Routledge
Taylor & Francis Group

Local Environment

The International Journal of Justice and Sustainability

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/cloe20

# Different shades of green: how transnational actors frame nature as a solution to sustainability challenges in African cities

Katharina Rochell, Harriet Bulkeley & Hens Runhaar

**To cite this article:** Katharina Rochell, Harriet Bulkeley & Hens Runhaar (12 Jun 2024): Different shades of green: how transnational actors frame nature as a solution to sustainability challenges in African cities, Local Environment, DOI: 10.1080/13549839.2024.2353047

**To link to this article:** https://doi.org/10.1080/13549839.2024.2353047

LOCAL ENVIRONMENT
https://doi.org/10.1080/13549839.2024.2353047

Routledge
Taylor & Francis Group



# Different shades of green: how transnational actors frame nature as a solution to sustainability challenges in African cities

Katharina Rochell[a], Harriet Bulkeley[a,b] and Hens Runhaar[a]

[a]Copernicus Institute of Sustainable Development, Utrecht University Utrecht, Utrecht, The Netherlands; [b]Department of Geography, Durham University, Durham, UK

**ABSTRACT**

Nature – based solutions (NBS) are increasingly being positioned within global discourses concerning how urban sustainability challenges can be addressed. To better understand to what extent, how, by whom and with what potential implications NBS are promoted in urban Africa, this paper focuses on transnational actors and presents a dataset covering 40 NBS initiatives in 57 cities across 19 African countries. A framing analysis is undertaken to understand to what degree NBS are mobilised in accordance with global discourses. To that end, the paper builds on existing work by Tozer et al. (2022, "Transnational Governance and the Urban Politics of Nature-Based Solutions for Climate Change." *Global Environmental Politics*, 1–23) on globally circulating frames of urban nature. In further contributing to their framework, we delve into the underlying values or shades of green that are being signified through the frames by applying the IPBES Nature Futures Framework. Results indicate that urban nature comes to be seen as a solution within a climate resilience – integrated benefits nexus through which various types of transnational actors are bringing nature into the city. Two important findings can be highlighted: First, the deployed frames offer opportunities to address major African urban sustainability challenges, but initiatives may not yet be configured to adequately address their scope and magnitude. Second, the configurations of frames are predominantly informed by instrumental values that put "Nature for Society" perspectives in focus, missing opportunities for NBS to build on relational values, or "Nature as Culture" perspectives and for accommodating a plurality of worldviews on desirable futures for urban nature.

**ARTICLE HISTORY**
Received 29 January 2023
Accepted 23 March 2024

**KEYWORDS**
Urban Africa; nature-based solutions; transnational governance; framing theory; nature futures framework

## 1. Introduction

Globally, there is a growing momentum in policy circles and academia to recognise the role of nature in addressing the nexus of climate, biodiversity and society-related challenges (Debele et al. 2023; Goodwin et al. 2023; Seddon et al. 2020). Nature-based solutions (NBS), defined by IUCN as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and

**CONTACT** Katharina Rochell k.rochell@uu.nl Copernicus Institute of Sustainable Development, Utrecht University, Vening Meinesz building, Princetonlaan 8a, 3584 CB Utrecht, NL
Supplemental data for this article can be accessed online at https://doi.org/10.1080/13549839.2024.2353047.

biodiversity benefits" (Cohen-Shacham et al. 2016, 2) are proliferating. There has been extensive work to define and describe the themes which the umbrella term covers, such as green and blue infrastructure, ecosystem-based adaptation and disaster risk reduction, ecosystem services and natural capital and this is increasingly taking an urban focus (Almenar et al. 2021; Dorst et al. 2019; Pauleit et al. 2017). To date, this has largely taken place in the context of cities in Europe, North America and Australia. Yet as analysis by Tozer, Bulkeley, and Xie (2022) shows, urban NBS are increasingly being positioned within global discourses concerning how urban sustainability challenges can be addressed. This raises important questions concerning how, by whom and with what potential implications NBS are promoted to tackle sustainability challenges in urban Africa. While there is a significant body of knowledge in several domains such as urban green infrastructure (e.g. Adegun et al. 2021; de Macedo et al. 2021; Du Toit et al. 2018), urban and peri-urban agriculture (e.g. Drescher, et al. 2021; Davies et al. 2021) and urban wetlands (e.g. Asomani-Boateng 2019; Cobbinah et al. 2022; Douglas 2018), work that specifically relates to the emergence and proliferation of NBS is only recently emerging (Kalantari et al. 2018; Lokidor et al. 2023). Importantly, while research focuses on specific cases and interventions that are increasingly framed as urban NBS, there is little attention given to how and with what implications this framing is taking place. Given the important role that transnational municipal networks and other international actors have played in advancing action for biodiversity protection and climate change in African cities (Simon, Goodness, and Lwasa 2021) and the growing prevalence of global discourses promoting urban NBS, attending to the work of transnational actors in shaping what it is that urban NBS in Africa are and can become is vital.

In taking as our focus in this paper the role that transnational actors are playing in framing urban NBS, we build on existing scholarship and practice which has drawn attention to the critical role that multilateral organisations, donor agencies and non-governmental organisations play in African urban governance (Ferguson and Gupta 2002; Olivier de Sardan 2011; Robinson 2021). The influence of these actors is gained through – sometimes conditional – provision of funding and lending, technical assistance and capacity building (Smit 2018; Stren 2014). This can be instrumental in enabling cities to undertake policy experiments (Chu, Anguelovski, and Carmin 2016). Typical governance subjects include land use management, basic services, mobility, public health, and safety (Smit 2018). Over time, many of these international actors have shifted their agendas from focusing on providing basic urban services to addressing climate change resilience in urban Africa (Bigger and Webber 2021; Foli and Béland 2014; Stren 2014). In parallel, transnational municipal networks (TMNs) focused specifically on climate, biodiversity and sustainability issues have grown in their reach and extent. These actors specifically support the development of plans and policies, facilitate knowledge exchange, build capacity, and set rules and standards for sustainable practices (Betsill and Bulkeley 2004; Roger, Hale, and Andonova 2019). Over the past two decades, African cities have increasingly engaged with these networks in seeking resources and expertise (Gore 2015). Examples of TMNs in Africa include ICLEI, which seeks to create awareness for climate change among city officials, including around water scarcity, biodiversity loss, adaptation to climate change and food security, as well as the 100 Resilient Cities Programme which focuses on developing resilience strategies (Hickmann and Stehle 2019; Roberts et al. 2020; Rochell et al. 2022). Yet our understanding of how these actors are now engaging in urban NBS is limited.

To explore this question, we present a dataset of 40 NBS-related and transnational actor-driven initiatives taking place in 57 cities in 19 African countries providing, to our knowledge, the first empirical data comparing NBS – understood here as different forms of deliberate interventions that seek to enhance, develop, or protect nature to resolve urban sustainability challenges – across African cities. To understand the degree to which these initiatives are being mobilised in accordance with global discourses, we use the framework developed by Tozer, Bulkeley, and Xie (2022) which identifies four frames – "nature for resilience", "nature for mitigation", "integrated benefits of nature" and "nature first" – and investigate how they are configured in the African context, by which types of transnational actors, and the implications this may have for addressing local sustainability challenges in practice. In seeking to understand the implications of these frames for urban NBS in Africa, we also delve into the

underlying values or shades of green that are being signified through these frames by applying the Nature Futures Framework conceptualised by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (Pereira et al. 2020) and used as a tool to assess how policies and initiatives contribute to different nature perspectives (Shaikh and Hamel 2023). We first conceptualise which value perspectives are inherent within each of the four frames advanced by Tozer, Bulkeley, and Xie (2022) and then apply the NFF as a secondary lens to the analysis of the dataset to identify what kind of value perspectives or shades of green dominate in initiatives by transnational actors in urban Africa and which ones may be missed.

The remainder of the paper is structured as follows: Section 2 focuses on the rationale for choosing frames as a conceptual lens, and presents the Tozer, Bulkeley, and Xie (2022) framework and the NFF and how they are brought into conversation in this paper. Section 3 introduces the dataset and explains the research methodology. Configurations of frames embraced by transnational actors are presented in section 4. Here, we highlight identified problems and suggested (nature-based) solutions as well as predominant underlying value perspectives of nature, and discuss potential consequences for addressing African urban sustainability challenges by situating the findings in the wider literature. Section 5 concludes by outlining the broader policy implications and suggests future areas of research.

## 2. Exploring frames of urban nature and their underlying value perspectives

Conceptually, to better understand how the emergence of NBS influences the governance of African urban sustainability transitions, it matters to explore to what extent and by whom global frames of urban nature are mobilised. To that end, section 2.1 introduces the concept of frames and the framework by Tozer, Bulkeley, and Xie (2022) which is used in this paper. Yet, there are various ways in which people and societies give meaning to nature. Recognising this complexity, the paper seeks to add to the existing framework and create a richer analytical approach by exploring what value perspectives of nature – here conceptualised as shades of green – are promoted through the rise of transnational governance of NBS in Africa. We apply the NFF presented in section 2.2 to do so.

### *2.1. Frames as a window into understanding African urban NBS*

Frames are central to how we come to understand the world because they shape the perception and construction of reality and practical action on the ground by laying "the conceptual groundwork for possible future courses of action, and actors intersubjectively, interactively construct the socio-political world in and on which they act" (Van Hulst and Yanow 2016, 99). As such, frames are a critical part of transnational governance because they serve to construct what, how and by whom challenges should be addressed (Entman 1993; Tozer, Bulkeley, and Xie 2022) with the effect that evolving discourses circulating among international organisations can directly impact domestic policy (Béland and Orenstein 2013). Often, studies focus on the contestation between discursive frames (Hajer and Versteeg 2005). For example, Melanidis and Hagerman (2022) use a discourse coalition approach to identify two opposing narratives of NBS in international environmental governance. They find that the dominant discourse is around leveraging the power of nature which is opposed by an emerging discourse that emphasises a dangerous distraction. The latter is held by critics who argue that NBS can also be co-opted to continue with an unsustainable status quo unless deeper structural issues concerning social justice are addressed.

Yet when it comes to the matter of urban NBS, recent research suggests that there is more in play than a simple opposition between two contrasting frames. Tozer, Bulkeley, and Xie (2022) examined how transnational networks and actors are mobilising NBS in urban settings and found that actors draw on four different frames about the promise that urban nature holds as a solution to climate and nature challenges. First, in the "nature for resilience" frame the problem is defined as increasing resilience in the face of climate change impacts and solutions are defined with their potential to

contribute to climate change adaptation and disaster risk reduction. TMNs are embracing the frame related to their climate adaptation or resilience work (e.g. 100 Resilient Cities, C40 Delta Cities and Urban Flooding Network), as well as financial institutions with an interest in disaster risk reduction, such as the World Bank and the Global Facility for Disaster Reduction and Recovery. Second, in the frame "nature for mitigation" the central problem is seen as limiting the global average rise in temperature below 1.5 degrees Celsius. TMNs and other urban climate actors (e.g. C40 Cool Cities Network) highlight urban nature as a strategy to not only capture carbon but also reduce greenhouse gas emissions by reducing energy through cooling and insulation. Third, the "integrated benefits" frame presents sustainability challenges as deeply intertwined and highlights the potential of nature to address multiple sustainability challenges simultaneously, including biodiversity loss, climate change, energy sustainability, health and wellbeing. TMNs traditionally focused on climate action (e.g. ICLEI) increasingly seek to address a wider range of issues and use NBS as a means to do this. Also, new partnerships between nature and urban organisations emerge (e.g. IUCN Urban Alliance), and conservation organisations that previously only focused on rural areas are entering the city through this frame. Fourth, the "nature first" frame centres around the problem of reversing biodiversity loss, which is seen to yield climate co-benefits. The frame is embraced by international biodiversity and nature conservation organisations (e.g. Nature Conservancy) who encourage cities to halt land use change and protect and restore natural areas. In positioning climate action as co-benefits to biodiversity protection through this frame, these actors also gain access to climate finance. The four globally circulating frames may be expected to shape how NBS is being promoted in urban Africa, given the influential role for urban governance that many of the above-mentioned transnational actors have on the continent.

### *2.2. Exploring the values underpinning frames of urban nature: different shades of green*

Within the four frames outlined above, various value perspectives of nature can be identified. Research has emphasised that people interpret and define nature based on their cultural and historical contexts (Posey 1999; Williams 1972) and that there are multiple ways of making sense of environmental affairs (Dryzek 2007). There are hence multiple different viewpoints on what to value about nature and why. The IPBES has conceptualised the variety of value perspectives under the Nature Futures Framework (NFF) in three different ways: "Nature for Nature" (NN), "Nature for Society" (NS), and "Nature as Culture" (NC) (Durán et al. 2023; Pereira et al. 2020). NN relates to intrinsic and eco-centric values from which perspective nature is appreciated and preserved for what it is and does without direct human benefits (in urban areas, for example, expressed through land sparing and rewilding); NS focuses on instrumental and utilitarian values and the benefits that nature provides to people (e.g. ecosystem services); and the NC perspective emphasises relational values between nature and people, often expressed in local knowledge systems and where people's identity is associated with nature (Kim et al. 2023; Mansur et al. 2022). In reality, policy interventions often show different gradients of each perspective (Kim et al. 2023). The NFF has been applied to the urban realm, for example by developing visions for positive urban nature futures in a generic manner (Mansur et al. 2022) or for the case of urban expansion in the Atlantic Forest in Brazil (Lembi et al. 2020), as well as for examining which nature value perspectives dominate in Master Plans of new cities in Singapore (Shaikh and Hamel 2023).

In this paper, we seek to bring the NFF into conversation with frames of urban nature held in transnational governance. We suggest that the NFF lends itself to extending the framework by Tozer, Bulkeley, and Xie (2022) by adding more depth of analysis in exploring which value perspectives (or gradients thereof) underlie initiatives promoted in urban Africa through the different frames. Conceptually, here we understand the different value perspectives underlying the four frames of urban nature as different shades of green. The two frames "nature for resilience" and "nature for mitigation" can be understood as corresponding to the NS value perspective in the NFF, because utilitarian, anthropocentric and instrumental value perspectives are inherent in both

of the frames. The "nature first" frame matches the NN perspective in the NFF, driven by intrinsic and eco-centric values of urban nature. Less clear is the relationship between the "integrated benefits of nature" frame and the NFF, as the former is broad in scope. In highlighting the power of nature to address multiple sustainability challenges, including biodiversity loss, climate change, energy sustainability, health and wellbeing, the frame potentially shows gradients of both NN and NS value perspectives, depending on which benefits are included. None of the frames carry NC value perspectives in an obvious manner. Yet, initiatives linked to the frames may also give importance to Nature as Culture – expressed by, for example, environmental stewardship, protecting species important for local communities and cultural heritage, or sacred natural elements (e.g. certain trees). To further our understanding of which value perspectives or shades of green underlie different frames of urban nature, the paper explores the configuration of the frames mobilised by transnational actors in the African context. This will be done in section 4 where frames of urban nature within the dataset are presented, by paying attention to dominant and missing value perspectives, and in section 4.4 where we discuss the potential implications thereof.

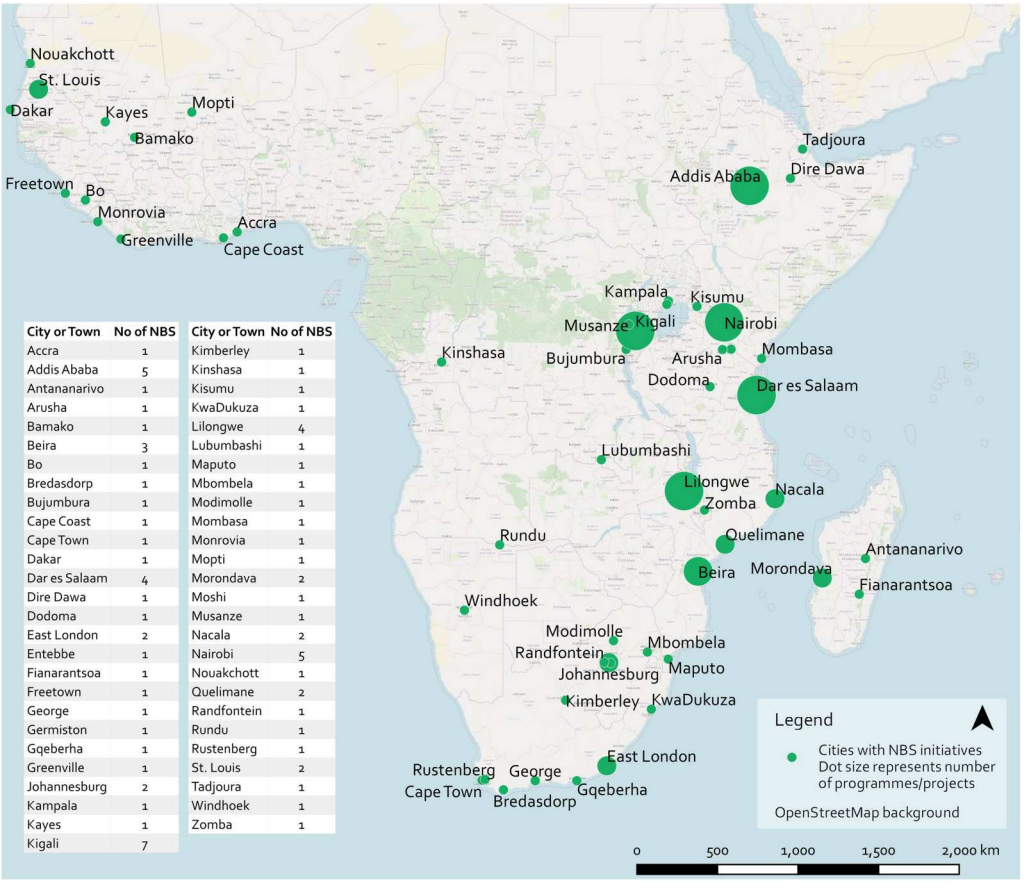
## 3. Evidence of NBS initiatives by transnational actors in urban Africa: dataset and methodology

The dataset that this paper builds on comprises 40 interventions of different types of transnational actors implemented in 57 cities across 19 African countries and is based on publicly available information in the English language (see Annex 1 in the supplementary material). It covers various groups of transnational actors, either involved as executing or implementing entities or funders, as Table 1 indicates. The geographical distribution of the interventions is visualised in Figure 1. The majority of interventions (25) focuses on cities above a population of one million, whilst small towns below 50,000 inhabitants are represented only three times, and the remaining cities are of intermediate size.

To gather evidence of NBS-related programmes and projects by transnational actors in urban Africa, data collection took place through an online search from March 2020 to December 2021. Understanding NBS for this research as an umbrella term to include different forms of deliberate interventions that seek to enhance, develop, or protect nature to resolve urban sustainability challenges determined the search terms. Searches were carried out on Google using the keywords "nature", "city", "urban", "Africa", in combination with the terms "green infrastructure", "blue infrastructure", "ecosystem services", "ecosystem-based adaptation", "ecosystem-based disaster risk reduction", and "nature-based solutions". Besides, the databases naturebasedsolutions.org and naturebasedsolutionsinitiative.org were screened for relevant initiatives. Where possible, data were

**Table 1.** Overview of main transnational actors in the dataset and the respective deployed frames of urban nature in Africa.

| Frame | Main implementing/ executing actors (in order of importance in terms of the number of initiatives they are involved in) | Key funding entities |
|---|---|---|
| Nature for Resilience | Multilateral entities (World Bank, UN-Habitat, UNEP, UNDP); International organisations (World Resources Institute); Humanitarian NGOs (Red Cross and Red Crescent, Oxfam) | Climate finance institutions (Global Environment Fund, Global Climate Fund, Adaptation Fund); Development finance institutions (e.g. Nordic Development Fund); Bilateral donors (e.g. UK, Germany, France); Multi-donor programmes (e.g. Global Facility for Disaster Risk Reduction) |
| Integrated benefits of nature | Transnational Municipal Networks (ICLEI); Multilateral entities (FAO, UN-Habitat, UNDP, UNEP); Nature/biodiversity organisations (IUCN, Nature Conservancy); International organisations (World Resources Institute); Urban-design focused NGOs (Kounkuey Design Initiative) | Bilateral donors (e.g. Sweden); Development finance institutions (e.g. European Investment Bank and KfW); Foundations |




| City or Town | No of NBS |
|---|---|
| Accra | 1 |
| Addis Ababa | 5 |
| Antananarivo | 1 |
| Arusha | 1 |
| Bamako | 1 |
| Beira | 3 |
| Bo | 1 |
| Bredasdorp | 1 |
| Bujumbura | 1 |
| Cape Coast | 1 |
| Cape Town | 1 |
| Dakar | 1 |
| Dar es Salaam | 4 |
| Dire Dawa | 1 |
| Dodoma | 1 |
| East London | 2 |
| Entebbe | 1 |
| Fianarantsoa | 1 |
| Freetown | 1 |
| George | 1 |
| Germiston | 1 |
| Gqeberha | 1 |
| Greenville | 1 |
| Johannesburg | 2 |
| Kampala | 1 |
| Kayes | 1 |
| Kigali | 7 |

| City or Town | No of NBS |
|---|---|
| Kimberley | 1 |
| Kinshasa | 1 |
| Kisumu | 1 |
| KwaDukuza | 1 |
| Lilongwe | 4 |
| Lubumbashi | 1 |
| Maputo | 1 |
| Mbombela | 1 |
| Modimolle | 1 |
| Mombasa | 1 |
| Monrovia | 1 |
| Mopti | 1 |
| Morondava | 2 |
| Moshi | 1 |
| Musanze | 1 |
| Nacala | 2 |
| Nairobi | 5 |
| Nouakchott | 1 |
| Quelimane | 2 |
| Randfontein | 1 |
| Rundu | 1 |
| Rustenberg | 1 |
| St. Louis | 2 |
| Tadjoura | 1 |
| Windhoek | 1 |
| Zomba | 1 |

**Figure 1.** Location of NBS initiatives with transnational actor involvement in the dataset. Note: The map indicates the distribution of identified NBS-related programmes and projects with a concentration in Eastern and Southern Africa. Whilst the dataset contains information on initiatives in 57 cities, some projects had not yet identified the names of target cities, hence the map contains a lesser number of cities. In South Africa, the ICLEI LAB Wetlands project covered District Municipalities which include a larger number of local municipalities. For visualisation, the town or city that hosts the seat of the District Municipality is shown.

verified by multiple sources. The following criteria guided the inclusion of interventions in the dataset: planned and implemented programmes or projects that fall under the umbrella term of NBS; NBS was at least constituting one component of the project – either in combination with grey infrastructure or as an NBS project in itself; both planned and already implemented projects (planned projects were only included where the concept notes have gotten official pre-approval to ensure that the research is based on representative projects where transnational actors support the approach). Initiatives that showed no involvement of transnational actors as either executing, implementing or funding entities, or were not urban or peri-urban in focus were excluded from the dataset. For each initiative, project documents and project reports were collected. In some cases, project documents were not available publicly. In lieu of such, project descriptions were extracted from the websites of the actors involved. The documents were stored in folders per actor.

The research approach to analysing the documents was based on framing analysis, undertaken through thematic analysis of project descriptions. This was aided by an analysis matrix that builds on the work of Entman (1993) who considers frames as a combination of a problem definition, a causal interpretation, and a preferred solution. Inspired by this, the matrix was structured to systematically capture and synthesise results of analysis of project-related information on challenges or issues to be addressed, as well as solutions proposed. As a living document the matrix evolved

alongside the analytical process containing the following main steps, which were made iteratively: First, qualitative analysis of each project, notably of all project-related texts, was undertaken. We manually coded the material to identify challenges or issues to be addressed as well as solutions proposed (cf. Entman 1993). Various challenges and solutions emerged which were inductively assigned to overarching themes. For example, heat stress, flooding and soil erosion were grouped under climate change adaptation and disaster risk reduction. Each of these was linked with the respective proposed solutions such as urban parks or forests, mangroves, green buildings, or solutions around rivers, streams and wetlands. Second, the thematic groups and associated projects were linked to the frames outlined by Tozer, Bulkeley, and Xie (2022). Illustrative features of these frames (see section 2.1) provided a guidance narrative to assign each project to an overall frame. A systematic way of designating projects was developed based on the level of emphasis on related issues in the project descriptions. For example, if a project description included detailed information and a strong focus on wetland management to address the issue of flood protection, and indicated in a side comment that it would also improve water quality, the main frame was designated as resilience, with added co-benefits under the integrated benefits frame. By arranging the results of the analysis in the matrix, quantitative observations regarding the dominance of certain issues and solutions advanced through the frames could be made. Besides, with regard to the role of transnational actors, the analysis matrix was structured to also capture information on funding entities, executing and implementing entities of each project. As such, the correlation of frames to projects allowed for identifying the main types of actors mobilising the frames, as well as the predominant challenges identified and solutions proposed by these actors. As a last step, we applied a secondary lens of analysis to the configuration of frames in the dataset by examining their underlying nature value perspectives. This was guided by examples of the coding scheme developed by Shaikh and Hamel (2023). For example, green and blue infrastructure can fall under "Nature as Culture" if meant to socialise or to emphasise historical or cultural value; but also under "Nature for Society" when regulating services (e.g. improving air quality, reducing emissions; or cooling) are emphasised. Overall, the iterative process of analysis resulted in eliciting frames of urban nature embraced by transnational actors, the configuration of frames in terms of the main issues advanced and the shades of green signified through these frames. The results are presented and discussed in the next section.

## 4. Dominant and missing frames of urban nature

Analysis reveals that transnational actors embrace two main frames in the African urban context: "nature for resilience" and "integrated benefits of nature". They are seldom advanced on their own but more often overlapping, creating nuances around a resilience-integrated benefits nexus as visualised in Figure 2. Notwithstanding these important variations, the "resilience" frame dominates in 17 projects while the "integrated benefits" frame does so in 23 of them. "Nature for mitigation" is never advanced by itself, but in nine instances included as one of the many integrated benefits of nature. "Nature first" is conspicuously absent. In the next sub-sections, we show which types of transnational actors deploy the frames (see Table 1 for an overview of the main types of actors) and what specific issues are advanced through them, and discuss potential implications by drawing on wider literature. We also present which underlying value perspectives can be identified and end with a reflection on the consequences thereof.

### *4.1. The frame "nature for resilience" abounds*

Globally, this frame is mainly deployed by TMNs with an interest in climate adaptation (such as 100 RC), as well as international organisations with a long-standing interest in disaster risk reduction, such as the World Bank or donor agencies (Tozer, Bulkeley, and Xie 2022). Our observations from the African context largely corroborate these findings. Within the dataset, multilateral organisations

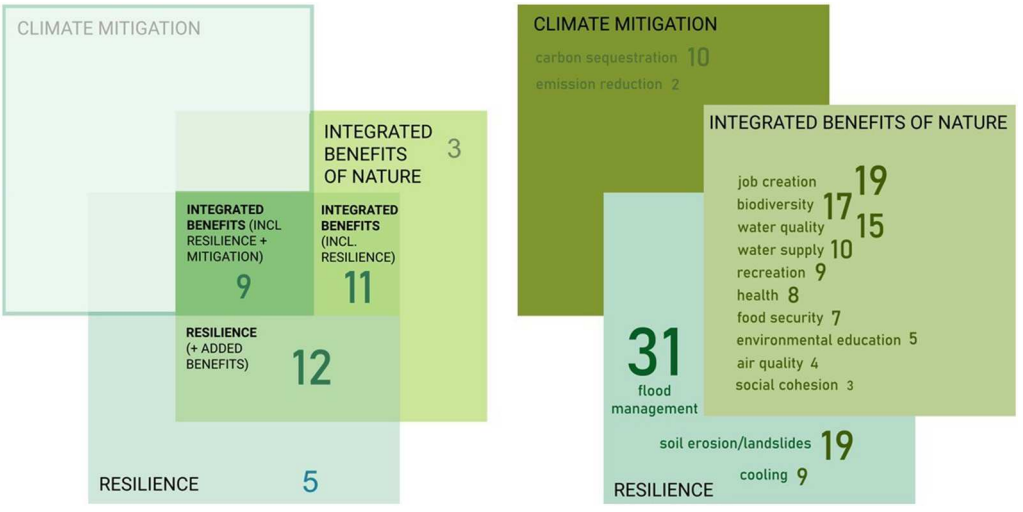



**Figure 2.** Main frames of urban nature in the African context and related issues addressed. Note: On the left, the main frames identified in the dataset are visualised. This shows a clear nexus between "nature for resilience" and "integrated benefits" in terms of the overlaps and combinations of frames as depicted in the centre of the figure. While the resilience frame dominates in 17 projects, 12 of these have also included additional benefits. The example outlined in the methodology section of this paper (a project focusing on wetland management to address flood protection, which seeks to improve water quality as a secondary or additional benefit) falls in this category. The "integrated benefits" frame dominates in a total number of 23 projects. In 11 of these, resilience or adaptation-related goals are included, while nine include both resilience and mitigation. The latter is never advanced as a main objective itself but is always included as one of the many integrated benefits of nature. The visualisation on the right depicts the main issues advanced through these frames and how often these issues are featured. For example, flood management is the top issue, which 31 initiatives refer to (to varying degrees of emphasis).

(World Bank and UN agencies) and donors (UK, Germany and Belgium) deploy the frame. In addition, it is often advanced in projects realised through climate finance from the Global Environment Fund, the Global Climate Fund or the Adaptation Fund. When resilience or adaptation are part of the problem framing, either as the main focus or as one aspect along with others in the "integrated benefits" frame, the narrative centres around flood risks (31 projects), often in connection with soil erosion and landslides (19 projects). Given the increasing climate-related hazards that make flooding a high-risk concern for African cities, as highlighted in the IPCC Sixth Assessment Report (Pörtner et al. 2022), this is not surprising. In comparison, the issue of cooling (9 projects) receives less attention whilst little emphasis is placed on addressing the damage from droughts (2 projects). However, as African cities are likely to face increased exposure to excessive heat over the coming decades (Kareem et al. 2020; Pörtner et al. 2022), this framing may become more prevalent in future. Overall, the issues for which nature is seen to provide solutions – predominantly concerning the climate resilience of African urban societies – resonate with instrumental values and the "Nature for Society" perspective conceptualised within the NFF.

In terms of identified solutions to these challenges, there is a bias towards green infrastructure and re- or afforestation. Tree planting is suggested as a solution in 22 projects. This mostly concerns addressing erosion and landslides in hilly and riparian areas. In a few cases, it constitutes a city-wide strategy like in Freetown, Sierra Leone. Other interventions concern the creation of urban parks as flood retention areas in 14 projects as in the Dar es Salaam Metropolitan Development Project. Both urban parks and tree planting are also linked to shade provision and cooling, in those projects that identify heat stress as a problem. In coastal cities, mangrove restoration is a popular measure to counter the adverse impacts of sea level rise, deployed in 14 projects. In fewer initiatives, water bodies are part of the solution. Wetland restoration, such as in the project on Flood Control and Integrated Urban Catchment Management in Kigali, is promoted in six projects. Only in rare cases, smaller-scale approaches to stormwater management are included. For example, the Realising

Urban NBS project in Nairobi's informal settlement Kibera includes the construction of sustainable urban drainage (SUD) in the form of filter drains, permeable paving, planting, and rain gardens. Research on African cities exposes issues of maintenance, revenues, and continuity in the management of SUDs (Mguni et al. 2022) but also demonstrates the benefits of the small-scale interventions for incremental upgrading and scholars advocate for their wider uptake (Mulligan et al. 2020). Transnational actors could play a key role in facilitating such practices. Another example of lesser-promoted solutions is green roofing, represented in the dataset in five initiatives. Its application in the African context faces obstacles, such as a lack of expertise and comparatively high construction costs (Labuschagne and Zulch 2016). However, given that this has proven to be an effective solution in providing water retention areas as well as cooling in other geographical contexts (Zheng et al. 2021), it seems worthwhile to investigate existing projects implementing green roofs in Africa and their potential for scaling up.

### *4.2. The frame "integrated benefits of nature" is equally important*

Tozer, Bulkeley, and Xie (2022) found that at the global level, this frame is advanced by TMNs who traditionally focused on urban climate but increasingly seek to address a wider range of issues. In line with this, our analysis reveals that ICLEI is deploying this frame in Africa, for example through four projects funded by the Swedish International Development Cooperation Agency (Sida). Sida is mobilising the "integrated benefits" frame by funding a total of seven projects. Other bilateral donors include Germany, the UK, Italy, and, in one instance, China. Besides, traditional urban actors like the World Bank and WRI engage through this lens. Tozer, Bulkeley, and Xie (2022) and Bulkeley et al. (2022) also find new partnerships between urban and nature organisations. Possibly, such a trend also emerges in the African context. Our dataset suggests that nature and conservancy organisations find their way into cities by forging partnerships with the private sector and foundations, for example between the Nature Conservancy, Coca-Cola Foundation and others in Cape Town's Water Fund. Given that the "integrated benefits" frame is particularly broad in scope, as outlined in section 2.2, initiatives promoted through this framing can include various gradients or shades of value perspectives of nature, depending on how and which issues are advanced. The analysis of the database shows that when the frame is deployed, transnational actors seek to address different issues in varying combinations, whereby the most often featured are economic development and job creation (19 projects), followed by biodiversity (17 projects). Issues of medium emphasis are water quality and supply (15 and 10 projects), as well as health and opportunities for recreation (8 and 9 projects), whilst the least attention is given to food security (7 projects) and socio-cultural issues. We discuss each group of issues below.

The benefits of **urban economic development and job creation** which nature is seen to provide inherently link the frame with an instrumental "Nature for Society" value perspective. It is included in 19 projects and mainly advanced by development finance institutions (European Investment Bank and KfW Development Bank) and UN agencies. Here, NBS are seen to provide benefits in the form of short- and medium-term job creation; economic gains from enhanced ecosystem services; or the creation of business opportunities. The notion of short- and medium-term job creation is represented by community involvement in urban greening activities. For example, the Dar es Salaam Metropolitan Development Project foresees "*Reforestation of upstream forest reserves, revitalization of mangrove area and urban greening along riverbanks and tributaries via a public works campaign (…) that provides training and employment for women and youth*". In Freetown, the Resilient Urban Sierra Leone Project involves communities in the City Council's Tree Tracking and Stewardship Programme that aims at "*verifying the incremental growth of each tree and unlocking the untapped potential of mass employment in forest restoration on a per-tree basis*". Expected gains from enhanced ecosystem services include improved livelihoods from an increased population of fish species in restored mangroves, such as in the Monrovia Metropolitan Climate Resilience Project. Three projects refer to the creation of business and job opportunities in connection to urban parks. For example, in

Beira, Mozambique, the KfW Development Bank foresees "*opportunities for small businesses*" in a newly created public urban park. Overall, ideas of economic development and job creation are predominantly framed as low-wage opportunities through public works programmes to remedy urban poverty. Research on the effects of such programmes shows that they can reduce poverty when the programme is sufficiently reliable and long-term (Gehrke and Hartwig 2018). Enquiring how to unlock gainful employment at a larger scale will be critical given the lack of formal employment in African cities (Lall 2017). Increased evidence of benefits of NBS in terms of urban economic development could also improve the valuation of nature in African cities and offer the potential for improved stewardship from a "Nature for Society" perspective.

**Biodiversity**, mentioned in 17 projects across all actor groups may intuitively link to the intrinsic "Nature for Nature" value perspective, but this is not always the case. Most actors add biodiversity concerns to a longer list of benefits without identifying inter-relations of goals and causalities of impacts. For example, in Cape Town, the Nature Conservancy's Water Fund "*will stimulate funding and implementation of catchment restoration efforts, and, in the process, create jobs and momentum to protect global biodiversity and build more resilient communities in the face of climate change*". This resembles the shading of green as represented in the "Nature for Nature perspective", where biodiversity is valued in and of itself, whilst societal co-benefits are presented as closely interlinked. In other cases, notably in TMNs' initiatives, biodiversity is positioned as a key underlying factor in the provision of ecosystem services. For example, ICLEI Africa's Interact BIO project aimed to support cities "*to understand and unlock (…) the potential of nature to provide essential services and new or enhanced economic opportunities, while simultaneously protecting and enhancing the biodiversity and ecosystems on which these services and opportunities depend*". Biodiversity here is valued from a "Nature for Society" perspective, linked to the utilitarian notion of ecosystem services. Overall, when observing patterns in the dataset related to how biodiversity is valued and defined, it is striking that it is referred to in broad terms and seldom relates to the richness of species and/or habitats and their diversity. General statements prevail, such as that green public spaces "*attract a wide range of birds and insects*" (UN-Habitat Global Public Space Programme). Furthermore, only a few projects include considerations of the selection of tree species, such as the "*right tree, right place*" principles in the Resilient Urban Sierra Leone Project implemented by the World Bank. Lacking specificity was also observed in the Africa-wide study on tree planting projects by Lobe Ekamby and Mudu (2022). More often, forests tend to be seen as automatically bringing biodiversity benefits: "*Trees and forests provide multiple health benefits, sustain water resources, help to combat climate change, and protect global biodiversity*" (Cities4Forests). Yet, researchers caution that the mere existence of more green may not automatically lead to increased biodiversity (Seddon et al. 2019). By paying attention to including specific targets and measures for biodiversity in their programmes and projects – irrespective of the underlying value perspective – transnational actors could better contribute to addressing the world's massive biodiversity crisis.

Issues that are of medium to lower quantitative importance in the dataset are **water quality and supply** (15 and 10 projects respectively), as well as health and well-being. The former finding is in line with a regional review of water-related investments by the World Bank and African Development Bank which found that objectives of water quantity and quality are mostly related to agricultural sectors (Oliver and Marsters 2022). **Health** is mentioned in nine, and opportunities for recreational activities in urban parks in eight projects. Physical health and health in general terms overshadows mental health which is only included in the narrative around the Cities4Forest initiative. Research has demonstrated the potential of NBS to significantly contribute to various indicators of health and well-being, but overwhelmingly focuses on the Global North (Kabisch, van den Bosch, and Lafortezza 2017; Van den Bosch and Sang 2017). Yet, also in African cities, there is widespread use of green infrastructure for aesthetic appreciation and recreation (Shackleton et al. 2018). Although more affluent urban residents disproportionally appreciate such integrated benefits of nature (Du Toit et al. 2018),

health-related issues may deserve more attention to capture the potential benefits of "Nature for Society" at large.

**Food security** – a benefit derived from Nature for Society – is surprisingly of very low prevalence in the problem framing with only seven projects including it. For example, FAO's Green Urban Oasis Programme seeks to "*turn dryland cities into 'green urban oases' and to bolster their overall resilience to climatic, health, food and economic crises, while reducing the impact of urbanization on biodiversity and the surrounding natural environment*". The role of urban agriculture (UA) in correlation with food security is emphasised in only three projects, while in three other projects, UA relates to income opportunities. The relatively low attention is inconsistent with the knowledge that UA plays an important role in food security and employment in the region (de Macedo et al. 2021; Titz and Chiotha 2019). UA is commonly perceived as a temporary poverty-related practice and remains insufficiently acknowledged in urban policy (Drescher et al. 2021). This reflects that amid an array of pressing urban planning and development challenges, African local governments tend to view food insecurity outside of their mandate, partly because it is often perceived as a rural problem (Davies et al. 2021). Food security is therefore absent from urban development planning and policy in many countries, and UA is even prohibited in many cities (Battersby and Watson 2018; Titz and Chiotha 2019). Where it is not prohibited, legal frameworks for UA are either non-existent or contradictory and overly complex (Drescher et al. 2021). Scholars find that this is perpetuated through visions of the "modern" African city to which UA, considered a rural activity, does not fit (Lwasa et al. 2015; Smit 2016). To increase food security it would be useful to enquire into the reconciliation between perceptions of UA and visions of African urbanism, as "food production is not 'the antithesis of the city', but an urban activity that contributes to the resilience of cities" (Drescher et al. 2021, 297). Today, UA initiatives in Africa are largely driven by grassroots organisations (de Macedo et al. 2021). Transnational actors can potentially play an important role in enhancing and widening such practices if based on due analysis of local contexts.

The least occurring issues are those found within the **socio-cultural domain**. Within the initiatives analysed in the dataset, there is little emphasis on social interaction (3 projects), social cohesion (3 projects), and cultural and social values (2 projects). Where this takes place it does so in conjunction with addressing multiple other integrated benefits, as exemplified in the Ras Mekonnen Riverside Rehabilitation project by UN-Habitat in Addis Ababa. With the understanding that "*(g)ood public spaces enhance community cohesion and promote health, happiness, and well-being*" the project focused on *"green public spaces, specifically river regeneration and working to link the riverbanks with the broader urban heritage of the city (…) which helped prevent landslides, provide shade and restore previously damaged ecosystems."* Another example is the Kibera Public Space project in Nairobi, implemented by the Kounkuey Design Initiative, which presents the developed public spaces as "*hubs of cultural exchange, economic activity, and environmental remediation*". Overall, the lack of inclusion of socio-cultural issues indicates limited attention given by transnational actors to "Nature as Culture" value perspectives which are often expressed in local knowledge systems where nature is shaped by culture and vice versa, and where people´s identity is associated with nature (Mansur et al. 2022). This points to potentially missed opportunities for building on local values and perceptions in enhancing, protecting or developing urban nature.

### *4.3. The frames "nature for mitigation" and "nature first" are sidelined*

"Nature for mitigation" – squarely falling under the "Nature for Society" value perspective – plays a relatively limited role. Whereas 12 projects across all actor groups mention it as a goal, none of them elevate it as a major target. Climate mitigation is rather framed as one of the "integrated benefits of nature". For example, in Dar es Salaam, the Implementation of Concrete Adaptation Measures project restored degraded mangroves to "*maintain water flow and storage in the face of droughts, as well as (to) provide protection against floods or storms. Other environmental benefits (…) include*

*nutrient cycling and water purification, coastal protection, habitat and nurseries, and carbon sinks"*. The limited role of the frame is in line with the patterns of climate finance in Africa. Most of it is directed towards adaptation efforts given that Africa contributes a relatively small share to the global greenhouse gas emissions and is highly vulnerable to climate change effects (Adenle et al. 2017; Nyiwul 2019). In comparison, the absence of the frame "nature first" in the dataset is striking. While globally, it is mobilised by biodiversity and nature organisations who encourage cities to halt land use change, our dataset shows no evidence of initiatives which are led from, or mainly focus on, the perspective of biodiversity protection or preservation. As a result, initiatives purely informed by intrinsic and ecocentric values of urban nature are lacking.

### *4.4. The frames bring distinct shades of green to the fore*

Overall, the analysis suggests that the discourses of urban nature mobilised by transnational actors in Africa mainly take an anthropocentric and utilitarian angle. The "Nature for Society" perspective of the NFF dominates in the initiatives covered in the dataset, reflected by a framing that positions NBS mainly as solutions to address climate resilience and adaptation in conjunction with various integrated benefits that these bring to urban societies. One has to look hard for an eco-centric framing – the "Nature for Nature" does not gain much traction, even though there a nuances of it when biodiversity gains are part of the benefits expected from NBS, as shown above. Certainly, "Nature for Society" perspectives will remain crucial in future, given the climate change-related projections of future vulnerabilities of African societies. Yet, to realise transformative change through NBS in urban Africa, there are opportunities for transnational actors to build on more shades of green or plural value perspectives, particularly by paying attention to how positive relational values of urban nature can be promoted. Indeed, studies have emphasised the importance of building on biocultural values in urban greening initiatives in Africa (Cocks et al. 2020). For example, Aalto and Ernstson (2017) describe how in Cape Town a wetland was protected from being built upon through community mobilisation and the creation of a narrative drawing together memories of oppression with contemporary notions of caring for nature. A historic slave legend was mobilised to connect the wetland (Princess Vlei) with Table Mountain, and promoted by activists to envision a hiking trail that could be used to raise awareness about colonialism, apartheid, and ecological rehabilitation. The example illustrates that relational and cultural values are inherently specific to the local historical and geographical context. Meanwhile, scholars caution that "designing interventions without incorporating cultural values can not only alienate locals but can even have negative unintended consequences undermining intended outcomes" (Du Toit et al. 2018, 258). Therefore, urban NBS projects, whether driven by transnational actor involvement or not, require inclusive processes to capture the cultural diversity among the many communities in cities, to define and move toward desirable urban nature futures (Mansur et al. 2022).

## 5. Conclusion

This paper presents new evidence of NBS-related efforts by transnational actors in urban Africa through a dataset of 40 projects in 57 cities across 19 countries. While the dataset provides an overview of the contemporary efforts of transnational actors in urban Africa, this is a dynamic field and research should continue to map out and analyse these efforts. The research focuses on the analysis of publicly available information in the English language and sources in other languages would usefully complement the dataset in future research. Methodologically, undertaking framing analysis based on thematic analysis of publicly available documents has limitations as it is influenced by the level of information given therein. Notwithstanding, the analysis in this paper critically advances our knowledge on how and to what degree transnational actors mobilise NBS in African cities in accordance with globalised frames of urban nature, and which shades of green are signified through these.

The analysis shows that two main frames advance particular problems and arguments around urban nature and generate resources in the form of programmes and projects in Africa: "nature for resilience" and "integrated benefits of nature". Whereas resilience is ubiquitous, the frame is seldom embraced on its own. It is mostly deployed in combination with co-benefits or interlinked with one or several integrated benefits of nature, such as job creation, biodiversity, or water quality – reflecting the multifunctionality of NBS. The dominant frames offer opportunities for mobilising NBS, and for benefiting nature and society because they intuitively align with the spectrum of urban sustainability issues in the African context. However, three risks emerge from the analysis of the dataset. First, as the NBS mobilised are biased towards addressing certain sustainability challenges, there is a risk of overlooking important issues. For example, whilst flood-related risks are at the centre of most interventions, heat stress and drought receive little attention but are critical future climate-induced risks as the IPCC Sixth Assessment Report reveals. Also, there is remarkably little emphasis on food security, which is inconsistent with the opportunities that NBS potentially hold to tackle the challenge. Second, the objectives pursued may not always be met by the most adequate solutions to address the magnitude of the challenge. For example, urban economic development and job creation rank high among objectives. Yet, solutions largely target short-to-medium-term and low-wage opportunities. Enquiring how gainful employment can be created through NBS will be critical given the high levels of poverty in African cities. Third, as observed regarding biodiversity, there is a lack of detailed targets and it might be deceitful to claim that NBS contribute to declared goals if their attainment is neither monitored nor evaluated. Goals and targets must be concrete, to avoid the risk of biodiversity becoming an empty signifier or device of ´green propaganda´.

A more fundamental finding is related to the implications of global discourses of urban nature, and the shades of green they signify, making their way into the African context. There is a risk that such global discourses universalise what urban NBS are meant to be – potentially narrowing down how they are thought about and practised in different contexts. In applying the NFF to our research we find that transnational actor-driven initiatives in African cities are predominantly rooted in a "Nature for Society" perspective informed by instrumental and utilitarian values and that little attention is given to "Nature as Culture" and relational value perspectives. This suggests that more needs to be done by these actors to accommodate the plurality of worldviews and perceptions that reflect various value perspectives on desirable futures for urban nature. For policy and practice, this implies that it is vital to ensure that global discourses do not become hegemonic in shaping what NBS in urban Africa ought to be, but that they are open to multiple different positionalities from the local context.

Building on the research in this paper, more conceptual and empirical work is required to understand how and with what implications NBS are discursively constructed in different contexts. The Tozer, Bulkeley, and Xie (2022) framework has proven to provide a useful lens to understand how transnational actors mobilise NBS in urban Africa in accordance with global discourses. However, as the framework relates to globalised frames of urban nature, its relevance for understanding how NBS are thought about and understood in African cities by a broad range of stakeholders is naturally limited. More theoretical and empirical work to investigate – possibly conflicting – frames embraced by various actors at different levels and the implications arising thereof, is needed. It will also be important to examine how and with what consequences global frames of urban nature translate into practice. Key issues relate to governance arrangements of NBS projects in African cities and how and to what extent endogenous processes, knowledge, norms and values are included to do justice to the realities of local contexts. Important questions also concern factors conditioning the effectiveness and long-term sustainability of implementing NBS on the ground, and enhancing the prospects of mainstreaming NBS by coherently addressing the sustainability challenges and development objectives of African cities, to benefit their societies at large.

## Acknowledgements

We are thankful to Els Keunen for providing kind support by producing the map.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## References

Aalto, Hanna Erixon, and Henrik Ernstson. 2017. "Of Plants, High Lines and Horses: Civic Groups and Designers in the Relational Articulation of Values of Urban Natures." *Landscape and Urban Planning* 157:309–321. https://doi.org/10.1016/j.landurbplan.2016.05.018.

Adegun, Olumuyiwa Bayode, Ayodele Emmanuel Ikudayisi, Tobi Eniolu Morakinyo, and Olawale Oreoluwa Olusoga. 2021. "Urban Green Infrastructure in Nigeria: A Review." *Scientific African* 14:e01044.

Adenle, Ademola A., James D. Ford, John Morton, Stephen Twomlow, Keith Alverson, Andrea Cattaneo, Rafaello Cervigni, et al. 2017. "Managing Climate Change Risks in Africa- A Global Perspective." *Ecological Economics* 141:190–201. https://doi.org/10.1016/j.ecolecon.2017.06.004.

Almenar, Javier Babí, Thomas Elliot, Benedetto Rugani, Bodénan Philippe, Tomas Navarrete Gutierrez, Guido Sonnemann, and Davide Geneletti. 2021. "Nexus between Nature-Based Solutions, Ecosystem Services and Urban Challenges." *Land Use Policy* 100:104898. https://doi.org/10.1016/j.landusepol.2020.104898.

Asomani-Boateng, Raymond. 2019. "Urban Wetland Planning and Management in Ghana: A Disappointing Implementation." *Wetlands* 39 (2): 251–261. https://doi.org/10.1007/s13157-018-1105-7.

Battersby, Jane, and Vanessa Watson. 2018. *Urban Food Systems Governance and Poverty in African Cities*. New York: Taylor & Francis.

Béland, Daniel, and Mitchell A. Orenstein. 2013. "International Organizations as Policy Actors: An Ideational Approach." *Global Social Policy* 13 (2): 125–143. https://doi.org/10.1177/1468018113484608.

Betsill, Michele M., and Harriet Bulkeley. 2004. "Transnational Networks and Global Environmental Governance: The Cities for Climate Protection Program." *International Studies Quarterly* 48 (2): 471–493. https://doi.org/10.1111/j.0020-8833.2004.00310.x.

Bigger, Patrick, and Sophie Webber. 2021. "Green Structural Adjustment in the World Bank's Resilient City." *Annals of the American Association of Geographers* 111 (1): 36–51. https://doi.org/10.1080/24694452.2020.1749023.

Bulkeley, Harriet, Linjun Xie, Judy Bush, Katharina Rochell, Julie Greenwalt, Hens Runhaar, Ernita van Wyk, Cathy Oke, and Ingrid Coetzee. 2022. "Cities and the Transformation of Biodiversity Governance." In *Transforming Biodiversity Governance*, edited by Ingrid Visseren-Hamakers and Marcel Kok, pp. 293–312. Cambridge University Press.

Chu, Eric, Isabelle Anguelovski, and JoAnn Carmin. 2016. "Inclusive Approaches to Urban Climate Adaptation Planning and Implementation in the Global South." *Climate Policy* 16 (3): 372–392. https://doi.org/10.1080/14693062.2015.1019822.

Cobbinah, P. B., P. I. Korah, J. B. Bardoe, R. M. Darkwah, and A. M. Nunbogu. 2022. "Contested Urban Spaces in Unplanned Urbanization: Wetlands Under Siege." *Cities* 121 (103489): 1–14.

Cocks, Michelle, Charlie Shackleton, Lindsey Walsh, Duncan Haynes, Amanda Manyani, and Dennis Radebe. 2020. "Decolonisation of Nature in Towns and Cities of South Africa." *Urban Nature: Enriching Belonging, Wellbeing and Bioculture* 104. https://doi.org/10.4324/9780367854898.

Cohen-Shacham, E., G. Walters, C. Janzen, and S. Maginnis. 2016. "Nature-Based Solutions to Address Societal Challenges." *Gland, Switzerland: International Union for Conservation of Nature*. https://doi.org/10.2305/IUCN.CH.2016.13.en.

Davies, Julia, Corrie Hannah, Zack Guido, Andrew Zimmer, Laura McCann, Jane Battersby, and Tom Evans. 2021. "Barriers to Urban Agriculture in Sub-Saharan Africa." *Food Policy* 103:101999. https://doi.org/10.1016/j.foodpol.2020.101999.

Debele, S. E., L. S. Leo, P. Kumar, J. Sahani, J. Ommer, E. Bucchignani, and Saša Vranić. 2023. "Nature-based Solutions Can Help Reduce the Impact of Natural Hazards: A Global Analysis of NBS Case Studies." *Science of the Total Environment* 902:165824. https://doi.org/10.1016/j.scitotenv.2023.165824.

de Macedo, Laura Silvia Valente, Marc Eric Barda Picavet, José Antonio Puppim de Oliveira, and Wan-Yu Shih. 2021. "Urban Green and Blue Infrastructure: A Critical Analysis of Research on Developing Countries." *Journal of Cleaner Production* 313:127898. https://doi.org/10.1016/j.jclepro.2021.127898.

Dorst, Hade, Alexander Van der Jagt, Rob Raven, and Hens Runhaar. 2019. "Urban Greening Through Nature-Based Solutions–Key Characteristics of an Emerging Concept." *Sustainable Cities and Society* 49:101620. https://doi.org/10.1016/j.scs.2019.101620.

Douglas, Ian. 2018. "The Challenge of Urban Poverty for the Use of Green Infrastructure on Floodplains and Wetlands to Reduce Flood Impacts in Intertropical Africa." *Landscape and Urban Planning* 180:262–272. https://doi.org/10.1016/j.landurbplan.2016.09.025.

Drescher, Axel W., Christian Isendahl, María Caridad Cruz, Hanna Karg, and Alisara Menakanit. 2021. "Urban and Peri-Urban Agriculture in the Global South." *Urban Ecology in the Global South* 293–324. https://doi.org/10.1007/978-3-030-67650-6_12.

Dryzek, John S. 2007. *The Politics of the Earth: Environmental Discourses*. Oxford: Oxford University Press.

Durán, América Paz, Jan J. Kuiper, Ana Paula Dutra Aguiar, William WL Cheung, Marieteuw Chimère Diaw, Ghassen Halouani, Shizuka Hashimoto, et al. 2023 "Bringing the Nature Futures Framework to Life: Creating a set of Illustrative Narratives of Nature Futures." *Sustainability Science* 2023: 1–20.

Du Toit, Marié J., Sarel S. Cilliers, Martin Dallimer, Mark Goddard, Solène Guenat, and Susanna F. Cornelius. 2018. "Urban Green Infrastructure and Ecosystem Services in sub-Saharan Africa." *Landscape and Urban Planning* 180:249–261. https://doi.org/10.1016/j.landurbplan.2018.06.001.

Entman, Robert M. 1993. "Framing: Toward Clarification of a Fractured Paradigm." *Journal of Communication* 43 (4): 51–58. https://doi.org/10.1111/j.1460-2466.1993.tb01304.x.

Ferguson, James, and Akhil Gupta. 2002. "Spatializing States: Toward an Ethnography of Neoliberal Governmentality." *American Ethnologist* 29 (4): 981–1002. https://doi.org/10.1525/ae.2002.29.4.981.

Foli, Rosina, and Daniel Béland. 2014. "International Organizations and Ideas About Poverty in Sub-Saharan Africa." *Poverty & Public Policy* 6 (1): 3–23. https://doi.org/10.1002/pop4.62.

Gehrke, Esther, and Renate Hartwig. 2018. "Productive Effects of Public Works Programs: What do We Know? What Should We Know?" *World Development* 107:111–124. https://doi.org/10.1016/j.worlddev.2018.02.031.

Goodwin, Sean, Marta Olazabal, Antonio J. Castro, and Unai Pascual. 2023. "Global Mapping of Urban Nature-Based Solutions for Climate Change Adaptation." *Nature Sustainability* 6 (4): 458–469. https://doi.org/10.1038/s41893-022-01036-x.

Gore, Christopher. 2015. "Climate Change Adaptation and African Cities: Understanding the Impact of Government and Governance on Future Action." In *The Urban Climate Challenge*, edited by Craig Johnson, Noah Toly, and Heike Schroeder, 205–226. New York: Taylor & Francis.

Hajer, Maarten, and Wytske Versteeg. 2005. "A Decade of Discourse Analysis of Environmental Politics: Achievements, Challenges, Perspectives." *Journal of Environmental Policy & Planning* 7 (3): 175–184. https://doi.org/10.1080/15239080500339646.

Hickmann, Thomas, and Fee Stehle. 2019. "The Embeddedness of Urban Climate Politics in Multilevel Governance: A Case Study of South Africa's Major Cities." *The Journal of Environment & Development* 28 (1): 54–77. https://doi.org/10.1177/1070496518819121.

Kabisch, Nadja, Matilda van den Bosch, and Raffaele Lafortezza. 2017. "The Health Benefits of Nature-Based Solutions to Urbanization Challenges for Children and the Elderly–A Systematic Review." *Environmental Research* 159:362–373. https://doi.org/10.1016/j.envres.2017.08.004.

Kalantari, Zahra, Carla Sofia Santos Ferreira, Saskia Keesstra, and Georgia Destouni. 2018. "Nature-Based Solutions for Flood-Drought Risk Mitigation in Vulnerable Urbanizing Parts of East-Africa." *Current Opinion in Environmental Science & Health* 5:73–78. https://doi.org/10.1016/j.coesh.2018.06.003.

Kareem, Buyana, Shuaib Lwasa, Denis Tugume, Paul Mukwaya, Jacqueline Walubwa, Samuel Owuor, Peter Kasaija, Hakimu Sseviiri, Gloria Nsangi, and Disan Byarugaba. 2020. "Pathways for Resilience to Climate Change in African Cities." *Environmental Research Letters* 15 (7): 073002. https://doi.org/10.1088/1748-9326/ab7951.

Kim, HyeJin, Garry D. Peterson, William WL Cheung, Simon Ferrier, Rob Alkemade, Almut Arneth, Jan J. Kuiper, et al. 2023. "Towards a Better Future for Biodiversity and People: Modelling Nature Futures." *Global Environmental Change* 82:102681. https://doi.org/10.1016/j.gloenvcha.2023.102681.

Labuschagne, Petronella, and Benita Zulch. 2016. "Green Rooftop Systems: A South African Perspective." *Energy Procedia* 96:710–716. https://doi.org/10.1016/j.egypro.2016.09.131.

Lall, Somik V. 2017. "Renewing Expectations about Africa's Cities." *Oxford Review of Economic Policy* 33 (3): 521–539. https://doi.org/10.1093/oxrep/grx038.

Lembi, Rafael Cavalcanti, Cecilia Cronemberger, Caroline Picharillo, Sheina Koffler, Pedro H. Sena, Jéssica Francine Felappi, Alice Ramos de Moraes, Adnan Arshad, Jessie Pereira dos Santos, and Andressa Vianna Mansur. 2020. "Urban Expansion in the Atlantic Forest: Applying the Nature Futures Framework to Develop a Conceptual Model and Future Scenarios." *Biota Neotropica* 20: 1–13.

Lobe Ekamby, Emmanuel SH, and Pierpaolo Mudu. 2022. "How Many Trees Are Planted in African Cities? Expectations of and Challenges to Planning Considering Current Tree Planting Projects." *Urban Science* 6 (3): 59. https://doi.org/10.3390/urbansci6030059.

Lokidor, Long'or Pauline, Miho Taka, Craig Lashford, and Susanne Charlesworth. 2023. "Nature-Based Solutions for Sustainable Flood Management in East Africa." *Journal of Flood Risk Management* 17: e12954.

Lwasa, Shuaib, Frank Mugagga, Bolanle Wahab, David Simon, John P. Connors, and Corrie Griffith. 2015. "A Meta-Analysis of Urban and Peri-Urban Agriculture and Forestry in Mediating Climate Change." *Current Opinion in Environmental Sustainability* 13:68–73. https://doi.org/10.1016/j.cosust.2015.02.003.

Mansur, Andressa V., Robert I. McDonald, Burak Güneralp, HyeJin Kim, Jose A. Puppim de Oliveira, Corey T. Callaghan, Perrine Hamel, et al. 2022. "Nature Futures for the Urban Century: Integrating Multiple Values Into Urban Management." *Environmental Science & Policy* 131:46–56. https://doi.org/10.1016/j.envsci.2022.01.013.

Melanidis, Marina Stavroula, and Shannon Hagerman. 2022. "Competing Narratives of Nature-Based Solutions: Leveraging the Power of Nature or Dangerous Distraction?" *Environmental Science & Policy* 132:273–281. https://doi.org/10.1016/j.envsci.2022.02.028.

Mguni, Patience, Amber Abrams, Lise Byskov Herslund, Kirsty Carden, Jessica Fell, and Neil Armitage. 2022. "Towards Water Resilience through Nature-Based Solutions in the Global South? Scoping the Prevailing Conditions for Water Sensitive Design in Cape Town and Johannesburg." *Environmental Science & Policy* 136:147–156. https://doi.org/10.1016/j.envsci.2022.05.020.

Mulligan, Joe, Vera Bukachi, Jack Campbell Clause, Rosie Jewell, Franklin Kirimi, and Chelina Odbert. 2020. "Hybrid Infrastructures, Hybrid Governance: New Evidence from Nairobi (Kenya) on Green-Blue-Grey Infrastructure in Informal Settlements." *Anthropocene* 29:100227. https://doi.org/10.1016/j.ancene.2019.100227.

Nyiwul, Linus M. 2019. "Climate Change Mitigation and Adaptation in Africa: Strategies, Synergies, and Constraints." In *Climate Change and Global Development*, edited by Tiago Sequeira and Liliana Reis, 219–241. Cham: Springer.

Oliver, Emmie, and Lizzie Marsters. 2022. "Nature-Based Solutions in Sub-Saharan Africa for Climate and Water Resilience." Technical Note. Washington, DC: World Resources Institute.

Olivier de Sardan, Jean-Pierre. 2011. "The Eight Modes of Local Governance in West Africa." *IDS Bulletin* 42 (2): 22–31. https://doi.org/10.1111/j.1759-5436.2011.00208.x.

Pauleit, Stephan, Teresa Zölch, Rieke Hansen, Thomas B. Randrup, and Cecil Konijnendijk van den Bosch. 2017. "Nature-Based Solutions and Climate Change–Four Shades of Green." In *Nature-Based Solutions to Climate Change Adaptation in Urban Areas*, edited by Nadja Kabisch, Horst Korn, Jutta Stadler, and Aletta Bonn, 29–49. Cham: Springer.

Pereira, Laura M., Kathryn K. Davies, Eefje den Belder, Simon Ferrier, Sylvia Karlsson-Vinkhuyzen, HyeJin Kim, Jan J. Kuiper, et al. 2020. "Developing Multiscale and Integrative Nature–People Scenarios Using the Nature Futures Framework." *People and Nature* 2 (4): 1172–1195. https://doi.org/10.1002/pan3.10146.

Pörtner, Hans-Otto, Debra C. Roberts, H. Adams, C. Adler, P. Aldunce, E. Ali, R. Ara Begum, et al. 2022. "Climate Change 2022: Impacts, Adaptation and Vulnerability." *IPCC Sixth Assessment Report* 2022: 37–118.

Posey, D. 1999. *Cultural and Spiritual Values of Biodiversity. United Nations Environmental Programme*. London: UNEP and Intermediate Technology Publications.

Roberts, Debra, Joanne Douwes, Catherine Sutherland, and Vicky Sim. 2020. "Durban's 100 Resilient Cities Journey: Governing Resilience from Within." *Environment and Urbanization* 32 (2): 547–568. https://doi.org/10.1177/0956247820946555.

Robinson, Jennifer. 2021. "Reconfiguring the Spaces of Urban Politics: Circuits, Territories, and Territorialization." *Spatial Transformations* 269–284. https://doi.org/10.4324/9781003036159-24.

Rochell, Katharina, Linjun Xie, Ryan Fisher, and Kirsty Griffin. 2022. "Contextual Factors for Transnational Municipal Network's Local Environmental Action: A Study of ICLEI Africa's LAB Wetlands SA Programme." *Local Environment* 28 (7): 882–899.

Roger, Charles B., Thomas N. Hale, and Liliana B. Andonova. 2019. "The Comparative Politics of Transnational Climate Governance." In *The Comparative Politics of Transnational Climate Governance*, edited by Liliana Andonova, Thomas Hale, and Charles Roger, 1–25. New York: Routledge.

Seddon, Nathalie, Alexandre Chausson, Pam Berry, Cécile AJ Girardin, Alison Smith, and Beth Turner. 2020. "Understanding the Value and Limits of Nature-Based Solutions to Climate Change and Other Global Challenges." *Philosophical Transactions of the Royal Society B* 375 (1794): 20190120. https://doi.org/10.1098/rstb.2019.0120.

Seddon, Nathalie, Beth Turner, Pam Berry, Alexandre Chausson, and Cécile AJ Girardin. 2019. "Grounding Nature-Based Climate Solutions in Sound Biodiversity Science." *Nature Climate Change* 9 (2): 84–87.

Shackleton, Charlie, Andrew Blair, Peter De Lacy, Humphrey Kaoma, Noster Mugwagwa, Mwazvita Dalu, and Wesley Walton. 2018. "How Important Is Green Infrastructure in Small and Medium-Sized Towns? Lessons from South Africa." *Landscape and Urban Planning* 180:273–281. https://doi.org/10.1016/j.landurbplan.2016.12.007.

Shaikh, Fairul Edros Ahmad, and Perrine Hamel. 2023. "Identifying Nature-Positive Futures in new Cities: An Application of the Urban Nature Futures Framework." *Sustainability Science* 2023: 1–12.

Simon, David, Julie Goodness, Shuaib Lwasa, José Antônio Puppim de Oliveira, Laura V. de Macedo, Jess Kavonic, Ellika Hermansson Török, and Thomas Elmqvist. 2021. "Urban Governance of and for Urban Green and Blue Infrastructure." *Urban Ecology in the Global South* 403–431. https://doi.org/10.1007/978-3-030-67650-6_16.

Smit, Warren. 2016. "Urban Governance and Urban Food Systems in Africa: Examining the Linkages." *Cities* 58:80–86. https://doi.org/10.1016/j.cities.2016.05.001.

Smit, Warren. 2018. "Urban Governance in Africa: an Overview." In *African Cities and the Development Conundrum*, edited by Carole Amman and Till Förster, 55–77. Leiden: Brill.

Stren, Richard. 2014. "Urban Service Delivery in Africa and the Role of International Assistance." *Development Policy Review* 32 (s1): s19–s37.

Titz, Alexandra, and Sosten S. Chiotha. 2019. "Pathways for Sustainable and Inclusive Cities in Southern and Eastern Africa Through Urban Green Infrastructure?" *Sustainability* 11 (10): 2729. https://doi.org/10.3390/su11102729.

Tozer, Laura, Harriet Bulkeley, and Linjun Xie. 2022. "Transnational Governance and the Urban Politics of Nature-Based Solutions for Climate Change." *Global Environmental Politics* 22 (3): 1–23.

Van den Bosch, Matilda, and Å. Ode Sang. 2017. "Urban Natural Environments as Nature-Based Solutions for Improved Public Health–A Systematic Review of Reviews." *Environmental Research* 158:373–384. https://doi.org/10.1016/j.envres.2017.05.040.

Van Hulst, Merlijn, and Dvora Yanow. 2016. "From Policy "Frames" to "Framing" Theorizing a More Dynamic, Political Approach." *The American Review of Public Administration* 46 (1): 92–112. https://doi.org/10.1177/0275074014533142.

Williams, R. 1972. "Ideas of Nature." In *Nature: Thinking the natural*, edited by D. Inglis, J. Bone, and R. Wilkie, (2005), 47–62, Vol. 1. New York: Taylor & Francis.

Zheng, Xinzhu, Yicheng Zou, Amanda W. Lounsbury, Can Wang, and Ranran Wang. 2021. "Green Roofs for Stormwater Runoff Retention: A Global Quantitative Synthesis of the Performance." *Resources, Conservation and Recycling* 170:105577. https://doi.org/10.1016/j.resconrec.2021.105577.