation of a joint use task force called Joint Use Moving People to Play ("JUMPP").[246] JUMPP is a task force made up of community-based organizations, government institutions, school districts, and public health agencies.[247]

The goals of JUMPP are to increase physical activity of community members by providing increased access to green spaces, support partnerships between organizations, and provide assistance and capacity building of the joint use agreements.

Joint use agreements are defined as an agreement between two or more entities sharing "resources to keep costs down and communities healthy."[248] Joint use agreements are important because many urban communities lack free or low-cost access to outdoor green spaces that can be utilized to increase physical activity and the health benefits that come from increased activity.[249] Joint use agreements can be formal or informal.[250]

Formal agreements are encouraged because they help prevent problems that can arise from maintenance, operations, liability, ownership, or cost of the shared space.[251] Some school districts have a formal process and qualifications that are required for schools to enter into

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[244] *Id.*
[245] *Grant Summary*, L.A. COUNTY, RENEW L.A. CNTY., http://www.publichealth.lacounty.gov/place/docs/CHLA_RENEW_summary_FINAL.pdf [https://perma.cc/7DF7-GX7K] (last visited Mar. 26, 2021).
[246] *Id.*
[247] *Id.*
[248] *About*, JOINT USE, http://www.jointuse.org/about/about-joint-use/ [https://perma.cc/RE3L-EH6R] (last visited Mar. 26, 2021).
[249] L.A. CNTY. DEP'T OF PUB. HEALTH, JUMPP STRATEGIC PLAN 2015–2020 (2015).
[250] JOINT USE, *supra* note 248.
[251] *Id.*

joint-use agreements.[252] Having this formalized process will help reduce the risks to both entities.[253]

It is important that the joint use partnerships are successful for the continued benefits of the agreement to the community.[254] The elements of successful joint use partnerships are:

> [c]learly articulated goals, [d]etailed planning that includes sources of funding and division of responsibilities, [a] recognition of the individual benefits to each partner, [a] long-term commitment from everyone involved, [o]ngoing communication among partners and with the community, [a] process for resolving any conflicts that may arise, [and] [s]upport from policy makers and community members.[255]

There are a few studies that have analyzed the benefits and challenges of joint use agreements. The first study was completed before the creation of JUMPP and the joint use task force.[256] This study identified the trend of these developing partnerships that provided joint use opportunities and benefits to communities with limited resources.[257] The study provided a good framework to build on by identifying the successes and the lessons that can be learned from these early partnerships.[258] The second study was done a few years after the creation of JUMPP and the task force identified the partnerships as an effective strategy to provide access to green space and promote the overall health of under-resourced communities.[259] The study also showed that communities with school partnerships are 16 times more likely to be used than a community school without a partnership.[260] Both studies showed that these partnerships

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[252] *Joint Use Agreements*, FACILITIES SERVS. DIV., L.A. UNIFIED SCH. DIST., https://www.laschools.org/new-site/joint-use-agreements/ [https://perma.cc/LL6G-NYWH] (last visited Mar. 26, 2021).
[253] *Id.*
[254] *Id.*
[255] JOINT USE, *supra* note 248.
[256] TAMAR COOPER & JEFFREY M. VINCENT, JOINT USE SCHOOL PARTNERSHIPS IN CALIFORNIA: STRATEGIES TO ENHANCE SCHOOLS AND COMMUNITIES, CTR. CITIES & SCHS. (Aug. 2008), http://citiesandschools.berkeley.edu/reports/CC&S_PHLP_2008_joint_use_with_appendices.pdf [https://perma.cc/UFY6-JZWK].
[257] *Id.*
[258] *Id.*
[259] Mariah Lafleur et al., *Increasing Physical Activity in Under-Resourced Communities Through School-Based, Joint-Use Agreements, Los Angeles County, 2010–2012*, 10 PREVENTING CHRONIC DISEASE 1 (2013).
[260] *Id.*

are very promising and that having strong partnerships is needed to navigate the issues that can arise from the partnership itself and the use of the space.

C. Transit to Trails in Southern California

Transit to Trails ("TOT") is a project that was "created by a partnership between the National Park Service, the Anahuak Youth Association, The City Project, Mountains and Recreation Conservation Authority, and an anonymous donor."[261] TOT was created jointly by both community-based organizations and government agencies because marginalized communities have a disproportionate lack of access to green spaces.[262] Transportation is one of the main barriers to the access of green spaces.[263] TOT "takes inner city youth and their families and friends on fun, educational, and healthy trips to parks, rivers, mountains, and beaches."[264] The Southern California Association of Governments ("SCAG") identified the problem that there is no good way for southern Californians to reach any of the four forests using public transportation.[265] In order to address issue of disproportionate access the SCAG identified that a multiagency effort would be required.[266] TOT has been a proven program that is a multiagency program that helps to remedy the issue of access.[267] The program continues its efforts to expand to other parks and counties throughout California.[268]

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[261] *Transit to Trails*, THE CITY PROJECT, https://web.archive.org/web/20200112091932/https://www.cityprojectca.org/transit-to-trails [https://perma.cc/SKK5-W5Y3] (last visited Mar. 26, 2021).
[262] *Id.*
[263] *Id.*
[264] *Id.*
[265] *Id.*
[266] *Id.*
[267] THE CITY PROJECT, *supra* note 261.
[268] *Id.*; *see, e.g.*, Doug Lewis, *City of Duarte's Free Rails-to-Trails Gold Line Shuttle Open Saturdays in June*, STREETSBLOG LA (June 3, 2016), http://la.streetsblog.org/2016/06/03/city-of-duarte-trials-new-rails-to-trails-gold-line-shuttle/ [https://perma.cc/4V27-26KW] (Another similar but different partnership to provide access to green space is City of Duarte's Free Rails-to-Trails Gold Line Shuttle. The City of Duarte partnered with San Gabriel Mountains Forever Coalition to create a daily shuttle that runs every thirty minutes to provide access to the San Gabriel Mountains for non-car-owning residents. The shuttle offers benefits not only to the local community by providing access but also to the environment by reducing car travel to the trailhead. The shuttle is funded by a local bottle return fund).

Like the bottom-up Urban Parks Movement and the top-down People Street programs in Los Angeles, the hybrid TOT program aims to address the lack of access of marginalized communities to green and blue infrastructure in the Los Angeles area.[269] TOT, though, is an example of partnerships to provide marginalized communities access to already *existing* green and blue infrastructure.[270] These types of partnerships are equally as beneficial as ones that create new green and blue spaces because some communities still lack resources to build new green and blue spaces and some are restricted by the surrounding development that prevents them from building new green and blue spaces.

D. North East Trees in Los Angeles, CA

North East Trees ("NET") is a nonprofit organization in Los Angeles with a mission to "bring[] back nature to [the] urban environment."[271] NET was started in 1989 by a retired high school teacher and licensed Landscape Architect, whose goal was to plant five trees a day for the rest of his life and to help troubled youth find meaningful job skills for the green industry.[272] His passion has resulted in building an organization that provides training and restoration to marginalized communities in Los Angeles.[273]

NET's focus has been to transform degraded areas in and around marginalized communities and turn them into parks, trails, and streetscapes to improve the overall environmental beauty and health benefits of a greener urban area.[274] NET engages the community through its various programs and projects aimed to improve the quality of the environment and health of the community.[275]

NET has six different programs it uses to move towards its goal of bringing back nature in an urban environment.[276] Those programs are storm water management, park design/build, watershed rehabilitation, urban forestry, youth stewardship, and community stewardship.[277] NET

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[269] THE CITY PROJECT, *supra* note 261.
[270] *Id.*
[271] *Mission Statement*, N.E. TREES, http://www.northeasttrees.org/ [https://perma.cc/37YK-AC3U] (last visited Mar. 26, 2021).
[272] *About Us*, N.E. TREES, http://www.northeasttrees.org/about [https://perma.cc/5HWD-G79M] (last visited Mar. 26, 2021).
[273] *Id.*
[274] *Id.*
[275] *Id.*
[276] *Programs*, N.E. TREES, http://www.northeasttrees.org/programs [https://perma.cc/4HT8-M3AJ] (last visited Mar. 26, 2021).
[277] *Id.*

has been successful in using these programs to further its mission.[278] NET has already completed a number of different parks, gateways, bike paths, and green corridors.[279] NET's continued success can be attributed to its commitment to its grassroots community based approach and its high level of community engagement.

NET can also attribute its effectiveness to its partnerships with the government and other nonprofit organizations.[280] NET is part of many initiatives of Los Angeles to improve its blue and green infrastructure.[281] The two large initiatives are the LA River Revitalization and the Million Trees LA.[282] The LA River Revitalization is a citywide project to restore the Los Angeles River and its riparian areas through watershed restoration and storm water management.[283] The Million Trees LA is also a citywide project to improve the urban canopy equally throughout the city to help reduce urban heat and improve air quality.[284] Both projects require many partnerships between community-based organizations and agencies at every level of government from local to state to federal, in order for the projects to be successful.[285] Funding is not the only way the government partners with nonprofit organizations. Community-based organizations also participate in planning and implementing the many individual subprojects that make up the larger projects in order to create an extensive and coordinated network of blue and green infrastructure in Los Angeles.[286]

E. Thunder Valley Community Gardens on the Pine Ridge Reservation

The Thunder Valley Community Development Corporation ("Thunder Valley CDC") is a Lakota-run grassroots organization of the

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[278] *Id.*
[279] *Id.*
[280] N.E. TREES, *supra* note 272.
[281] *Id.*
[282] *Id.*
[283] CITY OF L.A., LOS ANGELES RIVER REVITALIZATION MASTER PLAN (2007).
[284] Jessica Debats, *Seeing the City for the Trees: Public Space, Climate Adaptation, and Environmental Justice in LA and New York's "Million Trees" Campaigns* (June 2016) (Ph.D. dissertation, MIT).
[285] Stephanie Pincetl, *Implementing Municipal Tree Planting: Los Angeles Million-Tree Initiative*, 45 ENV'T MGMT. 227, 227–38 (2010).
[286] *Community Stewardship*, N.E. TREES, http://www.northeasttrees.org/community-stewardship/ [https://perma.cc/P4AD-Y8M9] (last visited Mar. 26, 2021); Pincetl, *supra* note 285, at 232.

Pine Ridge Reservation in South Dakota.[287] The Thunder Valley CDC was founded by "a group of young people who were reconnecting to Lakota spirituality and identity through ceremonies."[288] The mission reflects their desire to create systematic change to poverty to preserve their people.[289] The grassroots organization's mission is to address the inequities in health, culture, and the environment suffered by the Oglala Lakota people on the reservation by creating a "regenerative community development plan."[290] The plan combats the lack of "physical, political, and economic infrastructure"[291] on the reservation by building local skills and leadership while honoring cultural heritage.[292] The regenerative community plan will ideally develop a "triple bottom line, which holds people, planet, and prosperity in equal standing."[293] The initiatives that the grassroots organization promotes are: Homeownership, Social Enterprise, Youth Leadership Development, Regional Equity, Lakota Language, and Food Sovereignty.[294] The Thunder Valley CDC creates and facilitates green infrastructure projects, like the Thunder Valley Community Gardens, under the Food Sovereignty Initiative.[295]

The community gardens green infrastructure serves both the people and the planet; they are functioning vegetable gardens that are planted, weeded, and harvested by the Food Sovereignty Initiative workers, youth leadership and development program participants, and community members.[296] Because the reservation is a food desert and the rates of diabetes and preventable diseases are among the highest in the country, the green infrastructure's purpose is to address these health crises.[297] The community gardens are primarily intended to provide access to healthy food on the reservation, increase food system sovereignty, improve public health, and decrease economic burdens on low-income families, while

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[287] *Who We Are*, THUNDER VALLEY CDC, https://thundervalley.org/live-rez/who-we-are [https://perma.cc/JGR4-SFS4] (last visited Mar. 26, 2021).
[288] JAMES N. WEINSTEIN ET AL., NATIONAL ACADEMIES PRESS, COMMUNITIES IN ACTION: PATHWAYS TO HEALTH EQUITY 187 (2017).
[289] *Id.*
[290] *Id.*
[291] *Id.*
[292] *Id.*
[293] *Id.* at 189.
[294] WEINSTEIN ET AL., *supra* note 288, at 188.
[295] *Food Sovereignty Initiative*, THUNDER VALLEY CDC, https://thundervalley.org/live-rez/our-programs/food [https://perma.cc/JN5M-V8E3] (last visited Mar. 26, 2021).
[296] THUNDER VALLEY CDC, *supra* note 287.
[297] *Food Sovereignty Initiative*, *supra* note 295.

increasing economic opportunity.[298] In addition to providing health benefits, the gardens provide locals with access to an educational space, where they can learn about gardening.[299]

The Thunder Valley CDC partners with several private and federal partners.[300] The grassroots organization existed independently before partnering with the federal government through the Promise Zone initiative created by the Obama Administration.[301] The Promise Zone initiative is an "example of place-based economic development initiatives advances by the federal government."[302] The program revolves around the federal government partnering with reservation leaders (or grassroots organizations in this case) and assisting them in attaining grants so that the communities can reach the goals that they create themselves.[303] After the Thunder Valley CDC was founded, the organization relied on this grant from the U.S. Department of Housing and Urban Development's Sustainable Communities to facilitate the process of putting together a community plan for sustainable development.[304] Since then, the grassroots organization has operated annually "at about $4 million with support from multiple federal agencies, foundations, and individuals."[305] The Administration for Native Americans and the U.S. Department of Agriculture are among the two federal agencies who lend the most support to the Thunder Valley CDC through the Promise Zone Initiative.[306]

In many ways, this type of federal partnership promotes nation-building, but it could still be improved. A positive aspect of this partnership is that the Thunder Valley CDC has quite a bit of discretion, at the local level, to implement and execute community regeneration strategies.[307] Also, the Promise Zone initiative requires evaluation of the partnership's

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[298] *Id.*
[299] *Community Gardens*, THUNDER VALLEY CDC, https://thundervalley.org/program-guide/community-gardens [https://perma.cc/3GQE-Q6QJ] (last visited Mar. 26, 2021).
[300] *Promise Zone*, THUNDER VALLEY CDC, https://thundervalley.org/change/regional-equity/promise-zone [https://perma.cc/LAC2-HVYU] (last visited Mar. 26, 2021).
[301] James Hall, *The Promise Zone Initiative and Native American Economic Development: Only the First Step Forward Toward the Promise of a Brighter Future*, 40 AM. INDIAN L. REV., 249, 259 (2016).
[302] *Id.*
[303] *Id.*
[304] WEINSTEIN ET AL., *supra* note 288, at 187.
[305] *Id.* at 188.
[306] *Id.*
[307] *Id.*

community progress; this helps the community implement effective long-term strategy that will help the reservation residents.[308]

On the other hand, a requirement of the grant is that the grass-roots organization wasn't entirely free to choose its own goals; it had to adopt at least 3 of the Promise Zone goals.[309] Even though the goals are broad, this situation reflects the federal government's control over the reservation. The Promise Zone initiative relies on project categorical federal grants.[310] Project categorical grants are contrary to the idea of promoting tribal sovereignty. They often come with strings attached that give federal administrators a "high degree" of control over recipients.[311] A focus on block grant funding could be a way to avoid this type of federal partnership in the future and truly support tribal sovereignty.[312]

F. Parkland Neighborhood Community Garden in Louisville, KY

In 2013, a community garden was created in the Parkland neighborhood, a predominantly Black and low-income neighborhood in the heart of Louisville, Kentucky's West End.[313] Parkland, the neighborhood where Muhammad Ali grew up, is now characterized by vacant properties, violence, and being a food desert.[314] The community garden evolved out of conversations between Louisville Metro Council Representative Attica Scott and the Parkland neighborhood representatives whom she represented, with Council Representative Scott seeking a way to improve residents' access to fresh vegetables and fruits and many residents expressing a desire for community gathering space and improvements to the many vacant properties in the neighborhood.[315] Council Representative Scott advanced the idea of using a vacant government-owned urban renewal property in the commercial core of the neighborhood, and promoted the idea of the garden among neighborhood residents.[316] Neighborhood residents

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[308] *Id.* at 189.
[309] *Id.*
[310] WEINSTEIN ET AL., *supra* note 288, at 189.
[311] *Id.*
[312] *Id.*
[313] *Community Garden in Parkland Aims to Improve Area*, WDRB (April 10, 2013), https://www.wdrb.com/news/community-garden-in-parkland-aims-to-improve-area/article_f95a129c-f3c3-5b2c-b8ea-cd31879e5a55.html [https://perma.cc/QU2C-AYUT].
[314] *Id.*
[315] LOUISVILLE METRO DEP'T OF ECO. GROWTH & INNOVATION, COMMUNITY GARDENS IN LOUISVILLE: A START-UP GUIDE 4 (2014).
[316] *Id.* at 4.

formed a group, the Parkland Community Garden, and elected seven residents to form the core group to plan the garden.[317] The group worked with the Louisville Metro government (represented by the Jefferson County Attorney's Office) to develop a license agreement by which the group would be granted rights to use the designated vacant urban-renewal land for the garden.[318] The land remains owned by the Louisville Metro government.[319] The group also worked with the Jefferson County Cooperative Extension Service to adapt the standard Gardener's Agreement to be used for all participants in the garden.[320] The Jefferson County Extension Service, University of Louisville Center for Environmental Policy and Management, and the Network Center for Community Change provided various education, technical, and community organizing support to the group.[321] In just the first year, 45 families and over 400 volunteers participated in the Parkland Community Garden.[322] Seven years later, this community-based green infrastructure has led to a new community-driven green space that is to be developed adjacent to the community garden, Parkland Plaza.[323] The Parkland Plaza project will feature community-planned trees, plaza-style cultural space for outdoor performances and vendors, and green play space, and is a partnership between residents of the Parkland neighborhood, Louisville Metro government, the Community Foundation of Louisville, the Center for Neighborhoods (a community-based nonprofit), and the nonprofit TreesLouisville.[324]

G. Watershed Protection Partnerships in Philadelphia, PA

The Philadelphia Water Department has a strong commitment to watershed protection and utilizes green infrastructure to help maintain those watersheds. There are seven different watersheds that run through Philadelphia and in which the City partners with other public and private partners to maintain. The watersheds are: Darby-Cobbs watershed;

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[317] *Id.* at 5.
[318] *Id.*
[319] *Id.* at 5–6.
[320] *Id.*
[321] LOUISVILLE METRO DEP'T OF ECO. GROWTH & INNOVATION, *supra* note 315, at 5–6.
[322] *Id.* at 6.
[323] *Conner Farrell, Louisville Receives Grant for New Community-Driven Green Space in Parkland Neighborhood*, WHAS (Nov. 20, 2020), https://www.whas11.com/article/news/community/parkland-plaza-received-multi-thousand-dollar-grant-for-construction/417-e9af8c55-fa7d-4356-9886-f636f413f3c8 [https://perma.cc/367T-77BF].
[324] *Id.*

the Delaware River Basin (the portion within Philadelphia); Pennypack Creek; Poquessing Creek; The Schuylkill River; Tookany/Tacony-Frankford watershed; and Wissahickon watershed.[325] The individual partnerships break down accordingly: eight Darby-Cobbs Partnerships; fourteen Partner organization for the Delaware watershed; eight Pennypack Partnerships; five Poquessing Partnerships; two Schuylkill Partnerships; one Tookany/Tacony-Frankford Partnership; and six Wissahickon Partnerships.[326] Most of these partnerships have been initiated by the Philadelphia Water Department or other local government agencies reaching out to community-based organizations to collaborate.[327] However, a few partnerships were driven by grassroots bottom-up initiatives or hybrid mutual activity by both government agencies and community-based groups.[328] By partnering with multiple organizations committed to protecting each watershed or basin, the Philadelphia Water Department is hoping to "unite Philadelphia with its water environment, creating a green legacy while incorporating a balance between ecology, economics, and equity."[329]

The Philadelphia Water Department unites many private and public entities committed to protecting the watersheds around the city. It offers many resources to be used by nonprofits in each watershed and tries to engage directly with community members by offering free green infrastructure, like rain barrels.[330] The Department organizes community outreach and directs community organizations or individuals who want to volunteer installing green infrastructure to the right location.[331] The Philadelphia Water Department also provides programs that incorporate all the watersheds they are committed to sustaining. For example, the Soak It Up Adoption Program "provides grants to civic organizations to help maintain the beauty and functionality of . . . stormwater infrastructure

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[325] *Community Partnerships Programs*, PHILA. WATER DEP'T, http://archive.phillywatersheds.org/community-partnership-programs [https://perma.cc/B36M-UKQD] (last visited Mar. 26, 2021)].

[326] *Id.*

[327] PHILA. WATER DEP'T, *supra* note 325.

[328] Julie Groff, Humboldt State University, Stormwater Management in Philadelphia: The Importance of Green Stormwater Infrastructure and Community Involvement in Greater Citywide Sustainability (May 2018) (MA thesis, Humboldt State University) (on file with Humboldt State University Digital Commons).

[329] PHILA. WATER DEP'T, *supra* note 325.

[330] *Id.*

[331] *Green Stormwater Infrastructure*, PENN. DEP'T CONSERVATION & NAT. RES., https://www.dcnr.pa.gov/Communities/GreenCommunityParks/GreenStormwaterInfrastructure/Pages/default.aspx [https://perma.cc/7ALU-WXMS] (last visited Mar. 26, 2021).

in Philadelphia's neighborhoods."[332] The Stormwater Management program provides free rain barrels to residents. The Department also sponsors educational centers in four of the watersheds.[333]

The Philadelphia Water Department invested over $68 million in the current fiscal year for its "Green City, Clean Waters and Storm Flood Relief programs, including green infrastructure, stream restoration, and sewer upgrade investments."[334] The City hopes that top-down community-based and government partnerships will fuel a "robust green jobs economy" and attract more "innovative and environmentally-conscious companies."[335] However, a potential challenge to Philadelphia's green infrastructure initiative is the demand for a local workforce trained to maintain green infrastructure. In addition, while community members are encouraged to participate in green infrastructure projects facilitated by nonprofits using local government programs, there is a risk that certain classes of people will be unable to participate in the program and the community participants do not have a say in what types of projects they would like in their neighborhoods.

H. Anacostia River Watershed Restoration in Washington, D.C.

Cooperation among federal, state, and local governmental entities and community-based groups, particularly in low-income Black urban neighborhoods and suburban neighborhoods of color, has led to the cleanup and restoration of one of the most degraded rivers in the United States, the Anacostia River, and its watershed in Washington, D.C. and Maryland.[336] The river and its watershed had been degraded by centuries of deforestation, unsustainable agricultural practices, wetlands loss, industrialization, and urbanization.[337] Many of the communities in the watershed have been shaped and marginalized by centuries of racial oppression, including slavery, Jim Crow segregation, racist urban renewal programs, and environmental injustices.[338] By the late twentieth century, the waters

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[332] PHILA. WATER DEP'T, *supra* note 325.
[333] *Id.*
[334] James Kenney, *As Green Infrastructure Pioneers, Philadelphia Is Primed for Workforce Development*, BROOKINGS INST. (May 15, 2017), https://www.brookings.edu/blog/the-avenue/2017/05/15/as-green-infrastructure-pioneers-philadelphia-is-primed-for-workforce-development/ [https://perma.cc/CP9F-S4E7].
[335] *Id.*
[336] *See generally* Arnold et al., *supra* note 32.
[337] *Id.* at 45–57.
[338] *Id.* at 43, 45–57.

of the Anacostia River were toxic, most of the urban lands near the river were paved and polluted, the river had lost much of its flow and functions, and the low-income Black residents of the D.C. neighborhoods adjacent to the river feared and loathed it.[339]

By the late 1980s, though, a new era of watershed restoration and green infrastructure was starting to emerge in the Anacostia as a result of increasing degradation from urbanized landscapes, growing environmentalism, and efforts to address racial and social injustices in the watershed's human communities.[340] The objects of these new governance initiatives included "cleaning up pollution, restoring essential watershed features, improving overall water quality and flows, using green infrastructure instead of grey infrastructure to manage stormwater runoff, and planning watershed-supporting land uses throughout the basin."[341] More than twenty different collaborative-governance partnerships, involving many government agencies and community-based organizations, have emerged or have been created to clean, restore, and conserve the Anacostia River watershed in various ways and with various projects and plans.[342] "Today, the Anacostia is governed by a complex network of governmental and non-governmental organizations, operating in different regions of the watershed and at multiple scales, and undertaking a variety of activities both independently and together."[343] Many of these governance collaborations include community-based groups.[344]

A community-based organization, the Anacostia Watershed Society has been one of the most important co-governance participants to engage Blacks and other people of color, low-income residents in watershed neighborhoods, and urban children and youth in planning for and implementing watershed restoration and green infrastructure projects.[345] Today's governance structures aimed towards watershed restoration and green

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[339] *Id.* at 37–39, 50–57, 67–68, 79–80. For an anthropological study of Anacostia neighborhood residents' attitudes towards the Anacostia River in the late 1990s, *see* Michael L. Kronthal, Local Residents, the Anacostia River, and "Community" (1998) (unpublished paper prepared for the Society of Applied Anthropology and U.S. Environmental Protection Agency).

[340] Arnold et al., *supra* note 32, at 57.

[341] *Id.*

[342] *Id.* at 58 n. 58–59, 63–66, 216.

[343] *Id.* at 58.

[344] *Overall Assessment of the Anacostia Watershed Partnership*, URB. WATERS FED. P'SHIP (Aug. 2017), https://www.epa.gov/sites/production/files/2017-08/documents/anacostia_watershed_final.pdf [https://perma.cc/2YAB-55LF].

[345] Dayana Molina, *Engaging Communities for Healthy, Equitable Development*, 4 URB. WATERWAYS NEWSL. 3, 17–18 (Summer 2015).

infrastructure can be traced in substantial part to at least three major activities undertaken by the Anacostia Watershed Society to make community voices heard in environmental and local governance: (1) litigation in the 1990s against the U.S. Navy (for pollution from the Washington Navy Yard), the D.C. government, and other government agencies; (2) strong publicity campaigns to make the public aware of the Anacostia's problems and shame government agencies into starting to take action; and (3) engagement of neighborhood residents and groups, particularly in low-income neighborhoods of color, in environmental education (e.g., guided canoe trips for children and youth), restoration (e.g., tree plantings), and expression of their voices in policy making (e.g., park creation).[346]

Nonetheless, despite the engagement of community-based organizations in creating and implementing many restoration and green infrastructure plans and projects in the Anacostia River watershed, low-income neighborhoods of color in the Anacostia River watershed are threatened and changed by strong, relentless gentrification and displacement.[347] A new green and blue infrastructure project—the 11th Street Bridge Park project that will be an elevated park on the old 11th Street Bridge linking the eastern and western parts of Washington, D.C., across the Anacostia River—aims to incorporate equitable development planning to give Anacostia neighborhood residents more control over housing and development and to protect their neighborhood from gentrification and displacement, but it's perceived skeptically by many in the community as a top-down effort at justice, driven by the government and a nonprofit organization.[348] The restoration of the Anacostia River watershed reflects a nuanced reality of both convergence between environmental and social/racial justice efforts and also continued and re-emergent tensions between them.[349]

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[346] *See* Arnold et al., *supra* note 32, at 58, 62–63, 65, 67, 87.

[347] *See generally* Brett Williams, *Gentrifying Water and Selling Jim Crow*, 31 URB. ANTHROPOLOGY & STUD. CULTURAL SYS. & WORLD ECON. DEV. 93 (2002) (exposing and critiquing the forces of gentrification and displacement in the Anacostia River watershed's restoration projects almost twenty years ago); Arnold et al., *supra* note 32, at 87 (noting that concerns over green gentrification threaten the justice and legitimacy of the Anacostia's restoration/greening governance reforms); Sarah Fox, *Environmental Gentrification*, 90 UNIV. COLO. L. REV. 803, 823 (2019) (referring to "an influx of new residential construction and an anticipated shift in neighborhood demographics as affluent, young, white professionals have begun to move into an area that historically housed an almost entirely lower-income and African American population").

[348] *See generally* Nufar Avni, *Bridging Equity? Washington, D.C.'s New Elevated Park as a Test Case for Just Planning*, 40 URB. GEOGRAPHY 1, 1–18 (2018).

[349] *See generally* Nufar Avni & Raphaël Fischler, *Social and Environmental Justice in Waterfront Redevelopment: The Anacostia River, Washington, DC*, 56 URB. AFF. REV. 1779 (2020).

V. DESIGNING AND IMPLEMENTING CO-GOVERNANCE FOR RESILIENCE JUSTICE

Both the literature on co-governance and the case studies explored in this Article lead to the conclusion that there is no one-size-fits-all structure for co-governance of green and blue infrastructure in low-income communities of color. Government officials and community activists will have to make choices about how to structure co-governance arrangements, which is addressed first in this Part of the Article. However, the goals and conceptual framework of resilience justice suggests certain design and implementation principles that should guide co-governance, which are addressed second in this Part of the Article.

A. Design and Implementation Choices

In designing and implementing co-governance, decisions will have to be made about how to structure the co-governance arrangement(s) and with what legal authority. One option could be a formal grant of governance power from the government to a community-based organization, although this raises questions about whether such a grant of power would be authorized under state law and whether it would run afoul of prohibitions on governmental transfer of the police power to private parties. Another option could be for the government to create a new legal entity with specified governmental authority over certain green and blue infrastructure projects and to provide representation by community residents on the entity's governing body. A third option would be to vest a community-based entity, such as a neighborhood council, with decision-making authority that is shared with existing governmental entities. For example, changes to a neighborhood's park management policies might have to be approved by both the city park board and a neighborhood council. More informal arrangements might be partnerships between governmental entities and community-based organizations, whether with respect to broad ongoing matters, such as watershed planning, or specific projects, such as the creation and management of a community garden. In these cases, the official legal authority for policy making and implementation usually still rests with the governmental entities, but there is a recognition that the policies and projects are likely to fail if there isn't substantial buy-in from community residents or organizations. Finally, the least formal form of co-governance is for the governmental entity to adopt enhanced participatory processes and rights for the residents and/or grassroots groups of marginalized communities. While many of these arrangements might be

considered merely top-down consultative procedures for public participation in governance, some of these arrangements might rise to the level of co-governance if the procedures are robust enough and the government officials would normally defer to community residents when making their decisions. Nonetheless, co-governance should emerge, as much as possible, from grassroots activism and/or the exercise of governance design powers by the members of low-income communities of color, not government-driven or top-down creation and design of these governance arrangements.

Another design and implementation issue has to do with who has ownership of the co-governed green and blue infrastructure. Property may be held, transferred to, or acquired by one or more government agencies, one or more community-based organizations, a co-governance legal entity (e.g., a park trust, a watershed partnership), or both governmental and nongovernmental entities as co-owners. The government could grant a lease, license, easement, or set of restrictive covenants regarding its green and blue infrastructure property to a community-based organization, a co-governance entity, or even to another governmental entity with greater co-governance capacities. In some cases, certain discrete elements of green and blue infrastructure, such as trees and biotic stormwater controls (e.g., rain gardens, bioswales, green buffers) may exist on private property and therefore be privately owned, but nonetheless be subject to conservation easements, restrictive covenants, and/or government regulations. Even when green and blue infrastructure is and remains owned by governmental entities, control over this infrastructure may be limited by express agreements for the shared governance, management, and/or maintenance of the infrastructure or by statutes, ordinances, regulations, or policies and plans that require the government to share control with community residents and organizations.

Scale is another design and implementation issue. In some cases, the neighborhood scale seems the obvious scale, such as for governance of a park or community garden in a particular neighborhood (e.g., Baldwin Hills parks; Parkland Community Garden).[350] In other cases, the relevant green and blue infrastructure will cover much larger geographic scales and thus may require multi-neighborhood scale, such as tree canopy planning (e.g., North East Trees) and planting or restoration and conservation of a waterway or its watershed (Anacostia River; Philadelphia

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[350] *See Parkland Community Garden*, LOUISVILLE GROWS, https://louisvillegrows.org/parkland-community-garden/ [https://perma.cc/Q74J-8KRX] (last visited Mar. 26, 2021) (asserting the scope of the Parkland Community Garden through the perceived benefits for the Parkland neighborhood).

watersheds).[351] Even larger scales, such as citywide, countywide, or regional co-governance systems, are often much more difficult to design with sufficiently equitable power and influence for marginalized and oppressed communities but nonetheless may be necessary in order to ensure that smaller-scale power-sharing with low-income residents of color isn't overpowered by larger-scale governance systems dominated by government agencies and by White, wealthier, business, and elite interests, as has been the case with the Los Angeles River restoration.[352]

The subject matter(s) and scope of the co-governance must be decided. The subject matter might involve very specific aspects of green and blue infrastructure, such as neighborhood tree canopy, creating a new neighborhood park or community garden, or restoring a small urban stream. Or the subject matter might involve broader sets of green and blue infrastructure, such as a watershed, a network of parks, greenways, or all sets of green and blue infrastructure that could be used to control stormwater runoff and protect water quality. Nonetheless, co-governance for these community environmental conditions must necessarily involve attention to economic, social, political, and health conditions that affect community resilience and vulnerabilities due to intersecting and cross-dynamic systems.[353] In particular, given the frequent incidents of green gentrification and displacement when green and blue infrastructure is created or restored in low-income communities of color, the co-governance system should expressly integrate green and blue infrastructure policies with policies, programs, and tools for fair and affordable housing and equitable development.[354] One set of tools for parks-related

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[351] *See* N.E. TREES, *supra* note 272 (showing North East Trees environmental restoration efforts spanning Southern California); *River Restoration Projects*, ANACOSTIA WATERSHED SOC'Y, https://www.anacostiaws.org/what-we-do/river-restoration-projects.html [https://perma.cc/BA6U-EADA] (last visited Mar. 26, 2021) (demonstrating the vast reach and coordination of the Anacostia River restoration).

[352] *See* Robert García & Tim Mok, *Whitewashing the Los Angeles River? Gente-fication not Gentrification*, PARKS & RECREATION MAG. (Sept. 5, 2017), https://www.nrpa.org/parks-recreation-magazine/2017/september/whitewashing-the-los-angeles-river-gente-fication-not-gentrification/ [https://perma.cc/BWL8-75WA].

[353] Linda Shi recommends the integration of smaller-scale green infrastructure projects in marginalized communities with numerous other areas of public policy, including urban agriculture, community development, local fiscal policy, and regional watershed planning, among others. *See generally* Linda Shi, *Beyond Flood Risk Reduction: How Can Green Infrastructure Advance Both Social Justice and Regional Impact?*, 2 SOCIO-ECOLOGICAL PRAC. RSCH. 311 (2020).

[354] *See generally* Alessandro Rigolon & Jeremy Németh, *"We're Not in the Business of Housing:" Environmental Gentrification and the Nonprofitization of Green Infrastructure Projects*, 81 CITIES 71 (2018).

anti-displacement strategies ("PRADS") is recommended in a report, Greening without Gentrification, issued by UCLA and the University of Utah:

> - A variety of strategies are being deployed around park projects across the country. Most of these efforts are multidisciplinary. Different strategies are likely more applicable and effective depending on whether the local real estate market is hot, warm, or cool.
> - That said, starting early, before developers and investors recognize the potential of park projects to increase surrounding property values, is considered best for success.
> - Community engagement is viewed as crucial for implementing PRADS, especially in the early stages of park development projects. Indeed, the impetus and energy for much of this work around the country has arisen from community-based organizations.
> - Projects in which equity-oriented efforts are more deliberate tend to use multidisciplinary approaches, integrating affordable housing, job training and creation, and support for small businesses.
> - Some projects include efforts to influence system-wide changes in public policies (for example, ongoing park funding measures that require anti-displacement strategies) alongside project-specific efforts (such as nonprofits building affordable housing units near new parks).
> - Efforts to address the threat of green gentrification directly and implement PRADS are leading many park advocates to participate in broader initiatives to address displacement, whether it is triggered by parks or not, and to conceive of parks as just one crucial part of equitable community development.[355]

Legal scholar Sarah Fox has recommended the environmental law principles and planning and land-use tools (including greater use of land

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[355] ALESSANDRO RIGOLON & JON CHRISTENSEN, GREENING WITHOUT GENTRIFICATION: LEARNING FROM PARKS-RELATED ANTI-DISPLACEMENT STRATEGIES NATIONWIDE, POLICY REPORT OF UCLA, THE UNIVERSITY OF UTAH, AND GREENINFO NETWORK (2000).

trusts) could be used to bridge the disconnect between environmental law and affordable housing, which is a contributing factor to green gentrification and displacement.[356]

Also, governance designers will have to decide whether the co-governance arrangement focuses exclusively or primarily on policy making decisions, on policy implementation decisions, or both? These can be nuanced structural choices that might have to be revisited. For example, residents of low-income neighborhoods of color might not have the time, energy, or resources to be involved in decisions about when parks will be mowed or trees will be trimmed, yet they might care about these decisions if the decision maker (e.g., local parks department, city arborist) is making choices that seem insensitive to the needs and goals of the neighborhood residents (e.g., park mowing or tree trimming during the middle of the neighborhood's big Juneteenth picnic).

Co-governance processes will have to be developed. Who gets to participate and in what ways? When and where and how often? Who will facilitate or lead the co-governance processes, and how will they be selected? How will the voices of the most marginalized and excluded be included and heard? How will decisions be made? Will changes to decisions be allowed, under what circumstances and how? How much flexibility and adaptive capacity will be built into the processes by which the co-governance system operates?

Finally, the co-governance arrangements will need to specify the relative responsibilities, duties, liabilities, and resource commitments of the various participants, including government agencies, nonprofit organizations, community groups, and individual community members. Mechanisms of transparency and accountability for all participants should be built into all co-governance arrangements. However, given the government's substantial role in creating and maintaining systems of injustice and inequality, the government should be expected to make substantial investments of financial resources, staffing, and other support in co-governance arrangement with low-income communities of color, and should use their sovereign immunity, insurance, and deep pockets to shield grassroots nonprofit organizations and residents of these communities from tort liability and risk of loss.

B. Design and Implementation Principles

The features of resilience-justice thinking and analysis, as well as lessons from the case studies and from the literature on green and blue

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[356] Sarah Fox, *Environmental Gentrification*, 90 UNIV. COLO. L. REV. 803, 851–63 (2019).

infrastructure equity, resilience justice, and co-governance, suggest that the following principles should be applied to the design and implementation of co-governance of green and blue infrastructure in low-income communities of color:

(1) Maximize bottom-up or grassroots-driven design and resist top-down or government-driven design.
(2) Create processes of inclusion and power-sharing, not mere participation or consultation.
(3) Expressly vest the co-governance structure with policy making and policy implementation decisions.
(4) Provide sufficient public resources to create and maintain needed green and blue infrastructure and to build social capital, adaptive capacity, and political power within marginalized communities.
(5) Engage in community organizing, capacity building, and empowerment.
(6) Invest in and build social capital within marginalized communities.
(7) Directly and honestly address difficult issues of racism and injustice, including the legacies and continuities of systemic racism, structural inequality, colonialism, and oppression.
(8) Don't be afraid of conflict, litigation, protest, and resistance, but don't dwell there; resisting power must become a pathway to exercising power for the good of the community and the cause of resilience justice.
(9) Litigation can be a useful disturbance or trigger to lead to power-sharing, addressing injustices, improving community resilience, and transforming the community's infrastructure.
(10) Integrate green and blue infrastructure policies with other policies designed to improve marginalized communities' resilience and reduce marginalized communities' vulnerabilities, particularly policies for fair and affordable housing and for equitable development.
(11) Create, restore, and transform green and blue infrastructure to be adaptive to disturbances, shocks, and changes, including disasters and climate change.

(12) Plan and create co-governance structures for resilience justice at multiple nested scales from the neighborhood level to the multi-neighborhood level to the city level to the regional level, and intentionally seek to share power at larger scales with marginalized and oppressed communities.
(13) Institutionalize co-governance systems and arrangements with legal and political authority, but design them with adaptive capacity, including flexibility, modularity, innovation, and experimentation.

CONCLUSION

The concepts of resilience justice and co-governance offer useful contributions to developing systemic reforms to achieve greater equity in green and blue infrastructure in marginalized communities, particularly low-income neighborhoods of color. In particular, these concepts help to link community-based green and blue infrastructure to resilience-building and justice-seeking efforts to empower marginalized communities, build their social capital and capacities, and integrate green and blue infrastructure improvements with efforts to address the many environmental, economic, social, and political inequalities and vulnerabilities that these communities have. However, examples of co-governance arrangements show that they are fraught with complexities, mixed outcomes, change over time, and vulnerabilities to the many different ways that systemic injustices are reinforced and replicated across governance institutions and social-environmental systems.

This Article has laid a foundation for future research, including community-engaged research, that will improve our understanding of co-governance, resilience justice, and equitable green and blue infrastructure. In particular, we need to continue to study examples of co-governance for green and blue infrastructure in low-income communities of color to identify and analyze:

(a) the features of co-governance, including:
  (1) structure;
  (2) functions/purposes;
  (3) participants;
  (4) formality, flexibility, responsibilities, and accountability;

(5) types and degrees of power-sharing;
(6) legal authority;
(7) resources;
(8) feedback loops; and

(b) the outcomes of co-governance, including:
(1) types, amounts, and quality of new/improved green/blue infrastructure and residents' perceptions of the infrastructure;
(2) economic impacts, including indicia of gentrification/displacement;
(3) social capital;
(4) community participation, inclusion, and empowerment; and
(5) residents' perceptions of justice.

We also need to study examples of persistently inequitable green and blue infrastructure, policy efforts to improve green and blue infrastructure in low-income communities of color, and green gentrification and displacement to assess how co-governance systems and resilience justice principles and tools might have produced better, more just outcomes. Neither co-governance nor resilience justice is a panacea for systemic racism and structural inequality, but both can be useful tools to low-income communities of color that are fighting for justice.

APPENDIX A
SOURCES OF SYNTHESIZED LIST OF GREEN AND BLUE INFRASTRUCTURE CATEGORIES

I. BOOKS:

- EUGENIE L. BIRCH AND SUSAN M. WACHTER, EDS., GROWING GREENER CITIES: URBAN SUSTAINABILITY IN THE TWENTY-FIRST CENTURY (University of Pennsylvania Press, 2008);
- KENNETH A. GOULD AND TAMMY L. LEWIS, GREEN GENTRIFICATION: URBAN SUSTAINABILITY AND THE STRUGGLE FOR ENVIRONMENTAL JUSTICE (Routledge, 2017);
- KEITH H. HIROKAWA AND PATRICIA E. SALKIN, EDS., GREENING LOCAL GOVERNMENT: LEGAL STRATEGIES FOR PROMOTING SUSTAINABILITY, EFFICIENCY, AND FISCAL SAVINGS (American Bar Association, 2012);
- VLADIMIR NOVOTNY AND PAUL BROWN, EDS., CITIES OF THE FUTURE: TOWARD INTEGRATED SUSTAINABLE WATER AND LANDSCAPE MANAGEMENT (IWA Publishing 2007);
- DANIELLE SINNETT, NICK SMITH, AND SARAH BURGESS, EDS., HANDBOOK ON GREEN INFRASTRUCTURE: PLANNING, DESIGN, AND IMPLEMENTATION (Edward Elgar Publishing, 2015).

II. GOVERNMENT REPORTS AND GUIDES:

- Haan Fawn Chau, Green Infrastructure for Los Angeles: Addressing Urban Runoff and Water Supply Through Low Impact Development (City of Los Angeles, April 17, 2009);
- Claudia Copeland, Green Infrastructure and Issues in Managing Urban Stormwater (Congressional Research Service, May 2016);
- Matthew Hopton, Michelle Simon, Michael Borst, Ahjond Garmestani, Scott Jacobs, Dennis Lye, Thomas O'Connor, William Shuster, and Taylor Jarnagin, Green Infrastructure for Stormwater Control: Gauging its Effectiveness with Community

Partners, EPA/600/R-15/219 (United States Environmental Protection Agency, October 2015);

- Melissa G. Kramer, Enhancing Sustainable Communities with Green Infrastructure: A Guide to Help Communities Better Manage Stormwater While Achieving Other Environmental, Public Health, Social, and Economic Benefits, EPA 100-R-14-006 (United States Environmental Protection Agency, October 2014);
- David J. Nowak, Susan M. Stein, Paula B. Randler, Eric J. Greenfield, Sara J. Comas, Mary A. Carr, and Ralph J. Alig, Sustaining America's Urban Trees and Forests, General Technical Report NRS-62 (United States Department of Agriculture, U.S. Forest Service, June 2010);
- U.S. Environmental Protection Agency and Los Angeles Council for Watershed Health, Green Infrastructure Opportunities and Barriers in the Greater Los Angeles Region: An Evaluation of State and Regional Regulatory Drivers that Influence the Costs and Benefits of Green Infrastructure, EPA 833-R-13-001 (United States Environmental Protection Agency, August 2013);
- U.S. Environmental Protection Agency, Green Infrastructure for Climate Resiliency (updated periodically).

III. NONPROFIT ORGANIZATION REPORTS AND GUIDES:

- Mark A. Benedict and Edward T. McMahon, Green Infrastructure: Smart Conservation for the 21st Century (The Conservation Fund and Sprawl Watch Clearinghouse, 2001);
- Josh Foster, Ashley Lowe, and Steve Winkelman, The Value of Green Infrastructure for Urban Climate Adaptation (The Center for Clean Air Policy, February 2011); Georgetown Climate Center, Green Infrastructure Toolkit (updated periodically);
- Jeffrey Odefey, Stacey Detwiler, Katie Rousseau, Amy Trice, Roxanne Blackwell, Kevin O'Hara, Mark Buckley, Tom Souhlas, Seth Brown, and Pallavi

Raviprakash, Banking on Green: A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits Community-wide (A Joint Report by American Rivers, the Water Environment Federation, the American Society of Landscape Architects and ECONorthwest, April 2012);

- David C. Rouse and Ignacio F. Bunster-Ossa, Green Infrastructure: A Landscape Approach (American Planning Association, 2013);
- United Nations Environment Programme (UNEP), UNEP-DHI Partnership—Centre on Water and Environment, International Union for Conservation of Nature (IUCN), The Nature Conservancy (TNC) and the World Resources Institute (WRI), Green Infrastructure Guide for Water Management: Ecosystem-Based Management Approaches for Water-Related Infrastructure Projects (United Nations Environment Programme, 2014).

IV. SCHOLARLY ARTICLES:

- Michelle C. Kondo, Sarah C. Low, Jason Henning, and Charles C. Branas, *The Impact of Green Stormwater Infrastructure Installation on Surrounding Health and Safety*, 105(3) AMERICAN JOURNAL OF PUBLIC HEALTH 114–121 (2015);
- S. J. Livesley, E. G. McPherson, and C. Calfapietra, *The Urban Forest and Ecosystem Services: Impacts on Urban Water, Heat, and Pollution Cycles at the Tree, Street, and City Scale*, 45 JOURNAL OF ENVIRONMENTAL QUALITY 119–124 (2016);
- Sarah Taylor Lovell and John R. Taylor, *Supplying Urban Ecosystem Services through Multifunctional Green Infrastructure in the United States*, 28(8) LANDSCAPE ECOLOGY 1447–1463 (2010);
- John R. Nolon, *Enhancing the Urban Environment Through Green Infrastructure*, 46 ENVIRONMENTAL LAW REPORTER 10071–10086 (2016).

APPENDIX B
CURRENT AFFILIATIONS OF RESILIENCE JUSTICE PROJECT RESEARCHERS

Full-time researchers in chronological order, followed by part-time research assistants in chronological order, followed by all part-time public-service interns grouped together in alphabetical order

Ra'Desha Williams: Planner, City of Phoenix Planning and Development Department, Phoenix, Arizona

Holden Pederson: Planner II, Adams County Community and Economic Development Department, Brighton, Colorado

Andrew Schuhmann: Attorney, WT&S Title, LLC and Hoffer Law LLC, New Albany, Indiana

Audrey Ernstberger: Legislative Committee Analyst, Kentucky Legislative Research Commission, Frankfort, Kentucky

Tiago de Melo Cartaxo: Invited Lecturer in Environmental Law, Nova University School of Law, Lisbon, Portugal, and Postdoctoral Research Assistant, University of Surrey, Surrey, England

Connor Cafferty: Associate, Gordon Rees Scully Mansukhani, LLP, Louisville, Kentucky

Taylor Gore: Associate, The Linley Jones Firm, P.C., Atlanta, Georgia

James Mains: JD and MUP, 2020, University of Louisville Brandeis School of Law and Department of Urban and Public Affairs

Kirk Mattingly: Judicial Clerk to the Honorable Charles R. Simpson III, Judge, U.S. District Court for the Western District of Kentucky, Louisville, Kentucky

Leanna Banda-Cruz: JD candidate, University of Louisville Brandeis School of Law

Payton Klatt: JD candidate, University of Louisville Brandeis School of Law

Elizabeth Roseman: MSSW and JD candidate, University of Louisville Kent School of Social Work and Brandeis School of Law

Elijah Beau Eisert: JD and MUP candidate, University of Louisville Brandeis School of Law and Department of Urban and Public Affairs

John Garvey: JD candidate, University of Louisville Brandeis School of Law

Henna Khan: JD and MUP candidate, University of Louisville Brandeis School of Law and Department of Urban and Public Affairs

Pierce Stevenson: JD and MUP candidate, University of Louisville Brandeis School of Law and Department of Urban and Public Affairs

Charles Michael Szot: JD candidate, University of Louisville Brandeis School of Law

Tim Mok: Greater LA Regional Coordinator, CivicSpark, Los Angeles, California (a joint program of the California Local Government Commission and the California Office of Planning and Research)

Briana Lathon: Senior Compliance Officer, Commercial, Humana Inc., Louisville, Kentucky

Luisa Trujillo: Program Director, Adelante Hispanic Achievers, Louisville, Kentucky

Henry Nieberg: Associate, Investment Research, Heitman LLC, Chicago, Illinois

Frank Bencomo-Suárez: JD candidate, University of Louisville Brandeis School of Law

Christine Calacsan: Assistant Public Defender, Louisville Metro Public Defenders Office, Louisville, Kentucky

Lauren Freeman: Attorney at Law with Bishop Friend PSC, Louisville, Kentucky

Taylor Ichinose: Assistant Commonwealth Attorney, Commonwealth of Kentucky, Campbell County, Kentucky

Demitri Johnson-Cantu: JD candidate, University of Louisville Brandeis School of Law

Margaret Lawrence: JD candidate, University of Louisville Brandeis School of Law

Natalie Nassar: JD candidate, University of Louisville Brandeis School of Law

Lauren Neal: JD candidate, University of Louisville Brandeis School of Law

Sarah Pennington: JD and MA candidate, University of Louisville Brandeis School of Law and Department of Political Science

Maximillian Schweiger: JD candidate, University of Louisville Brandeis School of Law

Margaret Sites: Staff Attorney, The Appalachian Research and Defense Fund of Kentucky, Richmond, Kentucky

Logan Wood: Attorney, Thomas Law Offices, Louisville, Kentucky