

NATURA Annual Report 2021-22

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

National Science Foundation

Grant No. (Grant #1927468 and #1927167).



Accomplishments

Major Goals of the project

- Expand our network of networks to share knowledge and best practices about nature-based solutions in diverse socio-cultural, ecological-biophysical, and technological-infrastructure contexts across the research–practice divide
- Share ideas and data on research and implementation in multiple contexts to generate and disseminate synthesis of state-of-the-science knowledge about the role of nature-based solutions in social, ecological, and technological strategies for urban resilience challenges
- Establish and maintain lines of communication among research and practitioners in global networks to propel improvements in professional capacity and cross-sectoral collaboration
- Increase the capacity of the next generation of urban scholars to conduct and communicate interdisciplinary research on resilience concepts and nature-based solutions, and to integrate this work into transdisciplinary planning and implementation of nature-based solutions
- Provide a mechanism for practitioners to learn about interdisciplinary research on nature-based solutions that are more locally relevant to the decisions they make in their cities.
- Advance professional learning opportunities for undergraduate and graduate students through a partnership with Resilient Urban Latin America International Research Experience for Students (RULA IRES).

Major Activities:

2022 NATURA All-Hands Meeting:

- The 2022 NATURA All-Hands Meeting (AHM) took place in-person in Malta from April 4-6 2022, with a total of 48 participants representing 26 networks, including 21 early-career members. The event enabled NATURA to consolidate current and future activities and solidify its mission.
- Over three days, the sessions were organized in a way that allowed every participant to engage in different manners as: 1) network representatives to share their mission and activities during round robin sessions; 2) regional representatives to share regional knowledge during a global roadmap workshop; 3) members of specific group projects to present progress and results during lightning talks; 4) individual researchers and practitioners to engage with different nature-based solutions themes and co-develop new projects during breakout group discussions; and 5) NATURA members to engage with the network’s goals and exchange ideas during plenary sessions.
- Our Early Career Network members also had a chance to present their research. This included presentations from Megan Maurer (ENVISION, VIVA-Plan network); Zbigniew Grabowski (SETS Convergence network); Joeri Morpungo (Natural Capital Project); Yuliya

Dzyuban (URExSRN); Konrad Buzinski (UNESCO European Regional Centre for Ecohydrology); Cassie Murphy (GoGreenRoutes); Matteo Giusti (Future Position X); Claire Cooper (NATURVATION); Melissa Ingaruca Moreno (ECN); and Laura Costadone (ECN).

- See the report detailing the outcomes from this meeting in the supporting documents.

Formation of Thematic Working Groups:

- After proposal review by the NATURA Steering Committee in June 2022, three new Thematic Working Groups (TWGs) were launched. The first, “Transforming SETS for Equity & Justice in nature-based solutions,” aims to generate a framework that conceptualizes care-full justice in nature-based solutions from a SETS perspective to analyze situated ethical entanglements. The second, the “Worldviews Thematic Working Group,” aspires to provide an open and reflexive space for diagnosing and critically assessing diverse worldviews underlying urban nature-based solutions in environmental policy, urban planning, and design. The third, “Utilizing the eLTER,” brings together researchers and practitioners of nature-based solutions in NATURA networks with the European Long-Term Ecological Research (LTER) network and to leverage NSF urban LTER networks in NATURA.

Regular Thematic Working Group and Early-Career Network meetings:

- Ten Thematic Working Groups (approx. quarterly) and the Early-Career Network (monthly) meet regularly to share ideas, publications, and to work on group publications and projects.
- This year two TWGs were able to conduct in-person meetings to advance their research goals. This included an April 2022 meeting of the Local to Global TWG led by Jennifer Rae Pierce, which enabled the development of a policy brief entitled “The Urban Butterfly Effect.” The Ecological Resilience and Traits WG also had an opportunity to convene a meeting in Stockholm in June 2022, enabling the team to work collaboratively on developing a traits-based framework for assessing ecological resilience in urban areas. The remaining TWGs have been able to meet virtually, and some TWGs took advantage of existing meetings (TNOC Festival, March 2022; NATURA All Hands Meeting, April 2022; and LTER All-Scientists Meeting, September 2022) to make progress on their goals. A call for in-person meeting requests (for existing TWGs) has been issued with a deadline of October 3, 2022.
- Under the leadership of Postdoctoral Fellow Loan Diep, the ECN has resumed regular meetings with a significant increase in membership and interest in research activities now underway.

Monthly NATURA webinars:

- The monthly NATURA webinar series offers attendees the opportunity to get an overview of networks new to NATURA and to learn about the progress of the TWGs or other activities (fellowships). Each webinar consists of two presentations followed by a Q&A session where attendees can ask questions and build connections among networks. During the 2021-2022 reporting period, NATURA organized eight webinars including 21 speakers from across the network of networks (see attached Table).

Regular NATURA regional nodes meetings:

- NATURA comprises five regional nodes: Asia-Pacific, Africa, Latin America, North America, and Europe. Regional nodes are led by co-PIs or core personnel; Weiqi Zhou and Yeowon Kim co-lead the Asia and Pacific network node, Pippin Anderson leads the Africa network node, Elizabeth Cook and Jordi Morato lead the Latin America network node, Nancy Grimm leads the regional North America network node, and Timon McPhearson leads the Europe network node. The regional leads are responsible for ensuring their networks remain active and integral to NATURA’s full suite of networks. The regional leads hold quarterly virtual meetings for their networks to share updates and propose new cross-network collaborations.
- The NATURA executive team has also started the process of forming two additional regional nodes, including one for the Middle East / North Africa, and one to better represent researchers in both Asia and the Oceania region (Australia, Melanesia, Micronesia, and Polynesia). We anticipate the Oceania node to be led by Dr. Dave Kendall. Our aim is to fill current research gaps and provide a more focused geographic region for research among the NATURA network and networks. In addition, our project-wide Global Roadmap activity will be coordinated within this structure of seven regional nodes.

NATURA Global Roadmap Project:

- This “overarching” project aims at supporting the mainstreaming of nature-based solutions globally, based on a synthesis of current urban nature-based solutions knowledge and implementation. The Global Roadmap for Urban nature-based solutions is being framed as the missing link for a global agenda on urban nature-based solutions between the Convention on Biological Diversity (UN-CBD), the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and other bodies driving global policy agendas, while also supporting regional, national, and local policymaking and planning by bridging key examples and learnings on nature-based solutions.
- The project involves the wider network through the regional nodes and is coordinating with ongoing initiatives, notably the EU nature-based solutions Roadmap and the United Nations Convention on Biological Diversity’s Cities Biodiversity Outlook III (which NATURA co-leads) in parallel. The project plan and timeline was developed this year. The regional task forces are currently being consolidated to start activities during the fall period of 2022.

Monthly NATURA newsletter:

- The NATURA newsletter is released once a month and highlights opportunities (including paid positions and educational trainings), resources, publications, presentations, events, and other relevant items pertaining to nature-based solutions around the world.

Weekly posting to NATURA Twitter account:

- The NATURA Twitter account shares publications, opportunities, and events of interest with the NATURA network and others.

Executive Team and Coordinating Committee:

- The NATURA Executive Team meets biweekly and the Coordinating Committee meets quarterly. The Executive Team includes PIs Nancy Grimm, Elizabeth Cook, and Timon

McPhearson; Coordinators Tessa Martinez and Christopher Kennedy; postdoctoral fellow Loan Diep, and former postdoctoral fellow Yeowon Kim. They address day-to-day issues concerning NATURA, and review and make decisions on TWG, workshop, and fellowship applications.

- The Coordinating Committee discusses new directions for NATURA and reviews and approves new member networks. Its members include the Executive Team and representatives from NATURA regions: Pippin Anderson, Marcus Collier, Jordi Morató, Weiqi Zhou, and Dave Kendal.

Specific Objectives:

- Expand the scope and advance research exchange on urban nature-based solutions by supporting thematic working groups (TWG) and regional nodes.
- Increase early career and graduate student opportunities for research and network exchange
- Advance research on nature-based solutions in the Global South
- Expand host networks who will support research fellowships for early-career scholars and practitioners
- Develop state-of-the-art regional knowledge for training undergraduate and graduate students on nature-based solutions leveraging expertise across the global network. This includes development of a new book co-edited by co-PI McPhearson and other NATURA members, “Nature-based Solutions for Cities”, forthcoming from Edward Elgar Publishing.
- Advance network interactions to build a global case-study database of nature-based solutions and to highlight research gaps for advancing knowledge for action on urban nature-based solutions for climate resilience
- Disseminate findings to diverse stakeholders, researchers, and networks through manuscript and white paper development and virtual and in-person events, conferences, and working-group exchanges
- Cultivate knowledge exchange among network members through an in-person All Hands Meeting

Significant Results:

Table 2. List of webinars hosted by NATURA during the 2021-2022 reporting period.

Webinar Date	Presenter	NATURA Network or TWG
October 12, 2021	Nea Pakarinen	ICLEI Europe network
November 17, 2021	Jennifer Pierce Sabrina Drill	Global to Local TWG

	Thomas Elmqvist Rob McDonald Oliver Hillel	Urban Nature TWG
	David Iwaniec Nancy Grimm Marta Berbés-Blázquez Niki Frantzeskaki	Nature-Based Pathways TWG
December 14, 2021	Chingwen Cheng	Design for Justice TWG
	Duván Hernán López	Urban Informality and Innovation for Resilient Futures TWG
January 11, 2022	Mike Treglia, Emily Maxwell and Natalia Piland	The Nature Conservancy network
	Mariana Vidal Merino	PlanAdapt network
	David Maddox	The Nature of Cities
February 8, 2022	Clive Davies	The European Forum on Urban Forestry network
March 8, 2022	David Iwaniec	SETS Convergence network
May 5, 2022	Clair Cooper Laura Costadone Melissa Ingaruca Moreno	Early Career Fellowship Presentations
September 13, 2022	Jennifer Rae Pierce Pablo Arturo López Guijosa Katinka Wijsman Marta Berbes	Global to Local TWG Early-Career Network

Regional Nodes

- *NATURA Asia-Pacific Regional Node:* Members continue to work on knowledge exchange on applications of NBS for urban flooding mitigation and adaptation in the context of the Asia-Pacific through journal articles. The group membership has been expanding by having more participation of early-career researchers and broader geographic coverage.
- *Africa Regional Node:* The regional node lead, Pippin Anderson, facilitated an ICLEI-led discussion as part of the [RISE AFRICA Festival](#) on the issue of language used on the continent in relation to NBS. This fruitful discussion and its findings will be published in due course. The node was represented by both panelists (Shuaib Lwasa, Franklin Kirimi, Pearl Gola, Jessica Kavonic, and Veronica Fortune) and participants. Two publications are being developed, one showcasing NBS from ICLEI work in Malawi, and another a review of NBS work across the continent.
- *European Union Regional Node:* The European node is aligning activities with all other European activities around nature-based solutions, most notably with NetworkNature, which has developed a European NBS Global Roadmap. One of the connections is the European branch of the global nature-based solutions Roadmap (now headed by Natalie Gulsrud and Davide Geneletti), paralleled by an European NBS Roadmap led by the network BiodivERSA.
- *North American Regional Node:* This regional node met twice over the year, and welcomed two new network members from Canada. Our initial group of networks lacked Canadian representation, but since our first NATURA postdoc as well as a UREX SRN member have taken positions at Canadian universities, we expect this part of the network to grow. The North American node is planning to engage fully in the Global Roadmap work beginning in fall 2022.
- *Latin America Regional Node:* The Latin America Regional node activities primarily took place through the Urban Informality working group and the NATURA RULA IRES (Resilient Urban Latin America International Research Experience for Students) program. The Urban Informality WG hosted Latin American focused sessions on nature-based solutions at COP26 in Glasgow (Nov 2021) and The Nature of Cities Festival (virtual, March 2022). In 2021-2022, the NATURA RULA IRES took place in Guayaquil Ecuador (see “opportunities for training...”). Finally, the Latin American Regional Node leads collaborated on a literature review and synthesis of NBS in Latin America, and plan to expand and invite additional Latin American collaborators.

Early Career Network (ECN):

- The ECN has provided continued support to early-career professionals through regular virtual meetings, emails, and Slack messaging to promote networking and career opportunities, share learning materials, and offer peer-to-peer support.
- The ECN hosted a session at the All Hands Meeting in Malta with 19 EC researchers and practitioners from different regions of the world who proposed ideas for the EC network’s future activities (listed below under ECN’s activities for Year 3).
- ECN members have participated in and co-led the launching of NATURA’s TWGs and projects.

Thematic Working Groups:

- *Transforming SETS for equity & justice in Nature-based solutions:* The idea for this TWG germinated in April 2022 in Malta, held its first workshop in May, was approved as a new TWG in June, and will begin developing outputs in late August 2022. Over the course of the summer this TWG increased in numbers by 10%, attracting several new early-career researchers and new members from Global South organizations. The TWG held two webinars and developed a theoretical framework for an ethics of “care-full” justice in nature-based solutions.
- *Utilizing European Long-term Ecosystem Research:* Presented nature-based solutions in eLTER in a Natura Webinar and began to organize the thematic working group.
- *Worldviews:* The TWG held monthly online meetings between April and July 2022 and resumed them in September 2022. The core working group consists of five members, and the wider working group of twelve people. The TWG has identified the need to assess the way dominant worldviews influence the outcomes of nature-based solutions (e.g., where nature-based solutions “carry” anthropocentric worldviews and fail to create sustainable ecological benefits). It further seeks to investigate how relational worldviews (also called “radical”) can lead to urban transformations.
- *Urban Ecological Resilience:* The TWG held virtual monthly meetings in spring 2022 and the first in-person TWG meeting in Stockholm in May 2022. The in-person workshop produced a research plan, starting with a conceptual framework on urban ecological resilience to be included in a forthcoming book chapter and a peer-reviewed journal article. Discussion of datasets for developing a comparative study of the resilience of urban nature-based solutions set the stage for new comparative research, joint proposals to EU and US funders, and resumption of monthly meetings in September to set a 2022-2023 agenda for comparative research across geographies.
- *Nature-Based Pathways:* This TWG has been meeting periodically, developing a tool for building a database of case studies for how transformative nature-based solutions get implemented. It focuses on the inflection points in a pathway to transformation, using the Hoelscher et al. (2018) framework to identify unlocking, stewarding, orchestrating, and transforming pathways to successful nature-based solutions. The TWG led a workshop at TNOC Festival (virtual) in March, met at the All-Hands Meeting (Malta) in April, and held a workshop at the All-Scientists Meeting of the US LTER (Asilomar, CA) in September. The TWG has developed an online-form for input of case studies and will be expanding the group in fall 2022.
- *NATURA Design for Justice TWG:* NATURA Design for Justice TWG continued making progress with a white paper, for which a conceptual diagram was developed. In parallel, the TWG developed a survey project aimed at nature-based solutions practitioners to understand the ways through which justice is integrated into design practices. An online internal workshop was organized in June 2022 to develop survey questions.
- *NATURA Global to Local TWG:* This TWG held their first in-person workshop in May 2022 and produced a policy brief called The Urban Butterfly Effect, which was a collaborative effort between several organizations. The brief provides recommendations for national governments to accelerate urban efforts to help them achieve the Global Biodiversity Framework (GBF) 2030.

- *Urban Nature Working Group*: This TWG drafted a concept note and convened a core group to develop the Cities Biodiversity Outlook III, a global science-policy assessment and process. Presented the CBO III draft themes at the TNOC 2022 festival and invited feedback from participants. The group developed a vision, mission and draft thematic areas for the Cities Biodiversity Outlook III, linking urban biodiversity and sustainable development goals in a matrix. Additionally, it created a foundational vision, potential themes and ideas for a methodology, including working directly with selected cities to develop the CBO III.
- *Urban Informality TWG*: The TWG developed an academic itinerary for the recognition of local laboratories of conflict and climate resilience in informal areas of Bogotá, lending insight to the informal urban landscape and environmental conflicts in the city. The group is working on future governance for just sustainability transitions in collaboration with several NATURA networks, particularly those with place-based future projects in Africa, Asia, and Latin America.

Key outcomes or other achievements:

- **Participation growth**: Since inception, the number of [networks](#) in NATURA increased from 26 to 48. Increased number of members contributed to the NATURA Horizon Survey increasing from 102 to 161 responders who provided their perspectives on knowledge gaps in nature-based solutions. The number of institutions associated with members has also increased, including 78 in Academia, 7 in Government, 3 in Private/Business, and 17 in Public-Civic Organizations. Membership in the Early Career Network increased by 42% (now 118 members).
- **NATURA All Hands Meeting (AHM)**. The AHM in Malta was very successful, convening 48 network members across several geographical regions who represented 26 of NATURA's core networks. This meeting was pivotal in bringing together the network to advance key research on nature-based solutions, draft an initial outline for the Global Roadmap project, and provide networking opportunities for early-career professionals.
- **New networks** were added to NATURA during this reporting period:
 - Partnership for Water Sustainability in British Columbia (PWS) - Tim Pringle - Canada
 - Kounkuey Design Initiative (KDI) - Joe Mulligan and Sabrina Ohler - Kenya
- **Early Career Network** had several successes:
 - has seen significant growth over the past year and now has 118 members
 - co-wrote and published a [blog](#) reflecting internal discussions on the multivalence of NBS, motivations for working on NBS and challenges and opportunities for NBS, and illustrated with case studies.
 - developed a series of podcasts ([Future Cities](#))
- **Advancing International Policy and Research**: Several NATURA network members, including Co-PI Timon McPhearson, played a leading role in developing a “Cross-Chapter Box” on “Nature-Based Solutions for Climate Change Mitigation and Adaptation” as part of the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) and

contributing to multiple chapters in the WGII and WGIII reports. The urban box appears across several of the IPCC report’s chapters. Multiple NATURA members were also contributors to the recent The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Values Assessment, which provides a diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services. Dr. Yeowon Kim contributed to a report to the National Research Council Canada on “Nature-Based Solutions to Urban Flooding: A Review and Future Directions” (Report No.: NRC-OCRE-2022-TR-011). Co-author: Muhammad Naveed Khaliq. (July 13, 2022). Members of NATURA (Co-PI Timon McPhearson and Harriet Bulkeley) contributed to the World Economic Forum report, “BiodiverCities by 2030: Transforming cities’ relationship with nature”. This report provides a vision for cities of the future and the needed systemic shifts to develop BiodiverCities that place nature at the heart of decision-making and infrastructure investments.

- **Advancing US Federal Policy:** In March 2022, PI McPhearson briefed the White House Office of Science and Technology Policy (OSTP) on the IPCC findings with respect to nature-based solutions. In follow-up meetings with OSTP, NATURA provided input to policy planning for US nature-based solutions investments leading to the Biden-Harris administration Executive Order issued on Earth Day 2022 to develop: 1) a report on nature-based solutions; 2) guidance on valuing nature; and 3) the first U.S. National Nature Assessment of the condition of nature within the United States. This is a breakthrough example of NATURA impact and also demonstrates that nature-based solutions are now becoming mainstreamed into US decision-making for climate action and social and environmental benefits.
- **Three new TWGs** were established in 2022, bringing the total number of working groups to ten. Since the All Hands Meeting, all TWGs have accepted sign-ups of people interested in participating and have begun to hold internal discussions.
- **Monthly webinar:** Four networks, six TWGs, and three early-career fellows presented to the NATURA community in the monthly webinar series (Table 2). Attendance is commonly 30-50 people.
- **Four early-career fellowships** were supported in the past year. The NATURA early-career fellowship program is a paid 6- or 15-week opportunity for research and networking at collaborating network institutions. The goal of the fellowship program is to 1) provide opportunities for students, early-career academics, and practitioners to explore nature-based solutions for urban resilience by spending time in residence with other networks; 2) support greater depth of analysis or synthesis by extending time of interaction; 3) support practitioner-researcher interactions through exchanges among worldwide networks. See “Opportunities for training and professional development” for information on fellows.
- The NATURA Network has engaged with its community through **communication** via [webinars](#), [All-Hands meetings](#), a shared Google calendar, a [website](#), a Slack workspace, and a monthly newsletter, which is disseminated regularly and as needed. Network points of contact and individuals are able to sign up through a Google form available on the website; presentations from webinars are also made available on the website.

- 10 Newsletters were released from October, 2021-September 2022. Within these newsletters, we have connected NATURA members to 68 opportunities, 38 publications, 29 resources, and 24 presentations.
- We continue to deploy Twitter as a communication tool to disseminate news and research from network members, as well as other resources connected to nature-based solutions, urban nature, urban resilience, and other urban systems work.

What opportunities for training and professional development has the project provided?

NATURA Early-Career Network:

- ECN has reinforced its many internal communication channels to foster learning and knowledge exchange with the aim of creating an inclusive, productive and creative space. The network provides peer-to-peer support to its members on a regular basis and creates and shares career-building opportunities including training material and MOOCs (e.g., via Slack, newsletters, social media).
- ECN is working in a collaborative manner to disseminate the perspectives of its members through academic and non-academic communication mediums, including webinars, publications, infographics, and podcasts to broaden the audiences and readers of nature-based solutions topics.
- ECN also explores avenues in ways that complement those of “established” scholars and practitioners, thereby building a distinguished epistemic community around urban nature-based solutions (e.g., by engaging with and bringing attention to NBS “hot topics” that remain underexplored in the network).
- With the increased active participation of practitioners, ECN is increasingly playing a “knowledge brokering” role to bridge gaps between theory and practice in innovative and creative ways (e.g., through the planned development of a compendium of methodologies) that fill a gap in the global nature-based solutions community.
- Several ECN members have endorsed leadership roles across NATURA’s new TWGs and projects (Worldviews, Transforming SETS for equity and justice, Global Roadmap).
- As detailed below, opportunities to support research and projects have developed further.

NATURA Research Fellowships

During the 2021-22 cycle NATURA supported five early-career fellowships to provide opportunities for students, early-career academics, and early-career practitioners to explore nature-based solutions for urban resilience by spending time in residence with other networks. Three fellows were selected in Year 2 and completed their fellowships in Year 3; two new fellowships were awarded in Year 3. Four of the fellows attended and presented at the Malta All-Hands Meeting in April, 2022. Fellows included:

- Melissa Ingaruca Moreno, design-led urban researcher based in Berlin, completed her 15-week fellowship in January, 2022. Her project assessed the transformative potential of

urban nature-based solutions at the Urban Systems Lab, The New School in New York City (host: Dr. Timon McPhearson, UREx, SETS Convergence).

- Clair Cooper, a PhD student in the Department of Geography at Durham University, UK worked with the Urban Systems Lab on a project investigating the role of social media data in the evaluation of relationship between nature-based solutions and health. Her 15-week fellowship was completed in December, 2021.
- Katinka Wijsman, a PhD student at the time and now Assistant Professor at Utrecht University worked with mentor Dr. Niki Frantzeskaki through the Swinburne Centre for Urban Transitions. Katinka developed a research project entitled “How can nature express its voice? Ecological justice and the question of nonhuman representation in the planning and design of nature-based solutions in cities?,” and was supported by a six-week fellowship in spring 2022.
- Mariana Hernández Montilla worked with Marcus Collier (Connecting Nature Network) in spring 2022 for 15 weeks (March-June 2022). She conducted a systematic review to explore risk and opportunities for transformative urban adaptation in the Global South, focusing on the use of nature-based solutions in participatory planning processes.
- Pablo Arturo López Guijosa worked with Jennifer Rae Pierce of the Urban Biodiversity Hub. During his six-week fellowship in spring 2022, he worked with the Global to Local TWG, taking a lead in completing the first draft of the policy brief they produced.

Student Research Awards on Nature-based Solutions

The NATURA project continued to support student research on nature-based solutions and to advance knowledge production across the networks. We successfully disseminated two research awards. An individual award to graduate student Yilei Yu at Arizona State University supported research across five public school sites in West Mesa and Tempe, AZ communities, exploring how the process of landscape performance monitoring in an outdoor learning environment can be used to address environmental justice on school campuses. The second award was for a group research project led by Duvan Lopez, who is investigating how to understand the complex and intersecting forces of climate change and informal urban development in Bogotá’s informal urban areas, and the role nature-based solutions can play in addressing issues of displacement, inadequate infrastructure, and the marginalization of voices in formal risk assessment and decision making.

Student Research Experiences:

Several members of the Latin American and North American Regional Nodes co-lead and contributed to an NSF grant proposal, “Resilient Urban Latin America International Research Experience for Students, (RULA IRES),” which was funded to support 10-week summer student research projects with NATURA partners in Ecuador, Chile, Colombia, and Mexico. In 2021-2022, the IRES team worked in collaboration with the Escuela Superior Politécnica del Litoral (ESPOL) from Guayaquil (Ecuador) to organize a 10-week research stay for a cohort of five undergraduate and graduate students. The students traveled to Guayaquil Ecuador in June 2022 where they began refining their research proposal and meeting with local stakeholders from an informal community (5 de Junio), Municipalidad Durán, and ESPOL while conducting research focused on community perceptions, needs, and solutions related to nature-based solutions to address urban resilience challenges such as local flooding and lack of infrastructure. NATURA collaboration with this RULA IRES project continues in

2022-2023, with a research experience planned for Bogotá, Colombia, in collaboration with the Urban Informality TWG and several NATURA networks, including RecNet in Bogotá.

Monthly newsletter:

- Opportunities (including paid positions and educational opportunities) are included in each newsletter every month.

Staff career development:

- Tessa Martinez (ASU), NATURA project manager, gained skills in project and event management, particularly in organizing the All Hands research meeting in Malta. During Martinez’s family leave in summer 2022, Dr. Michele Clark (ASU) assumed some of her responsibilities, particularly for funding and reimbursement of participant expenses.
- Christopher Kennedy (The New School), NATURA’s Outreach Coordinator, has further honed his web development and communication skills through development of the NATURA website, and has also gained experience in facilitating international exchanges, setting up J1 scholar visas, and navigating international tax requirements.
- Dr. Loan Diep (The New School), NATURA’s Postdoctoral Fellow, has developed experience in project management by joining the executive team. Diep also gained skills in mentorship, working closely with two research assistants at the Urban Systems Lab to develop the NATURA Global Roadmap for Urban Nature-based solutions project. She has built further experience in networking and facilitation through her leadership role with the Early Career Network.

How have the results been disseminated to communities of interest?

Outreach and Communications

- Monthly newsletter
- Email
- Weekly Twitter posts
- Monthly webinar

Meetings and Workshops

- 2022 NATURA All-Hands Meeting
- Kendra Sharp, head of the NSF Office of International Science and Engineering (OISE) selected NATURA for a featured webinar as part of their “Cool Science” series on International Collaborations to Confront Global Challenges delivered to the NSF National Science Board.
- *The Urban Informality TWG* has facilitated ongoing online conversations as part of the “Environmental Urban Peace” initiative to reflect from the community experience to identify needs, priorities and strategies to materialize the resolution of conflicts in

Colombian cities. The TWG also presented a Seed Session at The Nature of Cities Festival entitled “LOCAL LABS Mapping: Locating socio-ecological conflict spaces in territory for the climate resilience”, which was also shared at the NATURA AHM in Malta. Members of the group organized “Building Resilience in Fragile Urban Environments” as part of an exhibition that took place at COP26 (Glasgow). The group also developed an audiovisual piece through Conference at Development Studies Association 2021, entitled “Arraigo: Redefining Relocation for Landslide-Affected Communities in Bogota, Colombia”.

- Co-PI Timon McPhearson was invited to brief the White House Office of Science and Technology Policy (OSTP) on the Intergovernmental Panel on Climate Change findings from Working Group II with respect to nature-based solutions, and continues to advise OSTP on nature-based solutions for climate adaptation policy, with expected new commitments from the Biden administration in November 2022 for COP27.
- Members of NATURA (Co-PI Timon McPhearson and others) held several discussions with the Ecological Society of America (ESA) leadership during the annual meeting in Montreal, Canada (August 2022) to advise on a strategy for advancing research on nature-based solutions and leveraging ESA membership for input to emerging US National Nature Assessment
- Members of NATURA have been invited to help develop a chapter on nature-based solutions for the forthcoming US National Nature Assessment.

Academic Conferences

NATURA network members shared research at several conferences, public lectures and other engagements:

- Nancy B. Grimm. 2022. Plenary: Resilience to climate change in streams and cities: looking to the past and the future. 36th Congress of the International Society of Limnology. Berlin, Germany.
- Nancy B. Grimm, Marta Barbés-Blázquez, Elizabeth Cook, Samuel Markolf, David Iwaniec, Timon McPhearson, Tischa Munoz-Erickson. 2022. Urban social-ecological-technological resilience for the Anthropocene. Ecological Society of America Meeting. Montreal, Canada.
- Karina Benessaiah, Timon McPhearson, Elena Bennett. 2022. Seed initiatives for change: how do transformational pathways emerge? Ecological Society of America Meeting. Montreal, Canada.
- Elizabeth Cook, Jennifer Ventrella, Timon McPhearson, Adam Parris, David Iwaniec, Lelani Mannetti, Tischa Munoz-Erickson, Daniela Tagtachian, Melissa Tier. 2022. Future climate resilience visions of New York City: 2100. Ecological Society of America Meeting. Montreal, Canada.
- Timon McPhearson, Nadja Kabisch, Niki Frantzeskaki. 2022. Nature-based Solutions for Cities: The promise, peril, and opportunity for resilience and equity through urban ecological infrastructure. Ecological Society of America Meeting. Montreal, Canada

- Daniela Garcia Moreno. 2022. Exploring perceptions of community well-being and resilience in a flood-prone community in San Juan Puerto Rico. Ecological Society of America oral presentation. Montreal, Canada.
- Yeowon Kim & Naveed Khaliq. June 6-8 2022. Nature-Based Solutions for Urban Flood Mitigation: Perspectives on Emerging Techniques. The Canadian Meteorological and Oceanographic Society (CMOS) - Canadian Geophysical Union (CGU) - Eastern Snow Conference (ESC) Joint Congress 2022. Virtual.
- Nancy B. Grimm. 2022. Keynote: Envisioning positive futures and nature-based solutions for the Anthropocene. Front Range Student Ecology Symposium, Fort Collins, CO, February 2022.
- Nancy B. Grimm. 2021. Plenary: Ecosystem services of natural, accidental, and designed wetlands in urban environments. INTECOL Wetlands Virtual conference, October 2021.

Publishing

- Members of the NATURA Network have developed several manuscripts now in review, or published.
- NATURA PI McPhearson and NATURA Postdoc Loan Diep published an editorial in the journal Nature urging other nations to follow the US lead on leveraging nature-based solutions and adaptation strategies, and reflect on POTUS's recent executive order to address climate change. (“Nature-based solutions for global climate adaptation”)
- Several NATURA members have contributed to a new book, “Nature-based Solutions for Cities” which brings together multiple and diverse perspectives together to describe the current state of the art in advancing nature-based solutions. The book will engage students, researchers, and practitioners from different backgrounds and professions, as well as actors in urban planning and decision-making. The book was presented to colleagues at this year's (2022) Ecological Society of America conference, with several webinars and talks planned for the Spring of 2023.

What do you plan to do during the next reporting period to accomplish the goals?

- Continue and expand the NATURA Early-Career Fellowships
- Continue monthly newsletters
- Continue weekly Twitter posts
- Continue monthly webinars
- Continue to fund accepted Student Research on nature-based solutions awards and release another call for proposals in the spring of 2023
- Thematic Working Groups (TWGs) will continue to meet regularly and work towards their stated goals
- NATURA network members will continue to advise on US federal policy as part of the U.S. National Nature Assessment, as well as provide contributions to the Global Biodiversity Outlook 3 organized by the Convention on Biological Diversity.

- The network has released a call for proposals to organize in-person meetings for thematic working groups (due October 3, 2022). We will also solicit proposals from early career professionals or Fellowships and Student Research Awards (due November 1, 2022).
- NATURA members are organizing a new RULA IRES program that will take place in Bogotá (Colombia) in summer 2023.
- NATURA Regional Nodes will continue their regular meetings
- Formation of new nodes: We will continue to advance plans to establish the Middle East and Oceania regional nodes to ensure the network continues to grow and includes research and knowledge from colleagues working in these important areas.
- Nature-based solutions Global Roadmap Project: NATURA plans to further develop and release initial findings from the nature-based solutions Global Roadmap project. The aim is to propose pathways that support urban nature-based solutions mainstreaming globally, based on regional profiles of nature-based solutions knowledge and implementation synthesizing identified gaps, trade-offs and opportunities. This will leverage and build on parallel initiatives that are ongoing through the network or networks.
- Thematic Working Groups:
 - Design for Justice TWG: Grant submission for promoting the EU Horizon-Canada based on the connection built through NATURA; TWG participation;
 - Transforming SETS for equity & justice in Nature-based solutions: 4 webinars between fall 2022 and spring 2023; an in-person writing workshop to further develop the peer-reviewed article and policy brief; establish a mentoring network for junior researchers
 - NATURA Design for Justice TWG: Organize an in-person workshop to finalize manuscript for theoretical framing paper and the survey questionnaires to be conducted as the next research project.
 - NATURA Global to Local TWG: Disseminate the policy brief and/or generate more in response to TWG member needs and resources available.
 - Utilizing European Long-term Ecosystem Research: This September is the first committee meeting (where annual agenda will be set); November - first online workshop; December - second online workshop; January - first in-person workshop. The TWG has begun to scan for appropriate grant calls for funding future research collaboration with the goal of preparing a grant submission to Horizon Europe (spring 2023).
 - Urban Nature Working Group: The coming year's outputs will include an operational plan for the development of the CBO III, a confirmed plan on the content of the CBO III and some of the initial writing done, including a writing workshop which will be in-person and supported by the NATURA fund (this support has been secured by the working group).

- NATURA Worldviews TWG: Building on a range of philosophical theories, the members of the TWG will map out how mechanical, dualistic and hierarchical, and relational, post-dualistic and post-anthropocentric worldviews impact nature-based solutions. Collect relevant literature and collate a list of indicators to assess dominant worldviews in nature-based solutions. Co-develop and submit a journal article as well as hold a scenario-building workshop. Findings will be presented at The Nature of Cities festival in October 2023.
- Urban informality TWG plants to develop a research proposal to enter into a process of co-learning about how to create more just future governance structures, including educating ourselves in the work of Indigenous, queer, feminist, African American, and disability scholarship.
- ECN is planning the following activities for Year 3:
 - A collaborative publication: as mentioned above, ECN organized virtual sessions which resulted in the writing of a blog piece published by the Nature of Cities at the beginning of 2022. ECN aims to turn this piece into a perspective paper at the end of 2022 for publication in early 2023. This perspective paper will raise a number of essential questions related to the potential of nature-based solutions to enact transformational change.
 - Platforms for knowledge exchange: There is demand for knowledge exchange around nature-based solutions methodologies and teaching material. A repository is being created for ECN members to share material and build a compendium of nature-based solutions methodologies illustrated with a range of case studies which group members are familiar with.
 - In-person ECN workshop: A 3-day in-person workshop is being planned for the end of the year 2023 in Bogotá (Colombia). The workshop will involve a brainstorming session to take the questions of the perspective paper further and identify routes for action, learn and exchange on nature-based solutions methodologies, and conduct field visits in partnership with the TWG Urban Informality.
 - Webinars: As part of the network's aim to build career-building opportunities, NATURA webinars are currently being led by EC members who also have the chance to present their work to the wider network.

Products

Journals:

Niki Frantzeskaki, Alessandro Ossola, & Judy Bush (2022). Nature-based solutions for changing urban landscapes: Lessons from Australia. *Urban Forestry & Urban Greening*

<https://doi.org/10.1016/j.ufug.2022.127611>

Nature inequity and higher COVID-19 case rates in less-green neighbourhoods in the United States

Erica N. Spotswood, Matthew Benjamin, Lauren Stoneburner, Megan M. Wheeler, Erin E.

Beller, Deborah Balk, Timon McPhearson, Ming Kuo & Robert I. McDonald. Nature Sustainability. (2021). <https://www.nature.com/articles/s41893-021-00781-9>
<https://doi.org/10.1038/s41893-021-00781-9>

Jennifer Rae Pierce, Sabrina Drill, Michael D. Halder, Mika Mei Jia Tan, Anushri Tiwari, and Pablo A. López Guijosa. 2021. Scaling Biodiversity Conservation Efforts: An Examination of the Relationship Between Global Biodiversity Targets and Local Plans. Global Urban Biodiversity and the Importance of Scale. <https://doi.org/10.3389/fcosc.2021.752387>

Examining ecological justice within the social-ecological-technological system of New York City, USA. Pineda-Pinto, M., Herreros-Cantis, P., McPhearson, T., Frantzeskaki, N., Wang, J., & Zhou, W. Landscape and Urban Planning. 2021 <https://doi.org/10.1016/j.landurbplan.2021.104228>

Kim, Y., Carvalhaes, T., Helmrich, A., Markolf, S., Hoff, R., Chester, M., Li, R., & Ahmad, N. (2022). Leveraging SETS resilience capabilities for safe-to-fail infrastructure under climate change. Current Opinion in Environmental Sustainability, 54, 101153.
<https://doi.org/10.1016/j.cosust.2022.101153>

Lampinen, J, García Antúnez, O, Olafsson, AS, Kavanagh, KC, Gulsrud, NM & Raymond, CM 2022, 'Envisioning carbon-smart and just urban green infrastructure', Urban Forestry & Urban Greening, vol. 75, 127682. <https://doi.org/10.1016/j.ufug.2022.127682>

Gulsrud, NM & Steiner, H 2022, 'Justice and the Pandemic City: How the Pandemic Has Revealed Social, Urban, and Data Injustices, and How a Narrative Approach Can Unlock Them', Frontiers in Sustainable Cities, vol. 4, 838084. <https://doi.org/10.3389/frsc.2022.838084>

Branny, A, Møller, MS, Korpilo, S, McPhearson, T, Gulsrud, N, Olafsson, AS, Raymond, CM & Andersson, E 2022, 'Smarter greener cities through a social-ecological-technological systems approach', Current Opinion in Environmental Sustainability, vol. 55, 101168.
<https://doi.org/10.1016/j.cosust.2022.101168>

Diep, L., & McPhearson, T. (2022). Nature-based solutions for global climate adaptation. Nature, 606(7915), 653–653. <https://doi.org/10.1038/d41586-022-01698-9>

McPhearson, T., E.M. Cook, M. Berbés-Blázquez, C. Cheng, N.B. Grimm, E. Andersson, O. Barbosa, D. Chandler, H. Chang, M. Chester, D.L. Childers, S.R. Elser, N. Frantzeskaki, et al. 2022. A Social-Ecological-Technological Systems Framework for Urban Ecosystem Services. *One Earth*.
<http://doi.org/10.1016/j.oneear.2022.04.007>

Books:

Nancy Grimm, Harini Nagendra, Gina Lovasi, Nadja Kabisch, Gregory Bratman, Rieke Hansen, Brian McGrath, Timon McPhearson, Lauren McPhilips, Paul Coseo and Zoe Hamstead. “Nature-based Solutions for Cities”, Editors: Timon McPhearson, Niki Frantzeskaki, Nadja Kabisch. Edward Elgar Publishing, UK. (in-review, expected Spring 2022)

Thesis/Dissertations

Elser, Stephen. *Ecosystem Services from Urban Ecological Infrastructure: Perceptions, Performance, and Priorities for Climate Resilient Cities*. ProQuest Dissertations Publishing, 2022.

Sauer, Jason. *Pluvial Flood Risk Modeling, Assessment, and Management Under Evolving Urban Climates and Land Cover*. ProQuest Dissertations Publishing, 2022.

Katinka Wijsman (2022). *Assembling Coasts: Climate Change, Resilience, and the Politics of Belonging*. The New School.

Garcia Moreno, Daniela, May 2022 Senior Thesis at Cornell University: Exploring perceptions of community well-being and resilience in a flood-prone community in San Juan Puerto Rico.

Conference Papers and Presentations:

Cheng, C. (2022). Nature-based Solutions for Climate Justice: Gauging the Gap between Justice Theory and Landscape Architecture Practice. Council of Educators in Landscape Architecture (CELA) Annual Conference. March 16-19. Santa Ana Pueblo, New Mexico.

Cheng, C., Grabowski, Z., Olivotto, V., Berbés-Blázquez, M., Gim, C. & Drill, S. (2021). Justice framework for nature-based solutions and implications for climate justice planning. Association of Collegiate Schools of Planning (ACSP) 2021 Annual Conference. October 7-9, 21-23. virtual.

Grimm, N. B. 2022. Plenary: Resilience to climate change in streams and cities: looking to the past and the future. 36th Congress of the International Society of Limnology. Berlin, Germany.

Nancy B. Grimm, Marta Berbés-Blázquez, Elizabeth Cook, Samuel Markolf, David Iwaniec, Timon McPhearson, Tischa Munoz-Erickson. 2022. Urban social-ecological-technological resilience for the Anthropocene. Ecological Society of America Meeting. Montreal, Canada.

Karina Benessaiah, Timon McPhearson, Elena Bennett. 2022. Seed initiatives for change: how do transformational pathways emerge? Ecological Society of America Meeting. Montreal, Canada.

Elizabeth Cook, Jennifer Ventrella, Timon McPhearson, Adam Parris, David Iwaniec, Lelani Mannetti, Tischa Munoz-Erickson, Daniela Tagtachian, Melissa Tier. 2022. Future climate resilience visions of New York City: 2100. Ecological Society of America Meeting. Montreal, Canada.

Timon McPhearson, Nadja Kabisch, Niki Frantzeskaki. 2022. Nature-based Solutions for Cities: The promise, peril, and opportunity for resilience and equity through urban ecological infrastructure. Ecological Society of America Meeting. Montreal, Canada.

Garcia Moreno, Daniela, Aug 18 2022 - Ecological Society of America oral presentation: Exploring perceptions of community well-being and resilience in a flood-prone community in San Juan Puerto Rico.

Elizabeth M Cook, Jennifer Ventrella, David Iwaniec, Lelani Mannetti, Timon McPhearson, Tischa Muñoz-Erickson, Adam Parris, Daniela Tagtachian, Melissa Tier. 2022. Future climate resilience and adaptation visions of New York City. American Association of Geographers. Virtual oral presentation, March 2022.

Grimm, N. B. 2022. Keynote: Envisioning positive futures and nature-based solutions for the Anthropocene. Front Range Student Ecology Symposium, Fort Collins, CO, February 2022.

Grimm, N. B. 2021. Plenary: Ecosystem services of natural, accidental, and designed wetlands in urban environments. INTECOL Wetlands Virtual conference, October 2021.

Other Publications:

1. Grabowski, Zbigniew, Ffion Atkins, Lelani Mannetti, Clair Cooper, Danielle McCarthy, Robert Hobbins, Matt Smit, Yuliya Dzyuban, Charlyn Green, Yeowon Kim, Hopeland P, Pablo Cantis, Luis Ortiz. (2022, January 18). Embracing Diverse Concepts of Nature-based Solutions to Enact Transformational Change: A Perspective From the Early Career Working Group of the NATURA Network. *The Nature of Cities*.

A collaborative essay developed by the NATURA Early Career Network membership for *The Nature of Cities*. Published. No.

2. The Urban Butterfly Effect: How nations can accelerate the contributions of local governments to global transformative change . 2022 <http://www.ubhub.org/pdfs/tube2022.pdf>

A policy brief exploring how local governments can advance the Global Biodiversity Framework targets.

[Jennifer Rae Pierce](#)

3. Shruti Jadala, Addison Martin, Margo Mattson, Isabella Pacenza, Carlos Romero. August 2022. *Perspectivas comunitarias de inundaciones y riesgos ambientales en 5 de Junio, Durán, Ecuador*.

This visual essay will be posted on the NATURA web site (natura-net.org) once it is translated to English (both Spanish and English versions will be posted).

4. Yeowon Kim, Muhammad Naveed Khaliq (2022). *Nature-Based Solutions to Urban Flooding: A Review and Future Directions*. A report to the National Research Council Canada (No.: NRC-OCRE-2022-TR-01)

This report contributed to expanding the North American regional participation by looking at policies, practices, and implementation challenges of nature-based solutions in Canadian urban centers.

Websites: <https://natura-net.org/>

Participant

Executive Team and Coordinating Committee Members

- Nancy Grimm
- Elizabeth Cook

- Timon McPhearson
- Yeowon Kim
- Christopher Kennedy
- Tessa Martinez
- Loan Diep
- Marcus Collier
- Pippin Anderson
- Weiqi Zhou
- Jordi Morató
- Mario Balzan

Network Members

African Center for Cities at the University of Cape Town
Biophilic Cities
Centre for Urban Transitions
Chinese Academy of Sciences Research Center for Eco-Environmental Sciences
Connecting Nature Trinity College Dublin
East Asia-Pacific Long-term Ecological Research (LTER)
ENABLE
ENVISION
European Forum on Urban Forestry
European LTER
Future Earth Urban Knowledge Action Network (KAN)
ICLEI Europe (Local Governments for Sustainability)
International LTER (ILTER)
IUCN Urban Nature Alliance
Natural Capital Project
Recycling the City Network (RECNET)

The Nature Conservancy North American Cities Program
The Nature of Cities
UNESCO Chair on Sustainability (UNESCO-SOST)
UNESCO European Regional Centre for Ecohydrology (ERCE)
Urban Resilience to Extremes Sustainability Research Network (UREx)
Urban Sustainability Directors Network (USDN)
Urban Water Innovation Network (UWIN)
US LTER
VIVA-PLAN
ICLEI Africa CitiesWithNature Initiative
USDA Forest Service- Urban Field Station
CREATE Initiative
Beyond the Academy Network
San Juan ULTRA Network
SMARTer Greener Cities
Urban Biodiversity Hub (UBHub)
PlanAdapt Network
Re-Nature Project
Western Center for Metropolitan Extension
Future Position X network
BIG Project
Oppla
Intemperie Studio
GoGreenRoutes

European Forest Institute
CLEARING HOUSE
Hyphae

Impacts

Impact on the development of the principal discipline(s) of the project

- NATURA network members published a major review manuscript exploring global perspectives across NATURA regions on nature-based solutions to expand the scope, reach and implementation of effective nature-based solutions strategies across geographies and multiple scales. See “A social-ecological-technological systems approach to urban ecosystem services” in One Earth in the “products” section.
- Network members are developing projects to improve understanding of the contribution of nature-based solutions to ecosystem protection, restoration and management, urban ecological resilience, and how nature-based solutions support the delivery of vital ecosystem services.
- Our work is exploring the role of nature-based solutions in physical and mental health, quality of life, social cohesion, and new perspectives on improving health outcomes for urban citizens.
- Research exchanges facilitated by the network are providing new understanding of the resilience of nature-based solutions to climate change, and proposing new integrative frameworks to complement existing knowledge, especially across diverse geographic areas.
- NATURA members have examined equity of nature-based solutions planning in US cities with multiple publications in urban planning and related journals
- Members of the Asia-Pacific Node are conducting research on applications of nature-based solutions for urban flooding mitigation and adaptation.
- NATURA members have contributed new research on knowledge to inform understanding of the principle discipline. This includes examples such as: An Australian perspective on NBS for urban areas and landscapes; Consideration of biodiversity and conservation for global cities; Utilizing technology and artificial intelligence to better understand impacts of climate and potential for solutions; and

Exploring the interdependencies and equity dimensions of COVID-19, access to nature, use of data and NBS in cities.

- Our early career research network also produced a summary of perspectives on how NBS can be conceptualized in different ways globally, and the importance of being inclusive to diverse understandings of governance, planning and decision-making, and centering human relations.

Impact on other disciplines

- Environmental and Social Justice: The NATURA Design for Justice Thematic Working Group has developed a theoretical framework to define ‘design justice’ in nature-based solutions projects. A manuscript is now being prepared.
- Economics: Members of the NATURA network and the Connecting Nature network organized a virtual summit in June 2021 exploring ways cities can adapt to living with Covid-19 and implement recovery strategies leveraging nature-based enterprises to become the engine for sustainable economic and jobs growth. The Summit has built new knowledge on economic benefits of nature-based solutions, as well as policy synergies and connections.
- Knowledge exchange and synthesis of nature-based solutions from diverse disciplines and global locations that integrate art, cultural understanding and humanities into qualitative research and practice on nature-based solutions. Several books chapters in the NATURA forthcoming book “Nature-based Solutions for Cities” explore this in various ways.
- Urban Planning: NATURA members co-led a special workshop during our All Hands Meeting bringing together ecosystem service scientists, urban planners, and municipal decision-makers to generate and improve approaches and tools that integrate nature’s contributions to people into the equitable design and re-design of cities.
- NATURA led sessions at the 2022 Ecological Society of America are contributing to diversifying the field of urban ecology through urban nature-based solutions scholarship
- Collectively, NATURA leadership and members have contributed to research articles and knowledge on topics that explore the intersection of topics such as: urban forestry, urban planning, environmental policy, ecosystem services, urban climate adaptation, equity and environmental justice, well-being and mental health, and social science to provide a more interdisciplinary perspective and understanding

Development of human resources

- The NATURA Early-Career Network has created a unique forum for early-career practitioners and researchers can engage with each other, share information, and offer peer to peer support.
- NATURA continues to cultivate professional learning opportunities for three people on staff– Tessa Martinez, Assistant Project Manager, Christopher Kennedy, Outreach Coordinator and Loan Diep, Postdoctoral Fellow. This includes adaptive planning, project management, facilitation of international research exchanges, and organizing public virtual events.
- The NATURA newsletter also includes job postings, relevant research, and training opportunities for network members and colleagues.
- NATURA webinars and other networking events and activities have created a culture and mechanism for knowledge sharing, training, and education.

Impact on teaching and educational experiences

- NATURA activities have brought together a diverse group of students across backgrounds and disciplines through participation in monthly webinars, the All-Hands Meeting and The Nature of Cities Festival, and participation in thematic working groups and regional nodes.
- The NATURA Early-Career Fellowship and Student Research Awards create a platform to support student-led research on urban nature-based solutions, and creates opportunities for collaborative knowledge sharing, publishing, and novel research.
- NATURA members were included as guest speakers in PI and Co-PI courses including McPhearson’s Urban Resilience course at The New School among others.
- NATURA members developed a short course (half-semester, ASU) as a prelude to the summer RULA IRES experience in Guayaquil, Ecuador (see description of the research experience under “Opportunities for training and professional development”). This short course, in addition to guiding students through the process of developing a proposal for a team-science project, also explores topics such as participatory research, cultural awareness, positionality and reflexivity, qualitative and quantitative research methods, and other tools that will be specifically useful in the context of the summer research experience. The course was developed alongside another course being offered in the context of a new concept in graduate training, “Immersive, Interdisciplinary, Identity-based Team Science Experience (IIITSE),” which has been piloted at ASU (PI Grimm and colleagues) and now forms the basis for a new NSF Racial Equity in STEM grant to ASU (Melissa Nelson, PI) that will use the IIITSE concept for participatory, community-embedded, action-oriented research with Indigenous communities.