

Policy Brief 3 | Green and Blue Infrastructure

Working with Nature

Next generation green and blue infrastructure for Addis Ababa

A Policy Brief by the Addis Ababa Urban Age Task Force | July 2022

Key messages

- Green infrastructure — from street trees, to parks and athletic fields, to urban farms, to forests — plays a key role in city residents' health, quality of life and resilience. Blue infrastructure — from groundwater aquifers, to rivers, to water treatment and stormwater management — is equally crucial.
- Addis Ababa has more than tripled its built-up area in recent decades, and lost significant green space, including streams, riversides, forests and cropland. The city has as little as 0.37 m² of green space per resident, and it is very unevenly distributed, so only one in nine residents lives within 800 m of green space. The urban heat island effect is getting ever worse, and air and water pollution are both serious problems.
- Green and blue infrastructure investments in Addis Ababa could bring multiple benefits, helping address urgent water supply challenges, flood risks, air quality and heat, enhancing biodiversity, creating new livelihood opportunities, and improving residents' overall well-being and social cohesion. City leaders already recognise this potential and have set ambitious goals for green space preservation — for instance, in the 2003 and 2017 Structural Plans. The key task now is to ensure good design and implementation.
- Addis Ababa can follow widely accepted design principles and best practices for nature based solutions, such as planting locally appropriate species to promote biodiversity; protecting and enhancing wetlands; integrating green and blue infrastructure in busy urban areas; and engaging local communities.
- Innovative projects around the world offer examples of how Addis Ababa could use green and blue infrastructure investments not only to address important environmental issues, but also to create vibrant new social spaces, with particular benefits for families with children and for poor and marginalised communities.
- The analysis commissioned by the Addis Ababa Urban Age Task Force also provides recommendations for effective implementation, including starting with a strong vision as the engine for change; using pilot projects as learning tools; building technical capacity and sharing knowledge through standards and guidelines; looking for “windows of opportunity” to act, such as the need to replace or upgrade old grey infrastructure; mobilising citizens and creating partnerships and networks; planning for long-term operation and maintenance costs; and implementing joint budgeting and mixed financing for projects.

Addis Ababa Urban Age Task Force

The purpose of the Addis Ababa Urban Age Task Force (AAUATF) is to support the City of Addis Ababa in advancing its strategic development agenda. The Task Force's work builds upon the Addis Ababa City Structure Plan (2017 -2027), exploring opportunities for compact and well-connected urban growth that can be delivered through integrated city governance.

In addition to advisory activities and capacity building, it identifies strategic pilot projects to address complex urban challenges around housing, urban accessibility, green and blue infrastructure, and urban governance.

The AAUATF is a partnership between the Addis Ababa City Plan and Development Commission (AACPDC), LSE Cities at the London School of Economics and Political Science, the Alfred Herrhausen Gesellschaft, and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

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Founding Partners

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1. Context

Green infrastructure — from street trees, to parks and athletic fields, to urban farms, to forests — plays a key role in cities' health, quality of life, social integration and cohesion, and resilience. Blue infrastructure — from groundwater aquifers, to rivers, to water treatment and stormwater management — is equally crucial.

Nestled amid forested mountains and crisscrossed by the Big Akaki River and its tributaries, Addis Ababa has a wealth of natural resources. It is a vibrant economic centre, generating 30% of gross domestic product (GDP),¹ and a hub of African diplomacy. Development in the city is booming.

Yet rapid growth has come at a cost. The Ethiopian capital is a magnet for job-seekers in both the formal and informal economies. Its population — 3.7 million as of 2018, by official estimates — grew by 17% from 2007 to 2017,² and is now increasing by about 3.8% per year,³ driven by migration from rural areas.

Addis Ababa's built-up area has grown even faster. A detailed analysis based on satellite imagery found that from 1984 to 2014, the city's urban area more than quadrupled, from 80 to 341 km² — with a 78% increase from 2003 to 2014 alone.⁴ Forest cover declined by 75% during those three decades, and agricultural land by 54%. Across the city, open and underdeveloped land, including river banks, streams and wetlands, were converted into housing, industrial space and offices or occupied by informal settlements.⁵ Without careful land management, far more green space was consumed than was needed to meet those needs, and the urban population density, about 74 persons per ha in 2017, is less than half the 1975 rate.⁶

Almost one-fifth of Addis Ababa was still forested in 2016,⁷ and the city doubled its urban park area from 2003 to 2016. However, the amount of green space per resident — 1.2 m² by one estimate, 0.37 m² by another⁸ — is a tiny fraction of the 9 m² recommended by the World Health Organization (WHO) or the Ethiopian government's own 15 m² standard. Green space is also unevenly distributed, so the amount of green space per person varies significantly from one sub-city to another. Overall, only about one in nine city residents lives within 800 m of a park, farm, forest or green riverside.⁹ During the hottest times of the year, the urban heat island effect is increasingly severe, especially where green space is scarcest.

At the same time, Addis Ababa has struggled with severe air pollution and ecosystems degradation, as well as water supply, water contamination and flood management issues.¹⁰ The city has plentiful surface water, from both large rivers, and small streams, but they can overflow and cause damage during heavy rains. Of even greater concern is that, due to inadequate stormwater and sewage management, the water is unsafe for consumption. Many users, especially in industry, therefore rely on groundwater instead, but that has led to over-abstraction, raising concerns about future water security.

Addis Ababa can do much better. This briefing paper, based on research conducted by Ethiopian and international experts for the Addis Ababa Urban Age Task Force, examines how strategic investments in green and blue (water) infrastructure can make the city healthier, more resilient to climate change and more enjoyable for residents and visitors alike, informed by examples from around the world.

City leaders have long recognised these needs. The 2003 Structural Plan called for more than 220 km² to be reserved for green space and established the Addis Ababa City Administration Environmental Protection Authority (AAEPA), which has acquired land from the sub-cities and protected and developed it to the best of its ability.¹¹ However, due to a lack of proper urban planning and inadequate implementation of the Structure Plan, green space continued to be lost. The 2017 Structure Plan calls for a doubling of urban park space and a near-fourfold increase in protected river and buffer areas, while recognising that a large share of urban farmland is now gone. The ideas and recommendations presented in this briefing paper are meant to help city leaders achieve and exceed the current Master Plan's goals and build a greener future.

2. Understanding green and blue infrastructure

Green and blue infrastructure can take many forms, and be natural, or planned and developed. The vast majority of Addis Ababa's remaining forests were planted, for instance; only about 550 ha of natural forests remain, in small pockets on inaccessible hillsides, around churches and in a few other locations.¹²

Healthy **urban forests** support wildlife and enhance biodiversity, help regulate the water cycle, reduce air and water pollution, and provide important recreational opportunities, contributing to people's mental and physical health. They also play a critical role in climate protection, by storing carbon, reducing ambient temperatures, and preventing soil erosion and landslides as torrential rains become more common.

Urban agriculture can range from commercial operations, to community gardens, to home gardens and chickens raised in back yards. Globally, 15–20% of the food supply is grown in urban areas — far more in some cities than in others — and supply-chain disruptions during the COVID-19 pandemic have highlighted the value of local production to ensure food security.¹³ Yet Addis Ababa currently produces very little of its own food, and most of the available land is on often-contaminated riverbanks. As noted above, the city has lost much of its cropland; restoring it will require zoning and deliberate protection.

Parks and gardens are public open space areas: from landscaped gardens, to forested areas with walking paths, to neighbourhood parks. When built strategically, they not only add beauty and recreational opportunities, but can also

help with water management. For example, swales — shallow, vegetated open channels — convey and treat stormwater. Similarly, rain gardens capture, detain, and treat runoff. These spaces can also include or be connected through **green corridors** — linear green spaces that protect natural habitats, such as river banks, rights of way, and paths for cycling, walking or horse-riding.

Sports grounds are large open space areas with natural or artificial surfaces that support active recreational activities, including pitches for football, tennis courts, bowling greens, golf courses, and school and other institutional playing fields. **Amenity green spaces**, meanwhile, are most common in housing areas, and provide areas for children and youth to play and for people to congregate, as well as for shared gardens. Cemeteries and churchyards are also important green spaces in Addis Ababa, providing important habitat for urban plants and animals. In addition, green infrastructure includes street trees, and green walls and green roofs on buildings.

Addis Ababa's blue infrastructure, meanwhile, includes **ivers, streams, creeks and channels** (the latter can be natural or built out of rock or concrete), as well as **wetlands** — mainly in the Akaki-Kality and Nifas Silk-Lafto sub-cities in the south. There are no significant ponds and lakes within city limits, but there are several within a short distance of Addis Ababa.

Green and blue infrastructure can be delivered at a range of scales: from individual sites, to precincts, to citywide initiatives. All projects will typically include planting or restoring vegetation, ensuring that there is adequate soil, with good drainage, and ensuring a reliable water supply. As described above, water management features are often included as well, such as flood protection, water filtration and storage.

3. The benefits of good green and blue infrastructure

Well-planned and implemented green and blue infrastructure can help Addis Ababa address many of its greatest challenges and policy priorities, especially with regard to air quality, water management, biodiversity, and people's health and socio-economic well-being.

Ethiopia's constitution grants every citizen the right to a healthy environment, but Addis Ababa's **air quality** is very poor, with three times the annual average concentration of fine particulate matter (PM_{2.5}), for instance, than the WHO considers safe, with particularly dire effects on children.¹⁴ Nationwide, air pollution is the No. 2 risk factor for death and disability, associated with about 2,700 deaths per year in the city. Without greater efforts to control the problem, the death toll is expected to rise to 6,200 per year by 2025.

Controlling the major sources of air pollution — transport, industry, waste management facilities, and smoke from household cooking — is clearly crucial. At the same time, green infrastructure can help improve air quality, both by

physically blocking particles, and by absorbing gaseous air pollutants.

Water management is an increasingly severe problem in Addis Ababa, due to the combined effects of rapid population growth, the expansion of the built-up area (resulting in large impervious areas), and climate change, which has increased extreme rainfall as well as droughts.¹⁵

The city's location in the highlands, combined with its topography, makes some areas very vulnerable to flooding. About 10% of the city is riverbanks and floodplains, highly exposed when rivers swell, and due to inadequate drainage systems much of the city is also vulnerable to flash floods during downpours. Denuded hills and land disturbances from extensive construction are leading to major landslides. The people who are most at risk are the poor, whose homes are made of mud and wood. And the more the city is paved over, the more floodwater will accumulate instead of draining into the soil.

Conventional urban surface water management, using engineered drains, sewers and channels, can help clear the water. However, when sewers and stormwater lines are combined, as they are in most of Addis Ababa, they can be overwhelmed during heavy rains and pour large volumes of untreated sewage into water bodies. Urban runoff can include many pollutants, such as heavy metals.

Nature-based solutions using green infrastructure can slow runoff, capture pollutants, and increase the amount of water that seeps into the ground instead of flowing into drains or filling the streets. The vegetation helps treat the water, removing sediments and pollutants, and the absorbed water then helps replenish groundwater reserves. Rainwater can also be harvested for later use.

Addis Ababa's **biodiversity** is declining as green spaces are turned into built-up areas, and what remains is increasingly fragmented and degraded. The ecological footprint of urbanisation often extends beyond the city limits. Some species may be able to adapt, but many others are being lost.

Increasing green spaces, especially ones that are deliberately designed to provide habitat for a wide range of species, and to be connected with one another, can help slow and potentially reverse this trend. Planting native species will not only support more biodiversity, but also help ensure that the trees and other vegetation can thrive under local conditions, with relatively little maintenance. It is also important to protect existing forests, especially the dwindling natural forest areas.

Green and blue infrastructure investments can also significantly improve **human health and well-being**. Not only do green spaces help reduce air pollution and the urban heat island effect, but they have also been shown to improve both physical and mental health.¹⁶ Spending time outdoors makes it easier to get exercise, can reduce many people's stress and anxiety,¹⁷ and also provides spaces to socialise, fostering social cohesion. This, in turn, can help reduce crime and create a sense of safety.



There are more tangible benefits as well. Urban green space can support local food production, increasing local food security, reducing costs and supporting the creation of new businesses. And it can offer a wide range of skill-building and job opportunities: from learning horticulture, to gathering medicinal herbs, to offering nature tourism and leisure activities, to hosting events. Some major parks, such as Hamle 19 and Peacock Park, are already popular locations for weddings and bridal photography.

More broadly, green and blue infrastructure can improve the aesthetic and social attractiveness of the environment and increase property values. For a city such as Addis Ababa, which is building a global reputation, these investments signal a commitment to providing a high quality of life for all.

4. Principles for effective planning and design

A green urban landscape and a sustainable water cycle are central to Addis Ababa's future success. A key insight from the work of the Addis Ababa Urban Age Task Force is that a holistic approach is crucial; green and blue infrastructure should be integrated seamlessly into the built environment and urban infrastructure, not treated as discrete or even "extra" features.

Based on an in-depth review of the city's challenges and opportunities, analysis for the Task Force has identified a detailed list of principles for green and blue infrastructure development, looking at specific objectives the City may want to pursue.¹⁸ Below are some illustrative examples.

To support year-round passive and active recreation:

- Select appropriate, native species that are well suited to the local climate and will be resilient to anticipated future climate changes;
- Secure local water supplies to provide irrigation for key sporting grounds, and use passive irrigation techniques for urban landscapes;
- Integrate green and blue infrastructure with key walking and cycling routes.

To strengthen people's connections with nature:

- Provide opportunities to play in nature and to learn about natural processes;
- Include gardens, trees and other vegetation in all the places where people live and work;
- Involve local communities in the design and management of natural features.

To improve the city and make it more prosperous:

- Enhance urban infrastructure such as pedestrian walkways, roads, buildings and drainage systems by integrating natural components to provide shade, cooling, stormwater management and air filtration;
- Place green and blue infrastructure in key gateway areas of the city as well as in business districts;
- Leverage the tourism value of green spaces and waterways by integrating views of them in public spaces and showcasing green space initiatives.

To protect and enhance local waterways and aquatic environments:

- Use vegetated surfaces, such as swales and rain gardens, to slow and reduce urban stormwater runoff;
- Naturalise modified waterways and add plantings along the riverbanks, aiming not only to beautify but to truly revitalise the landscape;
- Link river landscapes across Addis Ababa, and conserve the Akaki wetlands and floodplain for aquifer recharge for the city's future water security.

To ensure enough water during droughts:

- Use alternative water sources, such as rainwater, stormwater or wastewater, to irrigate green spaces and urban trees;
- Identify areas with particularly high need and consider locating infrastructure there that can store water while providing additional landscape benefits (e.g. wetlands, ponds);
- Use vegetated systems (such as wetlands or biofilters) to help purify water for local use.

To mitigate flood risks:

- Increase the share of green space and unpaved areas across the city, especially in flood-prone areas, to reduce stormwater runoff volumes;
- Direct stormwater runoff to vegetated areas and maximise soil volumes to maximise infiltration;
- Integrate "sunken" areas and overland pathways within green spaces that can hold floodwaters when needed, but which serve other purposes the rest of the time.

To provide pleasant and cooling environments during hot weather:

- Maximise tree canopy and vegetated cover in highly pedestrianised areas to provide shade;
- Add more plantings as well as open water to provide natural cooling in an urban environment;
- Look for areas where prevailing winds can blow over urban water features or saturated soils to provide passive cooling.

5. Inspiration from around the world

Aiming to inform and inspire planners and policy-makers in Addis Ababa, the Urban Age Task Force examined how other cities have tackled similar challenges. The resulting paper presents six main case studies — in Santiago, Chile; Medellín, Colombia; Seoul, Korea; Darfur, Sudan; Toronto, Canada; and Copenhagen, Denmark — and four support cases — from Mexico City; Singapore; Guangzhou, China; and Zuera, Spain.¹⁹ All are worth reading; this section presents snapshots of three, as examples.

The Mapocho 42K

The Mapocho river, which flows through Santiago, was a landmark of the Chilean capital for generations, but in the 1970s, it became a major sewage disposal canal. In the 1990s, a highway further disconnected the city from much of the river. By the turn of the century, it was badly contaminated and malodorous.

The first step in the river's transformation was Mapocho Urbano Limpio, an engineering project that sanitised the water in 2012, converting sewer sludge into clean energy and biosolids into fertiliser. A team from Pontificia Universidad Católica de Chile, backed by a foundation and the national government, brought together a wide range of stakeholders to redesign the landscape along the river.

Today, a 225 ha integrated park system stretches along 42 km of the Mapocho's southern riverbank and into the heart of the city. It includes a bike path, a pedestrian walkway, a continuous line of native trees, and 15 linked parks. Not only did it reconnect people to nature and to the water, but it also linked eight communes with different socio-economic profiles. Many people commute along the paths, there are morning bike rides for children, and an annual 10K race on the river draws about 1,200 people.

The Mapocho 42K could offer valuable insights for the Sheger riverside corridor development project in Addis Ababa, launched as a flagship programme of the national government in 2019. The project spans 56 km, including both well-established formal and informal settlements. The Mapocho 42K shows how riverside communities can be engaged to become protectors of local ecosystems, with a strong sense of ownership. It also shows how bottom-up initiatives can effectively complement top-down projects.

Parks around water cisterns in Medellín

In 2012, while looking at satellite photographs of Medellín at night, representatives of the Water and Energy Utilities Public Company of Medellín (EPM) realised that many dark, crime-ridden areas in the city corresponded to water storage facilities that they owned. EPM analysed the sites and chose 20 to be turned into public green spaces, prioritising those with the greatest potential for social impact.

The project, called Unidades de Vida Articulada (Units of Articulated Life), began in 2013. Today, 19 have been

completed. Each park is different, designed through a participatory process in which community members could present their needs and wishes and were involved in the implementation. The cisterns, still in use, became visual landmarks, and the slopes around them were turned into terraces and overlooks, with iconic architecture, fully integrated into the surrounding neighbourhoods. Small buildings were added for educational facilities, gyms and sports fields, and local libraries.

Infrastructure that used to be fenced off from the public is now accessible by people of all backgrounds, even as it continues to support the water supply system. Overall, about 162,000 m² of new public spaces and 40,000 m² of new public buildings have been added. Crime and the perception of danger have declined, and communities have a new sense of civic pride.

Like Medellín, Addis Ababa is nestled amid hills. Projects like this could inform efforts such as Entoto Park, now under development. By creating a process that invites community members to shape public spaces, learn about infrastructure, and value and protect nature, the Medellín parks show how safe, open, green spaces can help to rehabilitate hillsides and improve people's quality of life.

The Wadi El Ku Catchment Project

In Darfur, Sudan, water scarcity has created social conflicts and environmental problems, with disproportionate impact on vulnerable communities that depend heavily on natural resources. The Wadi El Ku Catchment Project set out to manage water resources more effectively and equitably, engaging with community members to monitor the water supply and distribute it fairly.

The project was implemented by the United Nations Environment Programme (UNEP) in partnership with the national and state government, in cooperation with local communities and local civil society organisations led by the UK-based Practical Action, funded and promoted by the European Union.

A key aspect of the project's governance is the Catchment Management Forum, where all stakeholders, including women, have a seat at the table and a role. People also contributed labour to implement field interventions, such as repairing the water retention structure, reseeding pastures and establishing nurseries. The Forum remains operational, to help sustain the project. Many community councils also continue to meet regularly to evaluate better ways to use resources and to keep improving the management of land, forest and water resources.

The project has improved water and food security while helping restore ecosystems that had been destroyed by war. It also has empowered women and girls and reduced the amount of time they need to spend collecting water, freeing them up for other important activities, such as education. And it is believed to have helped bridge divisions in Darfur society and build new partnerships.

6. From vision to action

Addis Ababa faces real challenges in developing the green and blue infrastructure that it needs. The city has lost a great deal of green space already, its waterways are badly degraded, and population growth and economic development continue to put pressure on the land. There are also institutional, technical and social challenges, and the cost of the projects would undoubtedly be significant.

Still, as city leaders recognise, it is all worth the effort. If Addis Ababa is to become a world-class city, it needs high-quality green spaces, clean and plentiful water, and healthy, thriving communities.

The Addis Ababa Urban Age Task Force analysis²⁰ lays out 10 recommendations for the effective implementation of green and blue infrastructure:

- 1 Start with a strong vision as the engine for change, showing people how their lives could improve;
- 2 Use pilot projects to test different ideas and demonstrate the benefits of these investments;
- 3 Build technical capacity and share knowledge through standards and guidelines;
- 4 Look for “windows of opportunity” to act, such as the need to replace or upgrade old “grey” infrastructure;
- 5 Mobilise citizens and social capital for projects, including professionals, activists, civil society and people in affected communities;
- 6 Create partnerships and networks to enhance strategic capacity;
- 7 Build up capacity for future projects through best practice examples, toolboxes, etc.;
- 8 Overcome silo mindsets by promoting policy integration, interagency coordination and knowledge exchanges, and joint training programmes;
- 9 Provide adequately for long-term operation and maintenance costs;
- 10 Implement joint budgeting and mixed financing, recognising that green and blue infrastructure has multiple purposes and benefits different stakeholders.

Conclusion

Addis Ababa is a beautiful city in an extraordinary landscape, but its natural resources are at serious risk. An important first step is to let nature lead the way, recognising that forests, wetlands and even urban parks and street trees often can meet vital needs better than built infrastructure.

A key insight from the case studies is that it pays to be resourceful and creative. Opportunities are already there. As the people of Medellín learned, looking at underutilised spaces with a creative eye can unleash their potential. Water storage facilities, landfills and other spaces can be reconfigured to serve new purposes. Sometimes even modest investments can catalyse social transformation.

A final takeaway is that in cities, green and blue infrastructure investments are ultimately for the people. This means there need not be a trade-off between human needs and nature. What matters is that affected communities feel included and listened to and can actively participate in designing and implementing projects. With strong local ownership, even small interventions can have big impacts.

Endnotes

- 1 Addis Ababa Resilience Project Office, 2021, "Addis Ababa Resilience Strategy."
- 2 Addis Ababa Resilience Project Office, 2021, "Addis Ababa Resilience Strategy."
- 3 The official estimate is widely viewed as conservative; by UN estimates, Addis Ababa had about 4.8 million residents as of 2020 and is expected to reach 8.9 million by 2035. See UN DESA, 2018, "World Urbanization Prospects 2018."
- 4 Zewdie, Worku, and Bantider, 2018, "Temporal Dynamics of the Driving Factors of Urban Landscape Change of Addis Ababa During the Past Three Decades," *Environmental Management*.
- 5 UN-Habitat, 2017, "The State of Addis Ababa 2017: The Addis Ababa We Want."
- 6 Worku, 2021, "Green and Blue Infrastructure in Addis Ababa: a review of challenges and response strategies"
- 7 Azagew and Worku, 2020, "Accessibility of Urban Green Infrastructure in Addis-Ababa City, Ethiopia." Similar studies in rapidly urbanising cities of Africa are scant. In this study, we assessed the status, accessibility and constraints of UGI in the rapidly urbanising city of Addis Ababa, Ethiopia. We first mapped and calculated the status of UGI from 2003 to 2016 based on the land use data in Arch GIS. We then analysed UGI access such as recreational parks based on proximate and per capita green indicators by using the land use maps, road network and gridded population data. Finally, we examined the challenges behind the current states of UGI based on document review, expert interview and field observation. Our study disclosed that the land use of UGI from 2003 to 2016 is decreased by 9.2%. The land use of urban agriculture decreased significantly (by 11.9%)
- 8 The higher estimate is from UN-Habitat, 2017; the lower estimate is from Azagew and Worku, 2020.
- 9 Azagew and Worku, 2020, "Accessibility of Urban Green Infrastructure in Addis-Ababa City, Ethiopia."
- 10 Worku, 2021, "Green and Blue Infrastructure in Addis Ababa: a review of challenges and response strategies."
- 11 Worku, 2021, "Green and Blue Infrastructure in Addis Ababa: a review of challenges and response strategies."
- 12 Worku, 2021, "Green and Blue Infrastructure in Addis Ababa: a review of challenges and response strategies."
- 13 Lal, 2020, "Home Gardening and Urban Agriculture for Advancing Food and Nutritional Security in Response to the COVID-19 Pandemic," *Food Security*.
- 14 Addis Ababa Environmental Protection and Green Development Commission, 2020, "Addis Ababa, Ethiopia Celebrates the First International Day of Clean Air for Blue Skies," Clean Air Blue Skies — United Nations Environment Programme; 2021, "Addis Ababa City Air Quality Management Plan (2021 to 2025)."
- 15 Worku, 2021, "Green and Blue Infrastructure in Addis Ababa: a review of challenges and response strategies."
- 16 See Stringer, L. 2016. *The Healthy Workplace: How to Improve the Well-Being of Your Employees — and Boost Your Company's Bottom Line*. New York: American Management Association. <https://www.leighstringer.com/books/the-healthy-workplace/>. See also this 2017 "Redesigning Wellness" podcast interview with the author: <https://redesigningwellness.com/2017/02/039-healthy-workplace-leigh-stringer/>.
- 17 See, e.g., Roe, Aspinall, and Ward Thompson, 2017, "Coping with Stress in Deprived Urban Neighborhoods: What Is the Role of Green Space According to Life Stage?" *Frontiers in Psychology*; Tomita et al., 2017, "Green Environment and Incident Depression in South Africa: A Geospatial Analysis and Mental Health Implications in a Resource-Limited Setting," *The Lancet Planetary Health*.
- 18 Worku, 2021, "Green and Blue Infrastructure in Addis Ababa: a review of challenges and response strategies."
- 19 del Hierro, Jácome-Polit, and Temesgen, 2021, "The Social Function of Green and Blue Infrastructure: international case studies and insights for Addis Ababa."
- 20 Worku, 2021, "Green and Blue Infrastructure in Addis Ababa: a review of challenges and response strategies."

References

- Addis Ababa Environmental Protection and Green Development Commission, 2020. Addis Ababa, Ethiopia celebrates the first International Day of Clean Air for blue skies. *Clean Air Blue Skies — United Nations Environment Programme*, 6 September. Available at: <http://www.cleanairblueskies.org/story/addis-ababa-ethiopia-celebrates-first-international-day-clean-air-blue-skies>.
- Addis Ababa Environmental Protection and Green Development Commission, 2021. *Addis Ababa City Air Quality Management Plan (2021 to 2025)*. Addis Ababa. Available at: <https://www.epa.gov/system/files/documents/2021-11/final-aqmp-addis-ababa.pdf>.
- Addis Ababa Resilience Project Office, 2021. *Addis Ababa Resilience Strategy*. Addis Ababa. Available at: <https://resilientaddis.org/wp-content/uploads/2020/06/addis-ababa-resilience-strategy-ENG.pdf>.
- Azagew, S. and Worku, H., 2020. Accessibility of urban green infrastructure in Addis-Ababa city, Ethiopia: current status and future challenge. *Environmental Systems Research*, 9(1). 26. DOI:10.1186/s40068-020-00187-0.
- del Hierro, S., Jácome, D. and Temesgen, T. K., 2022. *The Social Functions of Green and Blue Infrastructure: International Case Studies and Insights for Addis Ababa*. Technical Report 3.2 for the Addis Ababa Urban Age Task Force. Bernard van Leer Foundation, The Hague, Quito and Addis Ababa. Available at: <https://urbanagetaskforce.net/addis-ababa/>.
- Lal, R., 2020. Home gardening and urban agriculture for advancing food and nutritional security in response to the COVID-19 pandemic. *Food Security*, 12(4). 871–876. DOI:10.1007/s12571-020-01058-3.
- Roe, J. J., Aspinall, P. A. and Ward Thompson, C., 2017. Coping with Stress in Deprived Urban Neighborhoods: What Is the Role of Green Space According to Life Stage? *Frontiers in Psychology*, 8. 1760. DOI:10.3389/fpsyg.2017.01760.
- Tomita, A., Vandormael, A. M., Cuadros, D., Di Minin, E., Heikinheimo, V., Tanser, F., Slotow, R. and Burns, J. K., 2017. Green environment and incident depression in South Africa: a geospatial analysis and mental health implications in a resource-limited setting. *The Lancet Planetary Health*, 1(4). e152–e162. DOI:10.1016/S2542-5196(17)30063-3.
- UN DESA, 2018. *World Urbanization Prospects 2018*. United Nations Department of Economic and Social Affairs, Population Division, New York. Available at: <http://esa.un.org/unpd/wup/>.
- UN-Habitat, 2017. *The State of Addis Ababa 2017: The Addis Ababa We Want*. United Nations Human Settlements Programme, Nairobi. Available at: <https://unhabitat.org/the-state-of-addis-ababa-2017-the-addis-ababa-we-want>.
- Worku, H., 2022. *Green and Blue Infrastructure in Addis Ababa: A Review of Challenges and Response Strategies*. Technical Report 3.1 for the Addis Ababa Urban Age Task Force. Addis Ababa. Available at: <https://urbanagetaskforce.net/addisababa/>.
- Zewdie, M., Worku, H. and Bantider, A., 2018. Temporal Dynamics of the Driving Factors of Urban Landscape Change of Addis Ababa During the Past Three Decades. *Environmental Management*, 61(1). 132–146. DOI:10.1007/s00267-017-0953-x.

Addis Ababa Urban Age Task Force Reports

Theme 1 | Urban Housing and Retrofitting

Policy Brief 1 | *The Addis Ababa City Block: a high-density, mixed-use and inclusive housing solution for the urban core*

Technical Report 1.1 | *The Addis Ababa City Block: inclusion and livelihood through the horizontal-above-vertical concept*, by Elias Yitbarek Alemayehu

Technical Report 1.2 | *Finding Housing Affordability: cost estimates and affordability paths for the Addis Ababa City Block* by Jacus Pienaar

Technical Report 1.3 | *Sustainable Building Materials: exploring green construction options for new housing in Addis Ababa*, by Hannah Langmaack, Peter Scheibstock and Thomas Kraubitz (Buro Happold)

Theme 2 | Transport and Mobility Services

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Technical Report 2.1 | *Digital Van Service Demand: gauging interest in mobility alternatives among current and aspiring car owners in Addis Ababa*, by Philipp Rode, Bethany Mickleburgh, Jennifer Chan and Rebecca Flynn

Technical Report 2.2 | *Digital Van Service for Addis Ababa: understanding the transport landscape and the potential for digital bus aggregation in Ethiopia's capital*, by Chris Kost and Gashaw Aberra (Institute for Transportation and Development Policy (ITDP))

Theme 3 | Green and Blue Infrastructure

Policy Brief 3 | *Working with Nature: next generation green and blue infrastructure for Addis Ababa*

Technical Report 3.1 | *Green and Blue Infrastructure in Addis Ababa: a review of challenges and response strategies*, by Hailu Worku

Technical Report 3.2 | *The Social Functions of Green and Blue Infrastructure: international case studies and insights for Addis Ababa*, by Santiago del Hierro, David Jácome and Tigist Kassahun Temesgen

Theme 4 | Urban Governance and Planning

Policy Brief 4 | *Urban Governance and Strategic Planning: how Addis Ababa could benefit from human-centred, inclusive design, participatory pilot projects and improved data management*

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Technical Report 4.4 | *Addis Ababa Spatial Compendium: mapping and urban analytics for Ethiopia's capital*, by Alexandra Gomes and Philipp Rode (LSE Cities)

Credits

This policy brief was written by **Marion Davis** based on two papers commissioned by the Addis Ababa Urban Age Task Force: Technical Report 3.1 *Green and Blue Infrastructure in Addis Ababa: a review of challenges and response strategies*, by Hailu Worku and Technical Report 3.2 *The Social Function of Green and Blue Infrastructure: international case studies and insights for Addis Ababa*, by Santiago del Hierro, David Jácome and Tigist Kassahun Temesgen.

To learn more about the Addis Ababa Task Force and find these and other outputs, go to: <https://urbanagetaskforce.net/addisababa/>

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Addis Ababa City Plan and Development Commission is committed and fully dedicated to preparing research-based city-wide short, medium and long term strategic development plans (both socio-economic and spatial) in order to transform the city to one among the middle-income cities in the world; create a liveable city for the citizen; and make Addis Ababa the best destination for investment in Africa. The commission is accountable to promote urban economy and jobs; deliver urban renewal and housing for citizens; improve urban environment and quality of life; and support policy decisions that will register accelerated, sustainable and equitable economic growth and a climate resilient green economy.

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LSE Cities is an international centre at the London School of Economics and Political Science that carries out research, conferences, graduate and executive education and outreach activities in London and abroad. It studies how people and cities interact in a rapidly urbanising world, focusing on how the physical form and design of cities impacts on society, culture and the environment. Extending LSE's century-old commitment to the understanding of urban society, LSE Cities investigates how complex urban systems are responding to the pressures of growth, change and globalisation with new infrastructures of design and governance that both complement and threaten social and environmental equity.

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