THE NEW SCHOOL
URBAN SYSTEMS LAB

ANNUAL REPORT 2023

Research, **design**, and **engagement** for more **equitable** and **resilient** cities

urbansystemslab.com **@USL_NYC**

79 5th Avenue, 16th Floor, New York, NY 10003

ANNUAL REPORT 2023

ABOUT USL

Over the past eight years, the Urban Systems Lab (USL) has been advancing urban systems science to provide the knowledge and analysis for developing more equitable, resilient, and sustainable cities. Our work spans urban climate resilience, nature-based solutions, big data and artificial intelligence, data visualization and design, urban ecology, environmental justice and equity, and urban policy and planning. We are driven by questions at the intersections of these key themes.

In this annual report for 2023, learn more about how we bring together designers, urban ecologists, scientists, researchers, and policymakers with the goal to improve the lives of those most vulnerable to climate impacts and enhance decision-making from local to global scales. Our unique impact stems from our position within The New School, which has long fostered progressive scholarship, civic participation, and social justice as part of its educational mission and values.

A NOTE FROM THE DIRECTOR

This past year we've seen enormous challenges from war, economic hardships, climate change, and more. Our work in the USL has never been more important and it's incredible amidst so much uncertainty and inequality that we still manage to co-create a space where diverse scholars can come together to advance resilience, sustainability and equity for cities. From new collaborations and projects (see below) to new and departing members of the Lab, we are embracing a continued need to grow further in our work, approaches, and collaborations.

I am immensely grateful to our students, faculty, and staff who make the Lab the vibrant, passionate, and capable place that is influencing the future of multiple cities, not least our home here in New York City. Thank you to everyone reading this for your support and collaboration and please keep in touch as we continue to host global networks, visiting scholars, local and national research efforts, and grow our core staff to improve decision-making and advocacy for more livable and just cities.

Timon McPhearson
Director, Urban Systems Lab
Professor of Urban Ecology
The New School

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CONTENTS

THE PEOPLE DRIVING OUR WORK

Our Lab's achievements this year would not have been possible without the dedicated efforts of our talented researchers, fellows, students, staff, and faculty.

STAFF

Loan Diep grew seven regional teams for the "Global Roadmap for Urban Nature-Based Solutions" initiative of the NATURA network. She has been co-leading this group with Timon McPhearson to help advance knowledge on urban nature-based solutions in the different world regions. She has also continued leading the NATURA Early-Career Network which met in San Juan (Puerto Rico) to explore local experiences of urban greening challenges on the ground.

Assistant Director of Geospatial Research **Ahmed Mustafa** advanced ClimateIQ by securing funding, assembling a talented team, and building its computing infrastructure Concurrently, he continued to develop SyNF project, successfully simulating the cascading failures in NYC's power and water networks due to flooding.

Research Fellow **Claudia Tomateo** developed graphic narratives for Ocellus XR and presented USL work as part of the community cohort for Wordling, an incubator program organized by Co-Creation Studio at MIT. She also led the design of the Ekos board game through systems thinking and collaborative design.

Natalie Pierson graduated with a double Bachelors in Environmental Studies and Interdisciplinary science and transitioned from Research Assistant to Lab Manager.

Eric Bonner took Bart Orr's Urban Ecosystem class and joined as Research Assistant to work on ClimateIQ to research the climate risk product market.

Research Technician **Joe Steele** helped manage the release of the Ocellus XR mobile application by visualizing geolocated and city-wide data on climate hazards, vulnerability, and solutions.' He have been working closely with partner ClimaSens on the new ClimateIQ initiative.

Associate Director **Daniel Sauter** took the Lab's science communication efforts to Silicon Valley as a finalist at AWE's XR Prize, adding extended reality to the Lab's comprehensive list of dataviz capacities, and providing users with unique interactive geospatial information of heat, flood risk, and other climate indicators in NYC.

Associate Director **Chris Kennedy** provided invaluable support across all operations of USL through project coordination, research and development, budgeting, hiring, operations, and communications. His organization and leadership skills enabled our lab's teams to collaborate easily and explore new ideas.

NEW LAB MEMBERS

The lab grew significantly this year with three new full time hires.

- **Madhavi Jain** brought her expertise in environmental science to advance our work on atmospheric modeling as a Postdoctoral Fellow.
- **Anna Kramer** joined us as a Spatial Analyst Fellow from the NYU Tandon School of Engineering where she graduated with a Master of Science in Applied Urban Science and Informatics in 2023.
- **Valérie Lechêne** came on board as Assistant Director of Operations and Communications to cultivate strategic impact.



STUDENTS

Three research and student assistants graduated from The New School and moved on to related pursuits. We are grateful for their work and contributions.

- **Nam Pham** graduated with a M.S. in Environmental Policy and Sustainability Management. As a Research Assistant, Nam collaborated with the Science and Resilience Institute at Jamaica Bay on the development of an evaluation framework for Natural and Nature-Based Features in New York State.
- **Maria Llona Garcia** graduated from a Master of Art in Poetry and deepened her engagement with writing as a Social Media Coordinator for Hayden Products.
- **Chandler (Chase) Louden**, who worked as student assistant on the Environmental Justice of Urban Flood Risk and Green Infrastructure Solutions project, graduated with a Master's of Science degree in Design and Urban Ecologies and joined Los Sures Southside United HDFC.



FACULTY FELLOWS

- **Luis Ortiz** (George Mason University) contributed to the NYC Town+Gown VIA study as part of the Task 2 team, providing new research and data on heat exposure and vulnerability. Luis is also a member of the ClimateIQ team, co-leading development of regional weather prediction models (WRF). Luis co-leads the newly established Virginia Climate Center at George Mason University.
- **Zbigniew Grabowski** (University of Connecticut) continued to work on assessing the state of knowledge and best practices to facilitate collaborative learning as part of an analysis of green infrastructure planning in New York State with support from NYS DEC
- **Elizabeth Cook** (Barnard College) continued to collaborate on multiple collaborative research efforts including the NSF-supported NATURA and Growing Convergence Research projects, as well as the NSF CRISES planning grant with colleauges at Cornell University and elsewhere.
- **Erik Andersson**, (Stockholm Resilience Centre) is working with USL's Timon McPhearson to co-lead the NATURA Thematic Working Group on Ecological Resilience and Traits.




PHD CANDIDATES

PhD candidate **Veronica Olivotto** advanced various USL research projects including NATURA and 'Equitable Green Infrastructure Planning in New York.' She presented her ongoing PhD dissertation work on managed retreat at Columbia University and the American Association of Geographers.

Pablo Herreros Cantis transitioned from Research Fellow to a PhD fellowship based at the Basque Center for Climate Change (BC3). There, he builds upon lessons learned at USL regarding the co-production of flood risk mitigation strategies. He continues to collaborate with the USL as a Visiting Scholar under Timon's PhD supervision.

PhD Candidate **Isha Rahman** is a Research Assistant in the NSF CRISES program working supporting Research Area 1 focused on climate hazards and risks in NYC. Her dissertation focuses on coastal city resilience for people and types of infrastructure.

PhD candidate **Bart Orr** continues to develop his doctoral research focused on energy democracy and climate justice in Puerto Rico. His forthcoming dissertation is tentatively titled: "*Post-Grid Puerto Rico: Energy and Politics of Climate, Decolonialism, and Disconnection*"

PhD candidate and Research Assistant **Sofya Krasnaya** supported Kresge CREWS Foundation work developing GIS analysis for the City of Milwaukee, and is now supporting design and research for the NATURA initiative with Postdoc Fellow Loan Diep.

PhD candidate **Jen Ventrella** supported research for the NSF Converging Social, Ecological, and Technological Infrastructure Systems (SETS) for Urban Resilience Project. As a graduate fellow, she worked with the Futures and Transitions Working Group of the New York City Panel on Climate Change co-lead by Timon.

PhD candidate **Filipa Grilo** co-chaired the Biodiversa+ pan-European Knowledge Hub focused on the potential of nature-based solutions for mitigating and adapting to climate change. She won the Luso-American Development Foundation scholarship which allowed her to present part of her PhD thesis in the Ecological Society of America Annual Meeting (ESA23) within the session titled "The Role of Traits in Urban Social-Ecological-Technological Systems," with NATURA's Urban Ecological Resilience Thematic Working Group.

VISITING SCHOLARS

The Urban Systems Lab hosted three visiting scholars who contributed to projects bridging research and practice in urban nature based solutions.

Alannah Hofemeier was the recipient of a NSF NATURA Early Career Fellowship award to support her research on developing participatory approaches to design and implementations of urban nature based solutions in informal settlements. Alannah worked closely with USL Faculty Fellow Elizabeth Cook at Barnard College as well as Timon McPhearson on her research. She is a Research Analyst in PlanAdapt's Coordination Hub, based in Berlin, Germany.

Livia Shamir was appointed a Visiting Scholar in 2023 and worked closely with colleagues at The Nature Conservancy and their Forest For All NYC program. Shamir worked with Elizabeth Cook at Barnard College on developing a NYC-based case study to better understand the relationship between urban forests and urban flows, and more specifically urban forestry's role in urban metabolism, circularity, and planning through Nature-Based Solutions. Livia is a Senior Researcher and Project Leader at Stefano Boeri Architetti's Research Department where she focuses on strategic urban planning projects to address socio-environmental challenges, specializing in sustainability and urban resilience strategies, urban afforestation plans, and Nature Based Solutions (NBS).

María Ruiz de Gopegui Aramburu was a Fulbright Scholar researching the impacts of community-based planning and inclusion along the Long Island City waterfront in Queens, NY. While at the lab she conducted interviews and focus groups with members of CBOs and governmental agencies involved in developing the Hunters Point South Park and development in Queens. She has since co-authored a paper with USL's Timon McPhearson and others entitled Climate justice in urban public space adaptation: Developing and testing a collective assessment tool in Hunters Point, New York City submitted to the journal, Cities. She is a PhD candidate at the BC3-Basque Centre for Climate Change and ICTA-UAB (Institut de Ciència i Tecnologia Ambientals, Universitat Autònoma de Barcelona).

Alex Putzer was appointed a USL Visiting Scholar in 2023 working on his dissertation on the rights of nature in urban environments as part of his program at the Sant'Anna School of Advanced Studies in Pisa, Italy. Alex collaborated with members of the NATURA Thematic Working Group on Worldviews, helping to design and co-lead a workshop at the Urban Systems Lab focused on developing an analytical framework for assessing underlying urban NbS worldviews and their implications for sustainability transformations.

The Urban Systems Lab now counts ten full-time members, four part-time members, six PhD students, two visiting scholars, and six faculty fellows forming a collaborative cohort with an increasing diversity of positionalities. The passion, expertise, and teamwork of our staff continue to drive impactful research and real-world solutions. We are proud to have these dedicated individuals advancing our mission.

OUR WORK

Nature-based Solutions for Urban Resilience in the Anthropocene (NATURA)

Team: Timon McPhearson, Nancy Grimm, Elizabeth Cook, Loan Diep, Tessa Martinez, Chris Kennedy, Natalie Pierson
Partners: National Science Foundation, Arizona State University

The Nature-based Solutions for Urban Resilience in the Anthropocene (NATURA) project links networks in Africa, Oceania, Europe, US-Canada, the Middle East and North Africa (MENA), Asia, Latin America and the Caribbean (LAC), and globally to enhance connectivity among the world's scholars and practitioners and improve the prospects for global urban sustainability. In 2023, USL Postdoctoral Fellow Loan Diep and Director Timon McPhearson continued developing The Global Roadmap for Urban Nature-Based Solutions to assess knowledge, challenges, and opportunities for innovation in research and practice within and across the world regions. Regional teams began compiling case studies to represent the state of NBS in their region while the core team conducted a systematic bibliometric and literature review of urban NBS. This initiative will result in a high-level report and a series of communications serving at both global and regional levels to facilitate innovation and the effective impact of urban NBS. NATURA also fosters the Early-Career Network, which has been building knowledge around innovative, participatory methods for nature-based solutions. They tested some of these methods in 2023 during a workshop in San Juan, Puerto Rico which will be compiled in a compendium that will be ready at the beginning of 2024. This upcoming spring (2024), the NATURA network will assemble for its final All Hands Meeting and a special Global Roadmap Meeting to synthesize findings and envision future actions and research.

ClimateIQ

Team: Timon McPhearson, Daniel Sauter, Chris Kennedy, Joseph Glesta, Victor Galaz, Ahmed Mustafa, Madhavi Jain, Anna Kramer, Luis Ortiz, Shammunul Islam, Eric Bonner
Partners: ClimaSens, Cary Institute of Ecosystem Studies, Beijer Institute / Stockholm Resilience Centre, George Mason University with support from Google.org

This year, the Urban Systems Lab team was awarded a $5 million grant from Google.org's Impact Challenge on Climate Innovation to further develop ClimateIQ. ClimateIQ is an AI-driven climate hazard assessment tool that combines advanced hydrological flood exposure modeling, atmospheric modeling for heat, humidity and drought, and extreme rainfall projections with data about critical infrastructure and socioeconomic conditions. The AI approach and massive data integration provide high-resolution, multi-hazard exposure information applicable across sectors and scales. This links direct human exposure and vulnerability assessments with evaluations of risk to critical infrastructure and services.

Members of the ClimateIQ team at the USL in New York City

with support from Google.org

Beijer Institute of Ecological Economics | Kungl. Vetenskaps Akademien The Royal Swedish Academy of Sciences

George Mason University

ClimaSens

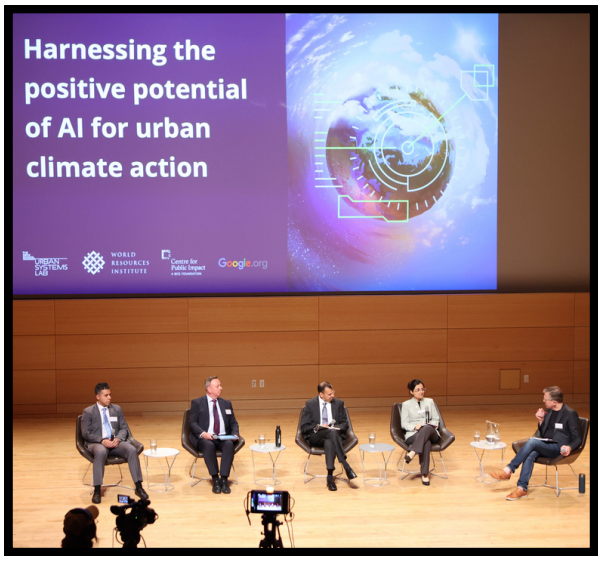
Cary Institute of Ecosystem Studies

ClimateIQ (continued)

The ClimateIQ initiative is in the early stages of development, but we anticipate the technology will enable cities and regions to prioritize investments and emergency planning spatially. This includes identifying areas of highest hazard exposure and taking climate justice action to prioritize solutions for the most vulnerable residents. Ultimately, ClimateIQ aims to impact large population segments in each region, but initial engagement focuses on key individuals in potential partner cities. Early metrics track the number of individual stakeholders directly involved in tool development. Google's support provides software, tools, and advanced technologies to improve the reach and scalability of ClimateIQ's impact such as Earth Engine, Cloud Platform, Data Commons, and advanced UI/UX dashboard development frameworks designed to improve reach and scalability of impact. Key components of the ClimateIQ effort include training climate modelers, machine learning researchers, and graduate students to utilize new AI methods and tools.

In September 2023, Director Timon McPhearson announced a partnership with New York City to pilot a beta version of the ClimateIQ app. This announcement occurred at a ClimateIQ event entitled “Harnessing the Positive Potential of AI for Urban Climate Action,” taking place at The New School’s Tishman Auditorium.

The ClimateIQ team brings extensive experience in climate risk modeling, AI applications, data analysis and visualization, and stakeholder engagement in cities. Led by Dr. Timon McPhearson, Director of the Urban Systems Lab at The New School in New York City, the core team includes faculty and researchers from The New School. It also includes partners from Climasens, Stockholm Resilience Centre, Beijer Institute of Ecological Economics, Cary Institute of Ecosystem Studies, and George Mason University.



Learn more at: https://climateiq.org/

Environmental Justice of Urban Flood Risk and Green Infrastructure Solutions

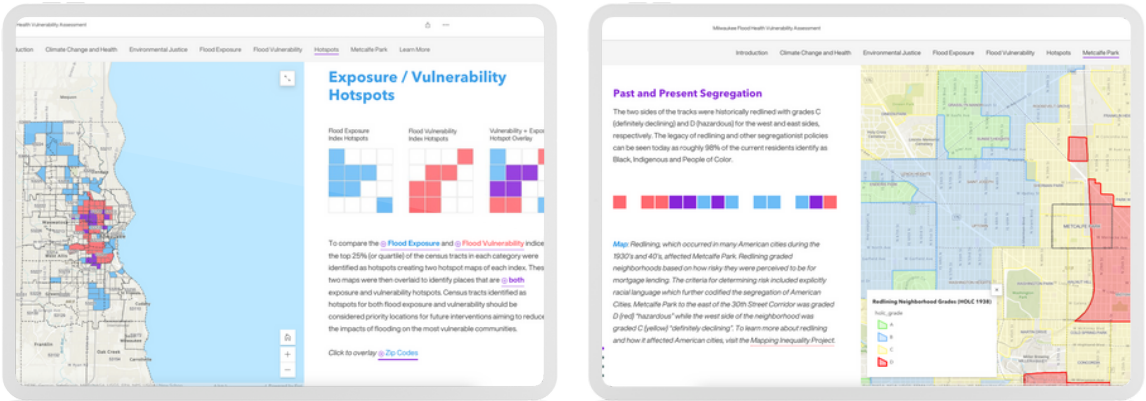
Team: Pablo Herreros Cantis, Timon McPhearson, Chris Kennedy, Sofya Krasnaya, Claudia Tomateo
Partners and Support: Groundwork Milwaukee, WE ACT, Groundwork USA, Groundwork Hudson Valley, Kresge Foundation

The Environmental Justice of Urban Flood Risk and Green Infrastructure Solutions project aims to understand environmental justice issues related to urban flooding in vulnerable U.S. cities. The project assesses social vulnerability across differently exposed areas to inform green infrastructure planning.

Since launching in 2019 with support from the Kresge Foundation, the Urban Systems Lab has helped to advance understanding of urban flooding's environmental justice implications. This is especially true in Milwaukee, Yonkers, and New York City. For example, we continued developing and disseminating the Milwaukee Flood Health Vulnerability Assessment with Groundwork Milwaukee. We worked closely with their Executive Director Kim Young and Climate Safe Neighborhoods Manager Deja Garner to discuss FHVA results and community engagement strategies for planning and advocacy. We continued to collaborate with Groundwork USA and Milwaukee on additional analysis to examine the relationship between flooding and formerly industrial contaminated sites in Milwaukee.

In 2023, the USL team was able to continue working with WE ACT for Environmental Justice to disseminate the Climate Ready Uptown Plan (CRUP) for Northern Manhattan, providing actionable emergency response information to vulnerable populations in the area.

Thanks to the support of our partners and Kresge Foundation, we continue to work with Groundwork Hudson Valley to understand how flooding impacts vulnerable communities in the City of Yonkers and the Saw Mill River Watershed. The USL continues to assist efforts to model the entire watershed area which in turns supports our provision of recommendations to County and City officials for areas where further analysis and interventions may be needed. Our prior modeling efforts are now included in **Yonkers Climate Action Plan**, and have been well received by municipal stakeholders and officials in helping to examine and visualize both social vulnerability and flood exposure in the region.



Screenshots of the Milwaukee Flood Health Vulnerability Assessment storymap

Town+Gown: Climate Vulnerability, Impact, and Adaptation Analysis (VIA)

Team: Timon McPhearson, Joel Towers, Drake Reed, Pablo Herreros Cantis, Luis Ortiz, Chris Kennedy
Partners: City of New York, Mayor's Office of Climate and Environmental Justice (MOCEJ), NYC Department of Citywide Administrative Services, Columbia University, Cornell University, City University of New York, Drexel University, Lamont Doherty Earth Observatory, Sarah Lawrence College, Science and Resilience Institute at Jamaica Bay, Stevens Institute of Technology, Natural Resources Defense Council, Population Council, NASA/GISS, USDA Forest Service, Arcadis

The Town+Gown NYC Climate Change Vulnerability, Impacts, and Adaptation Study (VIA), led by The New School's Timon McPhearson (Co-PI) and Joel Towers (Co-PI), brings together an interdisciplinary team of researchers, climate scientists, and professionals to work closely with the Mayor's Office of Climate and Environmental Justice, the NYC Panel on Climate Change, and Interagency Climate Taskforce to develop a comprehensive analysis of, and deliver data on, future climate conditions and associated socio-economic impacts in NYC.

This past year, the Task 2 team continued to develop climate projections for the NYC Region including Sea level rise and coastal flood projections and High resolution heat projections. The team also assessed Tropical Cyclone (TC) Sensitivity and compound climate events. The Task 3 team developed intensity-duration-frequency (IDF) curves for NYC to better understand current and future extreme heavy rainfall. This included an event ranking and historical trends analysis of observed heavy rainfall events. The Task 4 team also worked closely with members of the NPCC and other stakeholders to envision a systematic assessment of health-related economic costs including spatial distributions of vulnerability and distribution of economic costs.

Finally the Task 5 team worked with partners at the City to develop a Flooding Vulnerability Index (FVI) for NYC that reflects each of the three components of vulnerability: exposure to a hazard, harm from the exposure, and capacity to recover. A final report will be released in early 2024, and may inform development of the NYC Panel on Climate Change's 4th Assessment Report which will drive future climate policy and planning in NYC.

Civic-Led Urban Adaptation Research Center (CIVIC-UARC)

USL Team: Timon McPhearson, Luis Ortiz, Chris Kennedy, Natalie Pierson, Ishita Rahman
Partners: Cornell University and Cornell Tech, National Science Foundation, Hunter College (CUNY), Barnard College, George Mason University, USDA Forest Service, RISE and Universe City

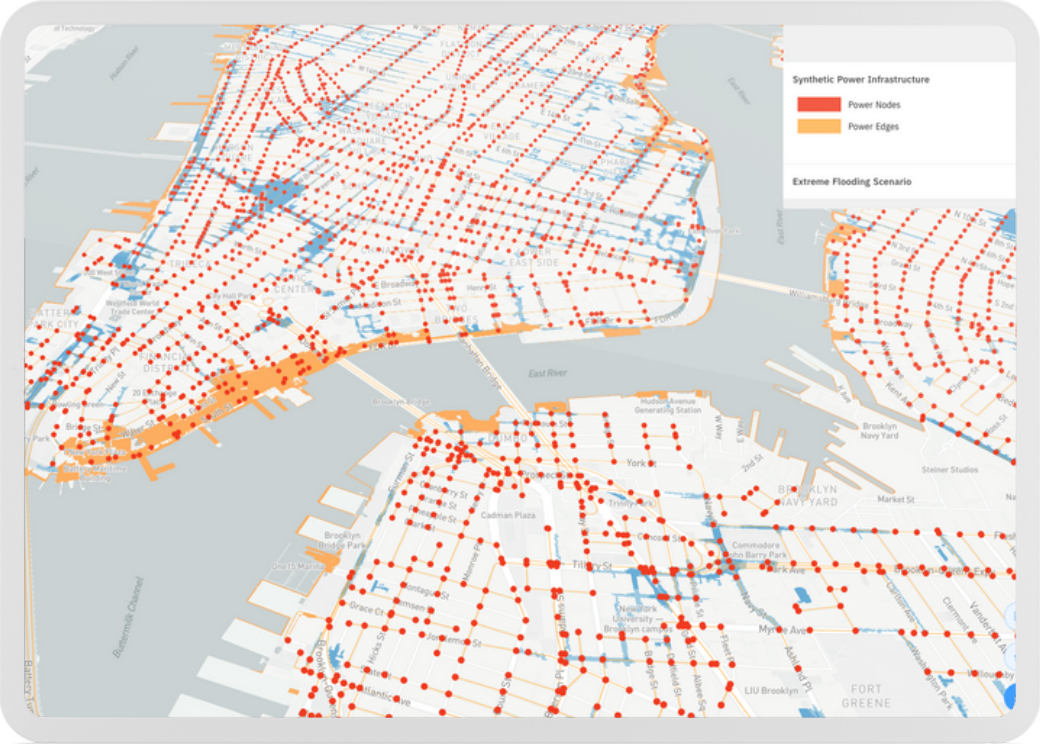
The USL is co-leading a National Science Foundation planning effort as part of the Catalyzing Human-Centered Solutions Through Research and Innovation in Science, the Environment and Society (CRISES program). The team is developing a plan for a new Civic-Led Urban Adaptation Research Center (CIVIC-UARC), which will foster new collaborations between an interdisciplinary team of urban experts and diverse institutions, work closely with civil society and public sector stakeholders, and use New York City as an urban laboratory. Our objective is to develop a model for coproduction of knowledge and solutions to address climate risks in cities, with special attention to environmental justice concerns. The work of the Center will train the next generation of climate adaptation scientists and scholars, build climate resilience capacities of local partners, and be a guide for other cities in the U.S. and around the world.

Synthetic Infrastructure (SyNF) Solutions to Improve the Sustainability of Energy Infrastructure Systems

Team: Ahmed Mustafa, Timon McPhearson, Daniel Sauter, Mikhail Chester, Ryan Hoff
Partners and Support: Sloan Foundation, Arizona State University, Georgia State University

This initiative brings together researchers at the Urban Systems Lab, Arizona State University (ASU) and Georgia State University (GSU) to co-develop synthetic infrastructure models for Phoenix, New York City and Atlanta that will simulate critical failure in energy distribution systems and potential cascading impacts on other power, water, and transportation infrastructure during extreme events to optimize solutions, and improve reliability and robustness. Since launching the effort last year the team has made significant progress toward development of synthetic infrastructure models for Phoenix and New York City, with continued scoping for Atlanta. The core team convened monthly to discuss key milestones, has worked in parallel teams including in-person research sprints, while also gaining access to critical datasets and resources needed to advance initial modeling and simulation.

Key interim outcomes include progress on model development, testing, and scenarios, publication of methods in peer-reviewed journal articles, multiple conference presentations, attending the Sloan Energy Insights summit in Washington, D.C., training of multiple graduates students in synthetic infrastructure modeling, one PhD dissertation completed, and one postdoctoral scientist trained.

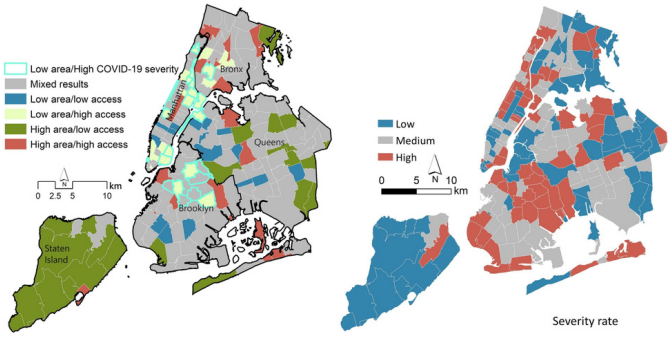


City of New York Synthetic Power Infrastructure. Urban Systems Lab OCELLUS Platform

PUBLICATIONS

Journal Articles

Mustafa, A., Kennedy, C., Lopez, B., & McPhearson, T. (2023). **Perceived and geographic access to urban green spaces in New York City during COVID-19**. *Cities*, 143, 104572. https://doi.org/10.1016/j.cities.2023.104572



Chester, M. V., Miller, T. R., Muñoz-Erickson, T. A., Helmrich, A. M., Iwaniec, D. M., McPhearson, T., Cook, E. M., Grimm, N. B., & Markolf, S. A. (2023). **Sensemaking for entangled urban social, ecological, and technological systems in the Anthropocene**. *Npj Urban Sustainability*, 3(1), Article 1.

Hirye, M. C. M., Alves, D. S., Filardo Jr., A. S., McPhearson, T., & Wagner, F. (2023). **Assessing Landslide Drivers in Social–Ecological–Technological Systems: The Case of Metropolitan Region of São Paulo, Brazil**. *Remote Sensing*, 15(12), Article 12.

Hoover, F.-A., Meerow, S., Coleman, E., Grabowski, Z., & McPhearson, T. (2023). **Why go green? Comparing rationales and planning criteria for green infrastructure in U.S. city plans.** *Landscape and Urban Planning,* 237, 104781.

Wang, J., McPhearson, T., Zhou, W., Cook, E. M., Herreros-Cantis, P., & Liu, J. (2023). **Comparing relationships between urban heat exposure, ecological structure, and socio-economic patterns in Beijing and New York City.** *Landscape and Urban Planning*, 235, 104750

Pineda-Pinto, M., Kennedy, C., Collier, M., Cooper, C., O'Donnell, M., Nulty, F., & Castaneda, N. R. (2023). **Finding justice in wild, novel ecosystems: A review through a multispecies lens**. *Urban Forestry & Urban Greening*, 127902.

Ghermandi, A., Langemeyer, J., Van Berkel, D., Calcagni, F., Depietri, Y., Egarter Vigl, L., Fox, N., Havinga, I., Jäger, H., Kaiser, N., Karasov, O., McPhearson, T., Podschun, S., Ruiz-Frau, A., Sinclair, M., Venohr, M., & Wood, S. A. (2023). **Social media data for environmental sustainability: A critical review of opportunities, threats, and ethical use.** *One Earth*, 6(3), 236–250.

Grabowski, Z. J., McPhearson, T., & Pickett, S.T.A. (2023). **Transforming US urban green infrastructure planning to address equity.** *Landscape and Urban Planning*, 229, 104591.

Books and Book Chapters

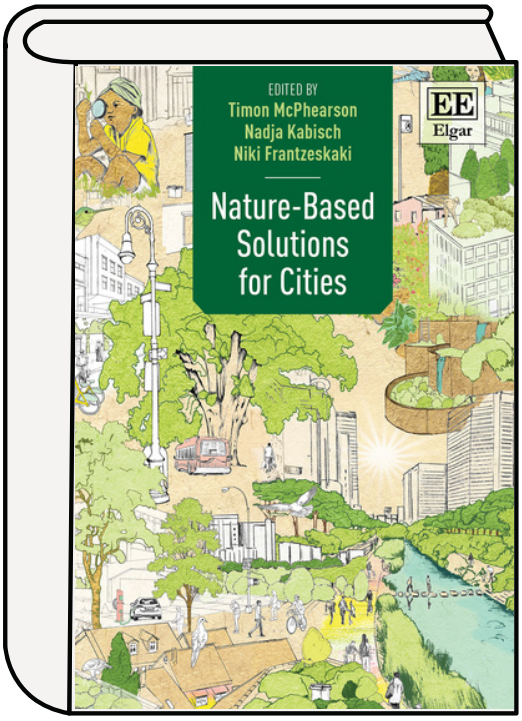
Nature-based Solutions for Cities

Edward Elgar Publishing, 2023 | Edited by:

Timon McPhearson

Nadia Kabisch

Niki Franzeskaki



Illustrations by Alyssa Dennis

Nature-based Solutions for Cities brings diverse perspectives from across the globe to describe the state of the art in advancing NBS for cities. This book provides a handbook for graduate students, early career professionals, and emerging and advanced scholars to begin working with NBS in ways that consider multiple perspectives, disciplines, and ways of knowing. Together, the chapters led by experts in both global south and north contexts, aim at understanding how NBS can be better managed, planned, and engaged with, and to center questions of NBS for whom and for what? Chapters Describe key knowledge and learning for advancing the interdisciplinary science of NBS in, for, and with cities and discuss the frontiers for next-generation NBS.

Key chapters co-led by USL members include:

McPhearson, T., Kabisch, N., & Frantzeskaki, N. (2023). **Nature-based solutions for sustainable, resilient, and equitable cities.** In Nature-Based Solutions for Cities (pp. xviii–11). *Edward Elgar Publishing.*

McPhearson, T., Andersson, E., Grilo, F., Lopez, B., & Zein, N. (2023). **Urban ecological resilience: Ensuring urban ecosystems can provide nature-based solutions**. In Nature-Based Solutions for Cities (pp. 49–81). *Edward Elgar Publishing.*

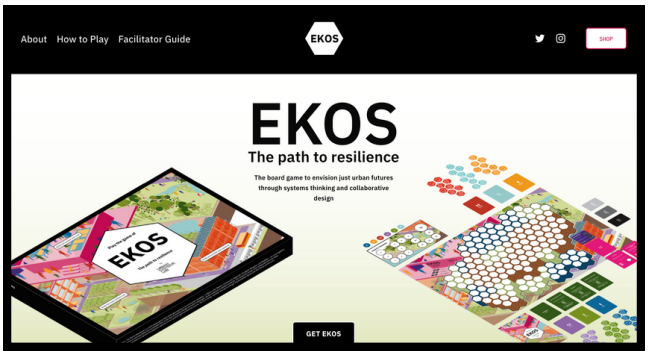
Kennedy, C., Irons, E., & Watts, P. L. (2023). Ecological art in cities: **Exploring the potential for art to promote and advance nature-based solutions.** In Nature-Based Solutions for Cities (pp. 316–339). *Edward Elgar Publishing.*

McPhearson, T., Kabisch, N., & Frantzeskaki, N. (2023). **Towards mainstreaming nature-based solutions for achieving biodiverse, resilient, and inclusive cities.** In Nature-Based Solutions for Cities (pp. 363–375). *Edward Elgar Publishing.*

PRODUCTS

Ekos Website

Ekos is a collaborative sustainable cities board game where a group of community members must come together to design and build a network of resilient systems, and envision a more equitable and sustainable city in the face of climate change and other challenges. This year, Urban Systems Lab set up the Ekos website for easier access to purchase the game, learn the rules, and a new facilitator's guide. The facilitator's guide has a summary of the key ideas explored in Ekos with additional resources and readings, suggested activities, and recommendations for how to assess learning as participants engage with game materials.



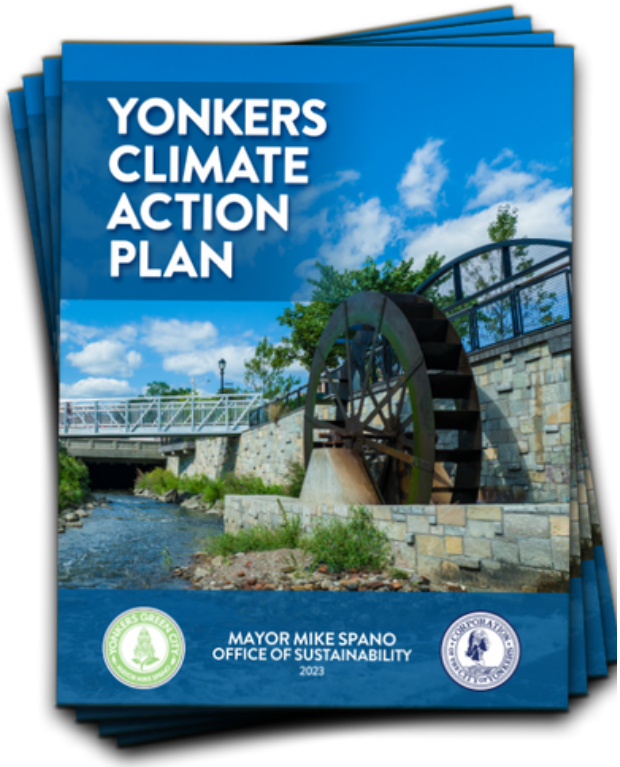
www.ekosgame.com

Ocellus XR

Ocellus XR is a mixed reality application that leverages the Urban Systems Lab's Data Visualization Platform to present users with unique interactive geospatial maps of heat, flood risk and other climate indicators in New York City. The app explores climate indicators such as heat and flood risk in a novel 3D interactive mapping environment, experiments with first person augmented reality on the streets of New York City, projects maps onto a physical surface displaying social, ecological and technological data layers with stakeholders and communities, and allows users to view proposed green infrastructure projects and explore climate solutions.

urbansystemslab.com/ocellusxr

Download Ocellus XR with the QR code.
Only available on iOS.

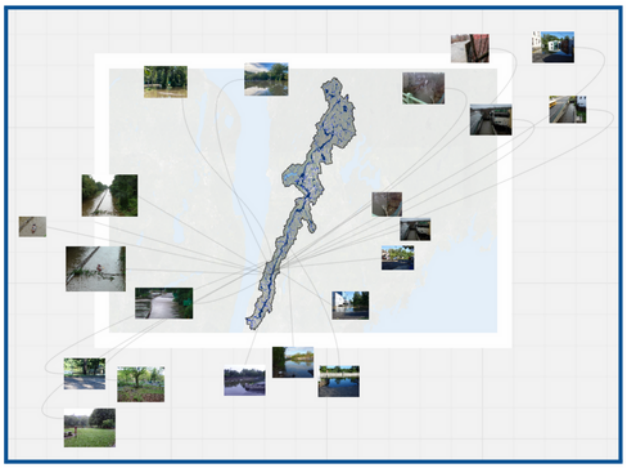


City of Yonkers Climate Action Plan

In 2023, The City of Yonkers Climate Action Plan used the Urban Systems Lab's 100-year rain event model, developed as part of Groundwork Hudson Valley's Climate Safe Neighborhoods program, to predict flood risk in Yonkers and inform a plan for reducing energy consumption, greenhouse gas emissions, and improving residents' quality of life.

Flood Risk Modeling in the Saw Mill River Watershed

Prepared by Pablo Herreros Cantis and Christopher Kennedy from the Urban Systems Lab and Ellen Theg from Groundwork Hudson Valley and supported by a grant from HREP, 'Flood Risk Modeling in the Saw Mill River Watershed' is a flood risk assessment report for the Saw Mill River Coalition and Westchester County. The report is specifically intended to help the watershed community prepare for the consequences of a warmer, wetter, and more extreme climate and potential catastrophic flooding associated with anticipated regional and global atmospheric changes.



GROUNDWORK Hudson Valley

NEW YORK STATE Department of Environmental Conservation

NEW YORK STATE Department of Environmental Conservation | Hudson River Estuary Program

NEWS & PUBLIC ENGAGEMENT

December 2023

Urban Systems Lab Supports the COP28 UN Climate Conference Joint Statement "The Science is Clear: We Need Net Zero Carbon Dioxide Emissions by 2050"
Director Timon McPhearson joined scientists worldwide for a joint statement organized by Future Earth and the World Climate Research Programme in response to comments regarding fossil fuel phaseout pathways. The statement titled, "The Science is Clear: We Need Net Zero Carbon Dioxide Emissions by 2050" explains how a phase-out of fossil fuels is necessary to keep the 1.5°C goal of the Paris Agreement within reach.

September 2023

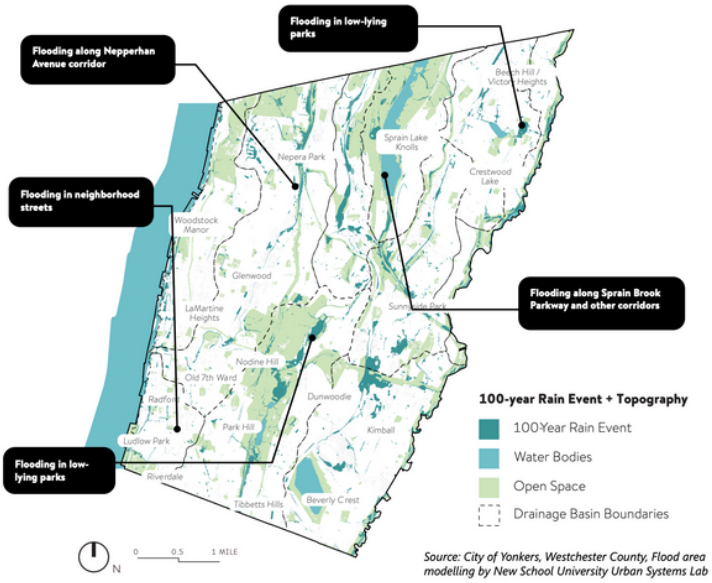
The New School's Urban Systems Lab, City of New York, Climasens and partners launch development of ClimateIQ, an AI-enabled, Urban Climate Risk Tool - *September 22, 2023*
This September The New School's Urban Systems Lab announced the continued development and scaling of ClimateIQ, an Artificial Intelligence (AI) powered climate risk evaluation tool built on multiple urban climate hazard models. The ClimateIQ team is partnering with the City of New York to test and validate the AI modeling environment. The development of ClimateIQ is being led by Dr. Timon McPhearson at The New School's Urban Systems Lab and a team of scientists and designers through a $5M award from Google.org's Impact Challenge on Climate Innovation. A launch event was organized with partners at the World Resources Institute and Centre for Public Impact at The New School's Tishman Auditorium in New York City.

August 2023

USL Releases Ocellus XR, a New App Using Augmented Reality to Understand Climate Risks in NYC
- August 1st, 2023
The New School's Urban Systems Lab launched Ocellus XR, an interactive mixed-reality mobile app that provides users in New York City with heat, flood risk, and other climate indicators. The app enables New Yorkers to understand their local climate risk, learn how to prepare for extreme weather, and advocate for equitable interventions and green infrastructure. Ocellus XR aims to center the voices of frontline communities and those most vulnerable to climate hazards while providing a free and easy-to-use tool to advance decision-making for equitable climate adaptation. Information and graphics for the "What Can You Do Section" of Ocellus XR was developed by WE ACT for Environmental Justice, the East Harlem COAD, and the Harlem Emergency Network as part of the Climate Ready Uptown Plan (CRUP).

June 2023

USL research featured in City of Yonker's Climate Action Plan - *June 29th, 2023*
Urban Systems Lab data and insights led by Research Fellow Pablo Herreros Cantis and co-produced with Groundwork Hudson Valley through a project funded by the Kresge Foundation was included in the City of Yonker's Climate Action Plan. The plan utilized the Lab's 100 year rain event model (rather than FEMA flood zones) developed for Groundwork Hudson Valley's Climate Safe Neighborhoods program. This model offers a finer grain analysis of assets at risk than the FEMA flood zones alone and also provides insight into social vulnerability, and characterizing flood risk to actually propose specific measures in concrete locations.



April 2023

USL's Timon McPhearson Receives ESA 2023 Sustainability Science Award - *April 26, 2023*
The Ecological Society of America (ESA) presented the 2023 Sustainability Science Award to Thomas Elmqvist, Erik Andersson, Niki Frantzeskaki, Timon McPhearson, Per Olsson, Owen Gaffney, Kazuhiko Takeuchi and Carl Folke for their article "Sustainability and resilience for transformation in the urban century," published in 2019 in Nature Sustainability. The Sustainability Science Award recognizes the authors of the scholarly work that makes the greatest contribution to the emerging science of ecosystem and regional sustainability through the integration of ecological and social sciences.

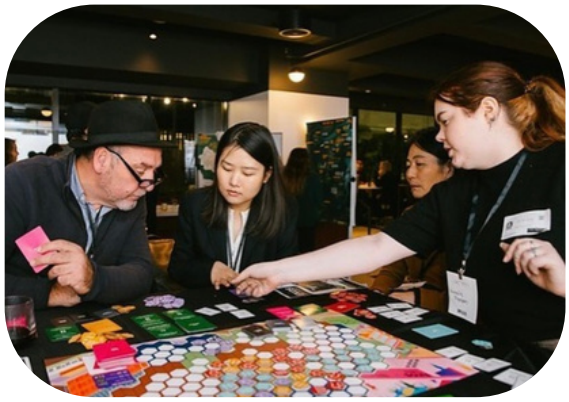
February 2023

USL's Timon McPhearson featured in new Discovery+ Docuseries, "Brink of Disaster"
- February 9, 2023
Dr. Timon McPhearson, alongside colleagues studying climate change, was featured in a new documentary series on Discovery+ called "Brink of Disaster". The three part series explores how cities are coping and preparing for hurricanes, storm surges, earthquakes and sea level rise, and what the latest science and tech can do to help. Dr. McPhearson was featured in "Episode 1: New York Superstorms".

EVENTS & CONFERENCES

October 2023

The Urban Systems Lab presented our game Ekos at the FUTURE Forum Night Lab, a social space that showcases projects from a wide range of disciplines with community-centered and creative approaches to raise awareness of different forms of urban, ecological, and cultural resilience. Dozens of people were introduced to and participated in an Ekos game led by director Timon McPhearson and lab manager Natalie Pierson, where they learned how to collaborate to build social, ecological, and technological systems (SETS), and responded to a diverse range of events.



Natalie Pierson (right) from Urban Systems Lab, The New School at the Future Forum Night Lab

September 2023

Timon McPhearson from Urban Systems Lab, The New School presenting at “Harnessing the Positive Potential of AI for Urban Climate Action”

On September 21st, 2023 The Urban Systems Lab presented at “Harnessing the Positive Potential of AI for Urban Climate Action” organized by The New School, Google.org, the Centre for Public Impact, and World Resources Institute (WRI). This event began with live demonstrations of two novel solutions: ClimateIQ from USL and large language models from WRI. This was followed by a panel discussion with Commissioner Rohit T. Aggarwala from the NYC Department of Environmental Protection, Secretary General Gino Van Begin from ICLEI, Interim Director Jaya Dhindaw of WRI, and Head of Crisis Response & Humanitarian Aid Alexander DIaz from google addressing the potential and challenges of leveraging technologies like Artificial Intelligence (AI) to accelerate climate action including data privacy, environmental impacts of AI, and the untapped potential of AI for adaptation strategies.

WORLD RESOURCES INSTITUTE

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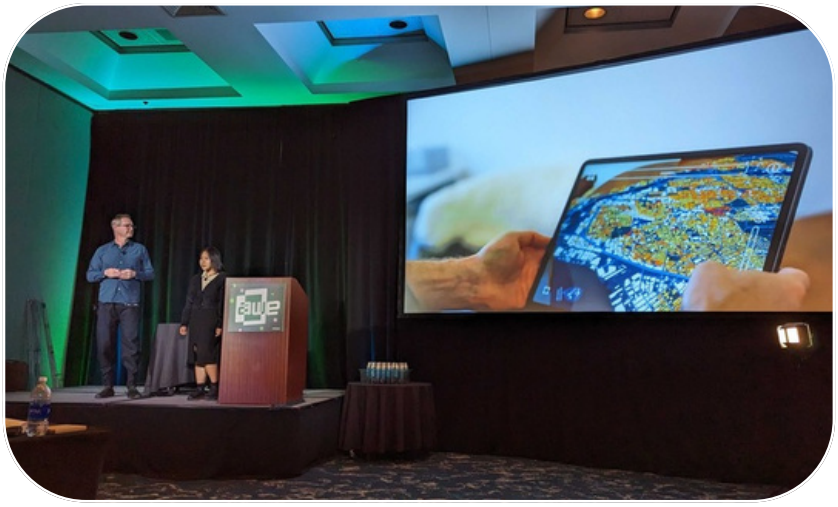
August 2023

Dr. Loan Diep and Timon McPhearson organized a session at this year's Ecological Society of America conference in Portland, Oregon titled “Finding Pathways for Urban Nature-Based Solutions Across the World's Regions.” Many speakers presented their knowledge on this topic, including Loan Diep and Rebecca Tiernan from Arizona State University, who gave progress updates and initial findings from the NATURA Global Roadmap. Loan Diep also authored a presentation with Taícia Marques from Universidad Nacional Agraria La Molina titled “Opportunities and Challenges to Multi-Scalar Nature-Based Solutions for Cities in Latin America & the Caribbean.” Associate Director Chris Kennedy, PhD Candidate Filipa Grilo, and Faculty Fellow Erik Andersson were part of a session exploring traits-based approaches to understanding nature-based solutions.

May 2023

The Urban Systems Lab’s product Ocellus XR was selected as a finalist for the Augmented World Expo (AWE) “XR Prize Challenge'', a $100K global competition harnessing AR and VR (XR) solutions to help fight climate change. Ocellus XR is a mixed reality application that leverages the USL’s Data Visualization Platform to present users with unique interactive geospatial information of heat, flood risk and other climate indicators in NYC, co-led by Daniel Sauter, Elena Peng, Timon McPhearson, Joe Steele, Claudia Tomateo, Chris Kennedy and other researchers from The New School. In April, USL welcomed colleagues from the Urban Design Forum, WE ACT for Environmental Justice, as well as students from Joel Tower’s course at the Parson School of Design to participate in an observation session for OCELLUS XR.



Daniel Sauter (left) and Elena Peng (right) presenting Ocellus XR as a finalist at the XR Prize Challenge.

April 2023

Members of the NATURA Worldviews Thematic Working Group joined members of the Urban Systems Lab for a weeks-long workshop. The workshop explored how the lack of operationalization of diverse relational worldviews in urban nature-based solutions reduces the range of possible future pathways and ultimately, can lead to a failure of sustainability transformation. Led by Melissa Ingaruca, Loan Diep, Alex Putzer, David Iwaniec, Davide Geneletti, Elizabeth Cook, Mariana Hernandez, Chris Raymond and others.

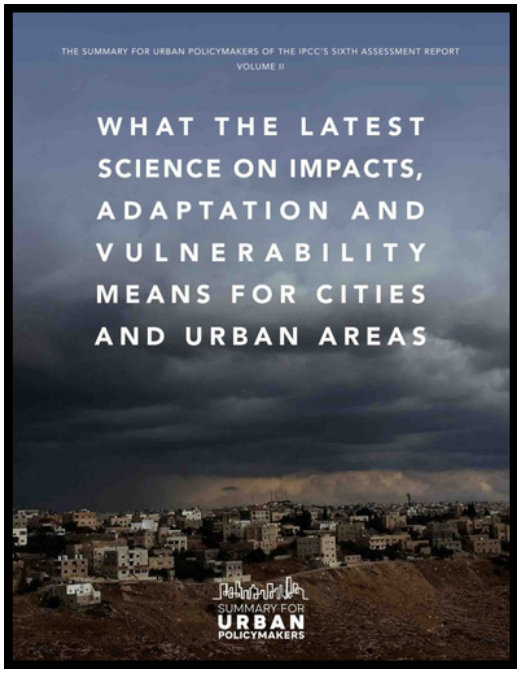
March 2023

On March 30th, 2023 researchers from the Tishman Environment and Design Center and the Urban Systems Lab engaged in a conversation exploring new research on environmental policy, sustainability and urban resilience. Yukyan Lam and Anna Yulsman from the Tishman Center presented a Delaware-based case study investigating whether low-income communities and communities of Color are benefiting from renewable energy rebates to the same extent as other communities. Loan Diep presented her research on the conceptualization and politics of green infrastructure in informal settlements in Brazil. Together, the speakers discussed how their work converged, how climate adaptation and clean energy efforts both contribute toward and detract from social and racial equity, and assessed areas for future research and inquiry.


Yukyan Lam


Anna Yulsman


Loan Diep



UN Report: Summary for Urban Policy Makers

On March 29th, 2023 Speakers Aromar Revi from the Indian Institute for Human Settlements (IIHS), Jagdish Krishnaswamy from IIHS, Seth Shultz from Resilience Rising, and director of Urban Systems Lab Timon McPhearson discussed how the opportunity for effective, efficient and rapid action in cities depends on accessible, actionable science at the city scale. Panelists broke down and highlighted key messages of the Summary for Urban Policymakers (SUP), a three-volume series of scientific reports that distill the most relevant climate science for urban actors from the IPCC's Sixth Assessment Reports. Panelists concluded by elaborating on how cities can accelerate and deepen climate action towards climate-resilient development in the next few decades.

PRESS

October 11, 2023
Leveraging Artificial Intelligence To Raise the Urban 'Climate IQ' - **Urban Matters**

October 3, 2023
NYC's broken flood mitigation strategy comes into focus at a critical time - **Archinect**

September 30, 2023
How do you prepare a city like New York for major floods? - **Vox**

September 19, 2023
$5m grant to fund development of AI-driven climate risk intelligence tool - **University of Melbourne**

September 15, 2023
Melbourne startup Climasens bags $5 million Google.org grant for AI-driven climate risk tool - **SmartCompany**

September 15, 2023
AI-Driven Climate Risk Evaluation Tool Developed by Climasens and Urban Systems Lab - **Clayton County Register**

September 13, 2023
The New School's Urban Systems Lab, City of New York, Climasens and partners launch development of ClimateIQ, an AI-enabled, Urban Climate Risk Tool - **New School News**

September 7, 2023
Exploring the urban ecosystem: A dialogue with Dr. Timon McPhearson on past, present, and future trends - **Yale Environment Review**

August 31, 2023
The New School's Urban Systems Lab Launches Ocellus XR App for Visualizing Climate Risk in New York City - **New School News**

July 26, 2023
Many Milwaukeeans live in a heat island, and 'we can't air condition our way out of this' - **Milwaukee Journal Sentinel**

May 3, 2023
$100,000 XR Prize Challenge: Fight Climate Change Finalists Announced, Demos to Be Showcased at AWE 2023 - **PR Newswire**

May 1, 2023
Ron Johnson said climate change could be good for Wisconsin. Experts disagree. - **Milwaukee Journal Sentinel**

February 10, 2023
New York City Buildings Largely Missing Green Roof Mandate - **ALM Globest**

February 6, 2023
Many plans for green infrastructure risk leaving vulnerable people out - **Science News**

February 1, 2023
New tree plantings in NYC fall to lowest level in 15 years - **Gothamist**

SUPPORT

The Urban Systems Lab receives generous support from The New School, Google.org, The Kresge Foundation, U.S. National Science Foundation, Sloan Foundation, The City of New York, WE ACT for Environmental Justice, New York State DEC/WRI Cornell, New York State Department of Environmental Conservation, Hudson River Estuary Program and Groundwork Hudson Valley. **Thank you to all our supporters!**

National Science Foundation
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THE KRESGE FOUNDATION

NYC DCAS
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NYC Mayor's Office of Climate & Environmental Justice

NEW YORK STATE WATER RESOURCES INSTITUTE
Cornell University

ALFRED P. SLOAN FOUNDATION

WE ACT FOR ENVIRONMENTAL JUSTICE

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2023 IN PHOTOS

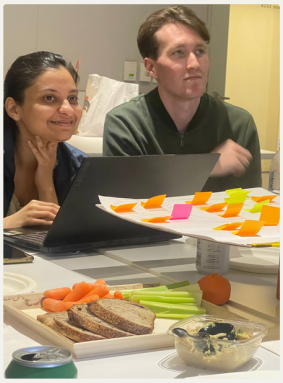
@ New School TEDC Event

Enjoying a round of Ekos!

USL Fall 2023 Retreat

Urban Systems Lab Fall 2023 Dinner

Lab meeting discussion



NATURA Workshop in San Juan, PR

USL Fall 2023 Retreat at Pound Ridge Reserve, NY

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