The Nature-based Solutions for Urban Resilience in the Anthropocene (NATURA) project links networks in Africa, Asia-Pacific, Europe, North and Latin America, and globally to enhance connectivity among the world’s scholars and practitioners and improve the prospects for global urban sustainability. NATURA exchanges knowledge, shares data, and enhances communication among research disciplines and across the research-practice divide to advance urban resilience in face of growing threats of extreme weather events.

During the 2019-2020 NSF reporting year, NATURA hosted its first Virtual All Hands Meeting where network members from around the globe engaged with one another. Network members participated in virtual discussions, presentations and intimate break-out conversations. As a result of this meeting, NATURA launched six Thematic Working Groups (TWGs), an Early-Career network, and Regional Nodes held their first meetings. Other activities have included holding 11 webinar presentations, dispersing 4 monthly newsletters, and sending over 50 tweets. Since launching, NATURA has seen significant growth in participation. Our number of networks has increased from 26 to 36 networks, the Europe regional node increased from 8 to 35 members, the Africa regional node increased from 6 to 41 members, the Latin America regional node increased from 6 to 64 members, the North America regional node increased from 5 to 47 members, and the Asia-Pacific regional node increased from 6 to 27 members. To solidify accessibility of resources and share information, NATURA has also developed a website that houses a newsletter and webinar archive, a network events page, NATURA publications, a network directory, and much more. During this reporting year, NATURA has supported work by members on 4 journals, 1 book, 1 book chapter, 1 session, and 8 presentations.

In the next reporting year, NATURA is excited to continue connecting networks involved in nature-based solutions around the globe by initiating Learning Exchanges, continuing to release newsletters, posting to Twitter, hosting webinars, generating more TWGs, and holding monthly discussions in regular meetings. For more information on NATURA and how to get involved please visit our website.

This material is based upon work supported by the National Science Foundation under Grant No. (Grant #1927468 and #1927167). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
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The Nature-based Solutions for Urban Resilience in the Anthropocene (NATURA) project links networks in Africa, Asia-Pacific, Europe, North and Latin America, and globally to enhance connectivity among the world’s scholars and practitioners and improve the prospects for global urban sustainability. NATURA exchanges knowledge, shares data, and enhances communication among research disciplines and across the research-practice divide to advance urban resilience in face of growing threats of extreme weather events.

As an important part of this knowledge sharing, learning exchanges will build capacity of the next generation of researchers and practitioners to work together on applications of nature-based solutions in a wide range of social, ecological, and technological contexts addressing five gaps:

- Synergistic benefits of bundles of NBS for urban resilience
- Role of social-cultural (S) context in NBS outcomes
- Role of ecological-biophysical (E) context in NBS outcomes
- Role of technological-infrastructural (T) context in NBS outcomes
- Role of SET interactions in NBS outcomes

Through all-hands meetings, thematic working groups, regional nodes, and synthesis writing workshops, NATURA will accomplish the goals of synthesis and data sharing, and network coordination. Early-career researchers and practitioners will be sponsored by NATURA to pay five-week visits to network partners. Further, NATURA will train postdoctoral scholars and graduate students through learning exchanges to networks around the globe. Through collaboration with partners, international students will be invited to participate in these exchanges, hosted by US networks.
01 / ACCOMPLISHMENTS

MAJOR GOALS OF THE PROJECT

- Create a network of networks that shares 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.

SPECIFIC OBJECTIVES

- Issue call for Thematic Working Groups (TWG) and support their initial efforts
- Provide a forum to support the communication of goals, accomplishments, and best practices among networks within NATURA
- Develop and implement a communication plan to support frequent and facile communication among networks
- Explore how climate-related challenges are unique to different world regions and which nature-based solutions are most regionally appropriate
- Develop a database of host networks who will support learning exchanges for early-career scholars and practitioners
MAJOR ACTIVITIES

2020 NATURA Virtual All Hands Meeting

The 2020 NATURA Virtual All-Hands Meeting took place from June 16-18, 2020, engaging network members in virtual discussions, presentations and intimate break-out conversations. The meeting created an opportunity to solidify Thematic Working Groups, as well as an opportunity for network members to exchange ideas, ongoing research and to pitch new and novel projects exploring the theory, practice and applications of nature-based solutions globally. A World Cafe session further promoted the international and inclusive approach of the NATURA network of networks, and a space to synthesize discussions and review emergent topics covered over the 2 day event. In total, this meeting included 68 presentations, 5 Regional Node kick-off meetings, and 6 sessions—3 of which were for Thematic Working Groups.

Formation of Thematic Working Groups

At the 2020 NATURA Virtual All Hands Meeting, five Thematic Working Groups were launched. These thematic working groups seek to advance synthesis on theory, research, and/or best practices related to nature-based solutions across diverse global social-biophysical contexts. Most of the Thematic Working Groups will meet virtually every 4-8 weeks.

NATURA Early-Career network established

The NATURA Early-Career network was created for network members pursuing an education or in the beginning stages of their careers (Ex. undergraduate to assistant professors or early-career professional practitioners). This network aims to build a community for EC members that will foster networking opportunities, sharing of information, and peer to peer support.

Monthly NATURA webinars

The monthly NATURA webinar series offers attendees the opportunity to get an overview of the networks that make up NATURA. Each webinar consists of (usually) two network presentations followed by a Q&A session where attendees can ask network specific questions.

Establishing of NATURA regional nodes

NATURA comprises five regional nodes: Asia-Pacific, Africa, Latin America, North America, and Europe. Regional nodes are led by co-PIs or core personnel; Nancy Grimm leads and coordinates the regional North America network node, Timon McPhearson leads the Europe network node, Elizabeth Cook and Jordi Morato lead the Latin America network node, Pippin Anderson leads the Africa network node, and Weiqi Zhou and Yeowon Kim co-lead the Asia and Pacific 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 will organize quarterly virtual meetings for their networks to share updates and propose new cross-network collaborations.

Monthly NATURA newsletter

The NATURA newsletter is released once a month and highlights opportunities (including paid positions and educational opportunities), 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.
<table>
<thead>
<tr>
<th>Date</th>
<th>Presenter</th>
<th>NATURA Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 17, 2020</td>
<td>Nancy Grimm, Timon McPhearson, Elizabeth Cook, Yeowon Kim, Pippin Anderson</td>
<td>NATURA introduction and welcome</td>
</tr>
<tr>
<td>April 14, 2020</td>
<td>Giles Sioen</td>
<td>Future Earth Urban Knowledge Action Network (KAN) and The Nature Conservancy North American Cities Program</td>
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<tr>
<td>April 14, 2020</td>
<td>Nancy Grimm</td>
<td>Urban Resilience to Extremes Sustainability Research Network (UREx SRN), ASU</td>
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<tr>
<td>May 12, 2020</td>
<td>David Maddox</td>
<td>The Nature of Cities</td>
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<tr>
<td>May 12, 2020</td>
<td>Bonnie Keeler</td>
<td>Beyond the Academy Network and the CREATE Initiative</td>
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<tr>
<td>June 9, 2020</td>
<td>Timothy Blatch</td>
<td>ICLEI’s Cities Biodiversity Center and Cities with Nature</td>
</tr>
<tr>
<td>June 9, 2020</td>
<td>Jordi Morató and Duván Hernán López</td>
<td>UNESCO Chair of Sustainability (UNESCO-COSOST) and Recycling the City Network (RECNET)</td>
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<tr>
<td>August 11, 2020</td>
<td>Sarah Hines</td>
<td>USDA Forest Service</td>
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<tr>
<td>August 11, 2020</td>
<td>Marcus Collier</td>
<td>Connecting Nature</td>
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<tr>
<td>September 15, 2020</td>
<td>Kristin Baja</td>
<td>Urban Sustainability Directors Network (USDN)</td>
</tr>
<tr>
<td>September 15, 2020</td>
<td>Clare Kazansky</td>
<td>The Nature Conservancy</td>
</tr>
</tbody>
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SIGNIFICANT RESULTS

Participation growth

- From the initial launching of NATURA, the number of networks increased from 26 to 36.
- Europe regional node increased from 8 members to 35 members
- Africa regional node increased from 6 members to 41 members
- Latin America regional node increased from 6 members to 64 members
- North America regional node increased from 5 members to 47 members
- Asia-Pacific regional node increased from 6 members to 27 members

NATURA Twitter:

- We have used Twitter almost daily to disseminate news and research from network members, as well as other resources connected to NBS and similar disciplines. Since launching our NATURA Twitter account in November 2019, we have added 509 Followers, garnered 28.5K impressions from Twitter users, 147 retweets, and 358 likes.

KEY OUTCOMES OR OTHER ACHIEVEMENTS

- Six TWGs were established and held rotating discussion sessions during the “World Cafe” portion of the Virtual All-Hands Meeting (VAHM): 1) Natura Design for Justice, 2) Nature-Based Pathways, 3) Global to Local, 4) Urban Nature, 5) Urban Informality, 6) Integrating NBS and the SDGs. Since the VAHM, all TWGs have accepted sign-ups of people interested in participating and several have begun meeting and have held discussions on their TWG Slack channel.
- 13 networks have presented to the NATURA community in monthly webinars (Table 1). Attendance is commonly 40-70 people.
- 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 has all been established since the initial launch. Network points of contact are able to sign-up through a Google form available on the website; presentations from webinars are also made available on the website.
- Four NATURA newsletters have been released from June-September, 2020. Within these newsletters, we have connected NATURA members to 21 opportunities, 10 publications, 18 resources, and 8 presentations.
- Five regional nodes (North America, Latin America, Europe, Africa, and Asia-Pacific) have been set up, and held their first meeting associated with the virtual all-hands meeting in July. Most have held subsequent follow-up meetings, all enabled with the NATURA Zoom rooms.
OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT

NATURA Early-Career network
This network within the broader NATURA network allows early-career professionals to stay in contact through regular virtual meetings, email, and Slack messaging to promote networking opportunities, share information, and offer peer to peer support to one another. The Early-Career network had their first meeting on September 21, 2020 where the group discussed further developing NATURA Collaboration guidelines, skill and knowledge sharing, communication, NATURA Learning Exchanges, engagement, and future meetings. The Early-Career network has their next meeting scheduled for October 20, 2020.

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

Staff career development
Tessa Martinez, who joined NATURA as its Assistant Project Manager, has acquired skill in use of Zoom technology, developing newsletter and other material, website design and content, calendar organization, and developing agendas and leading meetings of the executive and coordinating committees.

Christopher Kennedy, NATURA’s Outreach Coordinator, has further honed his web development and communication skills through development of the NATURA website.

Dr. Yeowon Kim, NATURA’s Postdoctoral Fellow, has had the opportunity to lead a group, the Early Career Network, and develop contacts around the world who share her interests in nature-based solutions. She has also worked with Weiqi Zhou to lead the Asia-Pacific regional node for NATURA. These roles are helping Kim to hone her communication and leadership skills.

DISSEMINATION OF RESULTS

- Monthly newsletter
- Email
- Weekly Twitter posts
- Monthly webinar
- 2020 NATURA Virtual All Hands Meeting
- Academic conference presentations (e.g., annual meeting Ecological Society of America)
PLAN TO ACCOMPLISH GOALS FOR NEXT YEAR

- Initiate the NATURA Learning Exchanges
- Continue monthly newsletters
- Continue weekly Twitter posts
- Continue monthly webinars
- The NATURA Network will be releasing another Call for TWG Proposals
- The NATURA Network will be releasing a Call for Proposals for Learning Exchanges
- NATURA Regional Nodes will establish regular quarterly meeting times

Thematic Working Groups (TWGs) will continue to meet regularly and work towards their stated goals

- **NATURA Design for Justice**: The goals of NATURA Design for Justice working group are three: 1) create a platform to share insights into aspects of procedural and distributive justice in nature-based solutions research and practice across international communities in the network; 2) identify opportunities for synthesis across the network related to justice processes and outcomes and translate ideas into proposals for future funding; 3) co-develop actionable plans to make equity and justice accountable in NATURA projects.

- **Nature-Based Pathways**: The goals of Nature-Based Pathways working group are: 1) Identify nature-based solutions, visions, pathways, framings and knowledge gaps; 2) Compare datasets and methods to recognize and assess NBS, innovation, and transformative capacity; 3) Identify transdisciplinary practices for catalyzing and managing NBS transformations

- **Global to Local**: 1) Based on local practice, identify which national-level goals in the Strategic Plan 2011-2020 and/or Post-2020 Global Biodiversity Framework of the Convention on Biological Diversity are most relevant in an urban context; 2) Suggest indicators that can be used at the urban level to measure progress towards these global targets; 3) Conversely, explore how local nature-based solutions and approaches to biodiversity conservation can inform global frameworks; 4) Provide inputs to the development of the post-2020 framework to improve coordination between global processes and parallel efforts by local governments on nature-based solutions planning; 5) Highlight best practices and support international city-to-city learning of urban nature-based solutions and biodiversity strategies.

- **Urban Nature**: This NATURA Thematic Working Group will for the coming year focus on mobilizing scientific knowledge through a global network of scientists and practitioners present at various sessions/meetings before and during COP15 in Kunming May 17-30 2021, and the associated 7th Summit of Cities and Subnational Governments, and Science Forum/International Conference on Science and Sustainability. We will specifically focus on scientific knowledge relevant to the new Convention on Biological Diversity goals and targets that are currently under negotiation, and will be adopted at the COP 15.

- **Urban Informality**: This working group has three goals: 1) to advance understanding of informality, by developing diagnostic tools to detect key aspects of informality that can have positive or negative impacts on resilience,
especially as regards implementation of NBS initiatives; 2) to contribute to improving the implementation of NBS in contexts of informality by analyzing good practices and lessons learned from experiences brought and shared by group members, culminating in a community of learning and a comprehensive compilation of applied tools and appropriate technologies from real-life situations; 3) to explore and develop mechanisms for enhancing governance for the implementation of NBS initiatives. Under this goal, the TWG will explore different examples of multistakeholder governance and decision making that leads to sustainable urban transformations with NBS.

- **Integrating Urban NBS and the Sustainable Development Goals (SDGs):**
  The goals of the Integrating Urban NBS and the SDGs working group is: 1) Gap analyses of urban nature-based solutions and SDGs; 2) Conflicts and barriers of urban nature-based solutions and SDGs; 3) Horizon scanning of urban nature-based solutions and SDGs; 4) Development of the connection between the NBS approach and the SDG approach

**Do contemporary policies designed to “green” cities reproduce past injustices?**

*Screenshot from Webinar conducted by Bonnie Keeler from the Beyond the Academy Network and the CREATE Initiative*
JOURNALS


BOOKS


BOOK CHAPTERS

CONFERENCE PAPERS AND PRESENTATIONS


Screenshot from Webinar conducted by Jordi Morató and Duván Hernán López, UNESCO Chair of Sustainability (UNESCO SOST) and Recycling the City Network (RECYCNET)
03 / PARTICIPANTS

NATURA TEAM

Nancy Grimm  
Arizona State University

Elizabeth Cook  
Barnard College

Timon McPhearson  
Urban Systems Lab, The New School

Yeowon Kim  
Arizona State University

Christopher Kennedy  
Urban Systems Lab, The New School

Tessa Martinez  
Arizona State University

Harriet Bulkeley  
Durham University

Marcus Collier  
Trinity College Dublin

Pippin Anderson  
African Center for Cities, University of Cape Town

Weiqi Zhou  
Chinese Academy of Sciences

Jordi Morató  
UNESCO Chair of Sustainability (UNESCOsOST)

Chantal van Ham  
International Union for Conservation of Nature

UREx Scenarios Approach

Diagnosis  
Survey  
Vulnerability analysis

Analysis  
Scenario Workshop I  
Data, outcomes, & process comparisons

Action  
Scenario Workshop II  
Goals-to-action

Governance document analysis  
Qualitative & quantitative analysis of scenarios

Reporting back & plan for continued engagement

Screenshot from Webinar conducted by Nancy Grimm, Urban Resilience to Extremes Sustainability Research Network (UREx SRN)
ORGANIZATIONS

African Center for Cities, 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
NATURVATION, Durham University, UK
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)
TraiNBS
PlanAdapt Network
Re-Nature Project
04 / IMPACTS

IMPACT ON THE DEVELOPMENT OF THE PRINCIPAL DISCIPLINE

- The Nature-based Pathways Working Group has begun to compare datasets and methods to recognize and assess NBS, innovation, and transformative capacity, as well as identification of transdisciplinary practices for catalyzing and managing NBS transformations.

- We have a book contract signed for “A modern guide to Nature-based Solutions for Cities” which draws on the NATURA network to advance the NBS field and assess the state of the art in knowledge.

- Multiple papers are submitted or in press including a global perspective on a SETS approach to urban ecosystem services, a global review invited by One Earth on NBS for urban climate change adaptation.

IMPACT ON OTHER DISCIPLINES

- Knowledge exchange and synthesis of nature-based solutions from diverse disciplines and global locations.

- Environmental and Social Justice: Synthesis and exchange on issues related to procedural and distributive justice in nature-based solutions research and practice across international communities as part of the Design for Justice TWG.

- Urban policy, planning and design: The Urban Nature and Global to Local TWGs have begun to synthesize research on how local nature-based solutions, policies and decision making strategies can inform global frameworks, and guide urban planning to achieve multiple goals: biodiversity protection, low-carbon emissions, and ample natural infrastructure for urban residents.

- New understandings and research on urban informality, urban resilience and governance inclusive of global south societies; how NBS can promote social cohesion, cultural awareness, and collective action.
IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES

- Since launching, the NATURA network has created an Early-Career Network where early-career practitioners and researchers can engage with each other, share information, and offer peer to peer support. NATURA has also hired two people on as staff—Tessa Martinez, Assistant Project Manager and Christopher Kennedy, Outreach Coordinator.

IMPACT ON INSTITUTIONAL RESOURCES

- NATURA is adding capacity and increasing network connections with important global networks in NATURA including The Nature of Cities, the ICLEI-led Cities with Nature partnership that includes core partners IUCN and The Nature Conservancy.

- NATURA is providing core networking resources through webinars, working groups, Slack communication, and meeting facilitation to key regional networks including e.g., bringing together multiple NBS networks in Europe together both within the European regional node in NATURA, but also to link with other NBS networks in other regions.

IMPACT ON INFORMATION RESOURCES

- The NATURA web platform has been developed over the first year of the project to catalyze network exchanges, to serve as a resource and repository for NATURA publications and products, and as a forum for Thematic Working Groups and networks to share ongoing research. The website further provides a dynamic space for hosting Webinar information and resources, a space for network members and interested individuals to join our Newsletter, and to learn about upcoming events related to NBS around the world. The website also played a key role in helping to facilitate, organize, and host resources for the NATURA All-Hands Meeting this summer. In the future, we plan to add further complexity to the site, add to the database of resources and products, and feature case studies and examples of NBS in-practice from each network member.

- The NATURA Slack workspace has been created to offer a platform for Thematic Working Groups, Regional Nodes, Executive Management Team, Coordinating Committee, and just general members to share information and communicate with one another.
IMPACT ON SOCIETY BEYOND SCIENCE AND TECHNOLOGY

- Engaging practitioners and non-academic community in knowledge exchange and synthesis through webinars and thematic working groups

What can urban and rural forestry learn from each other?

NUCFAC Research Need: Several!

Slide courtesy of Rich Hallett, USDA Forest Service

Screenshot from Webinar conducted by Sarah Hines, USDA Forest Service
05 / CHANGES & PROBLEMS

CHANGES IN APPROACH AND REASON FOR CHANGE

- Due to the novel Coronavirus, COVID-19, the NATURA network was unable to travel for the 2020 All Hands Meeting that was supposed to take place in Marseille, France from June 16-18, 2020. Instead, the NATURA network changed this meeting to be virtual, which ultimately allowed for more of the network to attend.

ACTUAL OR ANTICIPATED PROBLEMS

- We anticipate COVID-19 pandemic travel and in-person meeting restrictions will delay launch of the in-person Learning Exchanges. In the case that COVID-19 is still limiting travel when Learning Exchanges have been launched, we are preparing for exchanges to be virtual as well as in person.
- We revamped our Year 1 All Hands Meeting (16-18 June 2020), which was originally planned to be held in Marseille France, to be an entirely virtual exchange at which we launched the Thematic Working Groups. Through a combination of the 2020 Virtual All Hands Meeting and Thematic Working Group Slack channels, we were able to initiate and move the five Thematic Working Groups forward in communication and planning.