

# Designing for Sustainable and Resilient Neighborhoods: The Case of Peacock Park in Addis Ababa (Ethiopia)

**RUBEN GARCIA-RUBIO**

Tulane University

**TAYLOR SCOTT**

Tulane University

**Keywords:** Addis Ababa, Urbanism, Resilience, Sustainability, Infrastructure, River

**Addis Ababa, Ethiopia’s capital, has dramatically increased in population and land cover over the last decade. This expansion in both population and urbanization has strained the functional capacity of city infrastructure and many parts of the urban population lack access to basic public services. Moreover, this reality is compounded with the increasing negative effects of climate change. Together, these effects will continue to compromise the future of Addis Ababa.**

**This article uncovers the initial outcomes of the “Addis Ababa River City” research project, which aims to create a holistic urban resilience strategy for Ethiopia’s capital through urban and architectural design. This document will address the design methodology and the resulting sustainable infrastructure design proposed for the upper region of the Kebana river. The sustainable infrastructure proposal primarily uses existing ecologies to address and pose solutions to the city’s most urgent urban issues. This text will culminate in highlighting the strategic intervention for Peacock Park, a key site within the sustainable infrastructure wherein a comprehensive redesign of the area proposes a more sustainable and resilient neighborhood.**

Rapid growth is compromising sustainable development in many cities worldwide. Addis Ababa, Ethiopia’s capital, has increased in population from 2.7 millions in 2007 to a range between 3.6 and 4.4 million inhabitants nowadays.<sup>1</sup> Similarly, the city has experienced rapid development and raised the land cover from 134km<sup>2</sup> to 201km<sup>2</sup> the recent years.<sup>2</sup> This expansion in population and urbanization has not kept pace with the urban infrastructures of the city and many parts of the population are experiencing a lack of basic services like water and waste management, affordable housing and facilities, mobility and energy, security and ecology... Future growth forecasts project similar figures for the city wherein Addis Ababa is expected to double its current population in the coming years. Moreover, the city is experiencing the negative effects of climate change. Ethiopia is expected to have a temperature increase of 1.8°C by 2050 and a rise in

extreme weather events an 18% (heavy rains and droughts).<sup>3</sup> These compounding effects will continue to exacerbate an already strained urban infrastructure, further compromising the future of Addis Ababa.

This paper unveils the initial results of the “Addis Ababa River City” research project.<sup>4</sup> The objective of this academic, independent, multidisciplinary, and long-term program is to address the aforementioned issues by creating a holistic urban resilience strategy for Ethiopia’s capital through urban and architectural design. The first part of this essay introduces the general research and design strategy created to address Addis Ababa’s most urgent urban issues. From here, the essay will highlight the sustainable infrastructure proposal derived from the findings of this critical research strategy. This sustainable infrastructure proposal is structured around Addis Ababa’s existing ecologies and provides specific design interventions which serve to alleviate the pressing urban issues. Finally, the essay will describe one such strategic intervention within the general infrastructure proposal, a redesign of the Peacock Park mixed-used area into a new sustainable and resilient neighborhood.

## **A SUSTAINABLE INFRASTRUCTURE FOR ADDIS ABABA**

The “Addis Ababa River City” research project engaged a multi-level analysis of Addis Ababa’s current urban state. This analysis and methodology included research into a variety of topics, history and demographics, urban ecologies and climate, infrastructures and mobility, socioeconomics and governance, at the country, metabolic region, and city-specific scale. Once compiled, this research was synthesized graphically into a series of maps. These conceptualized maps allow for the layering of data to uncover profound links, new readings, and a more holistic understanding of the complex urban realities faced at a country and city scale.

One such important reading of Addis Ababa is to understand the city as a river city. The morphology of Ethiopia’s capital is strongly characterized by its geography. A mountain limit on the North, East and West sides, with a gentle slope towards the South, has fostered the presence of about 607km of water bodies that populate the whole city.<sup>5</sup> Additionally, the



Figure 1. Peacock Park. Ruben Garcia-Rubio.

foundation of the city was related to the existence of hot springs in the area which spurred the construction of baths and palaces by the Ethiopian ruling class. Nevertheless, Addis Ababa has turned its back to the rivers and now they are mainly open-air dumping channels.

The general analysis also uncovered five urgent issues currently facing Addis Ababa. These five issues are directly and indirectly linked to the current state of the city's rivers, particularly shown in the upper Kebena river region. These five issues include an increase in urban flooding events, high rates of pollution in the rivers; a shortage of potable water; a lack of urban multimodal mobility with the disconnection between the rivers and the surrounding city; and a lack of basic public facilities along the upper region of the Kebena river.

The "Addis Ababa River City" research project proposes to invert the current relationship between the city and its rivers by using these same water bodies to address the most urgent urban issues. The initial research project outcomes are focused on a particular area within the city, the upper region of the Kebena river from the Entoto mountains to Peacock

After diagnosing the most urgent urban issues, the research project proposes the use of a sustainable infrastructure to tackle these ailments. This infrastructure is formed by three different -but interconnected- layers: ecology, the recovery of the rivers and riverbanks; opportunity, the promotion of zones of activity and connection of points of interest; and connectivity, the creation or modification of axial and

transversal mobility networks to reconnect to the river. Thus, the sustainable infrastructure uses the rivers and its associated ecologies as the basic components of the design. Additionally, the sustainable infrastructure extends its impact towards the neighborhoods that are situated along the rivers. Once evaluated, the holistic urban strategy proposed for this area could be translated to other parts of the city, or even to other cities, that share similar landscapes and urban issues in order to facilitate the creation of more resilient cities.

#### **PEACOCK PARK: A CASE STUDY FOR CREATING A NEW SUSTAINABLE AND RESILIENT NEIGHBORHOOD**

As a central site within the sustainable infrastructure strategy for the upper region of the Kebena river, Peacock Park was deemed a critical location in need of strategic design intervention. Peacock Park is not only a park, but also a small mix-used area located in the Bole sub-city in Addis Ababa's downtown city center. This triangular-like shape area is nestled at the confluence between the Kebena river on the South-East side and the Bante-yiketu river on the West-South side. Ghana Street serves as the northern boundary. With a surface area of around 36.4ha, Peacock Park includes a 26.1ha public park, two popular settlements along the riverbanks, an informal marketplace, and a large group of urban farming plots.

The defining element of this mixed use area is Peacock Park, which is located at the core of the site and lends its name to the whole zone.<sup>6</sup> Peacock Park is one of the largest of many gated, city parks administered by the local government.<sup>7</sup> The park and its small public facilities are mainly used for recreational

purposes and public activities.<sup>8</sup> These small facilities include a wooden pergola, a derelict public restroom, a few small storage facilities, and the ongoing construction of a new public zoo. Indigenous plants, such as *Olea Africana*, *Acacia Abyssinica*, *Millettia Ferruginea*, and *Cordia Africana* create a scenic natural backdrop; ideal for the occasional wedding ceremonies that take place within the park space.<sup>9</sup>

Outside of the gated park and along the Kebena and Banteyiketü rivers are groupings of large popular settlements. There is a stark contrast between the built environment of the popular settlements located in the north and the ones located in the southern portion of the site. The popular settlements located near Ghana Street on the northern border are larger, built with a higher quality, and portray a more urban design character. This is due to these settlement's location within the downtown core and associated city infrastructure, i.e. roads, bridges, water utility, sewage system, and economic hubs. This proximity precipitates a few public facilities within these northern popular settlements, such as the Betsega Hospital and a thriving commercial corridor along Ghana street.

In contrast, the southernmost settlements have a more fragile character. More isolated from the downtown district, these popular settlements do not have the same access to the city infrastructure from which its northern counterparts' benefit.<sup>10</sup> Located closer to the confluence of the rivers, these southern popular settlements are more disconnected and inhospitable from the urban core due to a lack of accessible roads and public utilities. Additionally, many homes and buildings within the southern settlements are located within the flood-prone riverbanks along the Kebena and Bante-yiketü. This reality places these homes and buildings in constant danger of severe damage from flooding events.<sup>11</sup>

Included in the economic zone of the northern popular settlements is a substantial marketplace. This market serves as the main entrance into Peacock Park and as a vibrant space for the buying and selling of goods. The open-air market creates a public space where city dwellers and urban farmers mingle and exchange goods. Basic goods, such as food, garments, furniture, and decorative items are sold here. Most of the produce sold is grown within the site by the farmers to tend the plots along the riverbanks.

The flood banks at the confluence of the Kebena and Banteyiketü rivers are also used for urban farming. This agrarian perimeter serves as a buffer between the polluted rivers and neighboring popular settlements. The economic vitality of the fertile soil also serves as a main source of income for individuals living in this area.<sup>12</sup> Delineated and maintained year-round, most of the crops are grown by farmers who live in the adjacent popular settlements.<sup>13</sup> These crops are then sold to individuals from the same popular settlements, typically at the large marketplace mentioned previously.

While farming plots are mainly confined to the confluence, the other side of the rivers are populated by a mix of small industries, nursery, hospital facilities, institutional and diplomatic buildings, and high-income homes with a mix of single houses and a few residential high-rise buildings.

Together, these programmatic spaces make Peacock Park a distinctive and vibrant mixed-use area formed by the juxtaposition of the natural and urban environments within downtown Addis Ababa. This complexity of space brought about by the symbiotic relationship between natural and manmade ecologies makes Peacock Park a critical site within the greater Addis Ababa sustainable infrastructure strategy.

### **MOST URGENT URBAN ISSUES IN PEACOCK PARK**

Unfortunately, these programmatic spaces within Peacock Park are also subject to the same rapid urbanization and climate related issues elucidated from the sustainable infrastructure design methodology stated previously. Again, these five key issues include lack of urban mobility networks and public housing and facilities, scarcity in potable water, pollution in the river waters and urban flooding events.

The public park space often goes unutilized and unnoticed due to several reasons. The gated park requires an entrance fee which negatively impacts public access. Park accessibility is threatened from a lack of appropriate urban connectivity and visibility. Overall accessibility by foot or car is difficult with only two main entrances off a small dirt road. A general lack of appropriate signage both inside and around the park makes navigation difficult and disorienting for park-goers. Moreover, vegetation is so overgrown in certain areas that accessing the rivers from the park is almost impossible. Increasingly prevalent flooding events along the riverbanks have destroyed footpaths and bridges while eroding large portions of what would otherwise be pristine park land. This lack of open space, pedestrian-friendly footpaths, and bridges across both rivers, further disconnects Peacock park from the surrounding urban fabric.

The health and viability of urban crop production is constantly at risk due to the polluted waters used for irrigation. An inadequate waste management system has led to the dumping of human and industrial waste directly into the rivers of Addis Ababa.<sup>14</sup> The polluted waters of the Kebena and Bante-yiketü creates water-borne diseases that negatively impact the crops grown in this area. Moreover, the high nitrogen levels within the polluted river water also affects the viability of the soil.<sup>15</sup> The public health of the city at large is at risk, not only from drinking polluted water, but also due to the potential disease outbreaks by way of ingesting the produce grown from these polluted waters.<sup>16</sup> This can negatively affect crop output, thereby decreasing the financial viability of the land.<sup>17</sup>

A lack of adequate public infrastructures also negatively impacts the vitality of this site. A deficient system of public



Figure 2. General Plan of Peacock Park. “Addis Ababa River City” Research Project (henceforth AARC)

facilities meant to manage municipal sewage and waste exacerbates the dumping of solid and liquid waste within the area.<sup>18</sup> This accumulation of waste threatens the health of both the manmade and the natural environments of Peacock Park. Furthermore, crumbling urban and ecological systems do not provide adequate means for mitigating stormwater.<sup>19</sup> Without these properly functioning systems, flooding events are more severe and water-borne diseases are more prevalent, directly affecting the visitors and inhabitants of the area. Additionally, the need for more adequate farming infrastructure, such as water pumps, tilling equipment, and irrigation channels, also hinders the efficiency of the farmers to tend to their fields.<sup>20</sup>

The popular settlements within the park include a large portion of inadequate homes that were built within the flood zone of the Kebena and Bante-yiketu rivers. Rapid and uncontrolled urbanization has led to the formation of these low-income residences and fragile settlements.<sup>21</sup> Due to a lack of affordable housing within the city center, the flood prone land adjacent to the polluted rivers serves as the only affordable space left to build homes for many low-income residents.<sup>22</sup> With the rate of severe flooding events increasing, these low-income communities are constantly at risk of losing their homes.

Finally, most residents within the popular settlements of Peacock Park do not have access to potable water. Many of the homes within the popular settlements do not have potable water connections inside their homes or even water spigots within the neighborhood.<sup>23</sup> This is due to an inadequate water utility service and dated water management infrastructure throughout the city. Instead, many individuals use the polluted river water for drinking, clothes washing, and bathing.<sup>24</sup> Again, this lack of potable water access and reliance on polluted river water then leads to the spread of water-borne diseases, which not only affect the inhabitants of Peacock Park, but those of the city at large.

### PROPOSED SOLUTIONS FOR A NEW PEACOCK PARK

In response to these issues, a sustainable infrastructure specific to Peacock Park was established to transform the site into a sustainable and resilient neighborhood. The Peacock Park sustainable infrastructure proposal is designed as a series of concentric rings wherein each ring serves a specific function to alleviate one of the five key issues.

The first ring serves as a line of defense to combat flooding and water pollution. Designed into the flood prone riverbanks of the Kebena and Bante-yiketu are a series of water detention ponds and a vegetated slow water filtration system. The slow water filtration system moves the river water through an engineered system of channels that include native plantings and soils. This system removes heavy metals and other pollutants in an environmentally friendly manner to help purify the river water.<sup>25</sup> These native plantings also help to enrich the soil's carbon content, thereby enhancing the land's

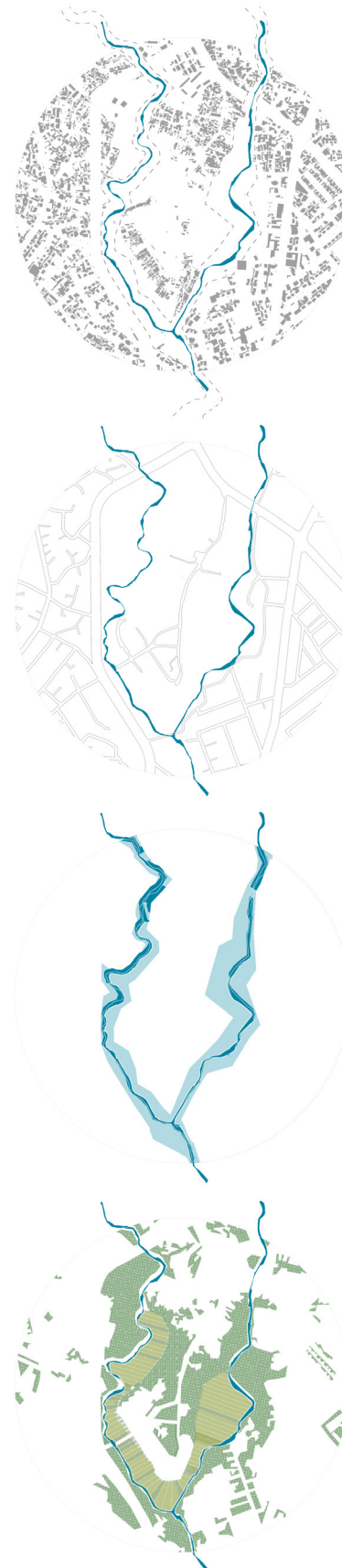


Figure 3. Analysis of Peacock Park: (a) Urban Fabric, (b) Connectivity, (c) Flooding, and (d) Productive Land. AARC



Figure 4. Proposal Plan for Peacock Park. AARC

agricultural productivity. The detention ponds are placed at points of lowest grade within the park. During severe storms and flooding events, these ponds will collect and slowly drain floodwaters out and away from the park. When not actively collecting water, these permeable pavement lined basins serve as dry spaces for civic engagement within the park. Together, these two systems serve as a vegetated buffer between the built areas within the park and the river floodplain.

From here, the sustainable infrastructure moves into ring two, further uphill from the riverbanks. Here, the existing farming plots are reorganized along a series of gabion walls. These gabion walls extend out from the riverbanks and into the farming plots. This allows for the now treated river water to divert along the gabion walls and flow into the farming plots as a means of natural irrigation. The gabion walls also line proposed footpaths built for farmer usage as they tend to their fields. The permeability of the walls is ideal as a way to withstand water damage from flooding events. In certain locations, the walls become small architectural interventions, such as tool sheds, outhouses, and potable water spigots. These interventions serve as the necessary public facilities needed to curtail the dumping of waste into the river and adjacent landscape.

Moving further uphill from the river, ring three is encompassed by a series of footpaths and small bridges. This new slow mobility circulation network connects the farming plots to the new residential neighborhoods housed within ring three. Now further uphill from the river's flood banks, new affordable housing units are built atop stilts above the ground plain. This elevated feature will help to mitigate the detrimental effects of flooding. Potable water utility lines are also proposed to extend from the adjacent downtown sector into these new housing units. This creates a new model for affordable housing wherein existing low-income residences can be re-located to more adequate housing within their same communities.

Finally, the central ring of the masterplan includes the redesigned public park space. The new Peacock Park serves as the scenic 'backyard' to the new housing units. A multitude of new routes direct visitors and residents through the park, into each ring, and out into the surrounding urban neighborhoods. Primary routes include the main vehicular road that links the park to the surrounding city. Secondary routes include pedestrian walkways and bridges that not only navigate people through the park, residences, and marketplaces, but also link to the greater slow mobility network throughout the city. Tertiary routes include the small footpaths for farmer use as stated previously.

This central ring also repurposes underperforming farming plots and once vacant residential lots into local community gathering spaces. These spaces include communal gardens, outdoor kitchens, and farm stands for locals to sell their

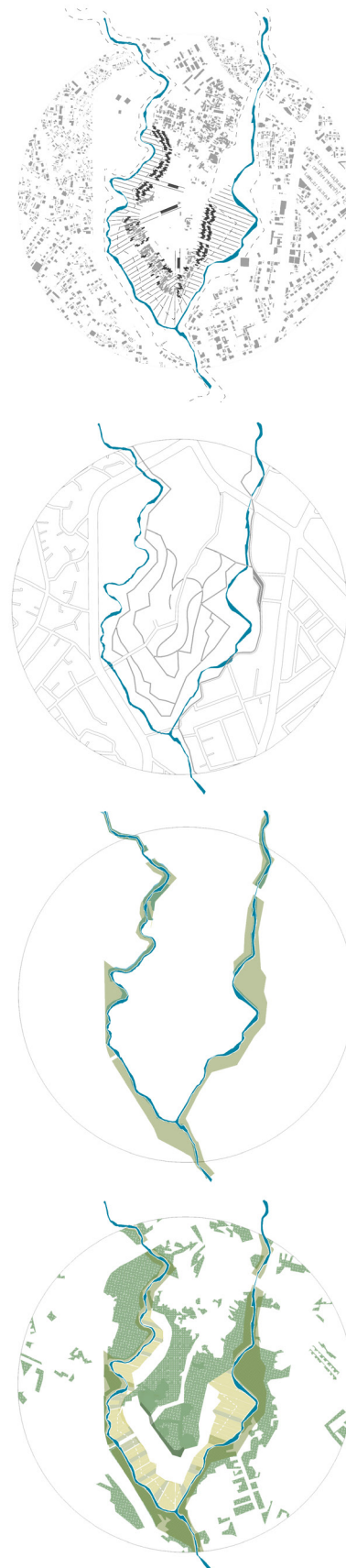


Figure 5. Analysis of the Proposal for Peacock Park: (a) Urban Fabric, (b) Connectivity, (c) Flooding, and (d) Productive Land. AARC

produce. Primary, secondary, and tertiary routes navigate through and between these spaces to establish a more organized and accessible sense of space. These small communal spaces help to reinforce a sense of community within the neighborhood; creating a feeling of belonging and ownership for the residences who call this area home.

## CONCLUSION

Together, the various aspects of the sustainable infrastructure design create a new and more sustainable and resilient Peacock Park. This new Peacock Park design reintroduces river dynamics into daily life by way of passively cleaning the polluted waterways, enriching the soils used for farming practices, and enhancing social engagement within the existing residential settlements. Once viewed as a public hazard, the rivers are now showcased as a vital part of urban living. Furthermore, the logic of this sustainable infrastructure design could be implemented alongside the national government's current plan to promote and support urban agriculture.<sup>26</sup>

Peacock Park serves as an important microcosm on how to address the complex issues that Addis Ababa faces in light of climate change and unchecked urban expansion. This new Peacock Park could serve as the neighborhood model wherein architecture and urban design can highlight using existing ecology to create more equitable, resilient, and economically viable urban settlements. In this way, the strategy could be exported to other parts of Addis Ababa, or other cities worldwide that are experiencing similar urban issues.

## ENDNOTES

- The last census was obtained in 2007, so there are different estimations for the current population according to different institutions. Central Statistical Agency, *Projected Population of Ethiopia - 2011* (Addis Ababa: Central Statistical Agency, 2019), <https://www.statsethiopia.gov.et/population-projection/>. United Nations, Department of Economic and Social Affairs, Population Division, *The World's Cities in 2018: Data Booklet, ST/ESA/SER.A/417* (New York: United Nations, 2018), 10, <https://digitallibrary.un.org/record/3799524?ln=en>. Elias Yitbarek Alemayehu, et al., "New Perspectives on Urban Transformation in Addis Ababa," in *The Transformation of Addis Ababa: A Multifunctional African City*, eds. Elias Yitbarek Alemayehu and Laura Stark (Newcastle upon Tyne, UK: Cambridge Scholars Publishing, 2018), 2.
- UN-Habitat, *The State of Addis Ababa 2017* (Nairobi: UN-Habitat, 2017), 73-74.
- "Ethiopia Projected Future Climate," WBG Climate Change Knowledge Portal, accessed August 5, 2020, <https://climateknowledgeportal.worldbank.org/country/ethiopia/climate-data-projections>.
- This research project is led by Assistant Professor Ruben Garcia-Rubio and is part of the Saul A. Mintz Global Research Studios at Tulane School of Architecture (Tulane University, USA). This paper unveils the outcomes developed within the research studio of the academic year 2019-20 with Taylor Scott as a research coordinator and Michael Bailey, Michael Brady, Kayla Buffington, Reed Campbell, Ysabel Colon, Claire DiVito, Mia Kaplan, Danielle Scheeringa, and Chenbo Xing as part of the research studio team.
- Centre for Environmental Science, *Addis Ababa Rivers and Riversides Development Plan Project Final Report. Part 1* (Addis Ababa: Addis Ababa University, 2017), 1.
- Peacock Park has also been known as Maekelawi Park, Central Park, or, more recently, European Union Peacock Park.
- There are two different types of parks in Addis Ababa, public and private managed. All public parks are managed by the Addis Ababa Beautification, Parks and Cemetery Development and Administration Agency. "Public Parks," Office of the Mayor, Addis Ababa, accessed November 11, 2020, <http://www.addisababa.gov.et/nb/web/guest/parks>. Yeshewazerf G/wold, "Assessment of Public Leisure Services Provision: The Case of Addis Ababa Recreational Parks" (Master's Degree Thesis, Addis Ababa University, 2011), 27-29. Gebeyehu Ayenew, "An Assessment of Green Area Development in Addis Ababa with Particular reference to Gullelle Sub City" (Master's Degree Thesis, Addis Ababa University, 2014), 31-34.
- The City Government planned to relocate the Lion Zoo Park in this area a few years ago to create the new "Addis Zoo Park." It was also designed a masterplan for the whole 36.4ha-area in cooperation with the city of Leipzig (Germany) and its zoo in 2010. Some small interventions were done but the development of the masterplan has been delayed. Although the construction of the zoo has been delayed, the "Addis Ababa City Structure Plan 2017-2027" situated the area for the "Peacock Zoological Park." This new park will be one of the two "Special Function Parks" proposed within the Plan and will be mainly focused on "conservation, education, research and recreation". Addis Ababa City Planning Project Office, *Addis Ababa City Structure Plan 2017-2027* (Addis Ababa: Addis Ababa City Planning Project Office), 179, 227, 297. Gebeyehu Ayenew, "An Assessment of Green Area Development in Addis Ababa with Particular reference to Gullelle Sub City," 64-66. "Concept of new Addis Ababa Zoo," Worldwide Zoo Database, accessed November 11, 2020, [http://www.wzd.cz/zoo/AF/ET/unknown/addis\\_ababa\\_zoo/00et\\_addis\\_ababa\\_text01-eng.htm](http://www.wzd.cz/zoo/AF/ET/unknown/addis_ababa_zoo/00et_addis_ababa_text01-eng.htm).
- "Public Parks. Peacock Park," Office of the Mayor, Addis Ababa.
- Axumite G. Egziabber, "Chapter 5. Ethiopia: Urban Farming, Cooperatives, and the Urban Poor in Addis Ababa," in *Cities Feeding People: An Examination of Urban Agriculture in East Africa*, eds. Axumite G. Egziabber, et al. (Ottawa: International Development Research Centre), 79-89.
- Ibid.
- Girma Kebede, "Farmers in the City: The Case of Addis Ababa, Ethiopia," accessed November 10, 2020, 7-12, [https://www.academia.edu/5240494/Farmers\\_in\\_the\\_City\\_The\\_Case\\_of\\_Addis\\_Ababa\\_Ethiopia](https://www.academia.edu/5240494/Farmers_in_the_City_The_Case_of_Addis_Ababa_Ethiopia)
- Ibid., 1-10.
- Hamere Yohannes, and Eyasu Elias, "Contamination of Rivers and Water Reservoirs in and Around Addis Ababa City and Actions to Combat It," *Environment Pollution and Climate Change* 1, no. 2 (2017): 2-5.
- Girma Kebede, "Farmers in the City: The Case of Addis Ababa, Ethiopia," 5-6.
- Hamere Yohannes, and Eyasu Elias, "Contamination of Rivers and Water Reservoirs in and Around Addis Ababa City and Actions to Combat It," 7-8.
- Girma Kebede, "Farmers in the City: The Case of Addis Ababa, Ethiopia," 7-9.
- Edmond J. Keller, and Edith Mukudi-Omwami, "Rapid Urban Expansion and the Challenge of Pro-Poor Housing in Addis Ababa, Ethiopia," *Africa Review* 9, no. 2 (2017): 173-85. <https://doi.org/10.1080/09744053.2017.1329809>.
- Hamere Yohannes, and Eyasu Elias, "Contamination of Rivers and Water Reservoirs in and Around Addis Ababa City and Actions to Combat It," 2-5.
- Girma Kebede, "Farmers in the City: The Case of Addis Ababa, Ethiopia," 10-12.
- Jemal Abagissa, "Informal Settlements in Addis Ababa: Extent, Challenges, and Measures Taken," *Journal of Public Administration, Finance and Law* 15 (2019): 7-8.
- Axumite G. Egziabber, "Chapter 5. Ethiopia: Urban Farming, Cooperatives, and the Urban Poor in Addis Ababa," 1-10.
- Edmond J. Keller, and Edith Mukudi-Omwami, "Rapid Urban Expansion and the Challenge of Pro-Poor Housing in Addis Ababa, Ethiopia," 174-176.
- Ibid., 173-85.
- Hamere Yohannes, and Eyasu Elias, "Contamination of Rivers and Water Reservoirs in and Around Addis Ababa City and Actions to Combat It," 9-10.
- Girma Kebede, "Farmers in the City: The Case of Addis Ababa, Ethiopia," 13-14.