



SUSTAINABLE URBAN SYSTEMS

THE NEXT URBAN GIANTS
BUILDING RESILIENCE AND EQUITY
INTO GROWING MEGAPOLITAN
REGIONS BY GREENING THE URBAN
HUMAN-NATURAL SYSTEM



July 30 - August 1, 2019

THE NEXT URBAN GIANTS

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JULY 30 - AUGUST 1

SEATTLE, WA



On behalf of the planning committee, we invite you help create a more equitable and healthy urban future at a by-invitation workshop:

This by-invitation only workshop will bring together a select group of 40 experts across an array of disciplines, sectors, and locations to:

1. identify the key challenges megapolitan regions and their adjacent communities and natural spaces face as urbanization continues,
2. explore the myriad approaches used in megapolitan regions to address these challenges, and
3. synthesize this information to identify priority research areas that a research network could promote for improving urban systems sustainability.

We need your perspective, knowledge, experience, connections, and collaborative and big-thinking mindset in the room.

This is a working conference – you are being invited to not just attend, but roll up your sleeves and focus on the most critical megapolitan challenges and opportunities. Together, with fellow attendees from academia, industry, government, and non-profits we hope to build new collaborative partnerships and outputs.

The end products from this conference, to be shared widely across our networks, include:

1. a white paper to NSF,
2. a peer-reviewed synthesis journal article
3. a “Green Print” for working managers and practitioners to help them transition material from the conference into their daily work, and
4. a scope of work for informing future education and outreach products.

This workshop is funded by a National Science Foundation Sustainable Urban Systems conference grant awarded to Washington State University (<https://www.nsf.gov/ere/ereweb/urbansystems/awards.jsp>). With this funding we are able to fully cover the costs of the workshop itself, including meals. Traveling and lodging (below federal per diem rates) will be attendee’s responsibility. Some limited support for travel costs is available on an as-requested basis. For more information about the logistics of the workshop, please contact Brad Gaolach (gaolach@wsu.edu; 425-405-1734).



SUSRN - Advancing Conference

*The Next Urban Giants: Building Resilience and Equity into Growing Megapolitan Regions
by Greening the Urban Human-Natural System*

July 30-Aug 1, 2019

Talaris Conference Center – 4000 NE 41st St, Seattle, WA 98105

Day 1- Plenary Session and Breakout Group Discussion

7:30 AM - 8:30 AM: Registration and Coffee

8:30 AM - 9:00 AM: Welcome and Opening Remarks

[Dr. Brad Gaolach, WSU Metropolitan Center](#)

[Ben Bakkenta, Director for Regional Planning, Puget Sound Regional Council](#)

[Dr. Kelvin Frank, Eastern Washington University](#) (Land Acknowledgment & Welcome)

9:00 AM - 12:00 PM: Morning Keynote Presentations

- 9:00-9:30: [Dr. Marina Alberti](#), University of Washington, **Urban Sustainability from an Eco-Evolutionary Perspective**
- 9:35-10:10: [Gordon Feller](#), Meeting of the Minds: **Next Generation Solutions: The role industry can play, and is already playing, to help regions and cities**
- 10:10-10:40 break
- 10:40-11:15: [Kim Zentz](#), Urbanova: **Urbanova – Re-thinking Urban Challenges for Mid-sized Cities**
- 11:20-12:00 [Sudha Nanadagopal](#), Environmental Justice Advocate / Social Venture Partners International: **Community Centered Solutions: Creating social cohesion and stronger communities**

12:00 PM - 12:30 PM: Expectations Wall Activity

Participants share their thoughts on what “Challenges”, “Needs”, “Questions”, and “Opportunities” should be addressed by a Sustainable Urban Research Center.

12:30 PM - 1:30 PM: Lunch Buffet

1:30 PM - 2:30 PM: Breakout Group Discussions- identify key megapolitan characteristics that promote sustainability (~8 people per group).

Discussion Questions:



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1. What are the key characteristics of a megapolitan region that control its ability to be connected, renewable, equitable, and adaptable?
2. How do urban system characteristics influence megapolitan resilience to different kinds of hazards and shocks (e.g., earthquake, fire, labor strike, flood, drought, human migration, etc.)?

2:30 PM - 3:00 PM: Breakout Groups Report Out

3:00 PM - 3:30 PM: Coffee Break

3:30 PM - 4:45 PM: Breakout Group Discussions- identify key megapolitan challenges or opportunities for promoting urban sustainability (~8 people per group).

Discussion Questions:

1. What are roadblocks or opportunities for building, governing, and fostering urban sustainability?
2. How do the challenges faced differ when considering the nested scales of urban systems (e.g., urban-rural gradient, short vs. long-term impacts, local vs. regional scale, sharing lessons learned)?

4:45 PM - 5:00 PM: Breakout Groups Report Out

6:00 PM: Reception with cash bar, dinner, and Adaptation Game Night

Day 2- Breakout Group Discussion and Manuscript Development

7:30-8:30 AM: Continental Breakfast

8:30 AM - 10:00 AM: Panel Session- A group of 4 panelists from four different metropolitan regions will discuss (1) key challenges and (2) promising opportunities and actions for moving towards a sustainable megapolitan system.

Panel Members:



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- Albuquerque, NM: [John Barney](#), Parks and Recreation Planning Manager, Bernalillo County NM
- Boston, MA: Dr. [Anne Short Gianotti](#), Associate Professor, Boston University
- Los Angeles, CA: [Janet Hartin](#), Area Environmental Horticulture Advisor and County Co-Director, Cooperative Extension San Bernardino County
- Sacramento, CA: [Dr. Gail Feenstra](#), Sustainable Agriculture Research and Education Director, University of California - Davis

10:00-10:30 Coffee Break

10:30 AM - 12:00 PM: Breakout Group Discussion- Led by Dr. Julie Padowski -- participants will identify key research and action pathways forward (~ 8 people per group).

Discussion Questions:

1. What are the most compelling basic research questions ("intellectual merit") and pressing societal needs ("broader impacts") that need to be addressed to enable a resilient and sustainable megapolitan region?
2. What are the major knowledge and implementation gaps? What types of research approaches or expertise are necessary?
3. What is the most important low-hanging fruit?
4. What would be the ideal way for a center to be structured to address these questions, gaps and opportunities?

12:00 PM - 1:00 PM: Lunch Buffet

1:00 PM - 2:00 PM: Breakout Group Summary- breakout groups summarize morning discussion with one powerpoint slide or poster board and present to all participants.

2:00 PM - 4:30 PM: Product Scoping/Development - Participants divide into subgroups and start scoping/drafting one of three different products. All drafting will take place in a shared Google Docs <http://bit.do/SUSPNW>)



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1. White paper and Manuscript - *Led by Julie Padowski* -- develop two documents that summarize 1) key challenges and opportunities cities face 2) how cities can build resilience and equity through green solutions 3) critical research areas that need to be addressed, 4) an interdisciplinary, cross-sectoral strategy for advancing research that supports sustainable urban development
2. Solution “Green Print” - *Led by Scott Altenhoff* -- a reference guide that can be widely shared by participants that clearly summarizes the meeting’s key issues and lessons, as they pertain to on-the-ground decisions. At a minimum, this “Green Print” will articulate: (1) the nature and scale of the problems facing megapolitan areas, (2) ideas for what novel solutions to these problems might look like, and (3) a list of “success stories” or case studies for solving problems at the megapolitan scale.
3. Education & Outreach Scope of Work - *Led by Dr. Ani Jayakaran* -- development of a “scope of work” (SOW) for future education and outreach products targeted at the general public, especially underserved communities. These potential products will be wide ranging in approach and target audiences. The SOW may include things like adaptation games, citizen science projects, or ad campaigns, as well as plans to establish strategic partnerships and secure future funding for development and rollout of these products.

4:30 PM: Adjourn

Dinner on your own - groups meet up

Day 3- Product Development & Discussion

7:30-8:30 AM: Continental Breakfast

8:30 AM - 10:30 PM: Products Draft Review- Participants in the three groups will collectively review the first drafts of the products to share progress and discuss questions about content and future directions.



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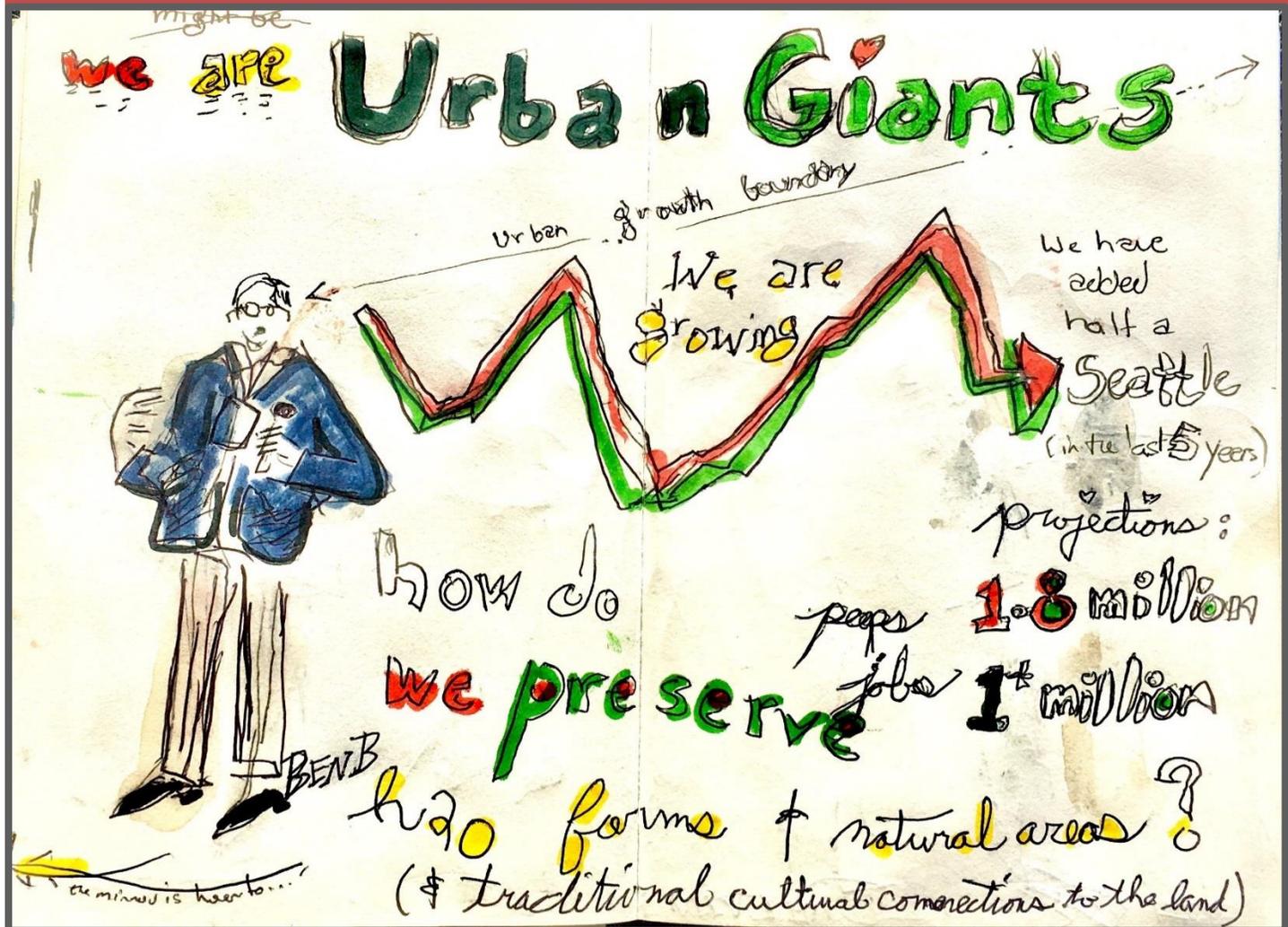
10:30 AM - 11:00 AM: Product Draft Summary Report Out -- Groups provide a brief overview of their draft documents to the full group. Participants will indicate their desired level of future participation finalizing conference products in manuscript finalization.

11:00 AM - Box Lunches available

11:00 AM - 11:45 AM: Establish Core Writing Team- Writing teams will be organized and will develop specific manuscript development tasks and product deadlines.

11:45 AM - 12:00 PM: Closing Remarks

Ben Bakkenta, Director of Regional Planning at the Puget Sound Regional Council, provides growth projection data.

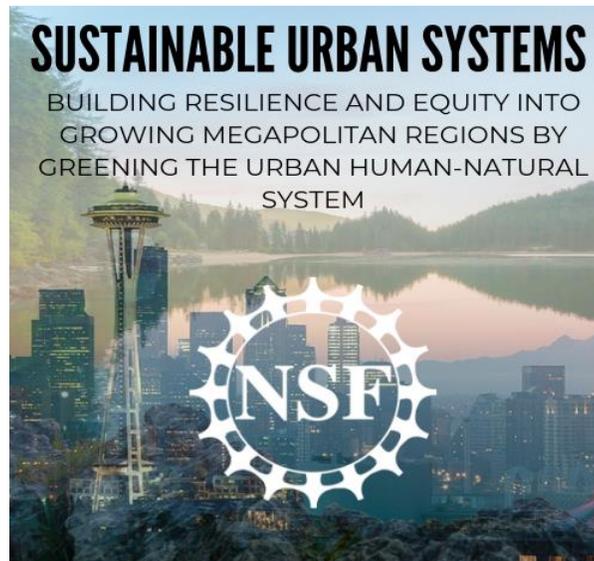
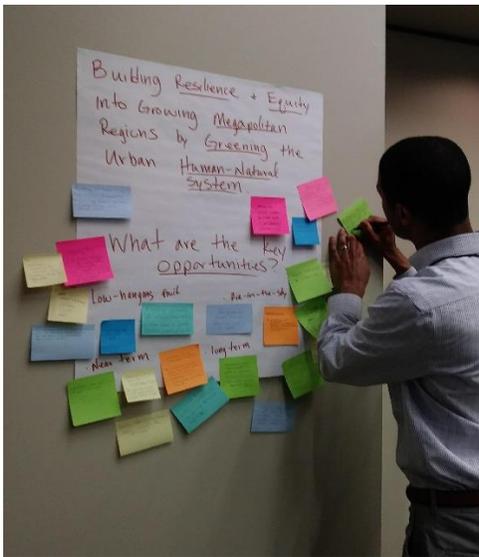


Authors

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EQUITY & RESEARCH

Urban research needs to embrace the dichotomous and tensioned nature of displacement. This means understanding and explicitly investigating the winners and losers of any system change.

RESEARCH DIRECTIONS

Next generation urban research should focus on 1) the wealth of emerging data and the responsibility to use these data ethically, 2) the role that communities can play in helping shape urban research by using community members as partners, and 3) using adaptive management for the path towards a sustainable urban future.

EXECUTIVE SUMMARY

This NSF-funded Sustainable Urban Systems workshop focused on the concept of “urban greening” in megapolitan areas as a lens to understand change within our human and natural systems. Over 53 participants from academia, government, industry, non-profit organizations, and community groups came together to share insights ideas about how to improve urban sustainability. In exploring the concept of “greening,” participants grappled with issues of displacement, environmental injustice, and cumulative impacts, and explored the role of connectivity and resilience in shaping the future of urban and megapolitan systems. Threaded throughout these conversations were calls for tighter, more conscientious engagement between researchers and community members to pursue science that can meaningfully improve management and livelihoods.

Future research efforts will be able to collect and synthesize high-resolution data and knowledge across multiple scales.



Metropolitan Center for
Applied Research & Extension

WASHINGTON STATE UNIVERSITY
EXTENSION

INTRODUCTION

In the United States, there are 10 interconnected metropolitan areas that encompass more than two-thirds of the total US population within roughly one-fifth of the total US land area¹. Continued rapid urbanization and the mounting challenges associated with a changing climate will make it more difficult than ever to maintain and improve human health and well-being and advance equity within these “megapolitan” regions that encompass urban, suburban, and non-urban ecosystems and environments. A key feature of these megapolitan ecosystems is their adaptive potential and continual emergence of novel connections and feedbacks linking communities and the environment^{2,3}. Our ability to create healthy, livable communities will depend on developing new knowledge and strategies to ensure these emerging connections and feedbacks evolve in an environmentally, socially, and economically sustainable and equitable manner. It is critical that we find ways to align urban development with cutting-edge science to ensure that the efforts and resources being committed to sustainability initiatives will produce positive, measurable impacts for both the people and environment in and surrounding urban centers.



EQUITY

Work is needed to understand how urban greening affects equity.



POLICY

For growth and sustainability, science-based policies are needed.



MEGAPOLITIAN

Rapid urbanization is occurring and creating more megapolitan regions.

One avenue for pursuing a more sustainable and just megapolitan future is through “green” solutions that explicitly consider the social and environmental impact of a given action or decision. This workshop used “urban greening” as a lens through

which to investigate the exogenous and endogenous challenges and changes in megapolitan areas, with a particular focus on the urban environment. Interest in “urban greening” accelerated in the 1980’s and many cities now enjoy and pursue initiatives that encourage the widespread integration and acceptance of actionable green solutions into urban planning and development initiatives^{4,5}. Today, there are many examples of cities and local governments pursuing sustainability through green solutions, whether by adding urban forests⁶ and green stormwater infrastructure⁷, designing sustainable transportation systems⁸, or promoting low energy consumption buildings⁹. Yet, our scientific understanding of how these greening efforts support greater urban sustainability remains poor. Efforts are needed to 1) assess the environmental, economic, and social changes generated from, and needed to sustain, equitable green change in megapolitan regions, as well as 2) explore the unrealized potential of greening in the absence of a complete understanding of the connections and processes within an urbanizing system. To move these two efforts forward, interdisciplinary research and a research network structure that can facilitate the easy integration of information across scales and communities will be needed.

This document reports on an NSF-funded Sustainable Urban Systems workshop, held July 30 - August 1, 2019 in Seattle WA. Focused on megapolitan areas and the myriad urban, suburban, rural, and natural systems connections, this group explored the key issues and challenges associated with urbanization and the role of green solutions in realizing the sustainable potential of these interconnected systems. In this white paper, we give a brief overview of the workshop itself to provide context for the ideas, challenges, and opportunities discussed here. We highlight key research themes and issues identified as critical for advancing our understanding of sustainable urban systems during these discussions. Finally, we close with a number of suggestions for how this type of research could best be supported and implemented.

ENGAGING IN COMPLEX MULTI-PERSPECTIVE DIALOGUES

This multidisciplinary workshop aimed to identify 1) a set of critical research needs, 2) key partnerships required, and 3) optimal pathways forward for advancing sustainable urban systems research that has significant societal and environmental benefits. We hosted this event in Seattle, WA, which is nested within an emerging megapolitan region known as the “Emerald Corridor” that spans from Vancouver, BC to Portland, OR, and placed particular emphasis on engaging with a diversity of participants. In total, 53 people attended, representing academia (20), government (13), industry (6), and community/non-profit organizations (14).

The workshop structure was designed to encourage participant discussion and maximize the useful feedback to the workshop organizers. To accomplish this, we used panel and breakout group discussions and educational, collaborative games to explore the various challenges and potential pathways forward for improving urban sustainability at the megapolitan scale. Having people of color and members of other marginalized communities involved in planning as well as on the speaking agenda was critical for framing conversations not only about sustainable urban systems but also about social equity and justice. Results of this workshop structure and



Workshop participants discussed strategies for resilient urban systems.

format resulted in some realized insights that inform not only the way we engage with urban experts and residents, but how future research should be advanced. **These results centered on 1) incorporating principles of environmental justice into research efforts, 2) fostering interdisciplinary and engaged approaches, and 3) building adaptive capacity.**

Working Towards A Just Future

Cities are inextricably connected to their human residents. Changes to the urban landscape, whether policy- or physically based, will necessarily also change the health and wellbeing of the people who live and work there. Given this close relationship, there is both a need for 1) a deeper conceptual and theoretical understanding of the complex changes urban development brings, and 2) a real need to pursue research that also aligns with urban community needs and interests, particularly those communities that have been socially marginalized. Funding agencies have historically shaped the first need, while the Environmental Justice Movement (EJM) and community organizers have been defining the second. At its core, the EJM seeks to reframe our understanding of sustainability by demonstrating how both environmental benefits and environmental risks are unequally distributed across race, class, gender, income level, and other social categories. This inequitable distribution, perpetuated by social and political structures, is pervasive. Examples include the co-location of waste sites and communities of color¹⁰, reduced tree canopy in low-income areas^{11,12}, and increased asthma¹³ and breast cancer rates¹⁴ in communities of color. Understanding the reasons and impacts of these inequalities and what solutions are possible for providing a more environmentally just future will depend on scientists intertwining these needs into their research questions and agendas. Science that produces more just and positive impacts for communities who are unequally affected is foundational for advancing our conceptual knowledge of how to build sustainable urban systems. To this end, science that explicitly acknowledges these inequalities and engages affected communities is needed. By striving for a more just scientific process, results can both advance science and provide new knowledge or pathways forward to the community for improving their circumstances.

Expanding Beyond Interdisciplinarity Through Engagement

Urban systems are multi-dimensional, integrating a wide array of actors, institutions, geographies, scales, timeframes, and disciplines. Given the complex and diverse array of problems these systems create and experience, true interdisciplinary work, integrating not only physical and social science disciplines, but those of law, medicine, and the humanities will be needed. Combined efforts will offer much needed bottom-up and top-down perspectives that can bridge divides, answer questions, and generate creative, transformative solutions by integrating science across cultures, political boundaries, and natural systems. Yet in systems

where the landscape and the humans within it are so deeply intertwined, interdisciplinary work may need an additional component: community engagement. New research would benefit from more thoughtful incorporation of the voices and viewpoints of the residents who would be most directly impacted by the results and outcomes of any urban research. To facilitate this engagement, researchers should reduce any hardships that stakeholders may face through their participation (e.g., providing childcare, holding meetings outside of normal working hours, offering food, and compensating them for their time) and be prepared to include and value alternative and traditional forms of knowledge. Finally, building science informed by community input should not be a “one-way street.” It will be essential for urban research to have strong, creative, communication strategies built in as a core piece of the overall research agenda to help stakeholders digest and interpret new knowledge and move beyond study results to construct novel, place-based solutions of their own design.



Participants work through The Game of Floods to explore a creative method for community input.

Building Adaptive Capacity

Urban systems are extremely dynamic and complex, and urban governing bodies could benefit greatly from conscientiously cultivating a culture that embraces greater adaptive capacity to help communities within a megapolitan region tackle positive transformation. Research that helps inform or build strategies for more deeply incorporating monitoring, modeling, experimentation, and assessment into urban design, governance, and culture would help communities better conceptualize their landscape, and how decisions made at one scale impact outcomes at other scales. To facilitate this more flexible framework of management, urban researchers should produce and share data and models that clearly capture changes in the state of the system at time and spatial scales that align with regulation, impact assessment, and



Marina Alberti from University of Washington provided a keynote on eco-evolutionary perspectives.

planning to make results more useful to policy and decision makers. The knowledge produced from these research efforts should incorporate and reflect not only an updated, collective scientific understanding of urban systems but the environmental goals, institutional mandates, and social expectations generated by those

embedded within the community. By encouraging research that includes multiple perspectives, knowledge from different domains can be used to build a more comprehensive, collective, and flexible understanding of how urban management should change, and can help ensure that when we transpose ecological metaphors of “resilience” (e.g., urban greening) onto culture and social systems, we do so in ways that are just and productive.

KEY THEMES AND ISSUES FOR ADVANCING SUS RESEARCH

Despite decades of discussion and experimentation aimed at tackling environmental degradation, social inequity, and urban sprawl, many of the outcomes of urbanization continue to negatively impact environmental health and human wellbeing. Outlined below are key themes and insights for the next generation of urban research identified by participants as critical for understanding the complex social and environmental impacts of urbanization.

Displacement

The concept of displacement is inherently intertwined with the process of change, impacting both humans and the natural environment in megapolitan systems. Displacement is commonly discussed within a negative discourse and is associated with issues ranging from homelessness, to rural subsumption, to urban biodiversity loss. In this workshop, discussions frequently pointed to the mounting evidence that adding green infrastructure within disadvantaged communities leads to

gentrification. In particular, efforts made by cities to reintroduce ecosystem services in areas by adding trees and other green spaces, with the intention of mediating temperature extremes and control runoff, also serve to enhance the natural



Breakout groups discussed the roadblocks and opportunities in building sustainable urban systems.

amenities of the community. In implementing green solutions, cities indirectly increase the property value and desirability of these areas, pricing existing residents out of their

own neighborhoods. Yet, displacement isn't inherently only a negative consequence of change. Keeping with this example, the removal of concrete and other impervious surfaces creates desired ecosystem responses that help naturally deal with temperature fluctuations and water quantity and quality issues that otherwise would require expensive technological or infrastructural solutions. In any system that is evolving, displacement will bring both positive and negative results that will be context-dependent, and scale-variable.

Cumulative Impacts and Co-Benefits

Small contributions, deletions, and alterations to a system may have little impact locally, but when assessed over longer time periods or larger spatial scales, can create measurable change, or *cumulative impacts*, that often result in unwanted or unintended outcomes. Cumulative impacts have long been acknowledged as important drivers of degradation in socio-environmental systems, including urban systems. Yet, our quantitative understanding of how and where these impacts accumulate in systems remains poor. As many urban communities embrace the “act local, think global” philosophy, new research needs to focus on the role that co-benefits from *coordinated*, small changes can have on achieving a wider set of urban sustainability goals through initiatives. These coordinated efforts are already happening in organizations like the 100 Resilient Communities or the World Mayors Council on Climate Change, therefore monitoring and assessing the impacts of these policies and changes will be vital. In moving from cumulative impacts to co-benefits, participants noted that such coordinated change would require new levels of data and knowledge integration across local, regional, and global scales, most likely utilizing new sensor technology and data mining efforts, and a mechanism by which these data would be made available to the local governments and communities who need this information to make informed on-the-ground decisions.

Key points:

Displacement: Urban research needs to work on human displacement. This means understanding and explicitly investigating the winners and losers of any system change and using this knowledge to focus on policies and sustainability efforts that can steer us onto equitable trajectories.

Cumulative Impacts: Future research efforts will need to collect and synthesize high-resolution data and knowledge across multiple scales to better understand how changes within these systems propagate through space and time. These data and results must be accessible to decision-makers, who will be key for coordinating sustainable urban initiatives.

Connectivity

Megapolitan centers represent a diverse landscape encompassing urban, suburban, rural, and natural areas, and provide a unique point of view for understanding the number and strength of economic, cultural, social, and environmental linkages between and within these different areas. Expanding our understanding of how not only social networks intersect, but how human and environmental systems interlink to



The conference was held at the Talaris Conference Center in Seattle, WA, which was recently sold for development. This became a discussion point on urban land use.

facilitate or hinder change will be critically important for understanding how to propagate sustainable change through an urban system. In particular, funding needs to be directed towards research that helps us better understand how external impacts and drivers at different spatial or temporal scales propagate through megapolitan systems given varying degrees of internal connectivity, and how in turn megapolitan systems create impacts beyond their own boundaries (e.g., telecoupling). In particular, additional research that models and tracks how resources and ideas move through a complex urban-rural system over space and time would offer an entirely new perspective on urban dynamics. Additionally, research that explicitly focuses on how social and environmental justice issues (e.g., access to food, affordable transportation) could be addressed by mobilizing resources along or through networks that maximize solution effectiveness while minimizing unintended consequences would help decision-makers plan new, more just, policies.

Resilience: Who is Impacted and How?

Urban communities must continually react to an array of external and internal pressures, whether from population growth, a changing climate, political/cultural dynamics, or other influences as they strive towards a more sustainable, just future. Future research efforts focused on urban resilience will need to span multiple scales to detect or predict the cascading effects of current system pressures and management responses on future

sustainability goals. In addition, urban resilience research will need to address the existing dual meaning of “resilience”, as this varies by discipline and is context sensitive¹⁵. For instance, while a resilient hydrologic system, which can withstand the effects of pollution or drought, is generally considered a positive attribute, creating or maintaining resilient systems of governance that marginalize or harm specific communities is a distinctly undesirable attribute. Future projects should work with communities to better monitor and interpret the nuanced and non-linear changes to social and environmental systems. This should include co-generating an understanding of urban system dynamics, as well as tools by which communities use this knowledge to identify where and when impending undesirable system changes will occur.

Key points:

Connectivity: New models that can map, interpret, and interlink information about social processes with natural processes will be critical for expanding our understanding of how human and natural systems function across the rural-urban continuum.

Resilience: Funding opportunities must be designed to account for the dichotomous definition of “resilience”. New theories, models, and empirical work that can track, quantify, and predict biophysical and human adaptive responses to change in urban environments need to explicitly incorporate concepts of environmental justice.

IMPLEMENTATION CHALLENGES AND OPPORTUNITIES

Challenges and opportunities are two sides of the same coin - challenges help us define opportunities to improve and move forward. When considered together, challenges and opportunities become springboards, revealing solutions to potential problems. This is particularly useful in a sustainable urban systems dialogue, where issues are complex and dynamic. The participants in this workshop suggest that integrating strategies to address the environmental justice issues that create sustainability roadblocks could very well be the launchpads from which new research questions and results create new pathways towards a sustainable megapolitan future. If considered a core component to any next generation urban research, this fundamental shift in approach could in turn lead to better science as community social resources are fully integrated into our conceptual understanding of urban systems. The following sections reflect where participants saw the biggest opportunities for urban research.

Facilitating Data-Driven Science and Policy

New technology and computing capabilities are allowing researchers to generate and collect data at scales, and in volumes, that are unprecedented. Modeling efforts that can incorporate these emerging and vast data resources will be particularly important for characterizing urbanizing areas, such as megapolitan areas, and for exploring the longer-term consequences or benefits of proposed sustainability policies or goals that are broadly focused or iterative in nature. These data in turn have the potential to support urban management at multiple levels, providing an informed understanding of potential costs and benefits, if they are harnessed and shared in ways that are accessible to the individuals or communities making on-the-ground decisions. At the same time, as remotely-collected, fine-resolution, data-intensive approaches become more commonplace, social scientists and ethics scholars will need to explore how these data can be used to address societal problems while protecting the privacy and welfare of the urban subjects. Meanwhile, students and scientists must be taught computational techniques for analyzing big data sets, and new analysis techniques must be identified and developed appropriately for data-intensive research.



Sustainable urban systems need trees and places for people to walk.

Community Engagement

Any research that has the potential to impact a human community should secure the support of those who would be potentially affected by the study and its results. This means researchers will need to invest in relationship-building interactions well in advance of proposal development to identify and earn the trust of key contacts or representatives for the system of study, show the demonstrated relevance of the project and its outcomes to all groups affected, and, as desired, include the community in the development

of the research questions, methods, analysis, interpretation, and dissemination of results. Decisions that are made without consideration of these community perspectives

can lead to mistrust and create perceptions of exclusion. This can have a direct impact on research, as past efforts to “green” or “revitalize” disadvantaged communities have been met with skepticism or distaste when residents were poorly engaged or consulted. To help ensure awareness and inclusion, researchers should plan to identify and bring all the appropriate stakeholders, groups, and constituencies to the table- beginning with a firm understanding of who the partners are going to be and how they will be identified. Urban residents and leaders are often intimately familiar with the problems of their communities in ways researchers are not. Intentional, early, and respectful engagement with these community experts can provide valuable insights into how new research problems should be addressed, helping identify hidden or subtle drivers or system processes that shape urban problems. Engagement can also help researchers identify strategies for making their work meaningful to the community. When appropriate, having community members help generate and guide research questions could advance science in novel ways while potentially providing real benefits to the systems studied. Finally, it should be reiterated that urban systems are human systems. Engagement should not simply manifest as “compensation” for underrepresented groups, but acknowledge traditional forms of knowledge, and build trans-disciplinary, trans-sectoral collaborations throughout the lifespan of the project.



Breakout groups during the workshop discussed the major knowledge and implementation gaps in involving communities.

Adaptive Management

Given the complexity of urban systems and our limited ability to assess future conditions, an adaptive management framework that embraces a culture of learning- including a willingness to be flexible and try new approaches to complex challenges- is critical. Cultivating functional and mutually respectful partnerships between researchers and community members will be important, especially for building new knowledge and models of how biophysical and policy changes propagate and alter urban systems. It will be the responsibility of the researchers to develop new ways to translate science to managers, and the community leadership to maintain an openness to scientific input and the opportunity to explore bold ideas that have potential to positively transform human wellbeing and environmental health in urban systems and across the megapolitan divides (e.g., urban-rural, cultural, socio-economic status). The successfulness of such a partnership will depend on whether the key players and important boundary-spanning agents within and across systems can be identified, and where and how information is being exchanged. Such relationships would be critical for translating scientific results to communities while providing mechanisms by which researchers could identify critical “friction spots” within urban systems where opportunities for improved, coupled, environmental, technological, and institutional development is possible, and where enhanced coordination and cooperation among urban residents and the scientific community may be valuable.

Key points from Challenges and Opportunities:

- ***Significant and fundamental institutional and technological advances, as well as funding, are needed to productively harness existing and emerging data to advance our understanding of urban systems and improve decision-making.***
- ***Funding agencies should offer more planning grant awards and opportunities to better support and legitimize relationship-building efforts between researchers and the communities they study. Additionally, requirements for a Community Engagement Management Plan (similar to a Data Management Plan) could help ensure researchers are using ethical, sensitive, and well-planned strategies for studying and testing innovative solutions in urban - human- communities***
- ***Supporting research that embraces adaptive management, and in particular, projects that build models, tools, or develop other mechanisms that help foster an adaptive management mindset by the communities studied, will help build a new culture of openness to learning and experimentation.***

ACKNOWLEDGEMENTS

This workshop was funded by a National Science Foundation Sustainable Urban Systems workshop grant (NSF 19-032) awarded to Washington State University (#1929824) and supplemental funding from The Nature Conservancy in Washington. The drawings are courtesy of participant John Barney, Parks and Recreation Planner and Artist from Bernalillo County, New Mexico. Ideas for this white paper were synthesized from participant discussions, and thus the authors would like to also thank: Martha Aitken, Marina Alberti, Scott Altenhoff, Molly Baer Kramer, Ben Bakkenta, Debolina Banerjee, John Barney, Todd Beyreuther, Aaron Clark, Chad Cramer, Steve Dubiel, Pam Emerson, Maggie Fasy, Gail Feenstra, Gordon Feller, Kelvin Frank, Erika Harris, Janet Hartin, Chris Hilton, Ani Jayakaran, Tiernan Martin, Sudha Nandagopal, Erin Nobler, Charles Patton, Aaron Ramirez, Yolimar Rivera Vazquez, Dale Silha, Matt Springer, Tracy Stanton, Trevor Taylor, Kahreen Tebeau, Heather Trim, Matias Valenzuela, Sean Watts, Raymond Williams, Roger Woodworth, Kim Zentz.

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SUSTAINABLE URBAN SYSTEMS

BUILDING RESILIENCE AND EQUITY INTO
GROWING MEGAPOLITAN REGIONS BY
GREENING THE URBAN HUMAN-NATURAL
SYSTEM



**Equitable and inclusive
approaches to engage
community - a proposed
scope of work**

October 2019



Metropolitan Center for
Applied Research & Extension

WASHINGTON STATE UNIVERSITY
EXTENSION

All drawings are by John Barney



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Community meetings need to involve many and diverse voices.

INTRODUCTION

The purpose of this document is to outline a general framework that could be useful in guiding outreach and engagement associated with research efforts, with a specific focus on engaging underserved communities in a manner that is inclusive and equitable. The framework could be used to inform how community engagement associated with solicitations for research or requests for proposals (RFPs), might occur. This work is the outcome of a conference workshop and subsequent conversations by a broad group of individuals with expertise in research, education, University Extension, and community engagement. All too often, engagement or broader impacts associated with research projects tend to be a hasty and last minute ingredient to a proposal, and not a fully integrated component of the proposed study. Traditional engagement typically resembles a one-way street in terms of information exchange - from researcher to community, leaving limited room for community to inform the study or project outcomes. A new model of partnership and engagement is the product that this framework seeks to support. There is a critical need for more research to create the framework from which new engagement models are likely to emerge.

Ensure that education is two-way: both community and researchers are learning from each other.

You have
hand &
to work

with the

GrassTOP

to get to the

GrassROOTS



Metropolitan Center for
Applied Research & Extension

WASHINGTON STATE UNIVERSITY
EXTENSION

KEY INGREDIENTS FOR EQUITABLE AND INCLUSIVE ENGAGEMENT

Front end engagement:

- Need to define who comprises the community/audience and how to authentically engage them in time and place.
- Need to co-create the research questions with community
- Need to define the time period/temporal component

Continuing engagement (iterative scoping):

- Communicate initial findings, rescope application
- Ensure open channels of communication and engagement
- Ensure that education is two-way: both community and researchers are learning from each other, which is possible through active roles for community in research, data collection, and analysis.

Post-project outreach:

- Ensure that research findings are communicated to the community
- Ensure that there is a sustainable exit strategy



FRONT END

Who is the audience or community to engage?



CONTINUING

How do we ensure that engagement is two-way?



POST-PROJECT

How do we ensure that efforts are on-going?

IDENTIFIED STRATEGIES FOR COMMUNITY ENGAGEMENT

Overall Goals and pre-project planning

- Engagement for the sake of engagement isn't the goal. Objective(s) need to be laid out early and clearly. Ensure that you are working towards those objectives but be flexible to adapt those objectives based on community feedback.
- Ensure that community leaders are identified early.
- Know what it takes to get people to show up: financial incentives, food, etc.
 - ◆ We often send the wrong message when asking people to show up on our schedules or our agendas while we are being paid to be there and they are either missing work or having to pay for childcare to be there.
 - ◆ How do we send them the right message? - join their meeting, go to them, work on their schedule
- Education/outreach efforts have to be conscious of the network being tapped into.
- Leverage the outcomes (potential) of the project to incentivize early engagement. Projects should be disproportionately beneficial to the communities being engaged. Communicate this to leaders from the outset.
- Outsource the community engagement to those that are experts (community-based organizations, University Extension).
- Build into the grant/project for funds to go to those community-based organizations (CBO). This can be used as a tool to get funds into the communities themselves to participate.

Engagement during project lifetime

- Ensure that one is mindful of who the audience is.
- Employ Games: Create a story about a future with mapping exercises. Play shadow-government games. For example, game out of how far one's food comes from, which can help recognize the rural urban connection.
- Identify incentives for the community as a whole. Leaders will recognize that and opt in.

- Ensure that you are sending the right message and that you are creating the right environment that shows people they are valued.
- Revise meeting or project agendas with feedback from the community.
- Ensure messages get out on time and in the right language.
- Practice deliberative democracy.

- Using culturally appropriate language is important.

- Engagement takes time. If you want to go fast, go alone. If you want to go far, go together.

- Audience for outreach should be the nodes of the social network, not the whole community.

Nodes typically classified as:

- ◆ Connectors, Mavens, Salespeople
- ◆ Paid community liaisons
- ◆ Community based organizations

- Be careful not to extract more from the community than you are putting into it.
 - Sustaining investments need to be made to perpetuate the capacity/expertise beyond the project. (while engaging)
 - Deploy train the trainer programs, grass tops to get to grass roots.
 - Constantly cultivate more leaders with the goal to build capacity in the community.
 - ◆ Accessible Green spaces are opportunities to build engagement.
- Leverage all the connections that need to be cultivated to create the



Sudha Nanadagopal, an environmental justice advocate, provided an inspiring keynote address on community centered solutions.

capacity for solving other problems. But! Needs to address fear of green gentrification and protect against it.

- ◆ Gold standard: the people that engage in the planning process need to be around to enjoy it!
- Leave with added capacity, partnerships, etc. that create sustainable systems (legacy).
- Deliberate and have a plan to “leave” the community as gracefully as entering it.

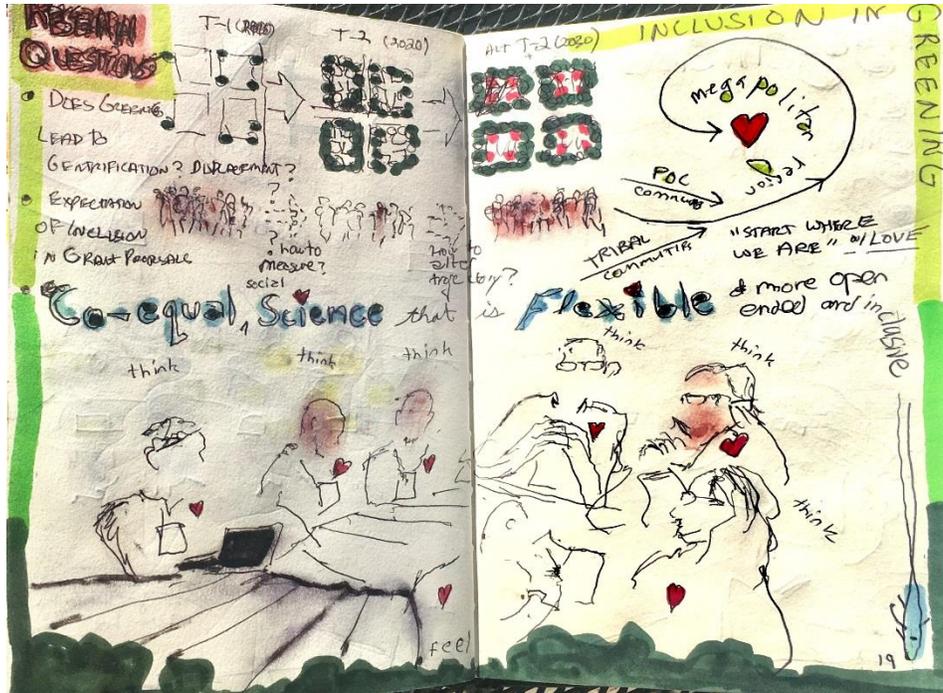
Youth engagement

- Underserved communities are often those missing from the table, especially the youth in those communities.
- Cultivating youth as leaders. As policy makers, translators, ambassadors. Focusing on youth addresses many of the barriers simultaneously.
- Continued engagement- youth commissioners as liaisons.
- Virtuous cycle of strengthening nature-culture connection through youth, builds capacity, fuels future commitment that is community-centered, leads to better science, and healthier communities.
- Develop policy advocacy internships for youth to participate in city councils, etc.

A SUGGESTED SCOPE OF WORK

- **Part I:** Build the network - [Researchers need training/help. This is where the planning budget goes and could build on Extension as conduit to community and / or other CBOs]
- The first step in developing a new model for engagement is testing several strategies for engagement within a network comprising community and researchers. The composition of this network will be arrived at by adopting the following steps:
 1. Define the boundaries (City, multi-city/megapolitan, regional, watershed)
 2. Inventory the communities needing to be engaged (people of color, lower income, suburban homeowners, renters)

3. Identify the “grass tops” or “network nodes” (mavens, connectors, salespeople) that can help amplify communication between researcher/Extension and community
4. Train the trainers (scientists/researchers) on culturally appropriate language and techniques to engage with community
 - a. Learn strategies on framing and messaging
 - b. Learn about cultural sensitivity and competency



Participants worked together during the workshop to develop the scope of work. Artist John Barney was part of this working group.

- **Part II:** Define the scope/shared research objectives (research community) & capacity building objectives (non-research community)
 1. Convene community grass tops and researchers led by a facilitator with the message from science community guided by trained science communicators.
 2. Ensure a means to facilitate a two-way sharing of information – between scientific team and community.
 3. Co-produce the research objectives & capacity building objectives
 - a. Iterative, adaptive, not one and done [within the constraints of the grant]

EXAMPLE BUDGET (\$50,000 - DIRECT COSTS ONLY)

- Training of academic personnel for community engagement/facilitation - \$15,000
- Developing engagement plan - \$5,000
- Community compensation - \$15,000
- Convening/meeting [include food/childcare] - \$5,000
- Stipends/Travel - \$10,000

TIMELINE (20 MONTHS)

- Training the science team - science communication/cultural competency [2 months.]
 - ◆ Framing and messaging
 - ◆ Sensitivity
- Building trust [8 months.]
 - ◆ Go to the community
 - ◆ Iterative scoping
 - ◆ Outsource / tap into existing networks
- Workshop [10 months]
- Development of proposal that is based on shared research and community objectives.

NEXT STEPS

Active consultations with foundations, funding agencies, and entities that seek to implement lasting change in communities of color on how to frame possible calls for proposals that incorporate the ideas listed in this document.

ACKNOWLEDGMENTS

This workshop was funded by a National Science Foundation Sustainable Urban Systems workshop grant (NSF 19-032) awarded to Washington State University (#1929824) and supplemental funding from The Nature Conservancy in Washington. The drawings are courtesy of participant John Barney, Parks and Recreation Planner and Artist from Bernalillo County, New Mexico.

The Next Urban Giants

A Practical Guide to the Future of City Building



INTRODUCTION

The following reference guide or “greenprint” was developed to document and highlight the key issues that emerged from the Next Urban Giants convening, which was held July 30-August 1, 2019 in Seattle, Washington. The goal of this workshop was to bring together a group of 50 experts from a wide array of sectors, disciplines and localities to discuss how growing megapolitan regions can increase resilience and equity through urban greening. This multidisciplinary workshop was funded by a National Science Foundation Sustainable Urban Systems conference grant (#1929824) awarded to Washington State University in connection with NSF’s Dear Colleague Letter (NSF 19-032).

Many individuals and organizations contributed their time and expertise to help plan, secure funding for, and conduct this conference. The conference committee was led by Planning Chair and Principal Investigator (PI), Brad Gaolach, from Washington State University. Conference planning committee members included: Brody Abbott from Ecotrust; Scott Altenhoff from the City of Eugene; Jessie Israel from The Nature Conservancy; Ani Jayakaran (Co-PI) from Washington State University; Julie Padowski (Co-PI) from Washington State University; Aaron Ramirez (Co-PI) from Reed College; Patricia Townsend (Co-PI) from Washington State University; Thaisa Way from the University of Washington; and Kim Zentz from Urbanova. A full conference participant acknowledgment roster can be found at the end of this document.

This document was created in the fall of 2019.

SPECIAL THANKS TO:

The National Science Foundation and NSF Program Officer, Bruce Hamilton, for funding this conference proposal and playing an active role in the workshop.

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The staff at WSU Metropolitan Center for Applied Research and Extension for expert assistance with planning and hosting the conference.





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A Practical Guide to the Future of City Building

Humans must equitably participate with nature and with each other.

Our climate is changing. We must think holistically about our place in the world and how we can play a regenerative role with nature beyond a mitigation mindset.

We must do this work for the benefit of and with the participation of all people. A holistic and inclusive approach should account for humanity's needs in a way that supports and integrates with natural systems. This is how we achieve true sustainability.

This guide is not meant to tell you what to think, but rather to suggest *how* to think. It is meant to help people describe to their decision-makers the direction we must go in to achieve these goals. It is meant for decision-makers to consider these concepts when crafting policy. Finally, it is meant to assist our society-building with authentic engagement that allows for humankind to thrive in balance with our environment.





Human Well-being



Health & Social Well-being

There are certain fundamental human needs that must be met in order for all people to be well and thrive physically and psychologically. These basic needs are critical foundations for people to be able to achieve their maximum potential to themselves, their families, and their communities. We now know that in addition to the obvious needs for clean air and water, nutritious foods, and shelter, regular exposure to nature plays a major role in human well-being. By creating an environment that allows equitable access to each of these needs, stability is created which reduces stress, increases personal resilience, and allows for healthy and productive social interactions.

Policy Recommendations

- Enhance access to nutritious, affordable food and clean water
- Create zoning laws and local programs that allow and incentivize affordable housing
- Enhance access to comprehensive health and human services
- Provide inclusive and equitable access to quality education
- Provide ample access to nature and greenspace
- Foster community safety and well-being through local programs and design of the built environment





Photo credit: Khoo Teck Puat Hospital



Case Study: Khoo Teck Puat Hospital Singapore, Republic of Singapore

This hospital was designed so that, in the words of their Ex-CEO, “one’s blood pressure lowers when he/she enters the hospital grounds.” This ambitious goal has been realized thanks to the total integration of nature into all elements of the buildings and campus. By immersing patients, visitors and staff in a therapeutic, forest-like environment, they are able to move beyond their physical ailments, worries and daily stressors, and heal. Every aspect of this site was designed to be calming and rejuvenating. This is the essence of salutogenic (health-promoting) design.

Making Connections

In addition to having a multitude of garden views, there are a number of engaging and educational rooftop food gardens growing 100 different types of fruit trees, 50 types of vegetables and 50 types of herbs. The organic produce that is grown in them is used in the hospital kitchen.

The many native plants and water features that were incorporated into the site design of this hospital campus attract a wide variety of birds and butterflies. It also serves as a peaceful community gathering spot, where neighbors can attend public lectures, exhibitions, and take part in educational programs.

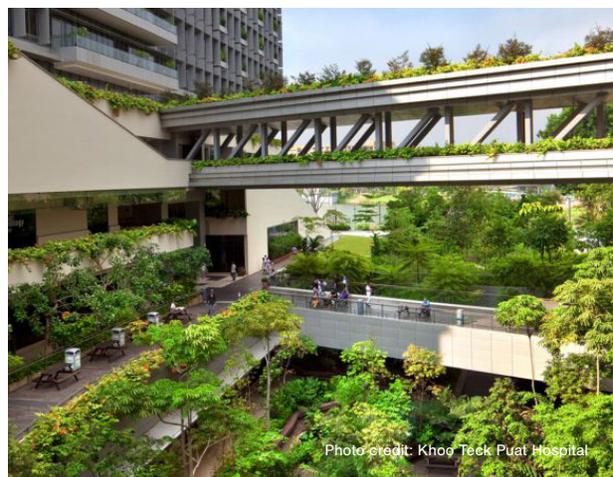


Photo credit: Khoo Teck Puat Hospital



Governance & Policy

A primary role of government is to help create and maintain the conditions for all people to find their own happiness. This is accomplished largely through sound planning and effective public administration, in order to help prevent the interests of the powerful and privileged few from overriding the interests of the many. Good leadership, governance and policy-making are essential to help regulate the forces that contribute to the inequitable and unjust distribution of power and wealth, and to provide for the true common good.

Policy Recommendations

- Create planning processes that are iterative and focus on multi-generational horizons and outcomes
- Close the opportunity gap and create an environment for equitable economic growth
- Mitigate social, ecological, and conflict displacement and social injustices
- Protect vulnerable communities and correct past and prevent future injustices in the criminal justice system
- Create sustainable initiatives that encourage social and economic upward mobility



Photo: Julia Airey



Case Study: Seattle Future City: Resilience Roadmap

Seattle's unique geographic location and exponential growth over the last several decades have brought an amazing amount of diversity to the city, but have also resulted in risks and vulnerabilities that reduce the city's ability for equity and resilience. The City of Seattle developed a framework delineating specific goals to guide policy decisions that foster an equitable environment for all residents to thrive in.

The Focus

Seattle's new framework focuses on lengthening their decision horizon to include multi-generational investment and decision-making. They created goals to incentivize economic opportunities to make Seattle an affordable city through the lenses of equity, civic pride, natural resilience, and climate change.

This multi-generational approach to decision making allows Seattle to prepare for acute shocks, such as earthquakes - while also addressing systemic issues faced by many cities such as social injustices, affordability, homelessness, and public safety.





Equitable Engagement

For a community to successfully offer a sustainable and high quality of life for all residents, decision-making must include those who are most susceptible to social and economic challenges, especially those who have been historically omitted from the conversation. Equitable and inclusive community outreach and engagement is an iterative process and must be continuously maintained in order to minimize negative impacts on those most vulnerable. An equitable community outreach and engagement process must uplift all voices and share the power of decision-making with all residents.

Policy Recommendations

- Identify your community's history, demographics, social networks and economic conditions
- Create an iterative engagement process that is accessible to all and allows for listening, learning, and changing.
- Build trust and strengthen community relationships
- Maintain trust through sustained engagement
- Identify and remove policies and processes that disproportionately have negative impact on marginalized communities





Portland, OR



Case Study: Branch Out PDX Portland, Oregon

In 2016, Portland Parks and Recreation partnered with Portland State University to look at how the city might equitably increase their urban tree canopy cover (UTC) and ensure that historically underserved neighborhoods would both benefit from and play an active role in these efforts. Lower income neighborhoods, communities of color, and areas with a higher percentage of refugees and immigrants tend to have fewer trees and less of the essential ecosystem services that directly support human health and contribute to urban livability. These are the same communities that will be most severely impacted by our changing climate.

Inclusivity & Greening

A primary goal to getting more trees planted strategically and equitably throughout the city was to do so through increased public involvement and authentic engagement that cultivated respect, mutual understanding, and cooperation.

Key elements of the community engagement process were: a Community Advisory Committee (CAC) with strong representation from disadvantaged communities, culturally-specific focus groups to build trust and conduct stakeholder interviews, and a well-crafted and widely distributed public survey.

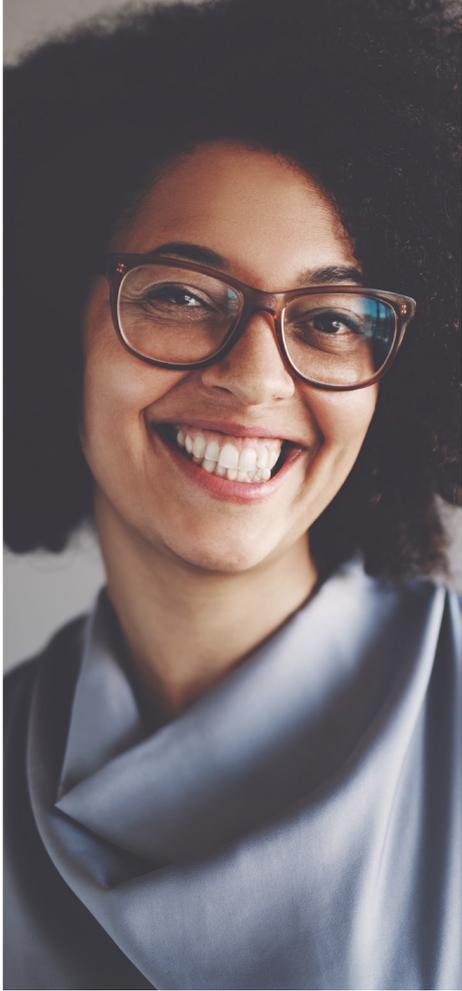


Tree Canopy in Portland
Image: Portland Parks & Recreation





Economy & Transportation



Prosperity

Prosperity through economic growth has long been the dominant idea of our current global society; however, economic growth alone does not ensure prosperous and fulfilling lives for humanity. We must take a holistic approach to growth by supporting social inclusion and protecting our planet so that it can support the needs of future generations. There is more than enough opportunity, income, and power to go around and we must create our society to build upon shared assets rather than the exploitation of many to enrich a few.

Policy Recommendations

- Create an environment that is just, equitable, and tolerant of all people with respect for gender, race, ethnicity, and cultural diversity
- Promote respect for human rights and human dignity
- Implement public policies that support an informed and healthy democracy
- Be mindful of and inclusive of the needs of the most vulnerable members of society
- Create equitable tax structure that minimizes wealth disparity and funds well-being initiatives
- Improve wages and job quality



Photo: The Urban Twist



Case Study: Transforming Our World: the 2030 Agenda for Sustainable Development United Nations, Worldwide

The United Nations took a step towards redefining prosperity by adopting this agenda. Their goal is to ensure that all people can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature. This holistic approach goes beyond material needs and includes values, relationships, freedom to think, act and participate.

Shared Prosperity

Indicators of success are measured at the global, regional, and national levels and address basic needs for humans to prosper including ending poverty and hunger, better education and healthcare, gender equality, sustainable economic growth, and sustainability of our planet.

This visionary planning document acknowledges the concept of nature as having certain rights. It points out that we humans, as stewards of the planet, must ensure that all of our decisions align with this fact, be inclusive, and environmentally sound.





Transportation

Transportation systems are more than a way to move people and goods. They provide the connectivity for healthy, vibrant communities and have a direct correlation with the health and well-being of the people and communities they serve. Communities should consider prioritizing accessibility and affordability of transportation options in addition to mobility so that people have better access to necessary elements for a high quality of life. Research has demonstrated that properly designed transportation systems provide health benefits, improve safety, lower stress, connect people with opportunities, and connect disadvantaged people to social support services.

Policy Recommendations

- Build safe and convenient walking, bicycling, and public transit systems
- Prioritize transportation funding for projects in low-income and rural communities
- Utilize full-cost/life cycle accounting; look at costs vs. value and not just implementation costs
- Support transportation modes that lessen environmental impacts
- Integrate land use and transportation planning to encourage equitable and affordable transit-oriented development





Photo credit: Alstom



Case Study: The Coradia iLint Frankfurt Rhine-Main Area, Germany

The Coradia iLint is the world's first passenger train powered by a hydrogen fuel cell. This zero-emission train produces only steam and condensed water as exhaust and emits low levels of noise. Specifically designed to utilize existing non-electrified rail infrastructure, it provides a clean and sustainable means for the transportation of people and can be built in large quantities.

The Future of Transit

As the demand for urban mobility increases, reducing the environmental impact from our transportation systems will be a crucial step in mitigating the effects of climate change. The trains use fuel cells to convert a mixture of hydrogen and oxygen into electricity.

Any surplus energy produced is stored in onboard ion-lithium batteries. Since steam and water are the only emissions, these trains can move many people around while eliminating a major source of greenhouse gas emissions.



Photo credit: Werner Pluta/Golem.de



Economic Development

A thriving economy should work in cooperation with natural systems in a way that allow both to thrive. Sustainable physical and virtual economies account for the planet, people, and profit in harmony with one another and do not prioritize one of these areas at the expense of the others. Sustainable economies offer stability, making them resilient to shocks and stresses that can often disproportionately impact vulnerable communities.

Policy Recommendations

- Incentivize businesses that support stakeholder value over shareholder value
- Use local assets and natural systems to create economic diversity
- Require education and licensing of businesses and developers that teach and require best holistic practices, energy efficiency, water conservation, and passive design techniques
- Disincentivize an extractive economy. Incentivize a recycling or replenishing economy





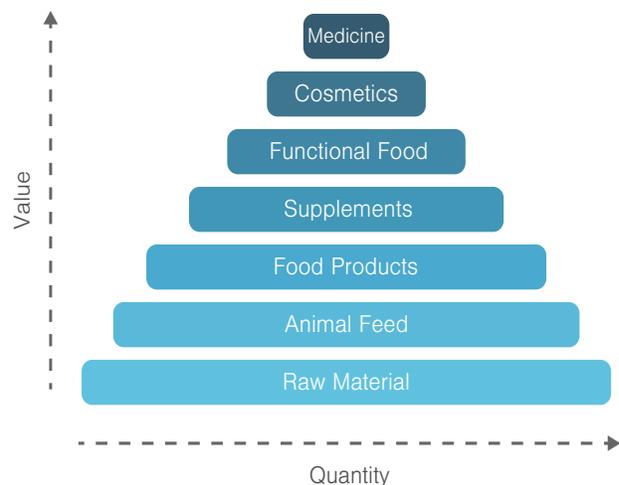
Case Study: Icelandic Ocean Cluster Reykjavik, Iceland

The Icelandic Ocean Cluster is a network of marine industries that leverage connections and interactions to foster sustainable economic development and innovation at a regional scale. The fishing industry has long been an important economic driver for Iceland and this coalition of entrepreneurs has allowed new businesses to thrive by fostering innovations and sustainable management of marine resources.

Their Model

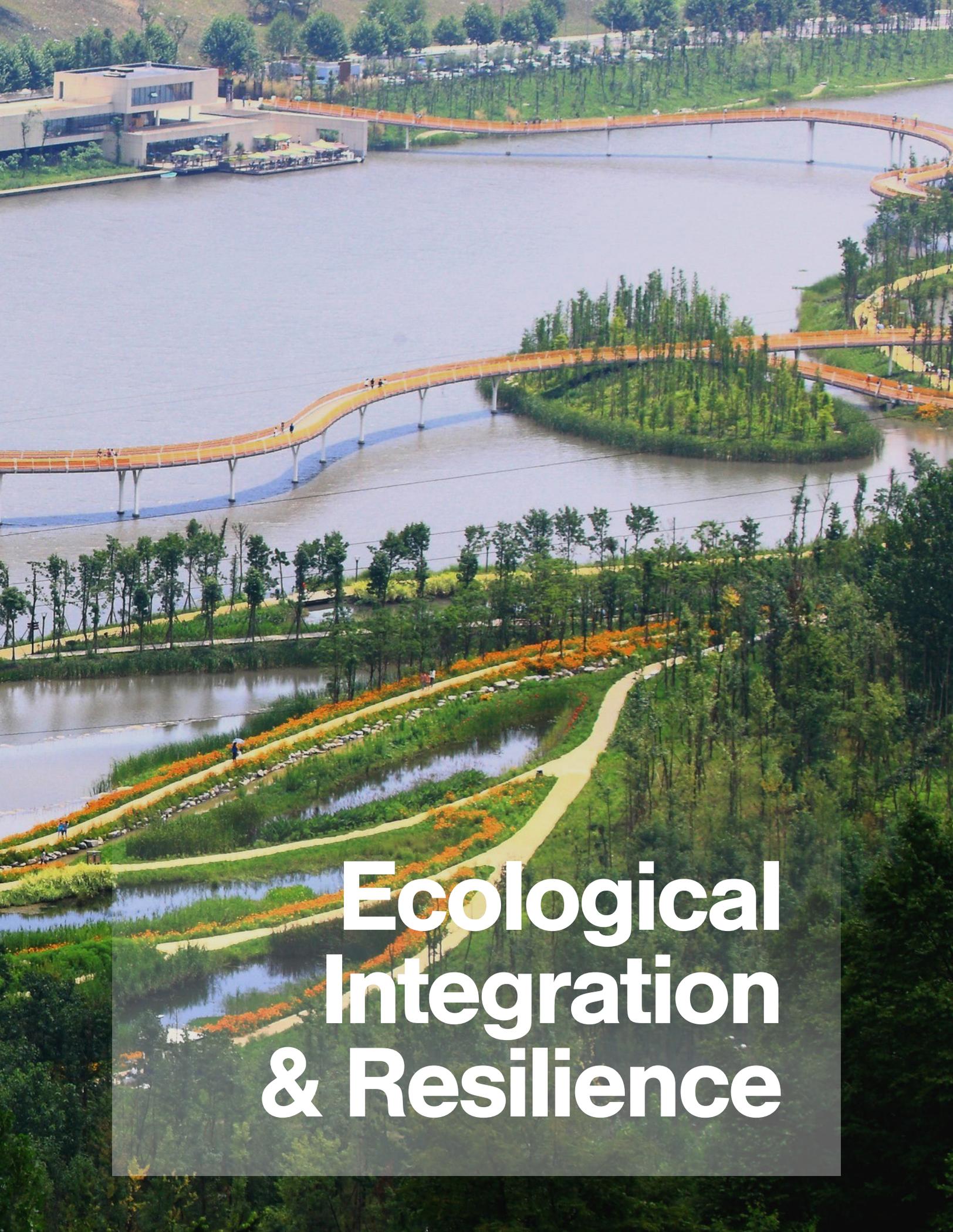
The Icelandic Ocean Cluster provides incubator and research space for entrepreneurs in the marine industry. The shared working environment has created a platform for innovation across companies and sectors that has fostered new business opportunities and biotechnical advances in the industry.

Over 50 companies have created products that result in total utilization of caught fish. This has allowed supporting sectors to rise alongside the base industry of fishing. In 2011, it is estimated that the ocean cluster provided a total contribution of 27.1% to the Icelandic GDP.





Liupanshui Minghu Wetland Park
Photo credit: Turenscape



Ecological Integration & Resilience



Food, Water, & Energy

According to the Food and Agriculture Organization of the United Nations, water security, energy security, and food security are interdependent sectors necessary for human well-being. Actions in one of these areas typically affect change in the others. As the world population continues to grow, demands on these systems increases and require sustainable management solutions.

Policy Recommendations

- Air quality, water quality, soil health, ecological connectivity must be at the forefront of these systems
- Maintain local control of production/management and be adaptable, scalable, replicable systems
- Systems must be decentralized, diverse, and well-coordinated; a network of networks (modularity)
- Strive for closed-loop systems that efficiently use waste and byproducts
- Create compact land use patterns that protect and minimize impacts on agricultural land





Case Study: Flexible Energy Supply Wellington, New Zealand

Nestled around a beautiful harbor near the sea, New Zealand's capital of Wellington has a long history of resilience. It's location, while ideal and picturesque, leaves the city highly susceptible to earthquakes and severe storms. The city's more than 400,000 residents decided to enhance their vulnerable power supply by shoring up critical infrastructure through decentralization.

Virtual Power Plant

A Virtual Power Plant utilizes numerous power sources that are independently owned and operated. Wellington implemented a three-pronged approach to enhancing their power system. They equipped homes with solar panels, which allowed homes to maintain power during outages and feed power back into the grid. Next, they empowered homeowners with a 'resilience upgrade' pack of emergency essentials that allows them to be community points of refuge during disruptions. Finally, they upgraded their central grid. The combination of these reduced homeowner power costs by up to 80% and reduced repair time of the grid by up to 12 weeks.





Urban Design & Infrastructure

Our built environment should maximize human integration into natural systems. A city's architecture and urban form should be complementary to its local ecology and culture. We must design our cities to participate with nature instead of working against it. Our land use and development patterns must be compact, diverse, and connected and serve the overall well-being for all people.

Policy Recommendations

- Assess the local ecosystem to identify opportunities for environmental conservation and regeneration inclusive of hydrological systems, topography and soil conditions, and vegetation and habitat
- Build efficiently and compactly in order to preserve ecologically sensitive areas
- Incorporate biophilic design into architecture and infrastructure that protects and regenerates the environment
- Create equitable physical and digital connectivity across diverse populations





Bishan-Ang Mo Kio Park
Photo: Dreiseitl



Case Study: Bishan-Ang Mo Kio Park Bishan, Singapore

The Bishan-Ang Mo Kio Park converted an existing concrete drainage canal into a meandering river with ecologically restorative function in an urban area. The city is prone to flash flooding and the park operates as a floodplain, providing recreational greenspace when water levels are low that becomes a riparian conveyance channel during heavy rain. Similar to natural river systems, the new river channel meanders with varying widths creating natural habitats teeming with biodiversity.

Ecological Restoration

The enhanced naturalized river has increased its conveyance capacity by over 40% and increased the park's biodiversity by over 30% even though no new wildlife was introduced.

A total of 59 species of birds and 66 species of wildflower have been identified in the park. As a testimonial to the project, a family of otters now call the park home with otters previously having been spotted only along the coastal areas.



Photo: Dreiseitl



Resilience

At its essence, resilience is about adjustment to, and capacity for, change. The success of any sustainable system includes the ability to quickly recover from shocks and stress and evolve as needed. The world changes. Natural and human-made systems change. We must allow these systems to similarly adapt and evolve and communities must be aware of their strengths and weaknesses in order to best prepare for them.

Policy Recommendations

- Establish a community vision of resilience
- Identify risks and vulnerabilities in city systems; consider both natural and man-made disasters
- Collaborate with local and regional partners to inform and support each other and identify shared systemic relationships
- Develop a resilience plan comprised of goals, strategies, and priorities to mitigate the impacts of system shocks and stressors
- Provide a framework and resources to implement actions





Case Study: CYREN Network Amsterdam, Netherlands

As our communities become increasingly digitized, the threat of disruption to essential services also continues to increase. The Netherlands is one of the top three countries targeted for cyber attacks according to the Amsterdam Port Authority. Their port region is one of the largest digital logistical hubs in the world and being able to defend and recover from these attacks is crucial in maintaining operations on an international scale.

Digital Resilience

The CYREN Network (Cyber Resilient North Sea Canal Area) takes a collaborative approach and collects and shares information about cyber threats with companies in the network. This allows the companies to prepare for possible cyber attacks in the region.

It is supported by a hotline that companies can call if they notice any attacks that could impact the region. The hotline is maintained and staffed by the Harbour Master which allows quick and efficient dissemination of valuable information that could prevent or mitigate the damage of these attacks for other companies.



Further Information Regarding Urban Greening

Human Health and Social Well-being:

[Green Cities: Good Health](http://depts.washington.edu/hhwb/)

[http://depts.washington.edu/hhwb/](https://willamettepartnership.org/wp-content/uploads/2018/07/Green-Infrastructure-Health-Guide_DIGITAL-VERSION-FINAL_reduced.pdf)

[Green Infrastructure & Health Guide](https://willamettepartnership.org/wp-content/uploads/2018/07/Green-Infrastructure-Health-Guide_DIGITAL-VERSION-FINAL_reduced.pdf)

https://willamettepartnership.org/wp-content/uploads/2018/07/Green-Infrastructure-Health-Guide_DIGITAL-VERSION-FINAL_reduced.pdf

[Washington State Recreation & Conservation Office](https://www.rco.wa.gov/documents/fact_sheets/RCO.pdf)

https://www.rco.wa.gov/documents/fact_sheets/RCO.pdf

Governance & Policy:

[Sustainability and Governance](https://meetingoftheminds.org/category/sustainability/governance)

<https://meetingoftheminds.org/category/sustainability/governance>

[Green Governance: Ecological Survival, Human Rights and the Commons](http://wealthofthecommons.org/essay/green-governance-ecological-survival-human-rights-and-commons)

<http://wealthofthecommons.org/essay/green-governance-ecological-survival-human-rights-and-commons>

[Bottom-up approaches not always good for natural resource management](https://www.stockholmresilience.org/research/research-news/2019-06-24-a-buzz-or-a-baller.html)

<https://www.stockholmresilience.org/research/research-news/2019-06-24-a-buzz-or-a-baller.html>

[The Emerge Leadership Project](https://living-future.org/emerge-leadership-project/#education)

<https://living-future.org/emerge-leadership-project/#education>

Equitable Engagement:

[The City Project](https://www.cityprojectca.org/healthy-green-land-use-equitable-development-and-civic-engagement-through-planning-by-and-for-the-community)

<https://www.cityprojectca.org/healthy-green-land-use-equitable-development-and-civic-engagement-through-planning-by-and-for-the-community>

[Community Engagement Guidance](https://www.fundersnetwork.org/wp-content/uploads/2017/07/Partners-for-Places-Community-Engagement-Guidance.x78069.pdf)

<https://www.fundersnetwork.org/wp-content/uploads/2017/07/Partners-for-Places-Community-Engagement-Guidance.x78069.pdf>

[How cities are reworking their approaches to homelessness](https://www.smartcitiesdive.com/news/how-cities-are-reworking-their-approaches-to-homelessness/505950/)

<https://www.smartcitiesdive.com/news/how-cities-are-reworking-their-approaches-to-homelessness/505950/>

Prosperity:

[The Case for Basic Income](https://meetingoftheminds.org/case-basic-income-16192)

<https://meetingoftheminds.org/case-basic-income-16192>

[The Block Project](https://living-future.org/affordable-housing-the-block-project/)

<https://living-future.org/affordable-housing-the-block-project/>

[Economy and Equity](http://www.frameworksinstitute.org/economy-equity.html)

<http://www.frameworksinstitute.org/economy-equity.html>

[How can cities redefine 'smart' to include equity? 6 leaders weigh in](https://www.smartcitiesdive.com/news/how-can-cities-redefine-smart-to-include-equity-6-leaders-weigh-in/562906/)

<https://www.smartcitiesdive.com/news/how-can-cities-redefine-smart-to-include-equity-6-leaders-weigh-in/562906/>

Transportation:

[New Urbanism-Green Transportation](http://www.newurbanism.org/transport.html)

<http://www.newurbanism.org/transport.html>

[How & Why to Create a Culture of Innovation in Transportation Agencies](https://meetingoftheminds.org/how-why-to-create-a-culture-of-innovation-in-transportation-agencies-30013)

<https://meetingoftheminds.org/how-why-to-create-a-culture-of-innovation-in-transportation-agencies-30013>

[Sustainable Transportation](https://www.asla.org/sustainabletransportation.aspx)

<https://www.asla.org/sustainabletransportation.aspx>

Economic Development:

[What is a “Green Economy?”](#)

<https://www.wri.org/blog/2011/04/qa-what-green-economy-0>

[The Economic Benefits of Green Infrastructure: A Case Study of Lancaster, PA](#)

https://www.cnt.org/sites/default/files/publications/CNT_EPA_LancasterGICaseStudy.pdf

[Markets for Better Water Quality](#)

<https://willamettepartnership.org/water-quality-trading/>

Urban Design & Infrastructure:

[Biophilic Design Initiative](#)

<https://living-future.org/biophilic-design-overview/>

[High-rise forests in Italy are fighting air pollution](#)

<https://www.theverge.com/2017/8/9/16112758/milan-vertical-forest-stefano-boeri-video>

[The Institute for Sustainable Infrastructure](#)

<https://sustainableinfrastructure.org/about-isi/>

[Cities and Urban Design Forecast](#)

<https://www.gensler.com/df2019-cities-urban-design>

Food, Water, & Energy Resource:

[What is Permaculture?](#)

<https://oaec.org/our-work/projects-and-partnerships/permaculture/what-is-permaculture/>

[The Permaculture Principles](#)

<https://www.youtube.com/watch?v=0mwRAf3z9ag>

[Social Equity Through Clean Energy](#)

<https://meetingoftheminds.org/social-equity-through-clean-energy-30837>

Resilience:

[Redefining Philanthropy for Urban Resilience](#)

<https://meetingoftheminds.org/redefining-philanthropy-for-urban-resilience-31100>

[Resilience Strategies along the Rural-Urban Transect](#)

<http://uli.org/wp-content/uploads/ULI-Documents/ULI-Resilience-Strategies-along-the-Rural-Urban-Transect-final.pdf>

[High Point Case Study from Seattle, WA](#)

<https://developingresilience.uli.org/case/high-point/>

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